

## Poster

Topic: Aetiology and pathogenesis

P0001

### ***Entamoeba gingivalis* key aggressive predator in periodontal disease**

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**Aim:** Periodontitis is a public health issue, being one of the most prevalent disease worldwide. However, the etiology is still unclear: genetics of patients cannot explain the dispersed or isolated localization of gingival pockets. The possible role of parasites in the establishment of periodontitis has been poorly studied until now. The aim of this project was to study a potential virulence factor between colonization of gingival crevices by the amoeba *Entamoeba gingivalis* and immune response.

**Material and Methods:** In eight different dental clinics in France, samples were taken in periodontal pockets (72) or healthy sites (33), and submitted to microscopic observation and molecular identification by PCR with a new set of primers designed to specifically detect *E. gingivalis*. This blind sample analysis showed the strong sensitivity of PCR compared with clinical diagnosis (58/72 = 81%), and microscopy (51/65 = 78%). The parasite activities detected by microscopy mostly consist in displacement, pseudopod formation and phagocytosis of PMN nucleus.

**Results:** The results of this work show that the parasite belongs to the species *E. gingivalis* and that its presence is correlated with periodontitis. *E. gingivalis* nourishes from PMN nucleus, leaving a denuded cell. Partly digested PMN is released as a ghost cell which may not be able to complete neutrophil extracellular traps and normal apoptosis. This predatory process we call "exonucleophagy" could explain inflammatory dysregulation in periodontal disease.

**Conclusion:** *Entamoeba gingivalis* aggressive behavior plays a key role in periodontal disease and could explain immune system dysregulation responsible for tissue destruction.

P0002

### **TBX21 polymorphism (rs4794067) increases T-bet expression and correlates with red complex bacteria detection in chronic periodontitis patients**

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**Aim:** To investigate the association of -1993T/C SNP polymorphism (rs4794067) in the TBX21 gene with the occurrence and severity of chronic periodontitis (CP) and to correlate the genetic variants of TBX21 with the detection/bacterial load of red complex periodontopathic bacteria.

**Material and Methods:** A case-control study was conducted enrolling 197 CP patients, 218 healthy subjects (H) and 193 chronic gingivitis (CG) patients (resistant phenotype). DNA was extracted from epithelial buccal cells and genotyped for

rs4794067 by RFLP analysis. The expression of T-bet, IFN- $\gamma$  and red complex bacterial load was quantified in a subset of the study population (125 CP and 63 H) by RT-PCR.

**Results:** The polymorphic homozygote genotype (TT) was significantly more frequent in the CP group, compared with the CG group (70.6% vs. 59.1%,  $p = 0.0087$ ). The "classical" H control group demonstrated an intermediary genotype, significantly different neither from CP nor CG. The expression of T-bet was significantly higher in the polymorphic homozygotes in comparison with heterozygotes and C-homozygotes. The combined effect on disease status of genotype and the presence/absence of red complex bacteria as environmental co-variable was significant for each red complex bacteria.

**Conclusion:** The overrepresentation of polymorphic homozygotes in CP patients indicates an association with disease status. The rs4794067 polymorphism increased the expression of T-bet, possibly tipping the immunological balance towards a Th1 response. The simultaneous analysis of genetic and microbiological data revealed a preponderance of microbiological variables as disease predictor; nevertheless increased odds for red complex bacteria detection were evident in polymorphic subjects, suggesting a genetic/environmental interrelation in predisposing to CP.

P0003

### **The effect of alcohol consumption on periodontitis in older Danes**

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**Aim:** To examine the association between alcohol consumption measured at different points in time and periodontitis at 20 years follow-up, also to investigate whether long-term alcohol consumption is related to periodontitis in old age.

**Material and Methods:** Participants aged 65 years or older in 2003, from the Copenhagen City Heart Study (CCHS), were invited to participate in the Copenhagen Oral Health Senior Study. The study consisted of 168 participants. Periodontitis was defined as having  $\geq 3$  teeth with clinical attachment loss at  $\geq 4$  mm. Alcohol consumption was measured at CCHS follow-ups in 1981–1983, 1991–1994 and 2001–2003, using a standard questionnaire. Alcohol consumption was defined as light, moderate and heavy drinking and used individually for each follow-up. The three follow-ups were also summarized into long-term alcohol consumption. Logistic regression analysis was used to estimate the relation between alcohol consumption measured at different points in time and periodontitis, and to assess the effect of long-term alcohol consumption on periodontitis in old age.

**Results:** Heavy drinkers in 1981–1983 had a higher odds ratio for having periodontitis compared to light drinkers (OR = 4.64, 95% CI = 1.11–19.42). Also an overall association between long-term heavy drinkers and periodontitis was found (OR = 2.24, 95% CI 0.58–8.58), though the estimate for heavy drinkers was not significant.

**Conclusion:** Early consumption of alcohol may increase the odds of having periodontitis 20 years later. There is a need for further studies including larger populations to investigate both alcohol consumption measured at different points in time, and

long-term alcohol consumption and periodontitis progression over time.

## P0004

### Gingival crevicular fluid soluble triggering receptor expressed on myeloid cells 1 (sTREM-1) levels in the elderly

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**Aim:** Aging is associated with altered immune response, therefore increased susceptibility to infections. Soluble triggering receptor expressed on myeloid cells 1 (sTREM-1) is involved in amplification of the inflammatory response to bacterial infection. This cross-sectional study aims to investigate the levels of sTREM-1 in gingival crevicular fluid (GCF) and their association with the levels of key periodontal pathogens in subgingival plaque of the elderly population with periodontal health, gingivitis and chronic periodontitis (CP).

**Material and Methods:** Fifty one systemically healthy elderly subjects were included and full-mouth periodontal examination was performed. Subgingival plaque and GCF samples were collected from healthy sites of the subjects without periodontal disease (n = 17), sites with gingival inflammation from patients with gingivitis (n = 19) and periodontitis sites of patients with CP (n = 15). GCF volumes were measured with electronic impedance device and sTREM-1 levels in GCF were measured by enzyme-linked immunosorbent assay. The subgingival plaque levels of *Porphyromonas gingivalis*, *Treponema denticola*, *Tannerella forsythia* were determined by quantitative real-time polymerase chain reaction.

**Results:** The ELISA analysis revealed that GCF samples obtained from healthy, gingivitis and CP patients had similar GCF sTREM-1 levels (p > 0.05). The subgingival plaque samples harvested from the patients with gingivitis and CP had significantly higher levels of *Tannerella forsythia* compared to the healthy ones (p < 0.05). However, the subgingival levels of the other two periodontal pathogens were not statistically different between the groups (p > 0.05).

**Conclusion:** The present data suggest that in the presence of periodontitis GCF sTREM-1 levels are not elevated in the elderly population, irrespective of changes in their microbial profile.

## P0005

### Lipopolysaccharide regulating amelotin gene transcription in gingival epithelial cells and amelotin protein localization in inflamed gingiva

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**Aim:** The purpose of this study is to evaluate the effects of *Porphyromonas gingivalis* (P. g.) and *Aggregatibacter actinomycetemcomitans* (A. a.) lipopolysaccharide (LPS) on amelotin (AMTN) gene transcription in mouse gingival epithelial GE1 cells, and AMTN protein localization in the mice and human inflamed gingiva.

**Material and Methods:** To determine the molecular basis of the transcriptional regulation of the AMTN gene by P. g. and A. a. LPS, we conducted real-time PCR, transient transfection analyses with chimeric constructs of the mouse AMTN gene promoter linked to a luciferase reporter gene using GE1 cells, and performed immunostaining to detect the AMTN protein localization at the junctional epithelium (JE) in P. g. and A. a. infected mice, and inflamed human gingiva.

**Results:** P. g. and A. a. LPS (0.1 mg/ml) increased AMTN mRNA levels at 24 h in GE1 cells. In a transient transfection assay, P. g. and A. a. LPS (0.1 mg/ml) induced luciferase activity of the construct (-878 to +65) in GE1 cells. In P.g. and A.a. infected mice gingiva and inflamed human gingiva, AMTN localization spread along the long JE of molars. However only the coronally part of AMTN protein expression disappeared from the JE due to severe inflammation in P. g. infected mice gingiva.

**Conclusion:** These studies demonstrated that AMTN gene and protein expressions were regulated by LPS, and that AMTN might play an important role in the resistance to inflammation in the JE.

## P0006

### Immunohistochemical analysis of the gingiva with or without periodontal inflammation compared to gingiva with periodontitis of type I plasminogen deficiency

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**Aim:** Type I plasminogen deficiency (Plgdef) is a rare condition with an uncommon form of a chronic inflammation of the mucous membranes. Gingival enlargements usually proceed with progressive periodontal destruction and subsequent tooth-loss. Plasmin(ogen)-independent alternative enzymatic mechanisms for fibrin clearance was suspected in these patients. The aim of this study is to verify, immunohistochemically, the occurrence of different enzymatic factors involved in tissue breakdown on samples of inflamed and healthy gingiva.

**Material and Methods:** Immunohistochemical analysis and semiquantitative determination of the enzymes elastase, plasminogen, cathepsin G, MMP-3 and MMP-7 and of glycoprotein fibrinogen were performed on gingival tissue samples from 3 healthy controls, 8 patients with Plgdef and 3 patients with gingivitis (G) and periodontitis (P).

**Results:** For elastase, significantly high numbers of leukocytes were detected in all samples. Staining for MMP-3 and MMP-7 was seen in samples with G and P. An even stronger staining was shown in samples with P by Plgdef. Fibrinogen was detectable in the plasma in all samples, but the staining for plasminogen was stronger in samples with P than in samples with G and P by Plgdef. Staining for Cathepsin G was weak only in samples with G and P.

**Conclusion:** A strong staining of elastase, MMP-3 and MMP-7 and a weak staining of plasminogen in Plgdef samples supports the above mentioned assumption. Local application of plasminogen therefore could be a therapeutic approach. Further investigations should determine the exact pathomechanism of this entity.

## P0007

### Arterial stiffness measures and periodontal condition – results of the Health 2000 Survey

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**Aim:** To study the association between periodontal condition and various measures of arterial stiffness.

**Material and Methods:** This study was based on a subpopulation of the Health 2000 Survey in Finland. After restriction to 45–64-year-old dentate, non-smoking, non-diabetic subjects with no history of cardiovascular diseases, the study population consisted of 157 subjects. Periodontal condition was measured by the number of bleeding sextants and the number of teeth with periodontal pockets 4 mm or deeper.  $\beta$ -estimates and their 95% confidence intervals (CI) were obtained from linear regression models.

**Results:** After adjusting for confounding factors such as age, gender, body mass index, education, serum lipid composition (triglycerides, HDL-C, LDL-C), number of teeth and physical activity, the number of bleeding sextants and the number of teeth with periodontal pockets 4 mm deep or deeper was weakly associated – although statistically insignificantly – with various arterial stiffness measures, such as Peterson's elastic modulus ( $\beta$ -estimate 31.1, CI –14.7 to 76.9, p-value 0.18;  $\beta$ -estimate 18.2, CI –2.3 to 38.7, p-value 0.08, respectively) and Young's elastic modulus ( $\beta$ -estimate 121.1, CI –105.7 to 347.9, p-value 0.29;  $\beta$ -estimate 77.8, CI –23.8 to 179.3, p-value 0.13, respectively).

**Conclusion:** There was an association, although statistically insignificant, between periodontal parameters, gingival bleeding and periodontal pocketing, and arterial stiffening. Further studies are required for a comprehensive understanding of the role of infectious periodontal diseases in arterial stiffening.

## P0008

### Development of a protocol for visualising extracellular DNA in ex-vivo dental plaque biofilms

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**Aim:** To develop a protocol to obtain high resolution images of ex-vivo dental plaque biofilms to allow study of the matrix components, specifically extra-cellular DNA.

**Material and Methods:** Ex-vivo samples, extracted human teeth, were collected from adult patients with advanced chronic periodontitis, demonstrated by radiographic bone loss >50% and mobility grade II or III. Teeth were extracted using an atraumatic technique (without the use of luxators) and without touching the subgingival root surface. All samples were stabilised and fixed overnight. Dehydration was performed in a graded ethanol series followed by processing in a CO<sub>2</sub>-based critical point dryer, and samples were sputter coated with chromium. Scanning electron microscopy was performed using a Helios NanoLab Dual Beam MK 2 field emission instrument. Secondary electron and backscatter images were obtained.

**Results:** The protocol for ex-vivo sample collection and processing allowed high resolution images of dental plaque biofilms

to be obtained. It was possible to carefully section samples, with an air turbine, without resulting in any detrimental effects on the dental plaque biofilm. Extracellular DNA-like structures were visualised demonstrating the success of the technique.

**Conclusion:** This study developed a protocol for obtaining high resolution scanning electron micrographs of ex-vivo dental plaque biofilms. Extracellular DNA-like structures were observed, thus supporting the hypothesis that extracellular DNA is a normal component of natural dental plaque biofilms. Further investigations are now required to confirm that these structures are composed of DNA, using immunolabelling methods, and to establish the structural importance of extracellular DNA in dental biofilms.

## P0009

### Quantitative analysis of Epstein–Barr virus DNA and Porphyromonas gingivalis associated with chronic periodontitis in Japanese patients

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**Aim:** Periodontitis is an infectious disease that involves specific types of periodontopathic bacteria, viruses and inflammatory mediators. A number of studies have recently suggested Epstein–Barr virus (EBV) involvement in the pathogenesis of periodontitis. The purpose of this study was to determine the quantitative analysis of EBV DNA and *P. gingivalis* among Japanese chronic periodontitis (CP) patients.

**Material and Methods:** A group of 25 patients with CP were included in this study along with 13 individuals without periodontitis. Subgingival samples were obtained with paper points. Quantitative real-time PCR was used to detect EBV DNA and *P. gingivalis*.

**Results:** In the CP patients, EBV DNA and *P. gingivalis* were detected in both 80% of sites with probing pocket depths (PPD) of >5 mm and in 40% and 36% of sites with PPD < 3 mm, respectively. EBV DNA and *P. gingivalis* were detected in 50% and 27% of periodontally healthy individuals. EBV DNA and *P. gingivalis* coexisted with a high frequency (68%) in the deeper PPD (>5 mm) sites of CP patients (68%). The range of counts in PCR-positive deeper PPD sites of CP patients for EBV DNA and *P. gingivalis* were  $3.74 \times 10^3$ – $2.83 \times 10^9$  and  $2.73 \times 10^5$ – $6.65 \times 10^9$  (copies/ml), respectively.

**Conclusion:** These results suggest an association between EBV DNA and *P. gingivalis* in Japanese CP patients. Further studies are necessary to elucidate the association; however, we believe that our enhanced understanding of the pathogenesis of periodontal diseases involving viral infections will lead to novel treatments.

## P0010

### Prevalence of Actinomyces spp. in patients with chronic periodontitis

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**Aim:** This study investigated the prevalence of Actinomyces spp. in shallow, deep and very deep pockets of patients with

chronic periodontitis compared to healthy controls and correlated the results with clinical status.

**Material and Methods:** Twenty patients with chronic periodontitis and 15 healthy subjects were enrolled in this study. Clinical indices were recorded in a six-point measurement per tooth. From each patient samples of supra- and subgingival biofilm were taken separately from teeth with shallow, deep and very deep pockets. Samples of supra- and subgingival biofilm were also collected from the healthy individuals. All the samples were cultivated on different media at 37°C in an anaerobic atmosphere for 7 days. All the suspect colonies were identified using a rapid ID 32 A system (bioMérieux) and MALDI-TOF-MS analysis using an Autoflex II Instrument (Bruker Daltonics) together with in house developed identification software and reference spectra database.

**Results:** A total of 977 strains were identified as Actinomyces. *A. naeslundii/oris* (430 isolates) was the most prevalent species and was found in all patients and in almost all healthy subjects. Significant differences ( $p = 0.003$ ) between the groups were found for *A. odontolyticus/meyeri* and *A. israelii* which were associated with periodontitis patients. *A. dentalis* showed a tendency to significance ( $p = 0.015$ ) in the periodontitis group. *A. gerencseriae* and *A. massiliensis* were significantly more often found supragingivally than subgingivally ( $p = 0.004$ ,  $p = 0.022$ , respectively) in the periodontitis group.

**Conclusion:** Whether some Actinomyces species, definitely important biofilm formers, are actively involved in the pathogenesis of chronic periodontitis needs further attention.

## P0011

### Effects of miRNAs on the expression of inflammatory cytokines in human gingival fibroblasts

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**Aim:** The purpose of this study is to determine the effects of microRNAs (miRNAs) on the expression of inflammatory cytokines in human gingival fibroblasts (HGF), and to identify the targets of miRNAs during the inflammation process.

**Material and Methods:** Gingival tissues obtained during periodontal flap surgery (inflamed gingiva from chronic periodontitis patients) or dental implant surgery (noninflamed gingiva from edentulous residual ridges). Total RNAs were isolated from both gingival tissues and miRNA expression profiles were examined by a miRNA microarray. Observed miRNA expression levels in inflamed gingiva were confirmed by real-time PCR. Overexpression plasmids with miR-223 inserts were used to search for the effects of miR-223 on mRNA levels of inflammatory cytokines in HGF.

**Results:** The three most overexpressed (by >2.72-fold) miRNAs were miR-150, miR-223 and miR-200b. IL-1 $\beta$  mRNA levels were increased by IL-1 $\beta$  (1 ng/ml) in HGF and were further induced by the overexpression of miR-223. IL-1 $\beta$  mRNA levels were increased by TNF- $\alpha$  (10 ng/ml), were not induced by IL-6 (1 ng/ml) in HGF and decreased by miR-223 overexpressions. Overexpression of miR-223 up-regulated IL-6 and TNF- $\alpha$  mRNA levels in HGF after stimulation by IL-1 $\beta$  and TNF- $\alpha$ . Computational prediction via TargetScanHuman (6.2) revealed that the putative target of miR-223 was conserved helix-loop-helix ubiquitous kinase (CHUK), also known as IKK $\alpha$ . Overexpression of miR-223 decreased CHUK mRNA and protein levels in HGF.

**Conclusion:** These studies demonstrated that gene expression of inflammatory cytokines was regulated by miR-223 via CHUK, and that miR-223 might control the inflammatory response and promote the pathogenesis of inflammatory diseases.

## P0012

### The evaluation of relative expression level of cytokines (IL-1b, IL-6, TNF-a) and MMP-9 in patients with gingival recession

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**Aim:** The aim of this study was to evaluate the difference between relative expression level of cytokines (IL-1b, IL-6, TNF-a) and MMP-9 in patients with different Miller class gingival recession.

**Material and Methods:** 14 patients age 30–45 with gingival recession were divided into two groups: first (6) – Miller I and Miller II class, second (8) – Miller III and Miller IV class. Both groups were recorded for clinical parameters: plaque index (PI), papilla bleeding index (PBI), recession depth (RD), recession width (RW), keratinized gingival width (KGW). All subjects were without comorbidity and did not take any drugs. Gingival biopsy material was obtained during surgical gingival recession covering. Relative expression level of cytokines (IL-1b, IL-6, TNF-a) and MMP-9 was detected by Applied Biosystems 7500 RT-PCR system. Statistical analysis was presented by REST 2009 V2.0.13 software.

**Results:** It was not showed significant difference of relative expression level between two groups of patients with different Miller class recession on all cytokines IL-1b ( $p = 0.90$ ), IL-6 ( $p = 0.47$ ), TNF-a ( $p = 0.70$ ) and MMP-9 ( $p = 0.80$ ). It could be explained with low number of patients. Probably for further investigation we should include healthy controls and compare them with gingival recession patients, or taking another molecular markers for our research.

**Conclusion:** The study indicates that the role of cytokines (IL-1b, IL-6, TNF-a) and MMP-9 in pathogenesis of different Miller class gingival recession is need to be further investigated.

## P0013

### Study of the influence of Solobacterium moorei on the development of multispecies biofilms using an artificial mouth system

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**Aim:** The formation of gram-negative anaerobic bacterial biofilms on lingual surfaces and the production of volatile organic compounds (VOC), products of their metabolism, are the main causes of halitosis. Recently, *Solobacterium moorei* was shown to possibly play an important role in this phenomenon, and for this reason, we considered evaluating the impact of this bacterium in multispecies biofilms built by three different oral populations.

**Material and Methods:** The following populations of oral bacteria were grown continuously in a bioreactor. Population\_A:

*Fusobacterium nucleatum*, *Aggregatibacter actinomycetemcomitans*, *Actinomyces naeslundii*, *Veillonella parvula*, *Streptococcus oralis* and *Streptococcus gordonii*. Population\_B: Population\_A plus *Prevotella intermedia* and *Porphyromonas gingivalis* and Population\_C: Population\_B plus *S. moorei*. To produce biofilms on hydroxyapatite discs using these populations, the system was maintained in anaerobic flow conditions at 37°C for 6 days. The proportion of species in each type of biofilm was assessed by Blood Agar and Dentaaid-1 culture plating in anaerobiosis and microaerophilia, respectively. The viability and structure of the biofilms was studied using confocal laser scanning microscopy.

**Results:** The percentage distribution of the species in the biofilm and mortality rates varied depending on the population studied. In biofilms with *S. moorei* (19% of the biofilm) an increased percentage of *P. gingivalis*, *A. actinomycetemcomitans*, *F. nucleatum* and *S. gordonii* and a decreased percentage of the remaining species compared to biofilms without *S. moorei* were observed.

**Conclusion:** *S. moorei* induced significant changes in the growth of other species and enhanced the growth of VOC-producing gram-negative anaerobes.

## P0014

### Roles of *Porphyromonas gingivalis* lipopolysaccharide—tolerized monocytes on neutrophils migration and respiratory burst

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**Aim:** Exposure of the host to periodontal pathogens and their virulence factors induces a state of hyporesponsiveness to subsequent stimulations, termed endotoxin tolerance. The aim of this study was to explore the roles and mechanisms of *Porphyromonas gingivalis* (*P. gingivalis*) lipopolysaccharide (LPS)—tolerized monocytes on neutrophils function.

**Material and Methods:** THP-1 cells were pretreated with 1 µg/ml *P. gingivalis* LPS (24 h), washed (2 h) and treated again (24 h). Freshly isolated polymorphonuclear leukocytes (PMNs) were resuspended in the upper wells and supernatants from tolerized THP-1 cells were added to the lower wells. After additional 1 h, the number of cells that migrated through the filter was evaluated. Moreover, PMNs were stimulated with supernatants from tolerized THP-1 cells for 4 h and generation of reactive oxygen species (ROS) was measured by flow cytometer. To identify possible mechanisms for these changes, cytokine expression patterns in tolerized THP-1 cells were explored by cytokine antibody array.

**Results:** With the stimulation of supernatants from tolerized THP-1 cells, PMNs that migrated to the lower chamber was less than those from the cells stimulated only once ( $p < 0.05$ ). In addition, there was a marked increase in ROS generation in PMNs stimulated with supernatants from tolerized THP-1 cells ( $p < 0.05$ ). Moreover, in tolerized THP-1 cells, 43 cytokines (43/170) were decreased (more than 2.5 fold), including CCL23 and IFN- $\gamma$ , and 11 cytokines (11/170) were increased (more than 2.5 fold), such as DR6.

**Conclusion:** *P. gingivalis* LPS-tolerized THP-1 cells could depress PMNs migration and contribute to respiratory burst, which might be related with the changes in cytokine pattern in THP-1 cells.

## P0015

### The ex vivo production of acetaldehyde in saliva samples of periodontitis patients and healthy controls

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**Aim:** Acetaldehyde is the first oxidation metabolite of ethanol and a proven risk factor for oral cancer. Periodontitis is epidemiologically associated with oral cancer. The aim of this pilot study was to compare the capacity of the oral microbiota to produce acetaldehyde in periodontitis patients and healthy controls as a possible mechanism for the epidemiological link with oral cancer.

**Material and Methods:** 26 untreated chronic periodontitis and 26 healthy controls were randomly enrolled. All participants provided one oral rinse sample that was stored in aliquots at -80°C until challenged with 20 mmol/l alcohol. Total aldehydes were quantified by a colorimetric assay. The alcohol dehydrogenase activity (ADH) was determined by two techniques: one colorimetric assay and one measuring absorbency of NADH. Total bacterial and yeasts counts were determined using q-PCR.

**Results:** Periodontitis patients versus healthy controls showed ADH activity, total aldehyde production and AHD activity (via NADH) of  $2.92 \pm 1.52$  vs.  $2.37 \pm 1.03$  nmol/l per minute ADH,  $52.3 \pm 100$  vs.  $42.4 \pm 40.8$  µmol/land  $400 \pm 88.7$  vs.  $363 \pm 69.8$  U/l respectively. These parameters were not significant different between groups. In an overall regression analysis however, total *Candida* spp. load was significantly associated with aldehyde production ( $p = 0.029$ ).

**Conclusion:** In this pilot study, ADH activity and total aldehyde production in periodontitis patients could not explain the higher risk of oral cancer in periodontitis patients as seen in epidemiological reports. Nevertheless the significant correlation between *Candida* spp. and aldehyde production could be a possible risk for oral cancer and pre-cancer sites.

## P0016

### Are the effects of fixed orthodontic treatment on gingival health similar in adolescents and young adults?

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**Aim:** The aim of this study is to compare the relationship of fixed orthodontic treatment and gingival health between adolescents and young adults.

**Material and Methods:** This study was performed by searching the files of the patients treated by post-graduate student of Gazi University Faculty of Dentistry Department of Orthodontics and included 60 patients. Each group, adolescents (aged < 18) and young adults (aged  $\geq 18$ ), is composed of thirty patients of similar gender and skeletal anomalies. And also, each group had underwent similar treatment subgroups (fixed orthodontic treatment with extraction and nonextraction). Intraoral photographs were analyzed and presence or absence of visible plaque, visible inflammation, gingival recession were recorded and incisor incli-

nations analyzed on lateral cephalometric films, before and after orthodontic treatment.

**Results:** The average value of visible gingival inflammation and gingival recession showed statistically significant increase among adults and the average values of visible plaque and inflammation demonstrated a likewise increase among adolescents when the treatments are finished. In both groups, gingival biotype and variations of incisor inclinations did not show any significant difference.

**Conclusion:** The results of the study showed that the responds of the periodontal tissue towards orthodontic treatment among adolescents more favourable than those of young adults.

## P0017

### Tumor necrosis factor-alpha gene promoter methylation in patients with periodontitis and rheumatoid arthritis

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**Aim:** Tumor necrosis factor-alpha (TNF- $\alpha$ ) polymorphisms have been shown to be associated with periodontitis and rheumatoid arthritis (RA). However, the role of TNF- $\alpha$  epigenetic variability in both diseases has not been elucidated. The present study was undertaken to evaluate whether the DNA methylation profile of the TNF- $\alpha$  gene promoter is unique to individuals with periodontitis and RA.

**Material and Methods:** After informed consent was obtained, 30 adults with RA, 30 adults with CP only, and 30 healthy controls (H) were enrolled. Genomic DNA isolated from peripheral blood was modified by sodium bisulfite and analyzed for DNA methylation of TNF- $\alpha$  gene with direct sequencing. Levels of TNF- $\alpha$  were determined by ELISA.

**Results:** TNF- $\alpha$  promoter fragment from -353 to +137 bp contained 10 CpG motifs. Frequencies of individuals with methylation at the -163, -119, -72, -49, and -38 bp motifs were significantly higher in the RA group than those in the H group ( $p < 0.001$  for all comparisons). Additionally, the -72 bp motif showed significantly higher frequencies of individuals with methylation in the CP group compared with the H group ( $p < 0.001$ ). Levels of TNF- $\alpha$  production by mononuclear cells were significantly different between individuals with and without the methylation at -163 bp ( $p = 0.03$ ).

**Conclusion:** These results suggest that hypermethylated status of CpG motifs in the TNF- $\alpha$  promoter region may be unique to patients with periodontitis and RA.

## P0018

### Salivary electrolytes in patients suffering from periodontitis

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**Aim:** The aim of this study was to determine levels of salivary copper, magnesium, chloride, potassium and sodium in healthy subjects and in subjects with periodontal disease.

**Material and Methods:** The study included 76 individuals divided in two groups. The test group consisted of 35 patients with diagnosis of chronic or aggressive periodontitis, and 41 subjects with no sign of periodontal disease. Clinical measurements were recorded (pocket probing depth, clinical attachment level, bleeding on probing and plaque index), and unstimulated whole saliva samples were obtained. The levels of sodium, potassium and chloride were determined by indirect potentiometry, copper was determined by atomic absorption spectrophotometry, and levels of magnesium were determined by spectrophotometric method with xylydil blue. Parametric statistical tests were used for data analysis.

**Results:** No significant difference in salivary phosphate, sodium, potassium, and chloride were found between the control and the test group. Patients with periodontitis had significantly higher salivary copper concentration compared to the control group. No significant differences in salivary phosphate, sodium, chloride and copper were found between patients with chronic and aggressive periodontitis; however there was significant difference in potassium level between chronic and aggressive periodontitis patients.

**Conclusion:** Significantly higher salivary copper concentration in the test group might reflect increased antimicrobial activity or ineffective enzymatic activity of the copper containing enzymes. Further studies with a larger sample-size are needed to confirm the findings of the present study, with a special emphasis on a particular form of periodontitis.

## P0019

### Microbial colonization of peri-implant sulci in patients with periodontitis

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**Aim:** The detection and comparison of the colonization of periopathogens in both the sulci of peri-implants, and natural teeth in periodontitis patients.

**Material and Methods:** A group of 23 patients who were initially diagnosed with an aggressive and chronic form of periodontitis were selected. After stabilization of the periodontitis using conservative surgical procedures, implantations were carried out. At a minimal period of 12 months after the implantations, PCR examination of 33 peri-implants and 33 natural teeth was performed to detect the following periopathogens: *Porphyromonas gingivalis* (P.g.), *Tannerella forsythensis* (T.f.), *Treponema denticola* (T.d.), *Prevotella intermedia* (P.i.), and *Aggregatibacter actinomycetemcomitans* (A.a.).

**Results:** Using the Fisher's exact test, no statistical significance was detected in the colonization of the periopathogens in question, both in the sulci of peri-implants and natural teeth: P.g.  $p = 1.000$ , T.f.  $p = 0.240$ , T.d.  $p = 0.270$ , P.i.  $p = 0.613$ , A.a.  $p = 0.613$  Similarly using the Mann-Whitney's test no significant correlation was observed in the detection of periopathogens overtime since the time of implantation: P.g.  $p = 0.785$ , T.f.  $p = 0.388$ , T.d.  $p = 0.172$ , P.i.  $p = 0.900$ , A.a.  $p = 0.235$ . However in contrast the Mann-Whitney's test displayed significantly higher rates of P. intermedia in sulci with greater depths as opposed to shallower sulci in those with peri-implants (median CPI 4.0 mm vs. CPI 3.0 mm respectively):  $p = 0.046$ ; P.g.  $p = 0.543$ , T.f.  $p = 0.204$ , T.d.  $p = 0.120$ , P.i.  $p = 0.046$ , A.a.  $p = 0.523$ .

**Conclusion:** No substantial difference in the colonization of periopathogens in sulci of peri-implants and natural teeth were

observed. In addition to this, the colonization of peri-implant sulci remained unchanged over time.

## P0020

### Immunohistochemical analysis of CD45RO positive T cells and expression of epidermal growth factor-receptor and vascular endothelial growth factor in nifedipine induced gingival overgrowth in rats

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**Aim:** The precise mechanism by which dihydropyridine calcium channel blocker nifedipine-induced gingival overgrowth and periodontal breakdown occurs is still not completely understood. The aims of this study were to evaluate CD4 T lymphocytes, CD8 T lymphocytes, CD45 RO memory T lymphocytes and expression of epidermal growth factor-receptor (EGF-r) and vascular endothelial growth factor (VEGF) in nifedipine induced rat overgrown gingival tissue during 4-week period.

**Material and Methods:** Rats with ligature induced periodontitis were treated with a daily oral gavage of 30 mg/kg of body weight of nifedipine (test) and 0.09% NaCl (control). Two and 4 weeks after the beginning of treatment, five rats from each group were sacrificed, the mandibles with the surrounding gingivae were removed and analyzed by using immunohistochemical technique. Statistical analysis was performed by using Mann-Whitney U test, Wilcoxon Signed-Rank test and Spearman's rank correlation.

**Results:** Immunohistochemical analysis revealed that, CD4 T lymphocytes, CD8 T lymphocytes and CD45RO memory positive cells and expression of EGF-r and VEGF were more prevalent in connective tissue of nifedipine-treated group compared to the controls throughout the study period ( $p < 0.05$ ). There were no statistically significant differences in the number of CD4, CD8 and CD45RO positive cells and expression of polypeptide growth factors between 2- and 4- week samples of nifedipine-treated group ( $p > 0.05$ ).

**Conclusion:** Within the limits of this study, we suggest that number of CD4 +, CD8 + T cells, CD45RO+ memory cells and expression of EGF-r and VEGF may have an effect on the pathogenesis of nifedipine-induced gingival overgrowth.

## P0021

### Histopathological evaluation of Porphyromonas gingivalis invasion of the brain: an experimental study in rabbits

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**Aim:** We had investigated the invasion of the rabbit's brain by Pg.

**Material and Methods:** Twelve male white New Zealand rabbits were divided into 2 groups. Group 1 (control) received standard food pellets; group 2 (experimental) rabbits were continuously challenged orally with Pg ATCC 33277 (0.2 ml of  $1.5 \times 10^8$ ).

**Results:** Grossly the infected brain group showed cerebral oedema and haemorrhage. Histological analysis of infected group with Pg. showed mild to moderate lesions in the cerebral cortex, moderate perivascular cuffing with neutrophils, lymphocytes, plasma cells and histiocytes. The meninges were mildly to moderately infected. Non caseating granuloma was observed in the cerebral cortex; the granuloma was composed of lymphocytes and plasma cells. BDNF levels were significantly higher in group 2 (93.568) than in group 1 (52.314).

**Conclusion:** Results showed brain infection with Pg. Porphyromonas gingivalis has the ability to pass through blood brain barrier to cause histopathological changes in rabbit brain.

## P0022

### In vivo and in silico analyses of MMP-7 in type-2 diabetes mellitus and periodontitis

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**Aim:** Matrix metalloproteinase (MMP)-7 is a regulatory enzyme in the pathogenesis of periodontitis and yet, its regulation in subjects with type 2 Diabetes Mellitus (T2DM) suffering with periodontitis remains unexplored. Our aims were (1) to examine MMP-7 secretion and localization in diabetic subjects suffering from generalized periodontitis (GP), (2) to create an in silico model able to integrate MMPs, tissue inhibitor of MMP (TIMPs), and members of the T2DM pathway together, to identify its central proteins/compounds, and finally, to calculate the shortest path/s (SPs) between "glucose" and "MMP7" in the model.

**Material and Methods:** Gingival tissue sections were collected from; T2DM subjects with GP (n = 14), systemically healthy GP patients (n = 11), systemically and periodontally healthy subjects (control) (n = 13). Numbers and localizations of MMP-7 expressing cells were analyzed immunohistochemically. The in silico network model was developed by using STITCH 4.0. Topology and SPs were determined by Cytoscape.

**Results:** In all groups MMP-7 expressing cells were visible at all epithelial layers. Numbers of MMP-7 expressing cells were elevated in subjects with T2DM + GP, in comparison to controls ( $p = 0.018$ ). Our in silico data characterized a direct interrelation between MMPs/TIMPs and T2DM pathway-related proteins. Our network model of interactions "MMP-T2DM" interconnected a total of 56 genes/proteins and 5 compounds. In addition, free radicals found to be the central nodes of "MMP-T2DM" and the SPs between glucose and MMP7.

**Conclusion:** Elevated MMP-7 expressing cell numbers in gingival samples of T2DM + GP subjects can be explained, at least bioinformatically, by a dysregulation in the glucose-free radical-MMP-7 cascade.

## P0023

### L-ascorbic acid 2-phosphate magnesium salt exerted antioxidant properties in human gingival cells

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**Aim:** L-ascorbic acid 2-phosphate magnesium salt (APM), a long-acting ascorbic acid derivative, has multiple functions, such

as enhancement of collagen synthesis in gingival fibroblast cells, phagocytotic activity in polymorphonuclear leukocytes, and reduction of human gingival inflammation. The aim of this study was to investigate the role of APM in increasing antioxidant properties as an ingredient to enhance the gingival function.

**Material and Methods:** Human gingival fibroblast cells (HGFs) were incubated in the presence or absence of APM (0–50  $\mu\text{mol/l}$ ). Intracellular reactive oxygen species (ROS), induced by 1 mmol/l  $\text{H}_2\text{O}_2$  (0.5–2 h) were quantified using CM-H2DCFDA as a ROS detecting reagent. Cell damage induced by  $\text{H}_2\text{O}_2$  was estimated using Calcein AM. The expressions of antioxidant enzymes, such as superoxide dismutase (SOD) and heme oxygenase-1 (HO-1), was measured by real time PCR and ELISA.

**Results:** In HGFs, 50  $\mu\text{mol/l}$  APM reduced the cell damage through the suppression of  $\text{H}_2\text{O}_2$ -induced excess ROS ( $p < 0.01$ , Tukey's test). The expression of SOD was increased by 50  $\mu\text{mol/l}$  APM ( $p < 0.01$ , Dunnett test). In contrast, the expression of HO-1 was not affected by any concentration of APM.

**Conclusion:** This study suggests that APM exerts antioxidant properties by eliminating ROS and increasing the expression of antioxidant enzymes in HGF. We previously demonstrated in a randomized, controlled clinical trial that dentifrice containing APM significantly reduced gingival inflammation. Taken together, it is suggested that antioxidant properties of APM have an important role in improving gingival inflammation by enhancing gingival function.

## P0024

### Role of nampt in alveolar bone remodeling

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**Aim:** Nampt, a pleiotropic mediator involved in NAD metabolism, exerts growth factor and cytokine activity. Nampt is upregulated in inflammatory diseases such as periodontitis or rheumatoid arthritis. Treatment of periodontitis decreases nampt expression and blocking nampt activity in experimental arthritis prevents from bone degradation. Today, we lack data on role of nampt in bone remodeling and in inflammation-driven bone resorption. Nampt produced NAD, majorly consumed by Sirtuin (Sirt) and Sirt-1 is a regulator of bone mass.

**Material and Methods:** In vivo model of alveolar bone remodeling is analyzed using immunohistochemistry. mRNA and protein expressions are studied using real-time RT-PCR and immunoblot. Primary murine calvaria osteoblasts are cultured in non-osteogenic (OG) and OG media and stimulated using recombinant nampt or NMN (product of nampt).

**Results:** (1) Nampt expression increased in osteoblasts cultured 3 weeks in non-OG and OG media (mRNA:  $\times 4.4$ ,  $p \leq 0.01$ ). 10  $\mu\text{mol/l}$  NMN significantly induced osteoblasts differentiation markers expression (BSP:  $\times 7.25$ ,  $p \leq 0.05$ ; OC:  $\times 1.9$ ,  $p \leq 0.05$ ). (2) Expression of nampt peaks at 18 h after bone remodeling induction ( $\times 2.74$  compared to  $T = 0$  h,  $p \leq 0.01$ ) in the periosteum osteogenic layer paralleled to RANKL and Sirt-1 expression. No expression was found in osteoclasts. In a pilot study, inhibition of nampt activity using FK866 decreases osteoclast recruitment ( $-25\%$ ) and activity ( $-40\%$ ). (3) Increased mRNA expression of RANKL/OPG ratio and MMP-13 was found in osteoblasts challenged for 6 h by 0.2–5  $\mu\text{g/ml}$  nampt.

**Conclusion:** Nampt seems to be implicated in activation step of bone remodeling in regulating osteoblasts cell differentiation.

## P0025

### The effect of obesity on oxidative stress in periodontal healthy and diseased tissues

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**Aim:** The aim of our study is to evaluate the effect of obesity on healthy or diseased periodontal tissues by malondialdehyde (MDA), protein carbonyl (PC) and total antioxidant capacity (TAOC) levels as biomarkers of oxidative stress (OS) in gingival crevicular fluid (GCF).

**Material and Methods:** Systemically healthy 45 normal-weight adults and 48 obese adults were included in the study. Body mass index was used in diagnosis of obesity. Periodontal status was determined through clinical periodontal measurements and radiographs. Afterwards, normal weight and obese adults were analyzed in 6 groups, normal weight + periodontal healthy (NH), normal weight + gingivitis (NG), normal weight + generalized chronic periodontitis (NP), obese + periodontal healthy (OH), obese + gingivitis (OG), obese + generalized chronic periodontitis (OP). The GCF MDA, PC, TAOC levels were examined by ELISA method.

**Results:** The GCF MDA, PC, TAOC levels revealed a statistically significant intra group differences ( $p < 0.05$ ). According to the GCF MDA and PC levels, groups were listed as  $\text{NP} > \text{NG} > \text{NH}$  ( $p < 0.05$ ) and  $\text{OP} > \text{OG} > \text{OH}$  ( $p < 0.05$ ). According to GCF TAOC level, groups were listed as  $\text{NP} < \text{NG} < \text{NH}$  ( $p < 0.05$ ) and  $\text{OP} < \text{OG} < \text{OH}$  ( $p < 0.05$ ). MDA and PC levels were higher in OP than NP; OG than NG; OH than NH and TAOC levels were lower in OP than NP; OG than NG; OH than NH. However, significant differences were found only in OP and NP matchup ( $p < 0.05$ ). In all subjects, clinical periodontal measurements showed statistically significant positive correlations with MDA and PC levels and negative correlations with TAOC levels ( $p < 0.05$ ).

**Conclusion:** Our results reveal that obesity may influence periodontal tissue destruction and disease severity through increasing the OS in the presence of periodontal disease.

## P0026

### Investigation of B/T-cell stimulation and osteoregulation in Thalassemia major in the presence or absence of gingivitis

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**Aim:** The aim of this study was to investigate levels of B/T-cell stimulatory, osteoregulatory cytokines and interleukin-8 (IL-8) in biofluids of patients with thalassemia major (TM) either with gingivitis or clinically healthy periodontium.

**Material and Methods:** Seventy-seven patients were included in this study (14 patients with TM and healthy periodontium (TMh), 15 patients with TM and gingivitis (TMg), 20 systemically and periodontally healthy individuals (Hh), 28 systemically

healthy individuals with gingivitis (Hg.). Clinical periodontal parameters were recorded. Gingival crevicular fluid (GCF), saliva, serum levels of IL-6, IL-8, soluble receptor activator of nuclear factor-kappa B ligand (sRANKL), osteoprotegerin (OPG), B-cell activating factor (BAFF), a proliferation-inducing ligand (APRIL) were determined by ELISA. Data were analysed by Kruskal-Wallis test, one-way ANOVA and Spearman's correlation analysis.

**Results:** Median GCF, serum and saliva BAFF ( $p < 0.001$ ), IL-6 and IL-8 ( $p < 0.005$ ) were higher in TMg than in Hg ( $p < 0.001$ ). GCF, serum, saliva APRIL, sRANKL, IL-6, IL-8 levels were higher in TM than in Hh ( $p < 0.05$ ). Positive correlations were found between BOP, PI scores and GCF APRIL, serum sRANKL, serum OPG, sRANKL concentrations in TM groups ( $p < 0.05$ ). Several significant positive correlations were found between BOP, PI scores and biofluid parameters also in systemically healthy groups.

**Conclusion:** TM may have a confounding role as an underlying systemic hematologic condition that may affect periodontal inflammation via dysregulation of lymphocytes and increased activation of osteoclasts.

## P0027

### Alzheimer's diseases-related gene and protein expressions in periodontitis-affected gingival tissues

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**Aim:** The pathogenesis of Alzheimer's diseases (AD) and periodontal diseases have some common factors including ageing and chronic inflammation but still unclear. When exploring a comprehensive gene expression, transcriptomes in periodontitis-affected gingival tissues, it was found that the AD pathway was significantly up-regulated in periodontitis-affected gingival tissues. AD-related genes, Amyloid beta precursor protein (APP), interleukin-1 beta and complement 1QA were significantly elevated in periodontitis. In the present study, Balance between APP and a potent amyloid controlling enzyme, neprilysin (NEP) mRNA expression levels, as well as the protein localisation of APP was analysed.

**Material and Methods:** Twenty periodontitis-affected and 20 clinically healthy control gingival tissues were taken from patients with severe chronic periodontitis or patients with tooth extraction needs. Total RNA was purified and used for quantitative reverse transcription real-time polymerase chain reaction (qRT-PCR). The localisation of APP was analysed by immunohistochemistry (IHC).

**Results:** The genes in the AD pathway, both APP and NEP were significantly elevated in periodontitis-affected gingival tissues. APP-expressing macrophages in inflamed gingival tissues were detected by double-stained IHC.

**Conclusion:** The activated AD pathway in periodontitis-affected gingival tissues was confirmed by qRT-PCR analyses that APP, IL-1 beta, C1QA and NEP genes were significantly elevated in periodontitis. Thinking that, NEP is one of the most important enzymes controlling amyloid beta deposition induced by APP, the increased NEP mRNA in periodontitis may inhibit amyloid beta protein deposition in gingival tissues. However, researches investigating further AD-periodontitis networks are needed.

## P0028

### Antibodies against prokaryotic Hsp60 and human Hsp60 in generalized periodontitis

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**Aim:** To investigate the immune reactivity against microbial and human Hsp60 in generalized periodontitis (GP).

**Material and Methods:** 60 patients (mean age 38 + 15) were divided into 2 groups: I- control (30 healthy subjects with intact periodontium), II- the main group (30 patients with GP). GP diagnosis was established on the base of objective periodontal indices. The level of anti-Hsp60 antibodies in serum was determined by ELISA. Asan antigensrecombinant GroEL protein of Escherihia coli (prokaryotic homologue of human Hsp60) and human Hsp60 recombinant protein were used.

**Results:** Content of antibodies against prokaryotic Hsp60 in the main group of patients was significantly higher than in control group ( $0.638 \pm 0.2$  vs.  $0.467 \pm 0.3$  units of optical density,  $p < 0.05$ ). The average content of antibodies against human Hsp60 (Hsp60 -I) in group II was also 30% higher ( $p < 0.05$ ), but there was no significant correlation between antibody content and the severity of GP or age of the patients. However, the results of conservative treatment (dynamics of periodontal indices) were significantly better ( $p < 0.05$ ) among patients where the content of antibodies against human Hsp60 did not exceed 0.5 units of optical density.

**Conclusion:** Increasing content of antibodies against prokaryotic and human Hsp60 is a possible mechanism of the chronic GP progression.

## P0029

### Changes of gene expression in T lymphocytes after Golli-MBP gene RNA interference

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**Aim:** Immune imbalance may play a important role in the pathogenesis of periodontal disease. The major cell types expressing golli in the immune system are the T-lineage cells. The aim of this study was to investigate the changes of genes in T lymphocytes after the Golli-MBP gene was down regulated by RNA inference.

**Material and Methods:** RNA interference depressed the expression of Golli-MBP in Jurkat cells. Gene chip was applied to investigate the alteration of gene expression. Total RNA were transcribed to double strand cDNA, then synthesized into cRNA and labeled with Cyanine-3-CTP. The labeled cRNAs were hybridized onto the microarray. The arrays were scanned by the Agilent Scanner G2505C. Differentially expressed genes were identified through fold change as well as p-value calculated with t-test. Afterwards, GO analysis and KEGG analysis were applied to determine the roles of these differentially expressed mRNAs. Finally, Hierarchical Clustering was performed to display the distinguishable genes' expression pattern among samples.

**Results:** The results indicated that there were 387 differential gene expression. In the Golli-MBP knocking-down Jurkat cells, there were 108 plus enhanced expression gene, 279 suppressed expression. GO analysis find out that differential expressed

genes involve several biological progress, including cell adhesion and immune response. Pathway analysis find out that most of the differential expressed genes (23.3%) involve Cytokine-cytokine receptor interaction.

**Conclusion:** After Golli-MBP was knocked down, the mechanism of biological characteristics changes in T lymphocytes was complex, it may involve in many kinds of functional proteins, metabolism and signal pathways. But it still needs follow-up experiments to confirm.

## P0030

### Correlation of pressure and displacement in a simulated gingival model during retraction

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**Aim:** This study uses an innovative model to measure pressure and the resulting movement of a simulated gingiva.

**Material and Methods:** An idealised tooth model was made from acrylic and vinyl polysiloxane was used to simulate the free gingiva, sulcus, and attachment. The pressure and displacement achieved by displacement materials (Expasyl, Expasyl New, and KnitTrax Cord) was measured. A stereoscopic digital measuring microscope was used to measure the space generated by the displacement material. A pressure gauge was used to measure the maximum and post-insertion pressures; Chart 5 software using a Power Lab system recorded the data. The pressures and displacement generated by the different materials were compared using a post hoc Mann-Whitney U test ( $\alpha = 0.05$ ).

**Results:** The median post-insertion pressures generated by Expasyl (292.5 kPa), Expasyl New (207.3 kPa) and KnitTrax Cord (230.8 kPa) were statistically comparable. Expasyl generated a maximum pressure of 318.3 kPa and Expasyl New of 283.1 kPa and KnitTrax Cord 259.4 kPa during injection. Injection of Expasyl resulted in a retraction distance of 1.31 mm, Expasyl New produced 1.04 mm, and placement of KnitTrax Cord generated a 0.96 mm, which mirrors an ideal clinical outcome.

**Conclusion:** All the retraction materials produced similar pressures below traumatic levels. The amount of gingival displacement corresponded to the post injection pressure.

## P0031

### Preliminary study of molecular mechanism involved in nicotine in combination with Porphyromonas gingivalis LPS induced monocyte-endothelial cell adhesion

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**Aim:** To investigate molecular mechanism involved in nicotine in combination with Porphyromonas gingivalis (P.g) lipopolysaccharide (LPS) caused monocyte-endothelial cell adhesion.

**Material and Methods:** The effect of nicotine, P.g-LPS and combination on the proliferation of U937 cells was determined by CCK-8 method. IL-6 expression was investigated by real time PCR after U937 cells were treated with nicotine, P.g-LPS and both. For HUVECs, the expression of monocyte chemoattractant protein CCL-8 and adhesive molecules Vcam-1,

VLAa4, OX40 and OX40L were detected by real time PCR and western blot assays after HUVECs were treated with nicotine, P.g-LPS and both.

**Results:** P.g-LPS did not affect the proliferative ability of nicotine in U937 cells. However, P.g-LPS induced IL-6 expression was inhibited by 100  $\mu$ mol/l nicotine in U937 cells. In HUVEC cells, the expression of CCL-8, Vcam-1, VLAa4, OX40 and OX40L were significantly up-regulated by combination of nicotine and P.g-LPS compared with nicotine alone, P.g-LPS alone and untreated control.

**Conclusion:** Up-regulation of CCL-8, Vcam-1, VLAa4, OX40 and OX40L expression on HUVECs by combination using P.g-LPS and nicotine could be one of molecular mechanism involved in the process of atherosclerosis.

## P0032

### The role of receptor activator of nuclear factor kappa B (RANKL) and osteoprotegerin (OPG) in the progressive course of chronic generalized periodontitis

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**Aim:** To study the role of markers of bone remodeling (RANKL, OPG) in the progressive course of chronic generalized periodontitis.

**Material and Methods:** Were examined 50 patients who were divided into two groups: the first group is a control group (27 patients), the second group – 23 patients with a diagnosis of chronic generalized periodontitis. The diagnosis was confirmed by clinical and radiographic methods, as well as on the basis of severity and intensity of destruction of periodontal tissue using the PMA index (Parma, 1960) and PI (Russel, 1956)

**Results:** On the basis of immunoassays (enzyme linked immunosorbent assay for the determination of OPG and RANKL in gingival fluid in pg/ml) in the second group of patients there is a significant increase in the concentration of cytokines RANKL ( $2.46 \pm 0.25$  pg/ml) and decreasing the concentration of OPG ( $195 \pm 28.21$  pg/ml) compared with the control group (RANKL  $0.18 \pm 0.21$  pg/ml; OPG  $443.63 \pm 64.02$  pg/ml). Increasing concentrations of RANKL and OPG reduction entails activation of osteoclastogenesis and bone resorption ( $r_{bs} = 0.71$   $p < 0.05$ ) than exacerbates the generalized chronic periodontitis.

**Conclusion:** Based on these studies we can conclude that the determination of the change of cytokines OPG and RANKL in gingival fluid reflects activation of osteoclasts and bone resorption progression depending on the severity of periodontitis.

## P0033

### The expression of NLRP3, NLRP1 and AIM2 in the gingival tissue of periodontitis patients: RT-PCR study and immunohistochemistry

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**Aim:** Detecting the distribution and intensity of NLRP3, NLRP1 and AIM2 expression in different types of periodontitis gingival tissues.

**Material and Methods:** A total of 65 gingival tissues were collected from clinic and been divided into 3 groups: patients with chronic periodontitis (CP), patients with generalised aggressive periodontitis (G-AgP) and healthy control subjects. Real-time polymerase chain reaction (RT-PCR) was performed to detect the mRNA expression of NLRP3, NLRP1 and AIM2 in full-thickness tissue. Then immunohistochemistry was used to detect the pattern of NLRP3, NLRP1 and AIM2 expression particular in the periodontal epithelium and in the connective tissue cells.

**Results:** The overall intensity of NLRP3 expression was significantly higher in CP and G-AgP tissue. A more significant difference was observed in the periodontal epithelium layer. NLRP1 was barely expressed in the healthy and periodontitis gingival tissues, whereas AIM2 was expressed at a higher level in the chronic periodontitis group.

**Conclusion:** The NLRP3, NLRP1 and AIM2 proteins were differentially expressed in gingival tissues from patients with CP and G-AgP and may play vital roles in the progression of periodontal inflammation to different degrees. Further studies should be carried out to provide a new direction for personalized periodontal treatment.

## P0034

### Neutrophil extracellular traps in periodontal health and chronic periodontitis. A pilot study

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**Aim:** This work aimed to investigate peripheral blood Neutrophil Extracellular Trap (NET) production in chronic periodontitis patients and gender and age matched healthy controls.

**Material and Methods:** Neutrophils were isolated from the peripheral blood of chronic periodontitis patients and their healthy counterparts (n = 20 pairs). Periodontal health/disease was evaluated by probing depth, clinical attachment loss and bleeding on probing. All volunteers were otherwise systemically healthy and non-smokers. To quantify NET release, neutrophils were stimulated with 50 nmol/l Phorbol 12-myristate 13-acetate (PMA) or 0.75 mmol/l hypochlorous acid (HOCl) for 3 h. Post incubation, NETs were fluorometrically quantified by micrococcal nuclease (MNase) digestion and Sytox green. Data were analyzed by applying non-parametric tests at the 0.05 level.

**Results:** Statistically significant differences were observed between groups regarding clinical parameters of periodontal disease (Mann-Whitney test  $p < 0.05$ ). No differences were observed between periodontitis patients and healthy controls regarding NET production for any of the investigated stimuli (Mann-Whitney test  $p > 0.05$ ). In both periodontitis and healthy subjects, HOCl-stimulated cells generated significantly higher levels of NETs compared with PMA, and the negative control (Kruskall-Wallis test  $p < 0.05$ )

**Conclusion:** Analogous peripheral blood-derived NET production between periodontitis patients and healthy matched controls was observed, thus NET release appears to be unchanged in systemically healthy patients with chronic periodontitis.

## P0035

### Inhibition of parthenolide on cytokines expression in RAW264.7 cells

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**Aim:** To study the inhibition of parthenolide on LPS induced cytokines expression in RAW264.7 cells.

**Material and Methods:** Quantitative Reverse Transcription Real-Time Polymerase Chain Reaction and Enzyme Linked Immunosorbent Assay were used to explore the cytokines expression in mRNA level (IL-6, TNF- $\alpha$ , Ptg2, IL-1 $\beta$ , IL-10, MMP13 and CXCL1) and protein level (IL-6, TNF- $\alpha$ , IL-1 $\beta$  and IL-10) after parthenolide (0.1, 1, 10, 50  $\mu$ mol/l) and Lipopolysaccharide (LPS, 10  $\mu$ mol/l) treated RAW264.7 cells.

**Results:** The mRNA expression levels of IL-6, TNF- $\alpha$ , Ptg2, IL-1 $\beta$ , IL-10 and MMP13 were dramatically decreased by 10  $\mu$ mol/l or 50  $\mu$ mol/l parthenolide after 10  $\mu$ mol/l LPS treated RAW264.7 for 8 h. Significant change of CXCL1 mRNA expression level wasn't observed. The protein levels of IL-6, TNF- $\alpha$ , IL-1 $\beta$  and IL-10 were also inhibited by 10 or 50  $\mu$ mol/l parthenolide after 10  $\mu$ mol/l LPS treated RAW264.7 for 24 h.

**Conclusion:** Cytokines expression induced by LPS in RAW264.7 cells were totally arrested by parthenolide. This study showed obvious evidences about anti-inflammation effect of parthenolide.

## P0036

### The underlying pathways involved in Aggregatibacter actinomycetemcomitans cytolethal distending toxin induced human T lymphocytes apoptosis

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**Aim:** Cytolethal distending toxin (CDT) is a genotoxin produced by many pathogens and can induce cell apoptosis. Aggregatibacter actinomycetemcomitans (*A. actinomycetemcomitans*) is to date the only known oral bacterial species with the capacity to excrete CDT. The purpose of this study is to investigate the apoptotic mechanisms in T lymphocytes exposure to *A. actinomycetemcomitans* CDT.

**Material and Methods:** Jurkat cells (human T lymphocytes) were treated with *A. actinomycetemcomitans* CDT for 24 h, then Annexin V/PI detection and electron microscopy were employed respectively to quantify and qualify the cell apoptosis. Apoptotic genes expression were examined by apoptosis array and verified using quantitative real-time PCR. Quantitative iTRAQ Proteomics was used to reveal the potential proteins involved in this process and the results were confirmed via western blotting.

**Results:** Significant apoptosis was identified in infected groups (50.4%) in comparison to the controls (4.71%). Eight (8/84) apoptotic genes involved in the RT<sup>2</sup> Profiler<sup>TM</sup> PCR array (Human Apoptosis array) were differentially expressed and confirmed by real-time PCR. Six of them were proapoptotic genes, including TNFRSF10B, CASP8, BCL10, TP53, HRK, BCL2A1, and two of them were anti-apoptotic genes, i.e.

BIRC2 and BIRC3. Fourteen differentially expressed proteins were detected by iTRAQ technology. Among them, five proteins (5/14), including TPX2, ETHE1, TOP2A, UBE2I and CASP3 were verified using western blotting.

**Conclusion:** *A. actinomycetemcomitans* CDT could mediate the apoptosis of human T cells through the extrinsic death receptor-mediated signaling pathway. Then, it may contribute to the development and progression of AgP by regulating the immune response.

## P0037

### BRONJ: the effect of zoledronic acid on VEGF receptors and implications for osteoblast growth and maturation

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**Aim:** Bisphosphonate related osteonecrosis of the jaw (BRONJ) manifests clinically as a failure to heal. Vascular endothelial growth factor (VEGF) has an essential role in wound healing and the coupling of angiogenic and osteogenic processes. Osteoblasts have been shown to produce VEGF and to express VEGF receptors. The aim of the present research was to determine the effects of inhibiting either or both of the receptors VEGFR1 and VEGFR2 on osteoblast growth and maturation.

**Material and Methods:** Three primary human osteoblast cell lines were cultured in 96-well plates in the presence of a specific VEGFR1 (ZM306416), VEGFR2 (ZM323881) or a dual VEGFR1&2 (KRN633) inhibitor in a 4 point dose response. After 23 days of treatment, a mineralisation assay was performed using 10% cetylpyridinium chloride to extract alizarin red. The alizarin red extract was transferred to a 96-well plate and read by a spectrophotometer at 562 nm.

**Results:** Ordinary one-way ANOVA analysis supported a dose response with a linear trend for the VEGFR1 inhibitor ( $p = 0.005$ ) and the dual VEGFR1&2 inhibitor ( $p = 0.007$ ). While mineralisation decreased as inhibitor concentration increased; all VEGFR1 and VEGFR1&2 inhibitor concentrations produced mineralisation data that was significantly different from the untreated control. There was no significant difference for the VEGFR2 inhibitor treated cells.

**Conclusion:** The results support an autocrine role for VEGF and its receptor VEGFR1 in osteoblast maturation as demonstrated by the dose-dependent mineralisation response to VEGFR1 inhibition. This provides the basis for on-going research into BRONJ pathogenesis aimed at elucidating possible mechanisms of VEGFR1 inhibition in primary human osteoblasts.

## P0038

### The clinical and microbiological features of sites with different probing depth reduction after non-surgical periodontal treatment of patients with aggressive periodontitis

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**Aim:** To evaluate the differences of clinical and microbiological parameters in sites of different probing depth (PD) reduction

after non-surgical periodontal treatment in individuals with aggressive periodontitis (AgP)

**Material and Methods:** Clinical examinations including probing depth (PD), attachment level (AL), bleeding index (BI) and full-mouth periapical photographs were collected from 20 patients with AgP, then the patients received non-surgical periodontal treatment, including oral hygiene instruction, supra-gingival scaling, subgingival scaling and root planing (SRP) and were followed to 6 months post-therapy. Gingival crevicular fluids (GCF) were collected at 1 site in each quadrant before and at 6 months post-therapy. Six kinds of putative periodontal pathogens and 6 kinds of short chain fatty acids (SCFAs) were detected in the GCF.

**Results:** The baseline clinical parameters of PD, AL and BI, and the baseline concentration of succinic acid, acetic acid, propionic acid and butyric acid are significantly higher in sites with PD reduction more than 2 mm sites compared with PD reduction no more than 2 mm sites. However, there are no significant differences in the clinical parameters, the 6 kinds of putative periodontal pathogen detection and SCFAs concentration between sites with PD reduction more than 2 mm and PD reduction no <2 mm at 6-month post-treatment. In sites with PD > 5 mm at 6-month post-therapy, all were found with red complex bacteria infection.

**Conclusion:** The baseline clinical parameters were the most important factors in PD reduction after non-surgical periodontal treatment in patients with AgP. In sites with deep pockets after non-surgical periodontal treatment, the active control of red complex bacteria is recommended.

## P0039

### External cervical resorption in vital teeth: a correlative nano-CT, cone-beam CT, scanning electron and light microscopic study

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**Aim:** To explore the three dimensional (3D) architecture and the cellular characteristics of external cervical resorption (ECR) and to understand the cause and the evolution of this pathology.

**Material and Methods:** In this study ten extracted permanent teeth were investigated. Diagnosis of ECR was based on clinical and radiographic examination (periapical and CBCT), whereas the possible predisposing factors were recorded. After extraction, the teeth were assessed by using nano-CT, hard tissue histology and scanning electron microscopy.

**Results:** Regardless the cause of ECR, all examined teeth share some common characteristics. The resorption process starts at the cervical area below cement-enamel junction and invades the dentin in a 3-dimensional way towards the pulp. However, it does not penetrate the pulp space. The pulp retains its vitality due to the pericanalar resorption resistant sheet. This layer consists of predentin, dentin and often of reparative bone-like tissue. Besides resorption, repair of ECR is another important aspect of this pathology. The repair takes place by an ingrowth of bone-like tissue into the resorption cavity, as confirmed by nano-CT, histology and scanning microscopy measurements. Bone turnover of this osseous tissue could be noticed. A 3D observation of the ECR pattern was possible based on the reconstruction processing of nano-CT images by CT-analyzer software. The multiple resorption-repair channels and their interconnections with the periodontal ligament space clearly

indicate the complexity of this periodontal-endodontic pathology.

**Conclusion:** ECR is a dynamic and complex pathology that involves endodontic and periodontal tissues. Based on our findings a better understanding on the cause and evolution of ECR is possible.

## P0040

### Analysis of the proximal bone level on root canal filled and non root canal filled teeth

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**Aim:** The communication between the periodontium and the root canal may serve as a pathway for infectious agents, leading to attachment loss. The aim of this study was to compare the interproximal bone level on root canal filled teeth and non root canal filled teeth (KREBS project).

**Material and Methods:** In a retrospective analysis, the records of patients from the school of dentistry at the University of Basel were consecutively screened during January 2009 and October 2011. The interproximal bone level at the mesial and distal aspects of root canal filled teeth and their contra-lateral non root canal filled correlates were assessed on periapical radiographs. Generalised linear mixed-effects models using the logit link were performed for comparison.

**Results:** The sample consisted of 72 patients comprising data from 128 pairs of teeth. The results for the mean interproximal bone level revealed 5.46 mm for root canal filled teeth and 5.44 mm for teeth without root canal filling ( $p = 0.89$ ). Using the maximal distance on either the distal or the mesial tooth surface a mean distance of 5.44 mm was detected for root canal filled teeth and 5.38 mm for non-root canal filled teeth respectively ( $p = 0.66$ ). The differences between the proximal bone level of root canal filled compared to non root canal filled teeth were not statistically significant in both analyses.

**Conclusion:** Existence of root canal fillings may not be a significant predictor for interproximal bone loss in periodontitis patients.

## P0041

### Bacterially stimulated TGF- $\beta$ 1 potentially induces epithelial-mesenchymal transition in a chronic periodontitis model system

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**Aim:** TGF- $\beta$ 1 is a potent inducer of epithelial-mesenchymal transition (EMT) in various diseases including drug-induced gingival overgrowth. Periodontal pathogens provoke changes in molecular expression in pocket epithelial cells. The aim of this study was to investigate TGF- $\beta$ 1 expression in an EMT in vitro model system which utilised cultured oral keratinocytes and periodontal pathogens.

**Material and Methods:** Oral keratinocytes (H400) were grown to sub-confluence in an atmosphere of 5% CO<sub>2</sub> at 37°C and

exposed to heat-killed *F. nucleatum* (FN), *P. gingivalis* (PG) (100 bacteria per keratinocyte) or 20  $\mu$ g/ml *E. coli* lipopolysaccharide (LPS) for up to 8-days. Culture supernatants were collected on days 1, 5, and 8 to determine TGF- $\beta$ 1 protein levels (ELISA) and RNA was also isolated from cultures using the RNeasy mini-kit. Reverse transcription polymerase chain reaction was performed to determine the relative gene expression levels of TGF- $\beta$ 1 and the key EMT markers (vimentin, S100A4,  $\beta$ -catenin, E-cadherin and N-cadherin) compared with non-exposed cultures.

**Results:** "Chronic" exposure of oral keratinocytes to PG, FN & LPS resulted in a significant increased TGF- $\beta$ 1 protein production (ANOVA,  $p < 0.05$ ) at days 1, 5, and 8. In addition there was up-regulation of TGF- $\beta$ 1 transcript and key mesenchymal markers (N-cadherin, vimentin and S100A4), associated with down-regulation of epithelial markers ( $\beta$ -catenin and E-cadherin) over this period compared with non-exposed controls.

**Conclusion:** Prolonged exposure of oral keratinocytes to periodontal pathogens increased TGF- $\beta$ 1 levels which potentially promoted EMT. These cellular changes may result in disruption of epithelial barrier function in periodontal pockets and may contribute to periodontitis pathogenesis.

## P0042

### The effects of rhAm on osteogenesis of hBMSCs

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**Aim:** Recombinant full-length human amelogenin (rhAm) has been found to promote periodontal regeneration. However, the effects of rhAm on osteogenesis are still unclear. This study is to observe the effects of rhAm on differentiation of human bone marrow stromal cells (hBMSCs) into osteoblasts, and to investigate the possible mechanism of rhAm promoting the osteogenic differentiation of hBMSCs.

**Material and Methods:** hBMSCs were cultured in vitro. The effects of rhAm on hBMSCs were compared to untreated cells for 1, 4 and 7 days. The gene and protein expression of involved factors (Runx2, ALP, Col-I) were analyzed by real-time polymerase chain reaction (PCR) and Western blot. The influence of rhAm in different concentrations on mineralization and osteogenesis of hBMSCs were observed using alkaline phosphatase and alizarin red staining methods. The data are analyzed by SPSS 13.0 software.

**Results:** Compared to the control group, both 10 and 20  $\mu$ g/ml rhAm significantly promoted the gene and protein expression of Runx2, ALP, Col-I ( $p < 0.05$ ). The effects were time-dependent. Both 10 and 20  $\mu$ g/ml rhAm could also facilitate osteogenesis and mineralization of hBMSCs treated with rhAm.

**Conclusion:** rhAm could promote the differentiation of hBMSCs into osteoblasts. These results suggest a new strategy to induce osteogenesis differentiation of hBMSCs.

**P0043****Assessing the antimicrobial activity of a chlorhexidine-containing mouthrinse on a multispecies biofilm using qPCR-PMA**

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**Aim:** The qPCR technique is currently one of the most commonly used methods for obtaining total bacterial counts from samples taken from different sources. A recently updated version of this method now allows for differential quantification of live and dead bacteria by using propidium monoazide (PMA). The aim of this study was to verify whether or not the qPCR-PMA method can be used to evaluate the antibacterial activity of a mouthrinse with chlorhexidine (CHX) on a multispecies biofilm grown in vitro.

**Material and Methods:** Biofilms composed of *Streptococcus oralis*, *Actinomyces naeslundii*, *Veillonella parvula*, *Fusobacterium nucleatum*, *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis* were grown on hydroxyapatite discs for 96 h under anaerobiosis at 37°C. The biofilms were treated with Perio Aid® (0.12% Chlorhexidine, 0.05% Cetylpyridinium Chloride) for up to 2 min. Subsequently, the biofilm was disrupted by vortex for 5 min, and bacterial counts were performed using: (1) culture, (2) qPCR and (3) qPCR-PMA.

**Results:** Significant differences were observed between the bacterial counts of the treated biofilms when comparing qPCR and qPCR-PMA. Under our experimental conditions, the qPCR-PMA technique was also found to detect decreases in survival of up to 4 orders of magnitude; greater reductions were only detected using culture technique.

**Conclusion:** The qPCR-PMA technique is a specific methodology that allows for differential bacterial counts to be performed to identify live and dead cells and can be used to determine the efficacy of a mouthrinse on a multispecies biofilm grown in vitro.

**P0044****Helicobacter pylori DNA presence in the oral cavity**

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**Aim:** Assessment of the oral presence of *Helicobacter pylori* DNA in oral cavity with and without mucosal lesions

**Material and Methods:** In the study 206 patients were enrolled and divided in to 4 groups. There were two tested groups of generally healthy 54 subjects with oral leukoplakia and 72 with oral lichen planus and two control groups without any mucosal lesions consisted of 40 patients with gastric problems and 40 healthy subjects. The presence of *H. pylori* DNA in 2 samples taken from premolar and/or molar interdental spaces or the periodontal pockets– depending on the stage of periodontium was analyzed by using a single – step PCR method. In periodontal examination clinical parameters were assessed: the pocket depth, bleeding and plaque index. Patients with severe periodontitis P3 according to the classification of Offenbacher and patients using antibiotic treatment within 3 months before examination were not included.

**Results:** *H. pylori* DNA was detected in 20% of patients with leukoplakia and in 23.6% in patients with oral lichen planus. However it was not detected in control healthy patients but was present in 15% in patients with gastric problems. In investigated groups of patients with leukoplakia, oral lichen planus and with gastric problems, periodontal status was worsen when compared with healthy control group

**Conclusion:** The oral presence of the *H. pylori* may be associated with the leukoplakia and oral lichen planus and with gastric *H. pylori* infection. The stage of periodontium and oral hygiene may be important when supragingival and subgingival plaque is considered as harboring *H. pylori*.

**P0045****Expression of transient receptor potential vanilloid receptor 1 in diabetic patients with chronic periodontitis**

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**Aim:** We previously reported that of transient receptor potential vanilloid-1 (TRPV1) was down-regulated in subjects with CP compared to subjects with gingivitis. TRPV1, a receptor for capsaicin, the pungent ingredient in hot chili peppers has been suggested as a major player in the process of neurogenic inflammation. Neuropathic changes and vascular complications are common pathologies associated with diabetes. TRPV1, recently, has also been implicated in etiology of diabetes and obesity. Clinically periodontal disease more common in diabetic patients compared to healty individuals. The objective of the present study was to evaluate the expression and the distribution of the transient receptor potential vanilloid receptor 1 (TRPV1) in tissue samples from healty and diabetic patiens with chronic periodontitis.

**Material and Methods:** Ten tissue samples from each group: healthy subjects with no periodontal disease and Chronic periodontitis and diabetic patients with periodontal disease were obtained during routine oral surgical procedures. The distribution of TRPV1 receptor in human gingival tissue was studied by immunohistochemistry.

**Results:** Histologic examination of the samples from healthy controls disclosed that clinically healthy gingiva does not correspond to histologically healthy gingiva. Subsequently, these samples were redesignated as gingivitis samples. TRPV1 was detected in gingival tissues of all groups. There was statistically no signifacant differences in the expression and distribution of TRPV1 receptor between samples obtained from diabetic patients and healty patients with chronic periodontitis.

**Conclusion:** Although biologically a potential biomarker for pathogenesis periodontitis associated with diabetes mellitus, our results did not support its role.

## P0046

### The decreased expression of E-cadherin by *P. gingivalis* LPS leads the destruction of the epithelial barrier function in human gingival epithelial cells

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**Aim:** The gingival epithelium is a first line of defense against bacterial challenge. E-cadherin (E-cad) plays an important role in cell-cell adhesion in the epithelium. Recently, a reduction of E-cad has been observed in inflamed gingival tissue. However, the relationship between E-cad and periodontal disease is not clear. The aims of this study were to investigate the expression of E-cad and alteration of permeability in epithelial cells treated with a lipopolysaccharide from *Porphyromonas gingivalis* (P.g-LPS) and to search for components that can resist P.g-LPS by regulating E-cad expression.

**Material and Methods:** A Simian virus-40 antigen immortalized human gingival epithelial cell line (epi-4) was incubated until it reached confluence. After that, we incubated the cells in the presence or absence of P.g-LPS and vitamins. E-cad expression was analyzed by real-time polymerase chain reaction and immunofluorescence staining. To confirm the effect of E-cad on transepithelial cell permeability, we use Transwell chambers paved with epi-4 cells and P.g-LPS as a transport substance. P.g-LPS passed through into the lower chamber across the epi-4 cells and was detected by endotoxin testing reagents.

**Results:** Expression of E-cad in epi-4 cells was reduced by P.g-LPS, and the reduction of E-cad accelerated the penetration of the P.g-LPS.  $\alpha$ -Tocopherol (Vitamin E) and L-ascorbic acid 2-phosphate magnesium salt (APM) inhibited the reduction in E-cad and penetration of P.g-LPS.

**Conclusion:** These results suggest that reduction of E-cad by P.g-LPS leads to destruction of the epithelial barrier function in human gingival epithelial cells and Vitamin E and APM may restore the impaired function.

## P0047

### Cigarette smoke accelerates periodontal tissue destruction in mouse experimental periodontitis model

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**Aim:** Periodontal diseases are chronic inflammatory diseases that result in periodontal tissue destruction. Smoking is one of the major environmental factors involved in the progress of periodontal diseases. In this study, we investigated the effects of cigarette smoke condensate (CSC) and nicotine, which is the most studied constituents in cigarette smoke, on periodontal tissue destruction.

**Material and Methods:** We injected CSC, nicotine and phosphate buffered saline (PBS) into mice, respectively. After the injection, a silk thread was tied around the tooth, while the contralateral tooth was untreated. After the ligature placement, the alveolar bones were scanned by micro-CT and stained histologi-

cally with hematoxylin-eosin and TRAP. Furthermore, mononuclear cells from submandibular lymph nodes (SMLN) were isolated and mRNA expression of RANKL was determined by real-time PCR.

**Results:** The images from the micro-CT scan showed significant bone resorption on the ligated side compared with the unligated side. In particular, CSC-treated and nicotine-treated groups showed greater bone loss than PBS-treated group. Compared to the unligated side, mRNA expression of RANKL in SMLN on the ligated side was up-regulated. Histological analysis revealed that bone surface on the unligated side was smooth, whereas that on the ligated side was irregular. With TRAP staining, in CSC-treated and nicotine-treated groups, more osteoclasts were observed than PBS-treated groups on the ligated side.

**Conclusion:** The present study suggests that treatment of CSC or nicotine exacerbates alveolar bone destruction in a periodontitis-model mouse probably via the induction of RANKL expression.

## P0048

### Gingival tissue MMP2 and MMP9 levels of chronic periodontitis patients with or without smoking

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**Aim:** Although it is known that smoking is a risk factor for periodontitis, it is not yet clear how it affects periodontal destruction mechanism. The aim of this study was to determine the effects of smoking and chronic periodontitis on gingival MMP-2 and MMP-9 levels, to determine the role of MMP-2 and MMP-9 on periodontal disease and to determine the relationship between smoking and gelatinases.

**Material and Methods:** 35 women, 45 men aged between 16 and 62 were included in this study (total 80 patients). Patients were divided into four groups: smokers with chronic periodontitis (n = 20), non-smokers with chronic periodontitis (n = 20), smokers without periodontal disease (control n = 20), non-smokers without periodontal disease (control n = 20). Gingival tissue samples were obtained from the deepest periodontal pocket in the periodontitis patients. Samples of the control groups were obtained during crown-lengthening or orthodontic tooth extraction procedures. Inflammatory cell, neovascularization and fibroblastic proliferation levels were evaluated in the tissue samples with hematoxylin and eosin staining, MMP-2 and MMP-9 levels were evaluated with immunohistochemical staining.

**Results:** MMP-2 and MMP-9 levels were found to be higher in patients with periodontitis compared to control groups ( $p < 0.05$ ). It was also found that smoking decreased the MMP-2 and MMP-9 levels in patients with chronic periodontitis but had no effect on MMP-2 levels in the control group and increased the MMP-9 levels in the control groups ( $p < 0.05$ ).

**Conclusion:** MMP-2 and MMP-9 levels were found to be higher in chronic periodontitis patients but the results on the effects of smoking on MMP-2 and MMP-9 levels were conflicting.

## P0049

### Detection of IL-10-producing neutrophils in chronic periodontitis

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**Aim:** Recently, neutrophils have been found to play a previously unsuspected suppressive role during acute and chronic microbial infection. To demonstrate whether neutrophils are able to transform into IL-10-producing cells during inflammation induced by Gram-negative bacteria, we analyzed purulent exudates from periodontal pockets of patients with chronic periodontitis.

**Material and Methods:** Six patients with untreated chronic periodontitis with a probing pocket depth >5 mm were recruited into the study. Purulent exudates were collected from the periodontal pockets before any mechanical debridement or pharmacological therapy was performed. One drop of purulent exudate was applied on microscope slides and fixed by 4% PFA. To visualize IL-10 positive neutrophils and Treg cells, double staining with anti-IL-10 and anti-FOXP3 mAbs was used. Neutrophils were identified based on the morphological features of the nucleus. Images were acquired using BD Pathway™ Bio-imager 850 and confocal Nikon D-Eclipse C1 microscopes.

**Results:** We found that IL-10-positive neutrophils were present in the all samples collected from the patients with chronic periodontitis. Confocal z-stack analysis confirmed the intracellular localization of IL-10 in neutrophils. Additionally, FOXP3+ lymphocytes were found to be negative for IL-10.

**Conclusion:** These experiments clearly confirm that human neutrophils are able to produce IL-10 during LPS-induced inflammation *in vivo*. Therefore, neutrophils might be an important source of anti-inflammatory IL-10. Our findings are in line with the concept of regulatory functions of neutrophils which are not only a homogenous population of effector cells.

## P0050

### The subgingival microbiome in periodontal sites of restored and unrestored teeth

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**Aim:** To investigate whether metal-based restorations influence the subgingival microbiome.

**Material and Methods:** Per patient one periodontal site with a metal-based restoration and one contra-lateral site without a restoration were selected on basis of radiographic bone loss  $\leq 2$  mm, restoration outline at sulcus level/subgingivally, pocket depth  $\leq 4$  mm and no root canal treatments. Subgingival samples were collected with sterile paper-points and microbial profiles were obtained by 16S rRNA gene amplicon sequencing. Restorations were sampled with an Arkansas-stone and the metal composition was determined using energy-dispersive X-ray spectroscopy.

**Results:** 11 dental patients were included. The average age was 51 years (range 41–67 years; 7 males, 4 females). No significant differences for the clinical parameters were found between the restored and unrestored sites. The average age of the restora-

tions (7 porcelain-fused-to-metal crowns and 4 amalgam restorations) was  $16.2 \pm 6.72$  years, range 10–30 years. Firmicutes was the most prevalent phylum at the restored sites (32% vs. 20% of the reads unrestored sites,  $p = 0.016$ ), and Actinobacteria at the unrestored sites (33% vs. 18% of the reads restored sites,  $p = 0.01$ ). In total, sequences clustered into 573 OTUs. Species richness (nr of OTUs) of the restored sites was significantly higher than species richness of the unrestored sites ( $117 \pm 32$  and  $96 \pm 20$  OTUs, respectively,  $p = 0.013$ ). No associations between the metal composition and bacterial profiles were found.

**Conclusion:** Metal-based restorations may enhance colonization of Firmicutes and adjacent pockets harbor more diverse microbial communities, probably by altered surface structure and roughness, enhanced retention, galvanic corrosion and leakage of metals.

## P0051

### Sex hormone receptors and periodontal repair in female rats

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**Aim:** Androgen and oestrogen receptors regulate many physiologic and pathologic events. We tested the hypothesis that prevention of androgen or oestrogen receptor activation influence periodontal repair in female rats.

**Material and Methods:** Fifty female Holtzman rats (approximately 200 g) were included in this study. Forty rats received ligatures around the lower first molars (periodontitis induction), while 10 other rats served as non-periodontitis controls. At day 13, thirty animals received no treatment (repair control;  $n = 10$ ), treatment with flutamide (an androgen receptor antagonist;  $n = 10$ ) or fulvestrant (an oestrogen receptor antagonist;  $n = 10$ ). Ligatures were removed at day 14, same day as 10 periodontitis control rats were killed. The remaining rats were killed at days 17 (for analysis of serum PgE2 by ELISA) or 28 (for analysis of radiographic bone loss, serum levels of oestradiol, progesterone, testosterone and C-telopeptide – CTX using ELISA;  $n = 5$ /group).

**Results:** Fulvestrant significantly increased serum testosterone (Kruskal–Wallis;  $p < 0.05$ ), decreased progesterone ( $p < 0.05$ ) and had no impact on oestradiol levels compared to control animals. Bone loss was significantly increased in periodontitis and repair animals (ANOVA;  $p < 0.0001$ ), and repair controls showed significantly less bone loss compared to periodontitis controls ( $p < 0.01$ ). Fulvestrant and flutamide prevented or decreased bone repair, but the result was only significant for fulvestrant group ( $p < 0.01$ ). CTX was similar among the groups ( $p > 0.05$ ). Serum PgE2 was significantly increased in fulvestrant-treated animals when compared to all other groups ( $p < 0.001$ ).

**Conclusion:** We conclude that estrogen receptors play an important role on bone formation during periodontal repair, but the impact of androgen receptors may be limited in female rats.

## P0052

### Role of smoking in the association between periodontal condition and blood pressure – results of the Health 2000 Survey

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**Aim:** To study the role of smoking in the association between periodontal condition and blood pressure.

**Material and Methods:** This study was based on a subpopulation of the Health 2000 Survey in Finland. After restriction to 45–64-year-old dentate, non-diabetic subjects without a history of cardiovascular diseases, the study population consisted of 307 subjects. Their periodontal condition was measured by the number of teeth with periodontal pockets  $\geq 4$  mm. Systolic blood pressure (mmHg) was used as the outcome variable.  $\beta$ -estimates were obtained from linear regression models. All models were adjusted for age, gender, BMI, educational level, triglycerides, HDL and LDL cholesterol, alcohol consumption and the level of physical activity. Different variables of smoking habits/history were used to control for the effect of smoking.

**Results:** Using a dichotomised (smoking/non-smoking) variable, the  $\beta$ -estimate for blood pressure was 0.32 (p-value 0.02), whereas using a more specific variable (daily smoker/occasional smoker/quit smoking over the past year/quit smoking more than a year ago/never-smoker), the  $\beta$ -estimate for blood pressure was 0.32 (p-value 0.02). Using a pack-year variable, the  $\beta$ -estimate for blood pressure was 0.34 (p-value 0.01). In stratified analyses according to smoking habits, there was practically no association between periodontal condition and blood pressure among daily smokers ( $\beta$ -estimate  $-0.04$ , p-value 0.89) or among never-smokers ( $\beta$ -estimate 0.14, p-value 0.53).

**Conclusion:** Smoking may cause spurious associations between periodontal condition and blood pressure. Using multivariate models to control for the effect of smoking appears to be an inadequate method. Other methods to control for the effect of smoking are advocated.

## P0053

### Tone of masseter muscles and oral cavity parafunctions

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**Aim:** Epidemiological studies indicate that problem of temporomandibular disorder (TMD) concern people of all age. Electromyography (EMG) is fairly new and accessible method of clinical evaluation of masticatory muscles. The aim of the study was to evaluate the level of masseters' muscle tone in relationship with the presence of characteristic symptoms of stomatognathic parafunctions and smoking habit.

**Material and Methods:** Examinations were carried out in 61 fifth grade students of Faculty of Dentistry Wroclaw Medical University (42 women, 19 men), mean age 23.5 years-old. Students filled up the questionnaire concerning subjective opinions on temporomandibular joint (TMJ) pain and smoking habit. In clinical examination were assessed: the presence of linea alba or mechanical trauma of buccal mucosa by cheek biting, the pres-

ence of the gingival recessions and tooth wear symptoms. Electromyography of masseter muscle during physiological resting position of mandible was performed, using EMG device Myoresearch Xp by Noraxon.

**Results:** Statistical analysis showed ( $p < 0.05$ ) that presence of linea alba or other buccal mucosa impressions, pain of TMJ and tooth wear were positively connected to increased masseters' tone. However duration of nicotinism had been assessed as having negative connection with the tone of masseter. But there is no statistical relationship between evaluated masseters' tone and presence of gingival recessions.

**Conclusion:** EMG allows an objective and qualitative evaluation of muscular activity. Basing on measured tone of masseter muscle our study proved that there was significant relationship between temporomandibular disorders and tobacco smoking habit and masseter muscles' tension. However further researches should be conducted.

## P0054

### Periodontal pocketing and gingival bleeding in relation to intake of omega-3 and omega-6 polyunsaturated fatty acids (PUFAs)

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**Aim:** To study whether the intake of omega-3 and omega-6 PUFAs in the diet is associated with gingival bleeding or periodontal pocketing.

**Material and Methods:** The data were collected from a nationally representative Health 2000 Survey. Smokers and people suffering from diabetes or rheumatoid arthritis were excluded. Analyses were made in two age groups: 30–49 years ( $n = 1212$ ) and 50–79 years ( $n = 980$ ). Clinically determined sextants with gingival bleeding and teeth with periodontal pockets were used as outcome variables. Dietary data were collected by a validated food frequency questionnaire covering the past 12 months. Energy-adjusted intakes of arachidonic acid (AA), eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and sums of omega-3 and omega-6 PUFAs, as well as ratios of EPA/AA, DHA/AA, and omega-3/omega-6 PUFAs were used as exposures.

Prevalence rate ratios were estimated using Poisson regression models. The models were adjusted for age, gender, number of teeth (offset), education, plaque, body mass index and serum level of CRP.

**Results:** There were no consistent associations between fatty acids and teeth with periodontal pockets or gingival bleeding. In the older age group, a moderate intake of AA was inversely associated with gingival bleeding and a high intake of AA was associated with the number of teeth with deepened periodontal pockets. The latter finding was not statistically significant in the fully adjusted model.

**Conclusion:** Intakes of omega-3 or omega-6 PUFAs were not consistently associated with gingival bleeding or periodontal pocketing.

**P0055****Oral malodour is associated with inflammatory cytokines in gingival-crevicular fluid and saliva**

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**Aim:** This aim of the present study was to investigate a possible association between volatile sulphur compounds (VSC) in breath and cytokines, measured in gingival crevicular fluid (GCF) and saliva of individuals with good oral health, gingivitis and chronic periodontitis.

**Material and Methods:** Samples were collected from 19 periodontally healthy, 6 gingivitis and 7 chronic periodontitis patients. Breath samples were analysed using a portable gas chromatograph (Oral Chroma) to determine concentrations of methanethiol and hydrogen sulphide. Six point pocket chart, bleeding index and plaque index scores (%) were used to identify deep periodontal pockets and the periodontal status of the participant. GCF was sampled by placing filter paper strips into periodontal pockets of selected teeth and analysed for inflammatory cytokines via a multiplex bead immunoassay.

**Results:** Negative correlations were observed in the following comparisons: methanethiol in relation to IL-12p70 ( $r = -0.37$ ;  $p = 0.04$ ) and Granulocyte-Colony Stimulating Factor ( $r = -0.45$ ;  $p = 0.01$ ); H<sub>2</sub>S compared with IL-17a ( $r = -0.39$ ;  $p = 0.03$ ) and Granulocyte-Colony Stimulating Factor ( $r = -0.38$ ;  $p = 0.03$ ). Methanethiol and H<sub>2</sub>S were positively correlated with TNF- $\alpha$  ( $r = 0.36$ ,  $p = 0.05$ ) and IL-13 ( $r = 0.42$ ,  $p = 0.02$ ), respectively. Salivary IL-17a and methanethiol ( $r = -0.39$ ;  $p = 0.03$ ) were associated negatively, whereas TNF- $\alpha$  and H<sub>2</sub>S were associated positively ( $r = 0.45$ ;  $p = 0.01$ ).

**Conclusion:** Our study found that methanethiol and hydrogen sulphide correlated positively with TNF- $\alpha$  levels, in both GCF and saliva, possibly as a result of a pro-inflammatory pathway activity enhanced by VSCs. On the other hand G-CSF and IL-17a levels were negatively associated with both VSCs, supporting their prior association with improved immunological status.

**P0056****Influence of periodontitis on systemic oxidative stress in a bioluminescent transgenic mouse model**

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**Aim:** Many studies have reported a significant correlation between periodontitis and systemic oxidative stress, and thus an in vivo imaging system for oxidative stress has been awaited. Recently, transgenic type Keep1-dependent oxidative stress detector (OKD) mouse was developed as a tool of bioluminescent imaging. The aim of this study was to investigate how periodontitis progression induced systemic oxidative stress in real time using the OKD mice.

**Material and Methods:** Fourteen male OKD mice (age; 8 weeks) (C57BL/6 strain background) were divided into two groups of seven mice each: the periodontitis group and the no treatment (control) group. In the periodontitis group, a 5/0 cot-

ton ligature was placed in a submarginal position on mandibular first molars to induced periodontitis. Luciferase activity, which indicated signals upon oxidative stress, was detected using a luminometer at 1, 2, 7, 14, 21, and 28 days. After the experimental period, the samples in the mandibular molar region were dissected to determine alveolar bone resorption. In the statistical analysis, t test was used to compare the two groups.

**Results:** In the periodontitis group, the luminescence activities in the mandibular, chest, and ventral areas were significantly greater than those in the control group at 7 and 14 days ( $p < 0.05$ ). Alveolar bone resorption was rapidly induced in the periodontitis group during 7 days and gradually progressed until 28 days.

**Conclusion:** Increased oxidative stress in the mandibular, chest, and ventral areas synchronized during progression of alveolar bone resorption.

**P0057****Aggregatibacter actinomycetemcomitans biofilm decreases keratin 19 expression in an oral mucosa culture model**

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**Aim:** Keratins are intermediate filament proteins expressed in epithelial cells. Keratin (K)19 is responsible for the epithelial homotypic cell-cell adhesion. At the dentogingival junction K19 is typical for the junctional epithelium (JE), it is highly expressed during active renewal of JE e.g. during tooth eruption and regeneration of JE after surgery. The goal of this study was to estimate the changes in K19 expression of gingival epithelial cells exposed to opportunistic periopathogen *Aggregatibacter actinomycetemcomitans*.

**Material and Methods:** The expression of K19 was investigated in an organotypic gingival mucosa co-culture model. Briefly, the model was constructed from collagen solution mixed with gingival fibroblasts and immortalized gingival epithelial cells seeded on the top. The model was co-cultured with *A. actinomycetemcomitans* biofilm grown on a membrane, or with membrane alone. The effect of the biofilm after 24 h was assessed using immunohistochemistry.

**Results:** We found two distinct patterns of K19 expression. The first group of specimens including the unstimulated gingival epithelium and biofilm free membrane uniformly showed K19 expression. The second group including *A. actinomycetemcomitans* biofilm showed a marked decrease in K19 expression, which also exhibited a variation between basal and suprabasal layers. The basal layer adjacent to the connective tissue showed more intensive staining than the suprabasal layer.

**Conclusion:** *A. actinomycetemcomitans* biofilm decreases K19 expression. After *A. actinomycetemcomitans* colonization to the most superficial layer of epithelium, the gingival epithelial cells may lose their resistance and become more vulnerable to bacterial infection. This may ease the invasion of the bacteria into deeper tissues.

## P0058

### Evaluation of the interaction between gingival inflammation and Thalassemia major via clinical and biochemical parameters

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**Aim:** It is hypothesized that thalassemia major (TM) may affect the clinical and/or biochemical findings in inflammatory periodontal diseases or vice versa. This study was planned to investigate clinical periodontal parameters with saliva and serum levels of matrix metalloproteinase-8 (MMP-8), MMP-9 and tissue inhibitor of MMP-1 (TIMP-1) in patients with TM.

**Material and Methods:** Whole saliva and serum samples were obtained and full-mouth clinical periodontal measurements were recorded in 29 TM patients and 25 systemically healthy (SH) individuals. MMP-8, MMP-9 and TIMP-1 levels in the biofluid samples were assayed by IFMA and ELISA. Data were tested statistically by Kolmogorov-Smirnov, Mann-Whitney U tests.

**Results:** Probing depth and gender were significantly different in the TM group from the systemically healthy control group ( $p = 0.037$ ). There were no significant differences in bleeding on probing, plaque index, age and smoking status between the study groups ( $p = 0.613$ ;  $p = 0.895$ ;  $0.508$ ;  $0.093$ , respectively). Saliva MMP-8, MMP-9 and TIMP-1 levels were significantly higher in the TM group than systemically healthy group ( $p = 0.014$ ;  $p < 0.001$ ;  $p = 0.042$ , respectively). Serum TIMP-1 levels were significantly higher; MMP-8/TIMP-1 and MMP-9/TIMP-1 ratios were significantly lower in the TM group than systemically healthy group ( $p < 0.001$ ;  $p = 0.005$ ;  $p = 0.022$ , respectively). Saliva MMP-9/TIMP-1 correlated with all periodontal data; saliva MMP-8 correlated with bleeding and plaque; saliva MMP-9 correlated with pocket depth in the TM group.

**Conclusion:** Within the limits of the present study, it may be suggested that TM exacerbates local inflammatory response. Larger scale and intervention studies evaluating different biochemical parameters in biofluids are required to better address this issue.

## P0059

### Evaluation of serum and GCF LL-37 levels in generalized aggressive periodontitis

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**Aim:** LL-37 is an endogenous antibiotic having role in innate immunity during periodontal inflammation. The aim of the present study was to evaluate the serum and GCF LL-37 levels in non-smoker generalized aggressive periodontitis (GAgP), gingivitis patients and healthy controls.

**Material and Methods:** Twenty-six GAgP patients, 24 gingivitis patients and 25 healthy control subjects were included into the study. Clinical periodontal parameters including probing depth, clinical attachment level, plaque index, and papilla bleeding index were recorded. GCF and serum LL-37 levels were analyzed by enzyme-linked immunosorbent assay.

**Results:** Age and gender distribution in the study groups were similar in the present study ( $p > 0.05$ ). GCF LL-37 total amount was significantly higher in GAgP patients compared to gingivitis patients and healthy controls ( $p < 0.05$ ). Gingivitis patients had significantly higher GCF LL-37 levels than healthy controls ( $p < 0.05$ ). However, no significant differences were observed in serum LL-37 levels among the study groups ( $p > 0.05$ ).

**Conclusion:** Local increase of LL-37 in patients with periodontal disease might reveal that LL-37 has a role in periodontal inflammation. Besides, increased GCF LL-37 levels in GAgP patients might suggest that this peptide is abundantly expressed in the presence of periodontal tissue destruction.

## P0060

### Expression of immune regulatory receptors in oral squamous cell carcinomas

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**Aim:** Programmed death 1 receptor (PD-1) is expressed on the surface of activated T cells, B cells and macrophages. PD-L1 and PD-L2 receptors are ligands of PD-1 and belong to the B7 family of immune regulatory receptors. PD-L1 expression has been detected in the majority of human carcinomas *in vivo*. PD-L1 mediated signals are able to negatively regulate activated T cell functions and survival, and may enable tumor cells to overcome host response. The aim of this study was to investigate the expression of PD-1, PD-L1 and PD-L2 receptor protein in oral squamous cell carcinomas.

**Material and Methods:** Tissues from 27 oral squamous cell carcinomas (OSCC) were paraffin embedded, prepared according to routine immune-histology and incubated with antibodies against human PD-1, PD-L1 and PD-L2. The immuno-staining was performed using diaminobenzidine as substrate. Nuclei were stained with hematoxylin. The samples were analyzed with a Leica DM 750 light microscope

**Results:** 21 OSCC from 27 were positive for PD-L1 and 17 for PD-L2. PD-1 was detected in 12 OSCC. The staining pattern for all three receptors was cytoplasmic. In 4 OSCC the PD-L1 and PD-1 expressions were located in the same area of the tissue.

**Conclusion:** Expression of the PD-1, PD-L1 and PD-L2 receptors in oral squamous cell carcinomas was demonstrated which may facilitate immune evasion of the tumors.

## P0061

### Cultivation of Treponema sp. in subgingival biofilm of periodontitis patients

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**Aim:** Nucleic-acid based methods are the gold-standard in analyzing microbes of subgingival biofilm. However, cultivation allows analysis of virulence and antimicrobial sensitivity of clinical isolates. The purpose of this study was to cultivate selected *Treponema* sp.

**Material and Methods:** Subgingival biofilm was collected from nine patients with generalized aggressive periodontitis, nine with

generalized chronic periodontitis and five periodontally healthy controls. Samples from six different sites were cultivated by using membrane filters and analyzed for *Treponema denticola*, *T. socranskii*, and *T. vincentii*. In addition, real-time PCR was performed. Culture and PCR were compared with McNemar test. Differences related to clinical diagnosis were analyzed by using Chi<sup>2</sup> test.

**Results:** Of all analyzed samples, 30 (25.4%) were tested positively for any *Treponema* spp. by culture. Among these 30 samples, one species was found in four samples, two species were detected in eight samples and all three analyzed species in 18 samples. Subject-based, the prevalence of *T. denticola*, *T. socranskii*, and *T. vincentii* was the highest in aggressive periodontitis (7–8/9 positive), followed by chronic periodontitis (4–5/9) positive, whereas only in 1 control *T. socranskii*, and *T. vincentii* was found. Differences were most remarkable for *T. denticola* ( $p = 0.006$ ). Site-based comparison revealed significant more positive samples for analyzed species when PCR was used (each  $p < 0.01$ ), however subject-based no difference was seen.

**Conclusion:** *T. denticola*, *T. socranskii*, and *T. vincentii* are cultivable in patients tested positively by nucleic acid based methods. They are associated with periodontal disease, in particular with aggressive periodontitis.

## P0062

### Genetic analysis of aggressive periodontitis in a cohort from Lagos, Nigeria

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**Aim:** To identify the genetic factors associated with Aggressive Periodontitis (AGP) in a cohort from Lagos, Nigeria.

**Material and Methods:** Screening and diagnosis were made by specialist registrars and consultants in the Periodontology Unit of the Lagos University Teaching Hospital in Lagos, Nigeria. Demographic data, saliva samples for DNA analysis and microbial samples from affected teeth, adjacent teeth and buccal sulcus were obtained for characterization from the indexed case. Saliva samples were also obtained from controls and unaffected relatives. We selected 6 single nucleotide polymorphisms (SNPs) in genes that were significantly associated with CRP levels from a recent Genome-wide Association Study (GWAS) for genotyping. Statistical analysis was done using PLINK to investigate the association of SNPs with AGP.

**Results:** There were 15 cases (9 females and 6 males) and 9 controls (4 females and 5 males). None of the 6 SNPs was significantly associated with AGP when we conducted a case control analysis ( $p > 0.05$ ). However there was a non-significant increased risk (OR = 1.6 for rs2794520C>T polymorphism downstream of the CRP gene and OR = 1.1 for rs4420065T>C polymorphism downstream of the LEPR gene) for AGP.

**Conclusion:** Our current sample size has limited power to detect any statistically significant differences. However, the trend observed for rs2794520 and rs4420065 warrants further investigation in a larger cohort. It is also important to conduct whole exome sequencing using these homogenous AGP samples from Nigeria in order to identify rare functional variants that may explain the genetic contribution of novel genes

## P0063

### Expression of TLR2, 4 and 9 in gingival tissue in chronic and aggressive periodontitis

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**Aim:** The aim of this study was to assess the expression of TLR2, 4 and 9 in gingival tissue from patients with chronic (CP) and aggressive (AgP) periodontitis. Also logistic regression was used in order to investigate the impact of TLRs expression on periodontitis.

**Material and Methods:** 62 patients with chronic and aggressive periodontitis were recruited. Gingival tissue samples were obtained during periodontal surgical procedures. The test group consisted of 30 healthy individuals (samples obtained during 3rd molar extractions). Real time PCR was used to measure TLRs' expression levels.

**Results:** Expression of TLR4 and TLR9 was significantly higher in all patients with periodontitis. Moreover TLR9 expression was also significantly higher in the CP in respect to AgP. Patients with aggressive periodontitis exhibited significant positive correlations between the expression of all TLRs and the presence of plaque and also showed significant positive correlations between the expression of TLR4 and TLR9 and the severity of periodontitis. Substantial higher values of all periodontal indices and lower number of teeth were reported in 15 individuals with the highest expressions of TLR4. 15 patients with highest expressions of TLR9 exhibited significantly elevated rates of only plaque and inflammation parameters. In a logistic regression model after adjusting for age, sex, smoking and plaque index high TLR9 expression was found to reduce the risk of chronic periodontitis.

**Conclusion:** TLR4 expression is associated with severity and progression of periodontitis while the high expression of TLR9 depends mainly on presence of plaque. Also TLR9 expression may play a protective role against development of chronic periodontitis.

## P0064

### The effect of systemic curcumin on local and systemic Th17 response and alveolar bone loss in experimental periodontitis

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**Aim:** Curcumin was reported to have some biological activities, anti-inflammatory and antioxidant effects. In this study, the effect of systemic curcumin on local and systemic Th17 response and alveolar bone loss were investigated in ligature induced experimental periodontitis in rats.

**Material and Methods:** Four groups were constituted: Group 1: rats with periodontitis and curcumin application; Group 2: periodontally healthy rats and curcumin application; Group 3: rats with periodontitis; Group 4: periodontally healthy rats. The administration of curcumin via oral gavage was started 1 day before the induction of periodontitis and was continued at 30 mg/kg body weight daily for 15 days. At the day 15, the rats were sacrificed. The maxillae were obtained, the gingival tissues

were removed and the morphometric evaluation of the alveolar bone loss was made. The gingival tissue samples were stained for the presence and density of IL-17 and ROR $\gamma$ t. The serum levels of IL-1 $\beta$ , IL-6, IL-17A, IL-23, and TGF- $\beta$  were determined with ELISA. The data were analysed with SPSS 9.0 (CA, USA).

**Results:** The lowest serum IL-23 levels were found in the Group 1, while the Group 3 has the highest ( $p < 0.0125$ ). The gingival tissues have shown significantly higher staining density in Group 3 than Group 1 for IL-17 and ROR $\gamma$ t ( $p < 0.0125$ ). The alveolar bone loss was not found significantly different between Group 1 and Group 4 ( $p > 0.0125$ ). The Group 1 has higher alveolar bone loss than the Group 3 ( $p < 0.0125$ ).

**Conclusion:** The application of curcumin has resulted in decreased alveolar bone loss and locally decreased Th17 response.

## P0065

### Real-time PCR quantification of five periodontal pathogens in subgingival samples from postmenopausal women

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**Aim:** The aim of this study was to quantify five periodontal pathogens: *Aggregatibacter actinomycetemcomitans*, *Fusobacterium nucleatum*, *Porphyromonas gingivalis*, *Campylobacter rectus* and *Tannerella forsythia*, in subgingival samples from postmenopausal women by quantitative polymerase chain reaction (qPCR).

**Material and Methods:** Subgingival samples were taken from seventy-six postmenopausal women with paper points and bacterial DNA was extracted. The hydrolysis probe 5' nuclease assay qPCR method was used to detect and quantify the presence of five periodontal pathogens in each sample, and further statistical analysis was performed to associate the results to the presence or absence of periodontitis.

**Results:** The participants had a median age of 63.0 years and 47.9% ( $n = 35$ ) had periodontitis. *P. gingivalis* was detected in 84.2% of cases ( $n = 64$ ), in 14.5% was non-quantifiable ( $n = 11$ ) and only in 1.3% of samples ( $n = 1$ ) it was not detected. *T. forsythia* and *C. rectus* was present in 100% of the samples ( $n = 76$ ), *F. nucleatum* in 98.7% ( $n = 75$ ) and *A. actinomycetemcomitans* in 73.7% ( $n = 56$ ). Statistical analysis did not show significant differences between patients with periodontitis and healthy patients in relation to the presence of the bacterial species examined.

**Conclusion:** In this study, the presence of five periodontal pathogens could not be related to the diagnostic of periodontitis. Women in the healthy category were not free of the presence of the oral pathogens; therefore, appearance of periodontal species was not sufficient to define disease.

## P0066

### Pyrosequencing analysis of oral microbiome of Chinese patients with aggressive periodontitis and their family members

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**Aim:** The aim of the present study was to investigate the abundance and diversity of oral microbiome in Chinese patients with aggressive periodontitis (AgP) and their family members.

**Material and Methods:** Saliva and pooled subgingival plaque samples were collected from 10 AgP patients and their family members with periodontitis. Plaque and salivary DNA were used to generate DNA amplicons of V1–V3 hypervariable region of bacterial 16S rRNA gene, and subjected to 454-pyrosequencing.

**Results:** High bacterial diversity was noted in the saliva and subgingival plaque of AgP patients (378 operational taxonomical units (OTU) in plaque, 422 OTU in saliva) and their relatives (449 OTU in plaque, 488 OTU in saliva). UniFrac and principal coordinates analysis (PCoA) showed distinct community profiles between saliva sample and subgingival sample of the subjects, and similar community profiles between plaque of AgP patients and their family members. The phylum of Bacteroidetes was the most abundant phylum in subgingival plaque sample of AgP patients (relative abundance: 49.8%) and their relatives (31.1%), whereas Firmicutes was the most abundant phylum in saliva sample of AgP patients (38%) and their relatives (35.8%). *Porphyromonas gingivalis* was the most abundant species in subgingival plaque sample of AgP patients (the highest abundance was 76.3%, and mean relative abundance 34.9%).

**Conclusion:** In periodontitis, there is significantly difference between the composition of salivary microbiome and subgingival plaque microbiome, as revealed by pyrosequencing. Similar community profiles between plaque of AgP patients and their family members suggested the transmission of oral bacteria.

## P0067

### *Porphyromonas gingivalis* suppresses immune response in periodontal fibroblast

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**Aim:** The periodontal fibroblast expresses various pattern recognition receptors (PRRs) which elicits an immune response to plaque biofilm. *Porphyromonas gingivalis*, a Gram negative anaerobic bacterium associated with periodontal disease is capable of subverting host immune responses in immune and non-immune cells through diverse mechanisms. However, the potential ability of *P. gingivalis* to modulate immune responses in periodontal fibroblast is currently not well studied. The aims of this study were (1) to determine if *P. gingivalis* modulates the activation of nuclear factor kappa B (NF $\kappa$ B), one of the main transcription factors regulating inflammatory responses in periodontal fibroblast and (2) to determine if *P. gingivalis* inhibits toll-like receptor (TLR) signaling.

**Material and Methods:** Periodontal fibroblasts were transfected with NF $\kappa$ B-SEAP reporter prior to infection with either live or heat-killed *P. gingivalis*. Cellular NF $\kappa$ B activation was moni-

tored by reporter assay and western blot analysis. Cytokine production was determined by ELISA.

**Results:** Periodontal fibroblast infected with live *P. gingivalis* activated cellular NF $\kappa$ B less compared to heat-killed *P. gingivalis* treated cells. Correspondingly, live *P. gingivalis* infected cells produced significantly less interleukin-6 (IL-6) compared to heat-killed bacteria treated cells. Additionally, live but not heat-killed *P. gingivalis* inhibited TLR2-mediated IL-6 production.

**Conclusion:** Manipulation of host innate immune response in periodontal fibroblast by *P. gingivalis* may contribute to dysbiosis during periodontal disease.

## P0068

### Expression and regulation of SIRP $\alpha$ in periodontal cells under inflammatory conditions

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**Aim:** Periodontitis, the chronic inflammatory disease affecting the tooth supporting tissue share several pathogenic pathways with Crohn's Disease, an inflammatory disease, located in the gastrointestinal tract. The immunoglobulin Signal Regulatory Protein alpha (SIRP $\alpha$ ) is a cell surface protein involved in the regulation of Crohn's Disease via pro-inflammatory cytokines. We hypothesize that the initiation and progression of periodontitis is dependent and regulated by the expression of SIRP $\alpha$  and the aim is to investigate the role of the immunoglobulin SIRP $\alpha$  under inflammatory conditions in tooth supporting tissue.

**Material and Methods:** Primary human gingival fibroblasts were harvested during periodontal surgery and primary human osteoblasts during orthopaedic surgery. The cells were cultured in presence of the pro-inflammatory cytokines interleukin1-beta (IL-1 $\beta$ ) and tumor necrosis factor alpha (TNF $\alpha$ ). After 24 h the cells were lysed, mRNA extracted and cDNA prepared. Thereafter SIRP $\alpha$  gene expression was analysed by qPCR and normalized to an endogenous control.

**Results:** Human gingival fibroblasts displayed a basal expression of SIRP $\alpha$  mRNA. The expression was significantly increased when challenged with either TNF $\alpha$  or IL-1 $\beta$ , key mediators of periodontal inflammation. We also demonstrated that the upregulated SIRP $\alpha$ -expression was dependent on the concentration of TNF $\alpha$  or IL-1 $\beta$ . Moreover, we demonstrated a basal expression of SIRP $\alpha$  mRNA in human osteoblasts, where the SIRP $\alpha$  mRNA expression was significantly increased in response to both IL-1 $\beta$  and TNF $\alpha$ .

**Conclusion:** We are the first to demonstrate a basal expression and an inflammatory regulation of SIRP $\alpha$  expression in cells of the periodontal tissue. These findings point towards a role of SIRP $\alpha$  in inflammatory conditions of the periodontium.

## P0069

### Evaluation of biochemical parameters, local and systemic levels of osteoactive and B cell stimulatory factors in gestational diabetes in the presence or absence of gingivitis

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**Aim:** Gestational diabetes mellitus (GDM) is defined as varying glucose intolerance with first onset or recognition in pregnancy. This study evaluated clinical and biochemical parameters in a possible association between GDM and gingivitis.

**Material and Methods:** A total of 167 pregnant women were included in the study. There were 101 women with GDM and 66 women without GDM. Subgroups were created according to the presence or absence of gingival inflammation. Plaque index, bleeding on probing, probing depth were recorded at 4 sites/tooth. Serum, saliva, and gingival crevicular fluid (GCF) levels of interleukin-6 (IL-6), IL-8, soluble receptor activator of nuclear factor-kappa B ligand (sRANKL), osteoprotegerin, B-cell activating factor (BAFF), a proliferation-inducing ligand (APRIL) were determined by ELISA. Data were analyzed by Kruskal-Wallis, Mann-Whitney U tests, and Spearman correlation analysis.

**Results:** Age and anthropometric indices were higher in the GDM than nonGDM group ( $p < 0.0001$ ). Clinical periodontal recordings, serum BAFF, IL-8, saliva sRANKL levels were higher in the GDM group ( $p < 0.05$ ). Saliva IL-6 level was higher in the GDM with gingivitis group than nonGDM with gingivitis ( $p = 0.044$ ). Serum, GCF BAFF ( $p < 0.0001$ ); serum, saliva, GCF APRIL ( $p < 0.0001$ ;  $p < 0.0001$ ;  $p = 0.032$ , respectively); GCF osteoprotegerin ( $p = 0.036$ ); serum, saliva sRANKL ( $p < 0.0001$ ) were higher in the GDM with gingivitis than GDM without gingivitis.

**Conclusion:** The inflammatory response seems to be more pronounced in women with GDM. The observed increase in both local and systemic levels of inflammatory cytokines may suggest an interaction between gingivitis and GDM.

## P0070

### Tight junction proteins and filamentous actin in gingival keratinocytes infected with *Porphyromonas gingivalis*

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**Aim:** Oral epithelium acts as an effective barrier against bacterial challenge. *Porphyromonas gingivalis* (*P. gingivalis*) is a major etiologic agent in the initiation and progression of periodontitis. In this study immortalized human gingival keratinocytes (IHGK) were used to investigate the influence of *P. gingivalis* ATCC-33277 on transepithelial resistance (TER), tight junction (TJ) proteins, the apical filamentous actin (F-actin) cytoskeleton and cell viability.

**Material and Methods:** IHGK were seeded on inserts until the development of a TER between 80 and 97  $\Omega \times \text{cm}^2$ .

*P. gingivalis* was added in a multiplicity of infection (MOI)  $10^4$ . Confocal microscopy was used to investigate the TJ proteins (claudin1, occludin) and F-actin. The morphology was investigated using transmission electron microscopy (TEM). Expression of TJ proteins was also detected by Western blotting. Annexin V FITC assay was used to detect apoptosis.

**Results:** After 24 h of infection with *P. gingivalis* a decrease of TER ( $97\text{--}15 \Omega \times \text{cm}^2$ ) occurred. The morphological localization of TJ proteins claudin1 and occludin changed, suggesting displacement of these proteins. Immunoreactivity of claudin1 and occludin decreased probably mediated by internalisation. However, reorganization of F-actin was demonstrated after 4 h of infection. TEM showed well-developed TJs in control cells. In infected cells, TJs were disrupted. Protein levels of claudin1 were similar in non-infected and infected cells, whereas occludin expression in infected cells disappeared, suggesting occludin degradation. *P. gingivalis* infection did not promote apoptosis of IHGKs after 24 h of infection.

**Conclusion:** Our findings indicate that *P. gingivalis* ATCC-33277 destroys the gingival epithelial barrier, accompanied by displacement of claudin1 and occludin and reorganization of F-actin cytoskeleton.

## P0071

### Lp-PLA<sub>2</sub>: as an inflammatory indicator in an experimental hyperlipidaemia and periodontitis model

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**Aim:** The purpose of this study was to evaluate the serum levels of lipoprotein-associated phospholipase A<sub>2</sub> (Lp-PLA<sub>2</sub>) and high sensitive C-reactive protein (hs-CRP) in hyperlipidaemic rats with periodontitis.

**Material and Methods:** Thirty nine adult Wistar rats randomly divided into 4 groups as follows: control group (C); hyperlipidemic group (H); periodontitis group (P); and hyperlipidaemic-periodontitis group (HP). Hyperlipidaemic groups were fed with diet containing cholesterol 2% during 8 weeks to induce hyperlipidemia. On the last 2 weeks, ligature was placed subgingivally around upper second molars to induce periodontitis. Histomorphometric and histological analysis were performed. Serum lipids, Lp-PLA<sub>2</sub> and hs-CRP concentrations were evaluated by ELISA.

**Results:** Alveolar bone loss (ABL) was significantly higher in the H, HP, and P groups than the C group ( $p < 0.05$ ). When compared with the C group, Lp-PLA<sub>2</sub> levels were higher in the P and HP groups ( $p < 0.05$ ), and the H group ( $p > 0.05$ ). Serum hs-CRP levels did not exhibit significant differences among the study groups ( $p > 0.05$ ). There was a positive correlation between ABL and low density lipoprotein ( $r = 0.421$ ,  $p = 0.008$ ).

**Conclusion:** In the presence of hyperlipidaemia, increased ABL leads to consider that the impaired lipid metabolism may play an important role in the periodontal breakdown. Moreover, Lp-PLA<sub>2</sub> could be an inflammatory indicator in the mechanism between hyperlipidaemia and periodontitis.

## P0072

### Evaluation of GCF CypA and EMMPRIN levels in different periodontal diseases

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**Aim:** Extracellular matrix metalloproteinase inducer (EMMPRIN) is the cell surface receptor of cyclophilin A (CypA). CypA is able to regulate inflammatory responses and matrix metalloproteinase production via its interaction with EMMPRIN. The aim of the present study was to evaluate the GCF CypA and EMMPRIN levels in chronic periodontitis (CP) patients, generalized aggressive periodontitis (GAgP) patients and periodontally healthy controls.

**Material and Methods:** Twenty CP patients, 19 GAgP patients and 30 healthy control subjects were included in the present study. All study patients were non-smokers. Full mouth clinical periodontal parameters including probing depth, clinical attachment level, plaque index, and papilla bleeding index were recorded. GCF CypA and EMMPRIN levels were analyzed by enzyme-linked immunosorbent assay. Data were analyzed statistically with parametric and non-parametric tests.

**Results:** Age and gender distribution in the study groups were similar in the present study ( $p > 0.05$ ). GCF CypA total amount was slightly higher in GAgP group compared to healthy controls ( $p = 0.05$ ). However, no significant difference was observed in GCF EMMPRIN total amount between study groups ( $p > 0.05$ ).

**Conclusion:** Higher levels of GCF CypA in patients with GAgP might demonstrate that CypA is associated with the inflammatory infiltration and alveolar bone destruction of GAgP. However, GCF EMMPRIN level does not seem to be affected by periodontal diseases.

## P0073

### Reconfirmation of the origin of the junctional epithelium by using the bioengineered tooth germ

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**Aim:** Recently, we have reported the junctional epithelium is derived from the odontogenic epithelium by using a bioengineered tooth which was consisted of the epithelial cells from GFP-transgenic mice tooth germ and the mesenchymal cells from normal mice tooth germ (Sci Rep. 2014; 4:4867). In this study, we reconfirmed the origin of the junctional epithelium, by producing the opposite pattern bioengineered tooth germ and observing the formation of the junctional epithelium in detail.

**Material and Methods:** We produced a bioengineered tooth germ, which was consisted of the epithelial cells from normal mice tooth germ and the mesenchymal cells from GFP-transgenic mice tooth germ. The reconstructed tooth germ was transplanted into the space, which had been produced by the extraction of first upper molars of GFP-transgenic mice. To confirm the characteristic of the reconstructed tooth-derived junctional epithelium, we immunohistochemically detected the expression of S100A8, which have been previously reported to be expressed in normal junctional epithelium.

**Results:** GFP-negative ameloblasts formed the reduced enamel epithelium at 40 days after transplantation. Subsequently, the erupting tooth finally reached the occlusal plane at 50 days after transplantation. At that time, the reconstructed tooth-derived junctional epithelium didn't showed GFP expression. The junctional epithelium of the reconstructed tooth showed immunoreactivity for S100A8 which distributions were similar to those of normal junctional epithelium.

**Conclusion:** These results strongly suggested that the origin of junctional epithelium was odontogenic epithelium. Furthermore, the expression of S100A8 in the bioengineered tooth-derived JE, was similar to that in the normal JE.

## P0074

### Role of magnesium and calcium in periodontitis and tooth loss: a 5-year follow-up

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**Aim:** In the Study of Health in Pomerania (SHIP), subjects with an adequate magnesium supply had a lower risk of periodontal disease and higher number of tooth than those with low magnesium levels. We conducted a 5-year follow-up to determine whether the baseline magnesium levels had a long-term effect on the number of teeth lost.

**Material and Methods:** Of 4310 participants diagnosed for periodontitis in the baseline study, 3300 were examined for progression of their periodontal state in the course of 5 years. We related the outcome variables of periodontal attachment level and tooth loss to baseline characteristics, especially serum magnesium and calcium levels, as well as systemic markers of inflammation. Serum specimens were used for determination of Mg by atomic absorption spectroscopy, of Ca by a colorimetric assay.

**Results:** The progression of periodontitis was determined by the ratio magnesium/calcium in a dose-dependent manner. Five-years mean attachment loss was highest in the lowest tertile of the magnesium/calcium ratio, and negligible in the highest (trend  $p < 0.001$ ). In inflammatory states as indicated by high CRP an increased tooth loss was observed as compared with no systemic inflammation. This was prevented by increasing Mg/Ca, also indicated by significant interaction between Mg/Ca and CRP ( $p < 0.001$ ). This effect modification was pronounced in male participants, but also significant in female subjects despite their generally lower tooth loss.

**Conclusion:** Magnesium or Mg/Ca ratio is associated with periodontitis including tooth loss. Magnesium is of predictive value for the fate of teeth in later life. Nutrients rich in magnesium may be effective as preventive means.

## P0075

### The upregulation of Slug in human gingival fibroblasts stimulated by cyclosporine A

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**Aim:** Cyclosporine A (CsA) is used as an immunosuppressive agent and its prominent side effect is the induction of gingival overgrowth. Slug is a master regulator of hoepithelial-mesenchy-

mal transition (EMT). We hypothesized that EMT may contribute to gingival overgrowth by the gain of fibroblastic marker in gingival epithelium and connective tissue stroma. The purpose of this study is to investigate the role of slug in the pathogenesis of CsA-induced gingival overgrowth.

**Material and Methods:** Clinical healthy gingiva and CsA-induced gingival overgrowth specimens were analyzed by using immunohistochemistry for slug expression in vivo. The effect of CsA on normal human gingival fibroblasts (HGFs) was used to elucidate whether slug expression could affect by CsA by using real-time reverse transcription-polymerase chain reaction and western blot. Slug knockdown in CsA-treated HGFs by lentiviral-mediated shRNAi was made for cell proliferation by tetrazolium bromide reduction assay.

**Results:** Slug expression was higher in CsA-induced gingival overgrowth specimens than clinical healthy gingiva. CsA was found to increase slug transcript and protein expression in human gingival fibroblasts (HGFs) in a dose-dependent manner ( $p < 0.05$ ). Down-regulation of slug by lentiviral infection significantly reduced CsA-induced cell proliferation in HGFs.

**Conclusion:** In the present study, we found that the upregulation of Slug in HGFs stimulated by CsA may play an important role in the pathogenesis of CsA-induced gingival overgrowth.

## P0076

### Characterisation of polysaccharides of an in vitro oral biofilm model in presence or absence of sucrose

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**Aim:** Pathogenic biofilms are the etiologic agents of several oral infectious diseases including gingivitis and periodontitis. Biofilms are embedded in a matrix of extracellular polymeric substances (EPS) where the major structural components are polysaccharides. The aim of this study was to characterise the carbohydrate-containing EPS of an in vitro multispecies oral biofilm model in presence or absence of sucrose using fluorescently labelled lectins.

**Material and Methods:** *S. oralis*, *V. parvula*, *A. naeslundii*, *F. nucleatum*, *A. actinomycetemcomitans* and *P. gingivalis* biofilms were grown on hydroxyapatite discs with acquired pellicle at 36°C in anaerobic conditions for 4 days with or without 5% sucrose. The biofilm cells and extracellular carbohydrates were stained with Syto 9 and Con A ( $\alpha$ -mannopiranosil/ $\alpha$ -glucopiranosil binding), WGA (sialic acid/N-acetylglucosaminyl binding), SBA (terminal  $\alpha/\beta$ -N-acetylgalactosamine/galactopiranosyl binding) and PNA (terminal  $\beta$ -galactose binding) fluorescently labelled lectins, respectively. Biofilms were visualized by CLSM. Images were analyzed by MetaMorph® and Imaris® software.

**Results:** The addition of 5% sucrose to the culture medium induced an increase of the biofilm cell volume; however, via ConA, WGA and SBA lectin staining, we observed a reduction in extracellular carbohydrates. Terminal  $\beta$ -galactose residue labelling (PNA) was similar for both growth conditions. Moreover, regardless of the medium's sucrose concentration, the carbohydrate residues stained with Con A and PNA were distributed throughout the biofilm volume; however, WGA and SBA stains were mainly situated in the upper-middle portion of the biofilm.

**Conclusion:** The addition of sucrose to the culture medium stimulates oral biofilm cell growth, to the detriment of the production of certain extracellular matrix-forming carbohydrates.

## P0077

### Loss of sympathetic nerve fibers in periodontal disease

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**Aim:** Current research suggests a decrease of sympathetic nerve fibers (NF) in chronic inflammatory disorders such as rheumatoid arthritis, diabetes mellitus and morbus crohn. This results in an imbalance of sympathetic and sensory NF in inflamed tissue. A loss of sympathetic NF leads to a decreased concentration of anti-inflammatory neurotransmitters, whereas neurotransmitters secreted from sensory NF mainly lead to inflammatory effects. It is likely that alterations in neurogenic modulation are also detectable in patients with periodontal disease (PD). The aim of this study was to investigate the density of sensory substance P (SP)-positive and sympathetic tyrosine hydroxylase (TH)-positive NF in human gingival tissue sections of patients with and without PD.

**Material and Methods:** Human gingival tissue sections from patients with PD (n = 30) and without PDs (n = 8) were analysed using immunohistochemistry to detect sensory SP-positive and sympathetic TH-positive NF.

**Results:** The density of sympathetic NF in gingival tissue sections from patients with PD was significantly reduced when compared with the control group (CG) (PD: 1.4 NF/mm<sup>2</sup> ± 2 NF/mm<sup>2</sup>; CG: 3.7 NF/mm<sup>2</sup> ± 1.2 NF/mm<sup>2</sup>; \*\*p < 0.005), whereas the density of sensory NF showed no significant difference between those groups (PD: 2 NF/mm<sup>2</sup> ± 1.9 NF/mm<sup>2</sup>; CG: 2.1 NF/mm<sup>2</sup> ± 1.7 NF/mm<sup>2</sup>; p > 0.5).

**Conclusion:** In conclusion, this study demonstrated less TH-positive sympathetic NF in gingival tissue from patients with PD as well as an imbalance between sympathetic and sensory NF, which might be directly related to the persistence of inflammation.

## P0078

### High through-put microbiological analysis of subgingival plaque in Chinese patients with aggressive periodontitis

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**Aim:** To compare microbiological strains in subgingival plaques detected by high-throughput microbiological testing between Chinese patients with Generalized aggressive periodontitis (GAgP) and matched periodontal healthy controls (H).

**Material and Methods:** Fifteen GAgP patients and fifteen age- and gender- matched periodontal healthy controls were selected. Subgingival plaque samples were collected from 8 mesial-buccal sites with deep pockets (PD ≥ 5 mm) in GAgP patients and from 8 matched sites with no deep pockets (PD ≤ 3 mm) in healthy controls. Total 379 microbiological strains were detected using Human Oral Microbe Identification Microarray (HOMIM). The differences at taxon/cluster values and predominant bacteria between two groups were compared.

**Results:** (1) 171 bacterial strains were detected in GAgP, which was more than that in H group (157 strains). (2) 47

strains were detected significantly more frequently in GAgP group than H group, including 21 strains only detected in GAgP group. (3) 12 strains including Porphyromonas gingivalis, Tannerella forsythia, Parvimonas micra and Filifactor alocis, were detected at significantly higher levels in GAgP group than in H group. (4) Filifactor alocis HOT-539\_AA69 and Desulfobulbus sp. HOT-041\_K70 were detected in 14 patients with GAgP and 1 healthy controls, the two strains were always detected together. (5) Cluster analysis according to overall microbiological results revealed 30 GAgP and 1 healthy subjects into one cluster and the other 14 healthy subjects into another cluster.

**Conclusion:** Subgingival microbial profiles by high throughput microbiological detection are significant different between GAgP and H group, which can well distinguish patients with GAgP from healthy subject.

## P0079

### The prevalence of gingivitis related to oral health behaviors and smoking habits in males and females from a young Eastern European population

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**Aim:** The objective of the present study is to evaluate the prevalence of gingivitis in a young Eastern European population and to explain the differences between sexes based on the interaction between oral health behaviors and risk factors, such as smoking.

**Material and Methods:** The study had a two-group parallel design including 63 subjects (30 males, 33 females) aged <20 years and 189 subjects (85 females, 104 males) with ages of 20–25 years. Gingivitis was assessed by bleeding on probing (BOP), plaque index (PI) and probing depth (PD). Additional information was collected regarding oral hygiene behaviors and smoking habits. Structural equation modeling was used to test pathways between these factors and BOP. Multiple group modeling was also performed in order to determine differences between males and females.

**Results:** Gingivitis is more prevalent in males than females. It is related to a higher percentage of smoking among males. Females had a higher level of oral health behaviors than males. There were significant statistical differences in the paths.

**Conclusion:** Sex-based differences in gingivitis can be explained by oral hygiene behaviors and smoking habits. To prevent gingivitis, different approaches to males and females are necessary.

## P0080

### Association between Prx mRNA expression and the gingival phenotype

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**Aim:** Paired related homeobox genes (Prx1 and Prx2) are transcription factors highly expressed in mesenchymal cells of developing jaws. Among other transcription factors, Prx proteins have an essential role in skeletogenesis, development of maxilla and mandible and tooth morphogenesis. Prx1 and Prx2 have been also shown to regulate cell proliferation, migration and

wound healing. The purpose of this study was to investigate if there is an association between the presence and the levels of Prx1 and Prx2 mRNA expression and the phenotype of human gingivae.

**Material and Methods:** Twenty two patients in need of crown lengthening were included in the study, ten with thick and twelve with thin biotype. Connective tissue samples were collected during the surgical procedure. The samples were used for RNA isolation and semiquantitative RT-PCR for Prx1 and Prx2 genes using GADPH as a housekeeping gene.

**Results:** RT-PCR analysis showed Prx1 mRNA expression in higher levels in thick gingival biotypes compared to thin. Moreover, Prx2 mRNA was either very low or absent in thick biotypes, whereas it was highly expressed in thin biotype. Additionally, both Prx1a and Prx1b alternatively spliced isoforms were detected and Prx1a was more abundant in most of the samples.

**Conclusion:** The pattern of mRNA expression of Prx1 and Prx2 in different gingival biotypes suggests an association of Prx2 presence with thin gingiva and high levels of Prx1 expression with thick gingiva. Further studies are needed to investigate if there is an antagonistic role between Prx1 and Prx2 transcription factors and how their expression regulates wound healing after periodontal surgery.

## P0081

### The association between HLA-B15 and -B5 and aggressive periodontitis in a Moroccan population: case/control study

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**Aim:** The genes encoding the human leukocyte antigens (HLA) have been considered candidate markers for periodontitis because they are involved in regulating immune responses. Several studies have examined this association, and despite the inconclusive results, the antigens HLA-A9 and HLA-B15 seem to represent susceptibility factors for aggressive periodontitis (AgP) whereas HLA-A2 and -B5 are potential protective factors against periodontitis. Ethnic factors are considered to be a major variable for evaluating the predisposition to the disease. The purpose of the present study was: 1) to assess the association of HLA-B15 and HLA-B5 with aggressive periodontitis and 2) to provide some pathophysiological hypothesis that could explain the role of HLA in the pathogenesis of AP.

**Material and Methods:** Five patients with aggressive periodontitis have been compared to five healthy controls unrelated. The HLA typing has been conducted by using complement dependent microlymphocytotoxicity assay.

**Results:** HLA-B15 showed a fairly significant frequency in patients with AgP without significant difference ( $p = 0.444$ ), whereas HLA-B5 had no association with the disease.

**Conclusion:** To our knowledge, this is the first case-control study on the association HLA-B15 with PA in a Moroccan population. This study may be considered as a preliminary study to be confirmed by increasing the sample size. This work could also serve as a basis to search for other associations by performing a complete HLA typing class I and II.

## P0082

### Caries prevalence in primary school children in Paraguay and Germany – a comparative study

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**Aim:** Dental caries continues to be one of the most common chronic diseases. Especially early caries in the mixed dentition remains a severe problem in public oral health not only in developing countries, but worldwide. The prevalence is related to the geographical region and socioeconomic status. Therefore, the aim of this study was to compare the “dmft”-index in primary school children in San Lorenzo (Paraguay) and Kiel (Germany).

**Material and Methods:** In this regional, cross-border, comparative study 185 Paraguayan primary school children (6–9 years old) were examined. Dental caries in primary and permanent teeth was assessed using the “dmft”-index. Moreover, a questionnaire on oral hygiene behavior was completed by the parents. Afterwards findings were compared to a similar study group in Kiel, Germany.

**Results:** 8.1% of the Paraguayan primary school children [PARA] had a naturally-healthy dentition. This was considerably less compared to the German cohort [KIEL] with 52.2%. The mean “dmft”-value in primary teeth was doubled (PARA: 4.2; KIEL: 2.0). The amount of children, who required dental treatment due to caries was 86.5% in Paraguay compared to 32.3% in Germany. The evaluation of the questionnaire revealed, that 66.3% of Paraguayan children brush their teeth for 1 min or even less.

**Conclusion:** Paraguayan children show a clearly higher prevalence of caries than their German counterparts. Poor oral health care might be one of the reasons. Additionally there are no official prevention programs in the schools of Paraguay, which could help to minimize the high spread of caries.

## P0083

### Leukocyte receptor expression in chronic periodontitis

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**Aim:** Periodontitis originates from an imbalance in the host response to the challenge of microbes, recognized in the periodontium by leukocytes through specific receptors. The aim of this study was to explore the expression of leukocyte receptors in the gingival tissues of chronic periodontitis patients.

**Material and Methods:** Thirty-seven chronic periodontitis patients were included in the study. Gingival biopsies were harvested from 3 diseased and 3 healthy sites and processed by flow cytometry for determination of the expression of fourteen leukocyte receptors (CD28, CD19, CD71, CD80, Ly6G, CD11b, CD49d, CD49e, CD4, CD25, CD8, CD16, CD14 and HLA-PECy).

**Results:** Expression of all studied receptors was higher in test compared with control sites ( $p < 0.005$ ). No associations were detected between clinical (PPD and CAL) and subject-based

parameters (smoking, age and gender) and expression of any of the studied leukocyte receptors.

**Conclusion:** This study suggests that considerable differences exist in the expression of leukocyte receptors between diseased and healthy sites in the same patients. Further studies are needed to determine which factors may influence leukocyte receptor expressions.

## P0084

### HSV-1 involvement in the etiopathogenesis of periodontal disease – a microbiological study

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**Aim:** This research investigates the presence of herpes simplex virus type 1 in the lesions of chronic and aggressive periodontitis and the association of this virus with potential periodontal bacteria.

**Material and Methods:** Subgingival plaque and saliva samples were collected from 19 patients diagnosed after clinical examination and laboratory with periodontal disease, in order, 12 patients with chronic periodontitis (CP) and 7 patients with aggressive periodontitis (AgP). Work steps have provided for: preparation of samples; preparation of reagents; processing of samples.

**Results:** When saliva samples were analyzed at patients with chronic and aggressive periodontitis, HSV-1 + *T. denticola* was detected in a higher proportion (21% for CP group and 12% for AgP group) followed by HSV-1 + *P. intermedia* (10% for CP group and 19% for AgP group), and the lowest value was recorded for HSV-1 + *E. corrodens* (1% and 4% for CP group respectively AgP group). Crevicular fluid microbiological assays revealed that *P. gingivalis*, *P. intermedia* and *A. actinomycetemcomitans* were detected in a higher proportion (18%, 23% and 12%) in the group with HSV-1 cohabitation and aggressive periodontitis. Also, representative values were recorded for HSV-1 and *T. denticola* (19% for CP group and 17% for AgP group).

**Conclusion:** The results support the hypothesis that the clinical situation encountered in certain types of severe periodontal infection depends on the presence of specific herpes and specific pathogens. Our findings lead to further testing of a variety of hypotheses concerning the association of viruses bacteria in areas affected by periodontal disease.

## P0085

### Gingival tissue expression patterns of heat shock proteins in different forms of periodontitis

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**Aim:** Heat shock proteins (HSP) are expressed in all organisms to protect damaged cells in response to environmental stresses including microbial insult of subgingival biofilm. The aim of this study was to investigate the gingival tissue mRNA expression of HSP60 and HSP70 in chronic periodontitis (CP), generalized aggressive periodontitis (G-AgP) and healthy subjects.

**Material and Methods:** A total of 61 subjects who met the inclusion/exclusion criteria were recruited, including 21 with

CP, 20 with G-AgP and 20 healthy subjects. Gingival tissue biopsies were obtained from the corresponding diseased or healthy gingival sites. Quantitative real-time PCR was employed in order to evaluate mRNA expression of human HSP60 and HSP70 levels in these tissue samples. Clinical parameters including probing depth (PD), clinical attachment level (CAL), plaque index (PI) and bleeding on probing (BOP) were recorded. Statistical analysis was performed using nonparametric methods.

**Results:** mRNA expression of HSP60 was significantly ( $p < 0.05$ ) elevated in the CP group when compared to the healthy group. Even though HSP70 expression was detected in all tissues, there was no significant difference between the study groups ( $p > 0.05$ ). mRNA expression of HSP60 positively correlated with the CAL, PI and BOP ( $r = 0.274$ ,  $p < 0.05$ ;  $r = 0.264$ ,  $p < 0.05$ ;  $r = 0.338$ ,  $p < 0.05$ ; respectively).

**Conclusion:** The elevated gingival tissue expression level of HSP60 in CP denotes an association of this molecule with chronic periodontal disease. On the contrary, HSP70 mRNA expression did not prove to be associated with periodontal disease. The differential expression of HSP60 and HSP70 in diseased periodontal tissues warrants further investigation.

## P0086

### Identification of amino acid residues involved in hemin binding in *Porphyromonas gingivalis* hemagglutinin 2

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**Aim:** *Porphyromonas gingivalis* is a major etiological agent in the development and progression of chronic periodontitis. *P. gingivalis* produces cysteine proteases (gingipains) including the lysine-specific gingipain Kgp and arginine-specific gingipain RgpA. Heme binding and uptake are fundamental to the growth and virulence of *P. gingivalis*. Recombinant hemagglutinin 2 (rHA2) of gingipain binds hemin with high affinity. The aim of the present work was to identify the residues involved in its hemin-binding activity.

**Material and Methods:** Functional rHA2 was expressed and rHA2 bound to hemin-agarose was digested with endopeptidase. The peptides bound to hemin-agarose were then identified by MS. Residues that bind hemin were then assessed by mutation and peptide binding inhibition analysis.

**Results:** The DHYAVMISK peptide was identified in the peptides derived from Asp-N- and Lys-C endopeptidase digestion of rHA2 bound to hemin-agarose. A monoclonal antibody, MAb QB, was produced and its epitope was associated with the DGFPGDHYAVMISK peptide within the HA2 domain. Hemin was shown to competitively inhibit the immunoreactivity of rHA2 or the peptide to MAb QB.

**Conclusion:** Based on these results, we propose that DHYAVMISK may be involved in *P. gingivalis* rHA2 hemin binding.

## P0087

### TLR 2/4 signaling in *P. gingivalis*-associated ligature-induced periodontal bone resorption

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**Aim:** This study was to determine the role of Toll-like receptor (TLR) signaling in *P. gingivalis*- and/or ligature-induced experimental periodontal bone resorption in mice in vivo.

**Material and Methods:** Wild type (WT), TLR2 knockout (TLR2KO), TLR4KO and TLR2/4KO mice (female, 8–10 weeks old) with C57/B6 background were used. Each type of mice was randomly divided into 4 groups (n = 5): control, *P. gingivalis* infection alone, ligation alone, and *P. gingivalis* + ligation. All mice were given kanamycin and ampicillin in drinking water daily for 4 days before treatment. Silk ligatures were placed around the maxillary second molars in the presence or absence of live *P. gingivalis* (ATCC 33277) in the sulcus of the maxillary second molars over 2-week period, after which the maxillary were removed for analysis. Images were captured under a digital stereomicroscope system and bone resorption area was measured using Image J (NIH).

**Results:** For each type of mice, ligation induced much higher level of bone loss than *P. gingivalis* infection alone, while there was no difference in bone resorption between ligation alone group and *P. gingivalis* infection + ligation group. Compared to WT mice, bone resorption was significantly increased in TLR2KO mice but decreased in both TLR4KO and TLR2/4KO mice when treated with *P. gingivalis* infection; TLR4KO mice showed reduced bone loss to ligation, while TLR4KO and TLR2/4KO mice showed reduced bone loss to *P. gingivalis* infection + ligation.

**Conclusion:** *P. gingivalis*-induced periodontal bone resorption is through cross-talk between TLR2 and TLR4, whereas ligation-induced periodontal bone resorption is through TLR4.

## P0088

### Dental and periodontal health status of adolescent inmates in Detention Center of Istanbul

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**Aim:** The aim of this study was to determine periodontal and dental status and smoking habits of adolescent inmates residing in detention center.

**Material and Methods:** This is a cross sectional study that was carried out on inmates. Totally 232 adolescent male inmates (mean age: 16.65 ± 0.91) who were residing in detention center in Istanbul, Turkey were assessed in this study. After taking general demographic information, all the subjects were clinically examined according to WHO criteria. Plaque index (PI) and Gingival index (GI) was recorded at Ramfjord teeth to evaluate periodontal status. All data were statistically analyzed by SPSS 15.0 programme, and chi-square test, Fisher's exact test, Kruskal-Wallis test and Mann-Whitney U tests.

**Results:** Average length of stay was 6.54 ± 8.38 (min:0.03-max:48) months. 44.4% of inmates never visited a dentists. PI and GI scores were above 1.00 value. The mean DMFT score

of adolescent inmates was 6.78 ± 4.07. 9.1% of inmates had traumatized teeth. 42 (18.1%) of all inmates had MIH. Approximately 10% (n = 24) of them had primary teeth and dental anomalies. While 12.9% of all using a drug for systemic diseases, 80.2% of inmates were smoking cigarettes before taken to detention center.

**Conclusion:** This survey indicated that the oral health of prison inmates was poor. Special attention from government and voluntary organizations is required to improve the overall health status of the inmates and to provide the oral health care services to inmates.

## P0089

### Fetuin-A gene polymorphism and serum, saliva and gingival crevicular fluid fetuin-A levels of patients with dental calculus

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**Aim:** Fetuin-A is a potent inhibitor of calcium-phosphate precipitation. We aimed to evaluate the association of fetuin-A polymorphisms with dental calculus and also to examine a possible relationship between the polymorphism with serum, saliva and GCF levels of fetuin-A.

**Material and Methods:** Fetuin-A c.742C>T and c.766C>G polymorphisms were investigated in 103 patients with or without dental calculus, using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) techniques. Serum, saliva and GCF fetuin-A levels of patients were compared according to dental calculus presence.

**Results:** A statistically significant difference was not observed when the genotype distribution of the fetuin-A c.742C>T and c.766C>G polymorphism was compared, between patients with or without dental calculus (p = 0.285, p = 0.115 respectively). Saliva and GCF fetuin-A concentrations of patients with dental calculus were statistically higher than those without dental calculus (p = 0.036, p = 0.001 respectively). In the subjects carrying the genotype distribution of the fetuin-A c.742C>T and c.766C>G polymorphism had not significantly different serum, saliva or GCF fetuin-A concentrations from the group carrying fetuin-A genotype CC (p = 0.97, p = 0.832, 0.391 respectively for fetuin A 742 and p = 0.541, p = 0.596, p = 0.735 respectively for fetuin A 766).

**Conclusion:** In this study, it was found that fetuin-A c.742C>T and c.766C>G polymorphisms were not to be associated with dental calculus. Also, that GCF and saliva fetuin-A levels were detected higher in patients with dental calculus than those without dental calculus may be the effect of adaptive mechanism to inhibit mineral precipitation and eventually calculus formation.

## P0090

### Clinical features of *Aggregatibacter actinomycetemcomitans* JP2 clone positive patients with aggressive periodontitis

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**Aim:** Many studies in Morocco have shown an association between aggressive periodontitis (AgP) and presence of *Aggregatibacter actinomycetemcomitans* (Aa) JP2 clone. However, few are known on distribution and extension of lesions in these entities. The aim of this study is to assess the extent and the severity of periodontal breakdown in relation to presence or absence of the clone JP2 of Aa.

**Material and Methods:** The study population consisted of 70 patients seeking treatment at the clinical department of Periodontology in Rabat, Morocco. Clinical parameters (plaque index, gingival index, probing depth and attachment loss) were measured, and radiographic examination was performed to complete the assessment.

**Results:** 77, 1% of patients were harboring JP2 clone of Aa (mean age; 20.6 ± 4.16). The probing pockets depth was deeper in JP2 clone positive patients than in negative ones with statistically significant difference (6.28 ± 0.80; 5.70 ± 0.9, p = 0.03). Attachment loss was also important in positive subjects than in negative one but with no statistically significant difference. Plaque index and gingival index were higher in negative ones than in positive JP2 clone patients.

**Conclusion:** Within the limitation of this study, the periodontal breakdown evaluated by pocket depth was found to be more severe in JP2 clone positive patients. That, support previous data showing the association between this bacteria and AgP in Morocco. However, the comparison of distribution of lesions between the positive and negative subjects was quite similar which arise some etiopathogenic hypothesis to be discussed during this presentation.

## P0091

### The effect of statin medication on the severity of chronic periodontitis

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**Aim:** The relationship between lipid metabolism disorders and periodontitis has been extensively investigated from various aspects, including the effect of lipid lowering medications on periodontal health. However the role of lipid-lowering medication on the severity of periodontal disease is still not fully understood. Our study investigated the effect of systemic statin medication on baseline periodontal parameters.

**Material and Methods:** In our retrospective study, baseline periodontal parameters (number of teeth – N, average probing depth – aPD, average clinical attachment loss – aCAL, bleeding on probing index – BOP%, number of teeth with PD ≥ 5 mm – Nt ≥ 5, number of sites with PD ≥ 5 mm – Ns ≥ 5) were compared of 21 chronic periodontitis patients who took statin medication for more than 1 year (test group) with 21 chronic periodontitis patients matching in age, gender and smoking hab-

its who do not take lipid-lowering medication (control group) and were not diagnosed with hyperlipidemia. Only non-diabetic patients were enrolled in the study.

**Results:** BOP% and aPD were significantly lower in the test group than in the control group (p < 0.05), while N, aCAL, Nt ≥ 5 and Ns ≥ 5 were slightly but not significantly lower in the test group than in the control group.

**Conclusion:** Our results showed conflicting evidence of the beneficial effect of statins on the severity of chronic periodontitis. Statin medication alone – due to the multifactorial nature of periodontitis – cannot be considered as a predictor of the severity of periodontal disease, therefore patients with statin medication have to be handled with the same care as nonhyperlipidemic patients.

## P0092

### A reproducible model of subgingival biofilms

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**Aim:** To develop a reproducible multispecies periodontitis biofilm model.

**Material and Methods:** Subgingival plaque samples were collected from deep pockets (PPD ≥ 6 mm) of 7 patients diagnosed with periodontitis and from shallow to moderate pockets (PPD ≤ 5 mm) from 2 periodontally healthy donors. An active attachment model and specific medium (Thompson) supplemented with 30% serum was used. Biofilms were harvested at 2 (2w) and 4 weeks (4w). Composition was analyzed using 16S RNA gene amplicon pyrosequencing. Similarities between the biofilms were assessed by non-metric Multidimensional scaling (n-MDS) using Bray Curtis (BC) similarity index and similarity percentage analysis (SIMPER). Duplicate experiments, biofilm source and age were compared.

**Results:** Periodontitis biofilms (P) were distinct in composition from health derived biofilms (H) by genera: *Peptostreptococcus* (P = 22%; H = 36%), *Parvimonas* (P = 21%; H = 14%), *Porphyromonas* (P = 14%; H = 0%), *Filifactor* (P = 10%; H = 0%), *Phocaeicola* (P = 5%; H = 0%), *Anaeroglobus* (P = 4%; H = 1%), *Prevotella* (P = 3%; H = 4%), *Veillonella* (P = 5%; H = 6%), *Fusobacterium* (P = 1%; H = 20%); and other 56 genera (SD 7) (P = 17%; H = 19%) regardless the experiments (1 or 2). Similarity distances (BC) (mean 0.73, SD 0.15) and the Shannon diversity index (mean 2, SD 0.2) revealed no differences between duplicate experiments (p-value 0.121). The n-MDS showed a strong clustering by donor. Dissimilarities between 2w and 4w accounted for 54% (SIMPER). 2w biofilms were more similar to the inoculum (mean BC 0.25) than the 4w biofilms (mean BC 0.21).

**Conclusion:** This model allows reproducible assessment of complex subgingival microbial communities including recently with periodontal disease associated bacteria such as *Filifactor*, *Anaeroglobus*, *Phocaeicola* and unclassified *Clostridia* among others.

**P0093****Differential expression of primary colonizer genes involved in biofilm formation**

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**Aim:** During the transition between planktonic growth and biofilm formation, bacteria have been reported to modify their pattern of gene expression to synthesize adhesion proteins, components of the extracellular matrix, communication molecules (quorum sensing), etc. Meanwhile, they reduce the expression of those genes whose function is no longer needed in a sessile life-style. The aim of this research was to study the expression pattern of some genes in a multispecies oral biofilm formed in vitro, which could be involved in the early stages of biofilm formation with primary colonizers.

**Material and Methods:** A mixture of the species *Streptococcus oralis*, *Streptococcus gordonii*, *Veillonella dispar* and *Actinomyces naeslundii* were grown planktonically. These same species were used to form biofilm on hydroxyapatite discs. After 6 h of incubation, the bacteria were harvested, and RNA extraction, reverse transcription and RT-PCR were performed to study the changes in the expression of some genes involved in quorum sensing, adhesion and carbohydrate metabolism (matrix synthesis).

**Results:** A greater expression level of the *luxS* gene (quorum sensing) was observed in planktonic compared to biofilm conditions. The opposite was found for the *srtB* gene, which encodes a sortase involved in anchoring surface proteins. Other genes associated with matrix synthesis (*gapA*, *scrR*, *fruA*) showed different induction or repression patterns.

**Conclusion:** During the early hours of biofilm formation, changes were observed in the expression pattern of primary colonizer genes that were involved in quorum sensing, adhesion and extracellular matrix formation.

**P0094****Matrix metalloproteinase (MMP)-8 and tissue inhibitor of MMP-1 (TIMP-1) gene polymorphisms in generalized aggressive periodontitis: gingival crevicular fluid MMP-8 and TIMP-1 levels and outcome of periodontal therapy**G. Emingil<sup>1</sup>, B. Han<sup>1</sup>, A. Gürkan<sup>1</sup>, A. Berdeli<sup>1</sup>, T. Tervahartiala<sup>2</sup>, T. Salo<sup>3</sup>, P. Pussinen<sup>2</sup>, T. Köse<sup>1</sup>, G. Atilla<sup>1</sup>, T. Sorsa<sup>2</sup><sup>1</sup>Izmir/Turkey, <sup>2</sup>Helsinki/Finland, <sup>3</sup>Oulu/Finland

**Aim:** The aim of the present study is to investigate matrix metalloproteinase (MMP)-8 and tissue inhibitor of MMP-1 (TIMP-1) gene polymorphisms in generalized aggressive periodontitis (GAgP) and to assess the effects of MMP-8 and TIMP-1 genotypes on the outcomes of non-surgical periodontal therapy.

**Material and Methods:** Genomic DNA was obtained from peripheral blood of 100 patients with GAgP and 167 periodontally healthy controls. MMP-8 + 17 C/G, -799 C/T, -381 A/G and TIMP-1 372 T/C, \*429 T/G polymorphisms were determined by polymerase chain reaction-restriction fragment length polymorphism. Patients with GAgP received non-surgical

periodontal therapy and were followed for 6 months. Clinical periodontal parameters and gingival crevicular fluid (GCF) samples were collected at baseline and at follow-up visits. GCF biomarkers were analyzed by immunofluorescence assay and enzyme-linked immunosorbent assay.

**Results:** Distribution of the MMP-8 -799 C/T genotypes was significantly different between the GAgP and control groups ( $p < 0.005$ ). TIMP-1 372 T/C and \*429 T/G genotypes in males were also significantly different between study groups ( $p < 0.004$ ). GCF MMP-8 levels decreased until 3 months after non-surgical therapy compared with baseline in T and G alleles, as well as G and C allele carriers ( $p < 0.0125$ ), whereas no significant decrease was observed in non-carriers ( $p > 0.0125$ ).

**Conclusion:** On the basis of the present findings, it can be suggested that MMP-8 -799 C/T and TIMP-1 372 T/C, \*429 T/G gene polymorphisms in males may be associated with the susceptibility to GAgP in the Turkish population.

**P0095****Evaluation of crevicular fluid levels of RANK, RANKL and OPG in periodontitis patients**

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**Aim:** The aim of this study was to investigate the GCF levels of RANK, RANKL and OPG before and after non surgical periodontal treatment. Thus, severity of the bone resorption or treatment results may be evaluated by the help of these biomarkers.

**Material and Methods:** 20 patients with Chronic Periodontitis (ChP), 20 patients with generalized GAgP, and 20 healthy control (C) subjects who are systemically healthy and non smoker were selected. The gingival crevicular fluid was collected by using sterile filter papers before and 12 weeks after the non surgical periodontal treatment. Also bleeding, plaque and probing depth scores were recorded at the beginning and 12 weeks after the initial periodontal treatment. Samples were pooled for the determination of GCF levels of RANK, RANKL and OPG. All markers were evaluated by ELISA method. The statistical analyses were carried out by SPSS 22.

**Results:** The GCF levels of RANK and RANKL were higher in GAgP compared to those of C and ChP ( $p < 0.05$ ). In both GAgP and ChP groups GCF levels of RANK and RANKL decreased significantly ( $p < 0.05$ ). Relatively GCF levels of OPG were decreased in GAgP group, but not significantly.

**Conclusion:** These results suggest that the biomarker profiles of periodontal diseases differ from each other. RANK and RANKL were elevated in GAgP according to ChP and C groups before periodontal treatment. In addition, RANK has a major effect on progressive bone resorption in generalized aggressive periodontitis and chronic periodontitis. The increase in the levels of osteoclastogenic markers dramatically decrease right after non surgical periodontal treatment.

## P0096

### Association between chronic periodontitis-associated subgingival microbiota and clinical inflammation by 16S pyrosequencing

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**Aim:** To use pyrosequencing of the 16S ribosomal RNA gene to analyse the relationship between the chronic periodontitis-associated subgingival microbiota and clinical inflammation.

**Material and Methods:** Sixty subjects with generalized chronic periodontitis participated in this study. Patients were divided into two groups according to their bleeding on probing (BOP) scores: group A (mean scores  $\leq$  50% in sampled sites) and group B (mean scores  $>$  50% in sampled sites). Subgingival bacterial samples from periodontal patients were studied by pyrosequencing PCR products of the 16S rRNA gene.

**Results:** In all the analysed subgingival samples, 101 bacterial genera and 203 species (from 41 genera of interest) were identified. Rarefaction curves showed a greater number of bacterial species in samples from group B compared to group A. There were statistically significant differences in the relative abundance of 13 genera and 9 species between groups A and B (Mann-Whitney test,  $p < 0.05$ ). *Tannerella forsythia*, *Treponema* species, *Prevotella nigrescens*, *Peptostreptococcus stomatitis* as well as *Desulfobulbus*, *Mogibacterium timidum* and *Filifactor alocis* were positively associated with the BOP scores. *Anaeroglobus*, *Capnocytophaga gingivalis*, *Kingella oralis* and *Veillonella* had negative correlations with BOP scores (Spearman correlation coefficient,  $p < 0.05$ ).

**Conclusion:** 16S pyrosequencing revealed that increased inflammation, at sites with periodontitis, is associated with a more diverse subgingival microbiota and specific changes in the bacterial composition, involving "established" periopathogens, commensals and novel disease-associated taxa at low-abundance. These results support the important role of gingival inflammation as a clinical indicator of the chronic periodontitis-associated subgingival community.

## P0097

### Evaluation of crevicular fluid levels of osteonectin and osteocalcin in periodontitis patients

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**Aim:** During the bone remodelling ON and OC levels may increase like degradation biomarkers due to continuation of inflammatory process. The aim of this study was to investigate the GCF levels of ON and OC before and after non surgical periodontal treatment. T

**Material and Methods:** 20 patients with Chronic Periodontitis (ChP), 20 patients with generalized GAgP, and 20 healthy control (C) subjects were selected for the study. The gingival crevicular fluid was collected by using sterile filter papers before and 8 weeks after the non surgical periodontal treatment. At the same time plaque, bleeding and probing depth scores were

recorded. Assays for GCF levels of RANK, RANKL and OPG were carried out by an enzyme-linked immunosorbent assay (ELISA) method. The groups compared with each other by utilizing Mann Whitney U-test.

**Results:** The GCF levels of ON and OC and were higher in GAgP compared to those of C and ChP ( $p < 0.05$ ). In both GAgP and ChP groups GCF levels of ON and OC decreased significantly ( $p < 0.05$ ).

**Conclusion:** These results suggest that the biomarker profiles of periodontal diseases differ from each other. ON and OC were elevated in GAgP according to ChP and C groups before periodontal treatment. After the non surgical periodontal treatment ON and OC levels dramatical decrease may be caused by the elimination of inflammation.

## P0098

### Gingival crevicular fluid and salivary HIF-1 $\alpha$ levels in periodontal health and disease

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**Aim:** Hypoxia and inflammation occurs simultaneously in several diseases including chronic inflammatory disease. Hypoxia inducible factor-1 $\alpha$  (HIF-1 $\alpha$ ) is a central transcriptional regulator that plays role in pathophysiological changes of homeostasis under conditions of oxygen deprivation. The aim of this study is to analyze the gingival crevicular fluid and saliva HIF-1 $\alpha$  levels as a hypoxia marker in periodontally healthy and diseased sites in periodontal inflammation.

**Material and Methods:** Gingival crevicular fluid (GCF) and salivary samples were collected from 6 chronic periodontitis, 18 gingivitis patients and 18 periodontally healthy controls. Clinical periodontal parameters were recorded at all subjects. HIF-1 $\alpha$  levels were assessed using an enzyme-linked immunosorbent assay.

**Results:** Chronic periodontitis, gingivitis and healthy controls had similar GCF HIF-1 $\alpha$  total amount, and there was no correlation between the total amount of HIF-1 $\alpha$  and clinical periodontal parameters ( $p > 0.05$ ). The GCF HIF-1 $\alpha$  concentration was significantly lower in chronic periodontitis than in healthy controls ( $p < 0.0001$ ). Salivary HIF-1 $\alpha$  levels were higher in chronic periodontitis compared to healthy controls. There was no significant correlation between salivary and GCF HIF-1 $\alpha$  levels ( $p > 0.05$ ).

**Conclusion:** The present study evidences for the first time the presence of HIF-1 $\alpha$  in GCF and salivary samples of patients with periodontal inflammation as well as healthy. According to the present findings GCF HIF-1 $\alpha$  levels could not differentiate chronic periodontitis, gingivitis and healthy individuals. On the other hand, increased oral levels of HIF-1 $\alpha$  in chronic periodontitis warrants further investigation.

**P0099****Tolerance to injection injury assessed by optical projection tomography: comparison of the lingual and the inferior alveolar nerve**

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**Aim:** The objective of this study was to evaluate the ability of optical projection tomography (OPT) to discern the microarchitecture and the injection injury of the inferior alveolar and the lingual nerve in 3D.

**Material and Methods:** Five euthanized piglets were included in this study. Their inferior alveolar and lingual nerves were unilaterally injected with pre-set volumes of local anaesthetic using the same injection pressure. The injection site was 5 mm above the lingula of the mandible where the inferior alveolar nerve block is typically performed. Excised nerves were fixed in methanol and subsequently cleared with benzyl alcohol benzyl benzoate and finally captured in 3D using OPT machine.

**Results:** Using OPT, we confirmed the differences between the two nerves in their diameters, number and the diameter of their fascicles, as well as in the ratio of neural to non-neural tissue. We clearly observed the injection injury in 3D. In the lingual nerve with less non-neural tissue and larger and fewer fascicles, OPT demonstrated disruption to the fascicles with a focal disruption of the outer epineurium, while in the inferior alveolar nerve only their displacement. Using OPT we clearly observed the differences in the internal organization of the inferior alveolar and the lingual nerves – which explains the variation in their susceptibility to injury.

**Conclusion:** Our findings explain the reason of the human lingual nerve being susceptible to injection injury after the inferior alveolar nerve block. This approach offers unprecedented possibilities for studying nerve microarchitecture topography and its tolerance to injection injury.

**P0100****Stillman's cleft histology**

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**Aim:** Stillman's cleft is a mucogingival triangular-shaped defect on the buccal surface of a root. The aim of this study is to examine the Stillman's cleft excised during surgery in order to observe the level of inflammation and if there are differences in the level of MMP-8 activity, composition of connective fibers and fibroblasts activity (focused on the regenerative capacity of this cells), IL-8 activity, epithelial activity (superficial and junctional), neutrophil activity in the two aforementioned areas.

**Material and Methods:** Type of study: Two case-control studies. Inclusion criteria: Patients have in common the presence of a Stillman cleft but in different periodontal conditions. Treatment of the Stillman cleft The surgical protocol consisted in the excision of the cleft as indicated by previously validated techniques in order to create a better manageable site for the surgical approach gingival recession. The surgical site followed the same surgical protocol of a normal gingival recession with the preparation of a flap that allows the coverage of the exposed root surface.

**Results:** First case (Mild lesion): A lichenoid band-like inflammatory infiltration is observed with focal epithelial ulceration corresponding to cleft floor; reactive atypia with many mitoses, spongiosis, acantosis and occasional dyskeratotic cells. Second case (Severe lesion): Inflammatory fibrous hyperplasia, pseudoepitheliomatous hyperplasia overlying sclerotic lamina propria has been observed.

**Conclusion:** This is the first study that have been made about the histology of Stillman's clefts with new technologies. Obviously we had different results from older studies. So we need to enlarge our sample to have a better understanding of this lesion.

**P0101****Calprotectin – a sequence of the in-vivo-gene expression**

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**Aim:** Antimicrobial peptides (AMPs), such as S100A8 and S100A9 (calprotectin-complex), are expressed by human gingival epithelial cells. Calprotectin plays a regulatory role in inflammatory processes through its apoptosis-inducing mechanisms and is particularly active against fungi and other invasive microorganisms. The aim of this study was to evaluate the sequence of the in-vivo-gene expression of S100A8 and S100A9 in human tissue samples from an experimental gingivitis study.

**Material and Methods:** In healthy volunteers (n = 18), natural dental biofilm was allowed to develop over a time-period of 21 days. Plaque index (PI), bleeding on probing (BOP%), and volumes of gingival crevicular fluid (GCF) were monitored at baseline and day 1, 3, 5, 7, 14, 21, and 28. Gene expression profiles of S100A8 and S100A9 were analyzed by real-time PCR technology.

**Results:** The experimentally induced gingivitis gradually developed with an increase in PI and BOP scores as well as in GCF volume up to 21 days. The gene expression level of S100A8 and S100A9 simultaneously peaked significantly at day 3 (p = 0.0042 and p = 0.0064, respectively) and at day 14 (p = 0.043 and p = 0.039, respectively). Surprisingly, the basal expression level for both S100A8 and S100A9 showed the same magnitude as the level of the housekeeping gene tested.

**Conclusion:** This in-vivo-study showed the time-dependent gene regulation of S100A8 and S100A9 due to an experimentally induced gingivitis for the first time. The comparably high gene expression level of both S100A8 and S100A9 as well as their simultaneous mRNA regulation suggests a pivotal role of calprotectin during the maintenance of a healthy oral homeostasis.

**P0102****Effect of ligature induced periodontal disease on experimental tongue cancer in Wistar rats**

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**Aim:** To analyze the effect of the presence of ligature induced periodontal disease on the experimental development of tongue cancer by 4-Nitroquinoline 1-Oxide (4NQO) in Wistar rats.

**Material and Methods:** Seventy-two 60-day-old male Wistar rats were distributed in three experimental groups: Group 4NQO, in which animals were exposed to a 50 ppm solution of the carcinogen for 140 days; Group Ligature + 4NQO, in which periodontal disease was induced by ligature in the second upper molar for 14 days and, after, the exposition to 4NQO for additional 140 days; Group 4NQO + Ligature, in which the animals were exposed to 4NQO for 140 days, and, after, periodontal disease was induced for 14 days. Weight of the animals was monitored during the entire study. Animals were sacrificed at the end of the experiment and the maxillary specimens and the tongues were analyzed in relation to alveolar bone loss and histopathological alterations.

**Results:** Fifty-six animals completed the study. No statistically significant difference was observed in sides without ligatures; a higher degree of bone loss was observed in the side that received ligature. There was a lower occurrence of well-differentiated squamous cell carcinoma in animals that presented, from the beginning of the exposition to the carcinogen, periodontal inflammation ( $p < 0.05$ ).

**Conclusion:** It may be concluded that the presence of periodontal inflammation seems to be a potential modulator of the carcinogenic process.

## P0103

### Adverse effects of nicotine on murine immortalized cementoblast cell line

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**Aim:** Cigarette smoking is an important risk factor in the pathogenesis of periodontal disease. Little is known about the effect of nicotine, the major component of cigarette smoke, on cementoblasts. The aim of this study was to investigate the pathological effects of nicotine on murine immortalized cementoblast cell line (OCCM.30).

**Material and Methods:** Cell viability was judged by using tetrazolium bromide reduction assay. Cyto differentiation was examined by alkaline phosphatase (ALP) assay. The production of nitric oxide (NO) and prostaglandin E2 (PGE2) was evaluated using Griess reagent and enzyme linked immunosorbent assay (ELISA), respectively.

**Results:** Nicotine demonstrated cytotoxicity to cementoblasts in a dose-dependent manner ( $p < 0.05$ ). Nicotine was found to inhibit ALP activity in a dose-dependent manner ( $p < 0.05$ ). In addition, nicotine augmented the production of PGE2 in a dose-dependent manner ( $p < 0.05$ ). Nicotine was found to induce NO generation in a dose-dependent manner ( $p < 0.05$ ).

**Conclusion:** Our results suggest that nicotine could inhibit cementoblast growth and cyto differentiation. In addition, nicotine could also induce the generation of inflammatory effects on cementoblasts.

## P0104

### The presence and upregulation of non-neuronal transient receptor potential vanilloid 1 (TRPV1) and transient receptor potential ankyrin1 (TRPA1) receptor in oral lichen planus

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**Aim:** Oral lichen planus (OLP) is a pre-cancerous disorder of the oral mucosa with a supposed role for neurogenic inflammation. The oral mucosa is densely innervated by sensory fibres. Non-neuronal cells (inflammatory cells, keratinocytes) release mediators that activate/sensitize sensory nerve endings via transient receptor potential channels (TRP) and cause the release of pro-inflammatory and anti-inflammatory neuropeptides. The accumulating evidence for the non-neuronal expression of TRP receptors promotes the possibility of cross-talk between sensory and extraneuronal TRPs by inflammatory mediators. TRP channels are expressed by epidermal, dermal, epithelial and immune cells. We set out to investigate the local mRNA and protein expression of two prominent members of the receptor family in OLP: vanilloid 1 (TRPV1) and ankyrin 1 (TRPA1).

**Material and Methods:** We collected buccal samples of OLP patients confirmed by pathologic assessment. We detected protein immunohistochemical localization by specific antibodies and DAB development and mRNA expression by quantitative PCR (qPCR).

**Results:** Besides pathological reports we verified patient samples by detecting the increased gene expression of tumor necrosis factor alpha (TNF $\alpha$ ), interferon-gamma (IFN-g), matrix metalloproteinase-1 (MMP-1) and mast cell chimase. We detected TRPV1 and TRPA1 immunopositivity in OLP compared to normal mucosa. Increased TRPV1 specific staining was observed in the epithelium, the vascular endothelial cell, lymphocytes and fibroblasts in the subepithelial tissue. Non-neuronal TRPV1 mRNA was also elevated. Expression of TRPA1 receptors was detected by means of immunohistochemistry and qPCR.

**Conclusion:** Based on our results we assume a role for extraneuronal TRPV1 receptors in the pathomechanism of OLP. They may mediate the release of inflammatory factors from keratinocytes.

## P0105

### Inflammatory profile and bone destruction in periodontitis associated to orthodontic forces

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**Aim:** The aim of the present study was to evaluate the inflammatory profile of the periodontal tissues and the alveolar bone destruction in response to concomitant periodontitis and orthodontic forces.

**Material and Methods:** A total of 144 male adult Holtzman rats were randomly assigned into four experimental groups: negative control (C), ligature-induced periodontal disease (P), orthodontic movement (OM), P followed by OM (OMP). After 1, 3, 7, and 15 days of the OM start, 9 animals from each group were sacrificed. Bone volume fraction (BVF) was mea-

sured using micro-computed tomography (microCT). Gene expression profile of inflammatory cytokines and their receptors was evaluated by PCR array assay and validated by qPCR. Protein production was evaluated by the Luminex System. Statistical analysis was performed using Student's t-test (PCR array data) and ANOVA followed by Tukey's post-hoc test.

**Results:** The OMP group exhibited continuous and significantly higher ( $p < 0.05$ ) alveolar bone loss compared to all the other groups as demonstrated by a decrease in BVF at 15 days. PCR array analysis revealed the induction of several inflammatory mediators/receptors in all groups. The 6 most upregulated genes for the OMP group were validated: CCL2, CCR2, IL-1 $\beta$ , IL-6R, Itgam, and TNF- $\alpha$ . For most of these genes, protein levels were also significantly higher in the OMP group.

**Conclusion:** Mechanical loading modulates the response of periodontal tissues to periodontal disease through the increased expression of proinflammatory mediators, which might be involved in the alveolar bone resorption. Thus, this study suggests that orthodontic forces may aggravate the periodontal breakdown in periodontitis.

## P0106

### Possible interaction between *Archaea* and *Bacteria* in subgingival biofilm of subjects with chronic periodontitis

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**Aim:** The aim of the present study was to evaluate the levels and proportions of Archaea in the subgingival biofilm of subjects with chronic periodontitis (ChP) and periodontally healthy controls (PH) and to correlate these findings with the levels and proportions of 40 bacterial species.

**Material and Methods:** Sixty subjects with ChP and 30 PH controls underwent clinical and microbiological assessment. The levels and proportions of Archaea were analyzed by quantitative PCR and the microbial profile by checkerboard DNA-DNA hybridization.

**Results:** Archaea were detected in 48 (80%) subjects and 51.6% of the sites of ChP group, and in 23 (76.6%) subjects and 46.6% sites of PH group ( $p > 0.05$ ). Levels of Archaea were significantly higher in ChP ( $6.4 \times 10^4$ ) than in PH ( $0.3 \times 10^4$ ) as well as in deep periodontal sites compared with shallow sites within ChP subjects. *C. showae*, *F. nucleatum* ssp. *nucleatum*, *P. micra*, *P. nigrescens*, *S. constelattus*, *T. forsythia* and *P. gingivalis* showed significantly higher mean levels in sites colonized by Archaea when compared to sites not colonized in the ChP group ( $p < 0.05$ ). There was a positive correlation between levels of Archaea and proportion of the red complex ( $r = 0.36$ ,  $p = 0.001$ ).

**Conclusion:** Archaea are often found in the subgingival biofilm of subjects with chronic periodontitis and periodontal health. The ecological changes in the microbiota of chronic periodontitis include increased levels of the Archaea domain. The presence of these microorganisms may interfere with the subgingival microbial profile of subjects with chronic periodontitis and disease deserves further investigation.

## P0107

### Effect of cyclosporin A on mitochondrial permeability transition pore in primary human gingival fibroblasts – an in vitro study

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Chennai/India

**Aim:** To determine the alterations in mitochondrial permeability transition pore in human gingival fibroblasts in drug induced gingival overgrowth.

**Material and Methods:** Human gingival fibroblasts (HGF) were cultured from gingival tissue obtained during crown lengthening procedure from healthy patients. The human gingival fibroblasts were divided into control and cyclosporin A (CsA) treated groups. The mitochondrial transition pore was assessed by means of calcium signaling on subsequent addition of calcein AM, Cobalt chloride and ionomycin to cultured HGF with and without CsA treatment.

**Results:** The results of the study showed that the calcium intensity remained unchanged even after addition of ionomycin (mitochondrial pore opener) in the cyclosporin A treated group representing the mitochondrial pore blocking capability of cyclosporine A. The findings of the present work showed that CsA interfered with MPTP which was evident by variation in the calcium signaling. In comparison to the control sample, MPTP was found to be inhibited in CsA treated HGF.

**Conclusion:** Mitochondrial permeability transition pore is an important checkpoint in the mitochondrial pathway of apoptosis. It is possible that CsA by blocking MPTP can have an inhibitory effect on apoptosis. This could increase the longevity of the fibroblasts and thereby lead to fibrosis as seen in the clinical picture of DIGO. This blocking action of CsA on MPTP could be a possible mechanism underlying the pathogenesis of DIGO.

Correction added on 3 July 2015, after first online publication. The primary author's order list S.S.V. Ganesh, U. Kumar, S.K.R. Suresh has been changed to S. Sundararajan, V. Ganesh, U. Kumar, K. Sugavanan, R. Suresh

## P0108

### Beta-lactamase-producing *Prevotella* species in maternal saliva

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Turku/Finland

**Aim:** *Prevotella* species are known as common beta-lactamase producers in the oral cavity and especially *P. melaninogenica* as a frequent finding in saliva. Several novel species have been described within this genus. In the present study, we examined the beta-lactamase production among oral *Prevotella* species isolated from post-partum women.

**Material and Methods:** Salivary *Prevotella* species originated from two study populations of generally healthy, non-smoking, Caucasian women. Time periods for the sample collections were 1989–1990 (41 women) and 2002–2006 (28 women). *Prevotella* isolates with various colony morphologies were identified by partial 16S rRNA gene sequencing. Beta-lactamase production of the selected 381 isolates was tested by the nitrocefin disk method.

**Results:** Out of the 381 *Prevotella* isolates tested, 241 isolates (62%) produced beta-lactamase. A half ( $n = 120$ , 49.8%) of

these beta-lactamase-positive isolates were identified as *P. melaninogenica*, 10% (n = 24) as *P. pallens*, 9.5% (n = 23) as the novel *P. jejuni*, 8.7% (n = 21) as *P. denticola*, and 6.2% (n = 15) as *P. nigrescens*. The rest of the positive isolates identified to the species level (n = 33) consisted of *P. histicola*, *P. salivae*, *P. aurantiaca*, *P. intermedia*, *P. buccae*, *P. nanceiensis*, and *P. scopos* as well as 5 unidentified *Prevotella* sp. isolates. Among the *P. denticola* isolates, the beta-lactamase occurrence differed between the two sampling periods; the 1989–1990 samples had less beta-lactamase-positive strains than the samples collected in 2002–2006 ( $p < 0.05$ ).

**Conclusion:** Beta-lactamase producing *Prevotella* species, including a number of recently described species, are common in maternal saliva. Our findings indicate that there may be a rising trend in the occurrence of beta-lactamases.

## P0109

### Comparison of two different orthodontic force magnitude's effects in periodontium used rat models for experimental tooth movement

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Istanbul/Turkey

**Aim:** The purpose of orthodontic treatment is to move teeth with minimum adverse effects for teeth and supporting tissue. To achieve that, optimal force system is needed. Some factors like magnitude of force, treatment duration, type of force are related to it. Our aim is to observe different force magnitude's effects in periodontium with a rat model during all the phases of orthodontic tooth movement.

**Material and Methods:** 56 male Wistar rats were used as experimental animals. There were two groups placed orthodontic appliances with high and low forces (10, 60 cN to all three maxillary molars) Rats were 10–12 weeks old and body weights were  $300 \pm$  g. Ethical permission for the study was obtained from animal experiments of local ethic committee in İstanbul University. A split mouth study design was used. Experimental side was randomly chosen and contralateral side as control. An orthodontic appliance including all three molars was bent and placed to experimental side. At 1, 7, 21, 42 days 7 animals were sacrificed for each two groups according to orthodontic tooth movement phases for histological studies.

**Results:** The histological sections stained with hematoxylin and eosin was evaluated for the measurement of width of the periodontal ligament space. In the group of applied high force, from 7 to 21 days and in the low force group, from 21 to 42 days there were statically significant change in the compression side.

**Conclusion:** Histological analysis of our study has been done and is carried on with immunohistochemical analysis for further investigation.

## P0110

### Effect of pregnancy on salivary interleukins and gingival inflammation

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**Aim:** To determine the influence of estradiol and progesterone fluctuations on the levels of salivary interleukin (IL)-1 $\beta$ , -8, and

-10, and to compare those with plaque exposure and gingival inflammation during pregnancy and post-partum.

**Material and Methods:** This longitudinal cohort study consisted of 30 generally healthy, non-smoking, pregnant Caucasian women, examined once per each trimester of pregnancy, and twice during post-partum. During each visit, visible plaque index (VPI) and bleeding on probing (BOP) were recorded and stimulated saliva samples were collected. Salivary estradiol and progesterone concentrations were determined by ELISA, and IL-1 $\beta$ , -8, and -10 concentrations by the Luminex technology.

**Results:** Salivary estradiol and progesterone concentrations increased significantly trimester by trimester ( $p < 0.001$ ) and decreased after delivery ( $p < 0.01$ ). During the second trimester, despite of the decreased VPI%, the highest peak of BOP% was observed ( $p < 0.001$ ), while the IL-1 $\beta$ , IL-8, and IL-10 concentrations in saliva remained rather stable. IL-1 $\beta$  and IL-8, however, correlated moderately with BOP% (Spearman's  $\rho$  0.4–0.5,  $p < 0.05$ ). Throughout pregnancy and post-partum, the correlation between VPI% and BOP% was moderate or strong (Spearman's  $\rho$  0.5–0.7,  $p < 0.05$ ). In addition, the concentrations of IL-1 $\beta$  correlated with those of IL-8 (Spearman's  $\rho$  0.6–0.9,  $p < 0.01$ ), and IL-8 with IL-10 (Spearman's  $\rho$  0.4–0.8,  $p < 0.05$ ).

**Conclusion:** Suppressed inflammatory responses with concomitant bacterial challenge influence the increased susceptibility to gingival inflammation during pregnancy.

## P0111

### Characterization of clinical isolates of Porphyromonas gingivalis and its effect on gingival epithelial cells

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**Aim:** To evaluate differences of virulence factors of *P. gingivalis* clinical isolates from chronic periodontitis and healthy patients and their effect on infected gingival epithelial cells viability.

**Material and Methods:** Clinical isolates from chronic periodontitis (CP) and healthy patients (H) and reference strains, 33277 and W50, were characterized by analysis of macro-morphological parameters, performing biofilm formation assays, binding Cytochrome C and Microbial Adhesion to Solvents (MATS) assays, identifying capsule, presence of fimbria, characterizing electrophoretic profiles of LPS, evaluating the GECs viability (OKF6/TERT2 line) by MTS method and invasion assays.

**Results:** Differences in growth and macro-morphology were found between CP and H patients isolates and they formed more biofilm than reference strains. Presence of capsule and fimbria was observed for each isolate with no significant differences. Most of clinical isolates from CP presented a lower surface polarity than H patients and reference strains. One of the isolate from CP presented the lowest polarity and highest ability to form biofilm. Most of these isolates increased the viability of OKF6/TERT2 cells after 12–24 h infection (higher for isolates from CP).

**Conclusion:** There is a great variability in the characteristics of *P. gingivalis* isolates on their cell envelope, which could be associated with invasiveness and cell infection. No significant differ-

ences were found for presence of capsule or fimbria related to its capacity of cellular infection, but isolates with low surface polarity, high capacity for biofilm formation from patients with severe clinical symptoms showed marked inhibition of apoptosis OKF6/TERT2 cells and it could be correlated to microorganism own changes associated with status of health and disease.

## P0112

### **P. gingivalis suppresses differentiation and increases apoptosis of osteoblasts from New Zealand Obese (NZO) mice compared to C57BL/6J**

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**Aim:** Studies have reported an association between metabolic syndrome (MetS) and periodontal disease. The aim of the present study was to analyze the effect of Porphyromonas gingivalis (P. gingivalis) on differentiation of primary osteoblasts of New Zealand Obese (NZO) mice, a MetS model, compared to C57BL/6J osteoblasts

**Material and Methods:** Primary calvarial osteoblasts, isolated from 3-day-old NZO and normal mice, were infected with P. gingivalis. Proliferation was quantified by BrdU incorporation. Cell cycle and early as well as late apoptosis was measured by flow cytometry. Gene expression was determined by Real-Time-PCR.

**Results:** 12 h following P. gingivalis infection, NZO osteoblasts showed a significantly ( $p \leq 0.01$ ) decreased proliferation with increased G<sub>2</sub> cell cycle phase compared to normal osteoblasts. Flow cytometry analysis demonstrated a significantly ( $p \leq 0.01$ ) greater increase of early apoptotic cells by Annexin-V positive and late apoptosis by Caspase-3 activity in NZOs at 3 and 6 h following infection. No significant LDH release was found. 8 days following P. gingivalis infection RT-PCR data showed a significantly ( $p \leq 0.01$ ) suppressed expression of collagen, osteocalcin and Runx2 in NZOs, compared to normal osteoblasts

**Conclusion:** The present data demonstrate that P. gingivalis downregulates proliferation and promotes apoptosis in primary NZO osteoblasts compared to C57BL/6J osteoblasts. Also, a suppressed osteoblastic marker expression in NZOs, may contribute to the pathogenesis of periodontitis in patients with MetS.

## P0113

### **Comparative evaluation of different models of experimental periodontitis in rats**

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**Aim:** Animal models of experimental periodontitis are widely used in studying pathogenesis and trials of new drugs for treatment of periodontal pathology. That's why creation of an experimental periodontitis model, most similar to humans is a burning issue.

**Material and Methods:** 50 male Wistar rats, weight: 350 g. Rats were divided into 5 groups with 10 rats in each group. Three-time intramuscular injection of 12 mg/kg of prednisone,

placement of ligature on the upper molars, soft food were used in the 1st group, only three-time IM injection of 12 mg/kg of prednisone in the 2nd group, single-time IM injection of prednisone of 12 mg/kg, placement of ligature on the upper molars, soft food – the 3rd group, placement of ligature on the upper molars without prednisone injection – the 4th group. Animals were used according to GLP protocol. Under Zoletil IM anesthesia, ligature was fixed between the 1st and 2nd upper molars with flowable light-cured composite material. Animals were decapitated after 14 days and histology samples were prepared.

**Results:** The best results were obtained in the 1st group where prednisone was injected three times: significant hyperemia, edema, suppurating periodontal pocket after 14 days of experiment. Fenestration defects were observed in the molar area. Signs of inflammatory alveolar bone resorption were detected in histology samples.

**Conclusion:** Three-time IM injection of 12 mg/kg of Prednisone and ligature placement accelerate progression of inflammation in periodontium and contribute to development of alveolar bone resorption foci as periodontal cysts.

## P0114

### **Expression of corticotropin-releasing factor receptors (CRF-R1,2) in human periodontal mast cells: peripheral target for a "stress neuropeptide"?**

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**Aim:** A relationship between periodontal illness and psychosocial predisposing factors is well established. Bacteria are the triggering agents of the disease however local host tissue conditions seem to cause most of the damage. Our aim was to identify molecular targets for potential neuroimmunomodulatory mechanisms. The neuropeptide corticotropin-releasing factor (CRF) is an established key mediator of various stress responses, thus we sought to examine out periodontal tissue expression of its receptor (CRF-R1,2).

**Material and Methods:** Immunohistochemistry (immunofluorescence and Peroxidase staining) techniques were employed on 4µm sections of paraffin-embedded periodontal tissues obtained from patients (male and female, age 25–60) for further histological characterization after initially being diagnosed with periodontitis. For comparison, healthy control tissue samples were obtained from patients undergoing routine tooth extractions.

**Results:** CRF-R expression was detected not only in nerve endings accompanying small peripheral blood vessels but also in local cell populations, especially mast cells. Morphologically distinguishable types of mast cells, i.e. blood vessel-associated ovoid type, and a type of mast cells with "dendritic" appearance expressed one or both receptors for CRF.

**Conclusion:** Overall numbers of mast cells, as well as those that were stained for CRF-R1,2 were augmented in chronically diseased tissue, however, also very big variations of these parameters were noted in control tissues independently of the presence of immune competent cells in their vicinity indicating acute inflammatory processes taking place. Taken together, our data suggest that non-inflammatory predisposing factors might cause differential numbers of mast cells which in turn may be of significant importance for local (over)stimulation of immune processes.

## P0115

### Distribution of methanogenic archaea in different oral sites amongst subjects with oral halitosis

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**Aim:** To determine the presence and distribution of Methanogenic archaea species in different sites of the oral cavity amongst patients with and without oral halitosis.

**Material and Methods:** Patients attending the OPD were selected and divided into 2 groups – Control group and Halitosis group. Supragingival and subgingival plaque and swab from posterior tongue were collected. DNA extraction was done using Bacterial genome extraction kit. A conventional PCR was used to detect the DNA of Methanogenic archaea. The PCR products were separated by electrophoresis in 1.5% agarose gel in buffer and visualised under ultraviolet light, followed by ethidium bromide staining. The positive samples were recorded, and the presence of Archaea were determined. The difference in presence and distribution of Methanogenic Archaea between control and oral halitosis subjects was assessed by non parametric methods.

**Results:** PCR revealed the presence of Archaea was 80% in tongue coating and 38% in supragingival sites of halitosis group whereas it was only 7% in supragingival sites control group and its absence subgingival sites of both groups.

**Conclusion:** Archaea were markedly detected in supragingival and tongue coating of halitosis group suggesting that these microorganisms might be involved in the pathogenesis of halitosis.

## P0116

### Prevalence of protozoans in patients with periodontitis

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**Aim:** This study evaluated the prevalence of protozoans (*Entamoeba gingivalis* and *Trichomonas tenax*) in the periodontal pockets of patients with periodontitis.

**Material and Methods:** Sub gingival and supragingival plaque were collected at least in 3 pathologic and one healthy sites from 48 patients with periodontitis. All the clinical parameters were recorded. The samples were diluted in filtered saliva (0.2 µm) and examined by phase-contrast microscopy, and submitted to molecular identification by PCR for the presence of protozoans.

**Results:** 41.6% of examined patients harbored in at least one site *E. gingivalis* and *T. tenax* (37.5% of patients presented only *E. gingivalis* and 14.6% *T. tenax*). Protozoans were identified in pathologic sites, except for one healthy site. Microorganisms were present only in sub gingival flora of periodontal pockets of 7.3 ± 2.1 mm, and with attachment loss of 9.3 ± 2.9 mm. 61.5% of *T. tenax* positive pathologic sites presented visible supragingival biofilm, and only 39.4% for sites with *E. gingivalis*. 75% of patients with protozoans were no smokers.

**Conclusion:** The protozoans were present in periodontal pockets of patients with advanced periodontitis. Their role in the etiology of this disease remains unclear and needs further studies.

## P0117

### HSP60 levels in peripheral blood mononuclear cells of individuals with chronic periodontitis under stimulus of rHmuY

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**Aim:** To evaluate the levels of heat shock protein (HSP) 60 human in peripheral blood mononuclear cells (PBMC) from patients with chronic periodontitis under stimulus of the recombinant protein HmuY of *Porphyromonas gingivalis*.

**Material and Methods:** Cells from 60 volunteers (30 with no periodontitis (NP) and 30 with chronic periodontitis (CP) were cultivated under stimuli of Pokeweed mitogen, protein rHmuY and without stimulation for 48 h. After this period, the enzyme immunoassay ELISA was performed to evaluate the levels of HSP60 in PBMC.

**Results:** Cells from CP patients cultured without stimulus produced lower levels of HSP60 when compared to cells from NP patients. It was not observed statistically significant differences between the PC and NP groups, subjected to different stimuli. However, when the samples from all study participants were grouped to evaluate differences among the three stimuli, the cells cultivated in the presence of rHmuY Pokeweed mitogen presented lower levels of HSP60 when compared to those cultivated in the presence of the mitogen ( $p = 0.03$ ).

**Conclusion:** It's possible that *Porphyromonas gingivalis* HmuY inhibit the production of HSP60 in PBMC human. In addition, the higher production of HSP60 by healthy control cells indicates a protective role against periodontitis.

## P0118

### Are there specific pathogens associated with etiology of aggressive periodontitis?

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**Aim:** This study aimed to investigate the percentage of *Aggregatibacter actinomycetemcomitans* (Aa), *Porphyromonas gingivalis* (Pg), *Treponema denticola* (Td) and *Tannerella forsythia* (Tf) in Brazilian patients with Generalized (GAP) and Localized (LAP) Aggressive Periodontitis (AP).

**Material and Methods:** Forty-eight subjects were included in the study, 28 with generalized aggressive periodontitis (GAP), 10 with localized aggressive periodontitis (LAP) and 10 periodontally healthy subjects. Subgingival biofilm was collected from the deepest pocket in each quadrant with a sterile paper point, which were immediately transferred to tubes containing 100 µl of sterile TE buffer and stored at -80°C. After extraction of genomic DNA, quantification of Aa, Pg, Td and Tf was performed by quantitative qPCR, using specific primers. Total bacterial load was determined with 16SrRNA universal primers.

**Results:** The average age for AP was 29.24 ± 6.4 years old and for healthy group was 21.6 ± 1.57 years old. Percentages of Aa, Pg, Tf and Td were significantly higher in AP than in con-

trols. We have found no differences in microbial levels between GAP and LAP for the studied microorganisms. Differences were found between the groups GAP and healthy for Aa, Pg and Tf ( $p < 0.05$ ) but not between LAP and healthy. None of studied organisms comprised more than 1% of total bacteria in the affected sites.

**Conclusion:** In our study, the four-studied microorganisms represented a very low percentage of total microorganisms present in the subgingival environment. Future investigations should be carried out looking for new pathogens that may be involved in the onset and progression of the AP.

## P0119

### Relationships among subgingival microbiota and interleukin-1 and interleukin-6 in gingival crevicular fluid of chronic periodontitis

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**Aim:** To examine relationships between subgingival microbiota and levels of gingival crevicular fluid (GCF) cytokines in periodontal health and chronic periodontitis.

**Material and Methods:** Sixty subjects with generalized chronic periodontitis and 22 periodontally healthy subjects participated in this study. Subgingival plaque and GCF samples were taken from the same sites. The subgingival plaque samples were studied by pyrosequencing PCR products of the 16S ribosomal RNA gene and GCF levels of interleukin (IL)-1 $\alpha$ , IL-1 $\beta$  and IL-6 analysed using a multiplexed immunoassay (Luminex).

**Results:** In comparison to the controls, the periodontal patients had significantly higher abundance of *Bulleidia extructa*, *Desulfobulbus propionicus*, *Eubacterium infirmum*, *Filifactor alocis*, *Peptostreptococcus stomatis*, *Phocaeicola abscessus*, *Porphyromonas gingivalis*, *Porphyromonas endodontalis*, *Selenomonas sputigena*, *Tannerella forsythia*, TM7, *Treponema denticola* and *Treponema medium*. In comparison to the controls, GCF in periodontal patients contained significantly higher amounts of three cytokines (Mann-Whitney test,  $p < 0.05$ ). Red complex, *Prevotella* species, *Anaeroglobus*, *Desulfobulbus propionicus* and *Filifactor alocis* were positively associated with the expression levels of all cytokines, especially with IL-6. *Abiotrophia*, *Gemella*, *Granulicatella*, *Fusobacterium*, *Haemophilus*, *Neisseria*, *Streptococcus* and *Schlegelella* had negative correlations with IL-1 $\alpha$ , IL-1 $\beta$  and/or IL-6 (Spearman correlation coefficient,  $p < 0.05$ ).

**Conclusion:** 16S pyrosequencing revealed that chronic periodontitis is caused by a dysbiotic change in the subgingival microbiota, in other words, a change in the relative abundance of individual members of the microbiota. "Established" periopathogens, commensals and novel disease-associated taxa demonstrated distinct associations with IL-1 $\alpha$ , IL-1 $\beta$  and/or IL-6. This confirms the pivotal role of these inflammatory mediators for diagnosis and future treatment of chronic periodontitis.

## P0120

### Effect of cyclosporin A on cytosolic calcium levels in cultured human gingival fibroblasts

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**Aim:** To evaluate the effect of cyclosporin A on cytosolic calcium levels in cultured human gingival fibroblasts.

**Material and Methods:** Human gingival fibroblasts were cultured from healthy patient samples undergoing crown lengthening procedures. The cells were treated with a cell permeant calcium dye, CALCIUM GREEN 1 AM followed by the addition of 25  $\mu\text{mol/l}$  of cyclosporin A to measure the cytosolic calcium levels in a time dependent manner using a colorimetric assay (MULTIMODE PLATE READER). Cytosolic calcium staining was also performed using confocal and fluorescence microscopy imaging.

**Results:** Cytosolic calcium level was increased in human gingival fibroblasts treated with cyclosporin A when compared to control group and the results were statistically significant ( $p$ -value  $< 0.05$ ). This was consistent with the results obtained from both fluorescence and confocal imaging.

**Conclusion:** The results of our study showed an increase in cytosolic calcium levels when human gingival fibroblasts were treated with CsA. This mechanism could plausibly upregulate certain important transcription factors such as c-JUN which is implicated in the pathogenesis of Drug induced gingival overgrowth. Thus it is noteworthy to research more on this arena and bring out therapeutic strategies accordingly.

## P0121

### Hyaluronan mediated leukocyte binding is inhibited by novel transporter inhibitors Xanthohumol and Curcumin in gingival fibroblasts

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**Aim:** In inflammatory diseases hyaluronan cable structures are discussed as a factor for chronification. It has been shown that these cable structures bind to peripheral blood monocyte cells (PBMC's). Hyaluronan is exported via multidrug resistance related protein 5 (MRP-5) transporters into the extracellular matrix. Xanthohumol and Curcumin are widely used and tested plant phenols and have been recently identified as MRP-5 inhibitors. Aim of this study is to investigate if these inhibitors are able to reduce hyaluronan mediated leukocyte binding in gingival fibroblasts.

**Material and Methods:** 20  $\mu\text{g/ml}$  Poly IC for 48 h or 1  $\mu\text{g/ml}$  Tunicamycin was used for stimulation. Afterwards cells were treated with 6  $\mu\text{g/ml}$  Xanthohumol and 6  $\mu\text{g/ml}$  Curcumin. PBMC's harvested from blood donors were co-incubated with confluent stimulated gingival fibroblasts. Slides were analyzed with immunofluorescence. Quantification was performed by staining PBMC's with carboxyfluorescein succinimidyl ester. Attached PBMC's were quantified using a FLUOstar OPTIMA plate reader. Students T-Test with Bonferroni was used for statistical analysis.

**Results:** Incubation with Poly:IC and Tunicamycin resulted in a significant increase ( $p < 0.001$ ) in retained PBMC's. Incuba-

tion with Curcumin reduced attached PBMC's to approximately 62% ( $p < 0.01$ ) in both cases. For Poly:IC, Xantohumol decreased PBMC's to 90% (sd: 21%) ( $p > 0.01$ ) and tunicamycin to 33% (sd: 46) ( $p < 0.01$ ). Immunofluorescence microscopy revealed that PBMC's were attached to fibroblasts via hyaluronan cable structures.

**Conclusion:** This study shows the dependency of MRP-5 transporters in hyaluronan mediated leukocyte binding. More clinical studies are needed to evaluate the role of Xantohumol and Curcumin as therapeutic agents in periodontitis.

## P0122

### The effects of tacrolimus on the expression of caspase-3 protein alone or in combination with nifedipine

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**Aim:** The aim of this study was to evaluate immunohistochemically the role of caspase-3 expression, a pro-apoptotic protein, in drug-induced gingival overgrowth.

**Material and Methods:** Forty Sprague Dawley male rats were equally divided into eight groups as; group 1: tacrolimus 8 weeks, group 2: nifedipine 8 weeks, group 3: tacrolimus and nifedipin 8 weeks, group 4: distilled water 8 weeks, group 5: tacrolimus 24 weeks, group 6: nifedipin 24 weeks, group 7: tacrolimus and nifedipin 24 weeks, group 8: distilled water 24 weeks. After macroscopic examination, caspase-3 expression was determined immunohistochemically.

**Results:** Macroscopic examination revealed that prominent gingival overgrowth was observed in long-term drug administered groups 5, 6, 7 while no signs of gingival overgrowth was observed in short-term drug administered groups 1, 2, 3. Caspase-3 immunoreactivity was similar in short-term drug administered groups 1, 2, 3 compared to control group 4 ( $p > 0.05$ ) whereas significant increases were found in long-term drug administered groups 5 and 7 compared to control group 8 ( $p < 0.0083$ ).

**Conclusion:** Within the limits of the study, we suggest that inhibition of pro-apoptotic protein caspase-3 might play an important role in the development of gingival overgrowth.

## P0123

### Effect of phenytoin and aging on the regulation of three enzymes of gingival fibroblasts

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**Aim:** Despite similar clinical manifestation of gingival overgrowth induced by antiepileptic and calcium channel blockers, various degrees of inflammation exist between them. The alteration of cytokine balance is suggested to exert greater influence on gingival overgrowth compared to the direct effect of drug on the regulation of extracellular matrix metabolism or proliferation of gingival over growth. Current study evaluated effect of Phenytoin on the regulation of Collagen, Lysyl oxidase and Elastin in adult and pediatric gingival fibroblasts.

**Material and Methods:** Normal human gingival fibroblasts (HGFs) were obtained from 4 healthy children and 4 adults. Samples were cultured with phenytoin. MTT assay was performed for evaluation of proliferation and ELISA for the level of IL1 $\beta$  and PGE2 production by HGFs respectively. Total RNA of gingival fibroblasts was extracted for RT-PCR of elastin, collagen and Lysyl oxidase. The Analysis of proliferation was assessed by Independent ANOVA test. Kruskal-Wallis test was used to assess the production of mediators with an alpha error level  $< 0.05$ .

**Results:** Significant difference in the expression of Elastin was observed between the controls and treated samples in both adult and pediatric groups and also in the expression of Lysyl oxidase between control and treated adults. No significant difference was observed in the expression of Collagen between control and treated adults.

**Conclusion:** The significant difference in the expression Elastin and Lysyl oxidase between adult and pediatric samples indicates the effect of age in the regulation of Elastin, Lysyl oxidase in both control and Phenytoin treated samples.

## P0124

### Metalloproteinase-8 concentration in gingival crevicular fluid in chronic/aggressive periodontitis patients

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**Aim:** The aim of the study was to determine the concentrations of metalloproteinase-8 in gingival crevicular fluid in patients with chronic/aggressive periodontitis compared to healthy individuals.

**Material and Methods:** The study included a group of 38 patients with diagnosed chronic/aggressive periodontitis. The control group consisted of 20 individuals with healthy periodontium - without clinical attachment loss, without periodontal pockets  $> 3$  mm and with bleeding index  $< 10\%$ . The clinical examination involved measurements of PD (mm), CAL (mm), BI (%). Gingival crevicular fluid was collected from each individual (from patients with periodontitis from deep and shallow pocket). The volume of gingival crevicular fluid was evaluated using Periotron device. The collected material was frozen at  $-20^{\circ}\text{C}$  and stored in that temperature until biochemical tests were performed. MMP-8 concentrations in saliva was determined with enzyme-linked immunosorbent assay ELISA.

**Results:** The study indicated higher MMP-8 concentration in gingival crevicular fluid of individuals with periodontal disease, compared to healthy controls. The higher concentration of MMP-8 in deep pockets, compared to shallow pockets, in patients with periodontal disease was observed. The study didn't revealed significant differences between patients with chronic and aggressive periodontitis.

**Conclusion:** The concentration of MMP-8 in GCF may be an indicator of the advanced periodontal disease but not the indicator of the differentiation of chronic and aggressive periodontitis.

**P0125****Effect of cyclosporin-A and angiotensin II on advanced oxidation protein products by human gingival fibroblast**

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**Aim:** To estimate the Angiotensin II and Angiotensin Converting Enzyme in Cyclosporin -A induced human gingival fibroblasts and the influence of Cyclosporin -A & Angiotensin II on the production of Advanced Oxidation Protein Products (AOPP) by gingival fibroblasts.

**Material and Methods:** Healthy human gingiva were obtained from 5 individuals, who were ruled of gingival/periodontal pathology and systemic diseases. Donors with smoking or other habits were excluded. Cells were seeded in 96 well plates for estimation of Angiotensin II and Angiotensin Converting Enzyme by ELISA. Cells were plated for MTT assay for angiotensin II & cyclosporin A. In the second experiment, from each cell line gingival fibroblast were seeded in 48 well plates and once they reached confluence ( $1 \times 10^6$ ), 10 micromol of angiotensin II & 25micromol Cyclosporin -A were added to each well and cells & supernatants were taken for AOPP estimation in microtitre plate reader as per the methodology of Witko - Sarsat (J Immunol, 1998)

**Results:** Control cells yielded 0.1198 ng/ml of angiotensin II, cyclosporin A added cells exhibited more angiotensin II (0.4569 ng/ml) & Angiotensin Converting Enzyme which was significant (both  $p < 0.05$ ). AOPP production, compared to control (0.9824 ug/ml), angiotensin II and cyclosporin A increased significantly immediately (2.1332 and 2.1376 ug/ml resp) and after 1 h (control: 0.5654 ug/ml, Ang: 2.0306 ug/ml: cyclo: 1.954 ug/ml) ( $p < 0.05$ )

**Conclusion:** Gingival fibroblast synthesize Angiotensin II & Angiotensin Converting Enzyme and cyclosporine increased the synthesis significantly. Both cyclosporin A and angiotensin II increased the AOPP production in human gingival fibroblasts.

**P0126****Effect of melatonin on advanced oxidative protein products in human gingival fibroblasts**

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**Aim:** The aim of the present study is to estimate Advanced Oxidation Protein Product (AOPP) levels in human gingival fibroblasts before and after treatment with melatonin

**Material and Methods:** Human gingival fibroblasts were cultured from gingival biopsies obtained with prior informed consent from 3 healthy human volunteers undergoing surgical crown lengthening. Pure melatonin was obtained from a commercial source (Sigma Aldrich) and the MTT cytotoxicity assay was performed on the cultured gingival fibroblasts. Based on this assay, the IC 50 concentration was determined to be 0.01  $\mu\text{mol/l}$ . The 3 samples of gingival fibroblasts were first analysed at baseline to determine AOPP levels by the spectrophotometric method using chloramine T as standard. Following this the cells were treated with 0.01  $\mu\text{mol/l}$  of melatonin for 5 min and AOPP levels were measured again.

**Results:** The mean baseline AOPP levels in the 3 gingival fibroblast cell lines was found to be 2.212  $\mu\text{mol/l}$  per litre. Following treatment with 0.01  $\mu\text{mol/l}$  of melatonin, the mean AOPP levels were reduced to 1.931  $\mu\text{mol/l}$  per litre.

**Conclusion:** Melatonin was found to reduce AOPP production in gingival fibroblasts. The results of this pilot study give an insight into the antioxidant role played by melatonin on human gingival fibroblasts. Melatonin could be used as a potent host modulatory agent in the management of periodontal disease.

**P0127****Does smoking affect gingival crevicular fluid LL-37 levels in patients with chronic periodontitis following non-surgical periodontal treatment?**

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**Aim:** LL-37 peptide expressed by neutrophils contributes to maintaining the balance between health and disease. Smoking is a risk factor for periodontitis that impairs neutrophil functions. The present study aimed to investigate gingival crevicular fluid (GCF) LL-37 levels following nonsurgical periodontal treatment in smoker versus non-smoker chronic periodontitis (CP) patients.

**Material and Methods:** Thirty-one CP patients (16 smokers, 15 non-smokers) and thirty-one systemically healthy subjects with periodontal health (16 smokers, 15 non-smokers) were included in the study. CP patients received nonsurgical periodontal treatment. GCF LL-37 levels and periodontal parameters were assessed at baseline, 1 and 3 months. GCF LL-37 levels were analyzed by ELISA.

**Results:** Smoker CP group had significantly lower GCF LL-37 level than non-smoker CP group at baseline ( $p < 0.05$ ). GCF LL-37 level in non-smoker CP group was significantly decreased at 3 month following nonsurgical periodontal treatment ( $p < 0.05$ ) while no significant decrease in GCF LL-37 level in smoker CP group was observed at 3 month ( $p > 0.05$ ). Periodontal parameters were correlated with GCF LL-37 levels in non-smoker CP group ( $p < 0.05$ ), but not in smoker CP group ( $p > 0.05$ ).

**Conclusion:** Smoking does not affect GCF LL-37 levels in periodontal healthy subjects. However, smoking might have suppressive effect on GCF LL-37 levels in the presence of CP.

**P0128****The effect of non-surgical periodontal therapy on lipid peroxidation, oxidative DNA damage and total antioxidant status**

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**Aim:** The purpose of this case-control study was to evaluate the effect of non-surgical periodontal treatment on the levels of oxidative stress products [malondialdehyde (MDA), 8-isoprostane and 8-hydroxy-2-deoxyguanosine (8-OHdG)], superoxide dismutase concentration and total antioxidant status (TAS) of the gingival crevicular fluid (GCF).

**Material and Methods:** Thirty patients with chronic periodontitis (experimental group) and thirty periodontally healthy individuals (control group) were enrolled in the study. The experimental subjects should at least submit one single-rooted tooth with advanced periodontitis, another with moderate periodontitis, a tooth with gingivitis and a periodontally healthy single-rooted tooth. Both GCF samples and full-mouth clinical periodontal measurements were recorded at baseline and at 1 month following the initial non-surgical phase of treatment. TAS, MDA, 8-isoprostane, 8-OHdG and SOD levels were determined, and the data generated were analysed by t-tests.

**Results:** At baseline, GCF from the experimental group contained statistically significant higher mean levels of 8-OHdG, 8-isoprostane and 8-OHdG and lower levels of SOD and TAS, when compared to controls. After non-surgical periodontal treatment, oxidative stress products reduced, and TAS and SOD levels increased. The second examination therefore revealed no statistically significant differences between both groups.

**Conclusion:** Non-surgical periodontal treatment may restore the imbalance between reactive oxygen species and antioxidant systems. Future investigations should evaluate the effect of incorporating exogenous antioxidants as part of the periodontal treatment.

## P0129

### **Porphyromonas gingivalis promotes the cell cycle and inflammatory cytokines production in periodontal ligament fibroblasts**

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**Aim:** The invasion of *Porphyromonas gingivalis* (*P. gingivalis*) can modulate host immune-inflammatory responses and destruct the balance of normal cell cycle, thereby leading to periodontal tissue destruction. Human periodontal ligament fibroblasts (PDLFs) are important cells in the pathogenesis of periodontitis. The aim of the present study was to discover the effects of *P. gingivalis* invasion on the cell cycle and inflammatory cytokine production in PDLFs.

**Material and Methods:** *P. gingivalis* invasion model into PDLFs was established. The effect of *P. gingivalis* invasion on the cell proliferation and cell cycle were detected by MTT and flow cytometry. The p21, cyclin D1 and cyclin E mRNA expression, p21 protein expression, as well as IL-6 and IL-8 protein levels were analyzed by real-time PCR, Western blot and ELISA, respectively.

**Results:** *P. gingivalis* invaded into PDLFs and promoted cell proliferation and G1 phase of PDLFs. G1 phase promotion was associated with the decreased level of p21 and the up-regulation of cyclin D1 at 6 h, and with the increased level of cyclin E at 12 h. Simultaneously, the immune-inflammatory response of PDLFs was initiated by *P. gingivalis* during the initial stage of invasion, including the increased expressions of IL-6 and IL-8.

**Conclusion:** We confirmed that the invasion of *P. gingivalis* could modulate the expression of PDLF genes, which control cell cycle and inflammatory cytokine production during the initial stage of invasion. Thus, the *P. gingivalis* invasion may contribute to the proliferation and inflammation of periodontal tissue in the early stage of infection.

## P0130

### **Implication of lysophosphatidic receptor-1 in tooth periodontal development and cementogenesis**

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**Aim:** LPA promotes cell growth, motility and differentiation and has been shown to influence both quantitatively and qualitatively bone development. The aim of the study was to investigate the role of the lysophosphatidic receptor 1, a G protein protein-coupled receptor, in cranio-facial and periodontal development.

**Material and Methods:** LPA1(−/−) and WT mice were sacrificed at D5, 14 and 28. X-rays and high resolution  $\mu$ CT analysis were performed on cranio-facial structures. Mineralization of WT and LPA1(−/−) mice first molars were compared using infrared spectroscopy. Mandibular samples were also embedded in paraffin and histological and immunohistochemical analysis of Bone Morphogenetic Protein (BMP) -2 and -3 were conducted on the first mandibular molar.

**Results:** LPA1(−/−) mice have an overall smaller head and show a decrease in mineralization of the cranio-cervical junction confirming a lack of endochondral ossification. Concerning the first molar phenotype, at D5 no histological differences were observed between WT and LPA1(−/−) mice, however at D15 and D28 LPA1(−/−) mice present shorter and less mineralized roots. Infrared spectroscopy also suggests a decrease in LPA1(−/−) mice tooth mineralization. BMP-3 is localized in the pulp, radicular odontoblasts, dental follicle and alveolar bone in the LPA1(−/−) mouse while it is mainly absent in the WT. On the contrary, BMP-2 is less found in LPA1(−/−) mice compared to WT.

**Conclusion:** LPA through its LPA-1 receptor plays a role in periodontal development and cementogenesis. Furthermore, absence of LPA1 seems to modify the expression of BMPs -2 and -3.

## P0131

### **The effect of orthodontic forces on RANKL-OPG levels in saliva and gingival crevicular fluid: a case control study**

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**Aim:** During orthodontic tooth movement, orthodontic forces induce remodeling of the periodontal ligament and alveolar bone by changing cellular and molecular activity. The aim of the present study was to evaluate the effect of orthodontic forces on IL-1  $\beta$ , RANKL and OPG levels in saliva and gingival crevicular fluid (GCF).

**Material and Methods:** The study population consisted of a total of 58 participants; the test group consisted of 38 patients undergoing orthodontic treatment, and the control group consisted of 20 patients who were not orthodontically treated as part of the study. Clinical parameters were recorded and GCF and saliva samples were collected from all the patients. IL-1  $\beta$ ,

RANKL and OPG levels in the collected saliva and GCF were measured by enzyme-linked immunosorbent assay.

**Results:** In this study, PI, GI, BOP and PD scores were significantly higher in the orthodontic treatment group ( $p < 0.05$ ). Although there was no statistically significant difference between the groups on IL-1  $\beta$ , RANKL and OPG levels in saliva, IL-1  $\beta$ , RANKL and OPG levels in GCF were significantly higher in the orthodontic treatment group ( $p < 0.05$ ).

**Conclusion:** The differences of the clinical parameters and higher levels of IL-1  $\beta$ , RANKL and OPG compared to control group indicate the association with remodeling process of the orthodontic treatment and gingival inflammation. Within the limitation of our study, the evaluation of GCF may be more specific for periodontal changes comparing to saliva.

## P0132

### Analysis of vitamin D receptor and osteoprotegerin gene polymorphisms in patients with chronic periodontitis

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**Aim:** Chronic periodontitis (CP) is an inflammatory disease characterized by loss of the connective tissue and alveolar bone destruction. The aim of this study was to determine whether generalized CP was associated with polymorphisms in vitamin D receptor (VDR) and osteoprotegerin (OPG) genes coding for proteins that are related to bone metabolism and/or turnover.

**Material and Methods:** 123 patients with CP and 118 healthy/non-periodontitis controls were enrolled in this case-control study. Five polymorphisms in the VDR [23005G/A (rs11568820, cdx2), 27823C/T (rs2228570, FokI), 60890G/A (rs154410, BsmI), 61888G/T (rs7975232, ApaI), 61968T/C (rs731236, TaqI)] and four variants in the OPG [C/T (rs6469783), 163A/G (rs3102735), 245A/C (rs3134069), 1181G/C (rs2073618, Lys3Asn)] genes were analysed using the polymerase chain reaction (PCR) methods followed by digestion with restriction enzymes or by real-time polymerase chain reaction (RT-PCR) method.

**Results:** There were no statistically significant differences in the frequencies of VDR cdx2, FokI, BsmI, ApaI and all OPG polymorphisms between CP and control subjects. However, the T allele and TT genotype of the VDR TaqI polymorphism occurred significantly more frequently in patients with CP than in controls (63.0% vs. 36.0%,  $p < 0.00001$ , OR = 3.03, 95%CI: 2.09–4.38 for allele and 40.7% vs. 12.7%,  $p < 0.00001$ , OR = 4.70, 95%CI: 2.45–9.01).

**Conclusion:** Our results suggest that the T allele and TT genotype of VDR TaqI is strongly associated with chronic periodontitis in the Czech population. In contrast, no other polymorphisms in the VDR or OPG genes were related to CP in this study.

## P0133

### Implication of protozoans in the etiopathogenicity of periodontitis: Myth or reality?

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**Aim:** The aim of this review was to perform a systematic evaluation of the literature reporting current scientific of the presence of protozoan, such as *Entamoeba gingivalis* and *Trichomonas tenax*, in periodontitis patients and to understand their role in the etiopathogenesis of this disease. The discussion of this review is based on the Socransky's Koch revisited postulates which determine the pathogen status of microorganism.

**Material and Methods:** Literature from epidemiological, clinical and experimental studies concerning protozoan, periodontitis and buccal cavity were reviewed. A systematic review was performed in Cochrane, and Medline for relevant articles up to July 2014: search for data which fulfill the five proofs of pathogenicity: (1) Association with disease, (2) Elimination of the organism, (3) Host response, (4) Animal pathogenicity, (5) Mechanisms of pathogenicity.

**Results:** A lot of studies shown the presence of protozoans in buccal cavity. Most of study found *T. tenax* in patients with poor oral hygiene. The presence of *E. gingivalis* was higher in pathologic sites than in healthy sites. No substantial data was found for proofs 2, 3, 4 and 5 even if some authors found fragments of leukocytic nuclei in the amoeba cytoplasm by microscopic examination.

**Conclusion:** Literature did not show any evidence that protozoans could cause or aggravate periodontal disease. Their potential role in the etiopathogenesis of periodontitis remains unclear and needs further studies.

Topic: Antimicrobial and anti-inflammatory therapies

## P0134

### The evaluation of photodynamic therapy in the treatment of periodontitis. Pilot study

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**Aim:** The aim of this study was to evaluate the efficacy of the novel approach of non-surgical therapy using photodynamic laser therapy for treatment of periodontal lesions.

**Material and Methods:** This pilot study included 12 patients with at least one periodontal pocket  $\geq 4$  mm in all four quadrants of the mouth, without systemic disease and without prior 6-months use of antibiotics. Split-mouth design was used to compare treatment options for four quadrants: scaling and root planning (SRP), SRP + photodynamic therapy (PDT), SRP+low-level-laser-therapy (LLL) and basic therapy (prophylactic). Baseline, 4 and 8 weeks post-treatment periodontal examinations included pocket probing depth (PPD), gingival index (GI), bleeding-on-probing (BOP), and clinical attachment level (CAL). Baseline, 4 and 8 weeks post-treatment microbiological samples were taken for anaerobic periopathogens using commercially available kits for detection of periopathogens. The sample was taken with sterile curette and cultivated in Schaedler

terrain. The culture was put in a hermetically sealed bag with anaerobic-generator sacculus, incubated for 48 h and read with anaerobic ID cards in Vitek-2© machine.

**Results:** The preliminary results showed significant reduction ( $p < 0.01$ ) of the PPD and BOP for quadrants treated with SRP + PDT, while SRP + LLLT and SRP alone showed same results. When comparing CAL between working groups, the SRP + PDT group showed significantly higher ( $p < 0.01$ ) CAL gain than the other two groups after 4 and 8 weeks. The analysis of variance between groups regarding all periodontal parameters and microbiological findings showed better results for the SPR+PDT group.

**Conclusion:** Photodynamic therapy, as an adjunct non-surgical method, may enhance mechanical debridement.

## P0135

### Akt activation is required for the early phase of osteoblast differentiation of MC3T3-E1 cells induced by TGF- $\beta$ 1

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**Aim:** Transforming growth factor-beta 1 (TGF- $\beta$ 1) influences a wide variety of important cellular activities and is secreted in inflammatory sites such as periodontitis. Although a pivotal role in the bone-remodeling process has been assigned to TGF- $\beta$ 1, excessive TGF- $\beta$ 1 production can also inhibit osteoblast differentiation. We have previously reported that IGF-1/PI3K signaling plays an important role in TGF- $\beta$ 1-induced osteoblast differentiation; however, the downstream signaling controlling this remains unknown. The aim of this study is to investigate the role of Akt, the major target molecule of PI3K, in TGF- $\beta$ 1-induced osteoblast differentiation.

**Material and Methods:** Murine preosteoblast MC3T3-E1 cells infected with retroviral vectors expressing constitutively active Akt (CA-Akt) were cultured in osteoblast differentiation medium (OBM) with or without TGF- $\beta$ 1. The degree of osteoblast differentiation was analyzed by alkaline phosphatase (ALP) activity and osteoblast-related gene expression. Protein expression of TGF- $\beta$ 1-related signaling molecules was assessed by Western blot. Cells were cultured for 2 weeks and mineral deposit formation was assessed by Alizarin Red staining.

**Results:** ALP activity and osteoblastic marker mRNA levels were significantly decreased by repeated TGF- $\beta$ 1 treatment compared with OBM in MC3T3-E1 cells ( $p < 0.01$ ). Expression of CA-Akt restored ALP activity following TGF- $\beta$ 1 treatment ( $p < 0.001$ ). CA-Akt significantly enhanced expression of osteocalcin and mineralization, but TGF- $\beta$ 1 treatment inhibited these effects. CA-Akt enhanced the phosphorylation of Erk1/2 and Smad3.

**Conclusion:** Akt activation is required for the early phase of TGF- $\beta$ 1-induced osteoblast differentiation and influences other TGF- $\beta$ 1 signaling. The activation of Akt could therefore be a useful treatment approach for bone regeneration in inflammatory disease including periodontitis.

## P0136

### Adjunctive antimicrobial photodynamic therapy in chronic periodontitis treatment – a meta-analysis

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**Aim:** To investigate the efficacy of adjunctive antimicrobial photodynamic therapy (aPDT) in patients with chronic periodontitis.

**Material and Methods:** Meta-analyses were conducted according to PRISMA and Cochrane recommendations. Extensive literature and manual search were performed on eight databases. Mean difference (MD), 95% confidence intervals (CI) were calculated for probing depth (PD) reduction and gain in attachment level (AL).  $I^2$  test was used for inter-study heterogeneity, publication bias was examined by visual inspection of funnel plots.

**Results:** From 992 identified and available records 811 were screened after removing of duplicates. 143 full-text reports were assessed and 81 studies were included in qualitative and 12 in quantitative synthesis (meta-analysis). The meta-analysis showed a statistical significant superior PD reduction (mm) and AL gain (mm) in test group (SRP + aPDT) over control group (SRP alone) for the follow-up of: 6 weeks (PD reduction) MD 0.15, 95% CI 0.06 to 0.25,  $p = 0.001$ ; 12 weeks (PD reduction) MD 0.17, 95% CI 0.16 to 0.18,  $p < 0.00001$ ; 12 weeks (AL gain) MD 0.24, 95% CI 0.10 to 0.38,  $p = 0.007$ . For the follow-up of 6 months the meta-analysis showed a not statistical significant difference between test and control group: 6 months (PD reduction) MD 0.08, 95% CI  $-0.25$  to 0.42,  $p = 0.63$ ; 6 months (AL gain) MD 0.20, 95% CI  $-0.08$  to 0.48,  $p = 0.16$ .

**Conclusion:** While there is clinical evidence of short-term benefits for PD reduction (mm) and AL gain (mm) no evidence is available for long-term benefits of adjunctive antimicrobial photodynamic therapy in chronic periodontitis.

## P0137

### Chlorhexidine mouthwash and sodium lauryl sulfate dentifrice: do they mix effectively or interfere? A systematic review

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**Aim:** What is the effectiveness of a chlorhexidine (CHX) mouthwash used in combination with a sodium-lauryl-sulfate (SLS) dentifrice on the parameters of plaque and gingivitis?

**Material and Methods:** MEDLINE-PubMed, Cochrane-CENTRAL, EMBASE and other databases were searched up to July, 2014. The inclusion criteria were (randomized) controlled clinical trials, subjects  $\geq 18$  years with good general health. Papers evaluating the effect of CHX-mouthwash used in combination with SLS-dentifrice or a dentifrice slurry compared with CHX-mouthwash as a single oral hygiene intervention or in combination with a SLS-free-dentifrice were included. From the eligible studies, data were extracted, and a meta-analysis was performed when feasible

**Results:** Independent screening of 83 unique papers resulted in four eligible publications, with nine comparisons. The meta-analysis showed that when a SLS-dentifrice was used as a slurry rinse, the interference on the plaque inhibiting effect of a CHX-mouthwash was significantly decreased (MD; 0.33;  $p \leq 0.00001$ ; 95% CI: <0.24; 0.42>). No significant difference was observed when SLS-dentifrice was applied as a paste in combination with CHX-mouthwash (MD; 0.08;  $p = 0.42$ ; 95% CI <-0.26; 0.11>). Descriptive and subgroup-analyses support these findings. Moreover, the observed effect for the dentifrice paste occurred regardless of the order of use.

**Conclusion:** This review demonstrates that when CHX-mouthwash is recommended, it can be used in combination with an SLS-dentifrice without any interference regarding its inhibiting effect on dental plaque, regardless of the order of use. Consequently, the collective evidence indicates that the combined use is not contraindicated. This recommendation has been graded as moderate taking a potential publication bias into account because three of the four studies emerged from the same research group.

## P0138

### Single blind, split mouth, randomized clinical trial on the effect of a microburst interdental cleaning device in orthodontic patients

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**Aim:** To evaluate the effect of a medium manual orthodontic toothbrush (Oral B Braces<sup>®</sup>, Oral B) compared to the same toothbrush combined with an interdental microburst device (Sonicare Air Floss<sup>®</sup>, Philips) on the control of supragingival plaque and gingival inflammation in orthodontic patients.

**Material and Methods:** A total of 22 patients undergoing orthodontic treatment were enrolled. A single, blind investigator, experienced in periodontology collected all the parameters at the baseline and re-evaluation (1 month follow-up). The following indices were recorded: Periodontal Screening and Recording, Plaque Control Record and Bleeding on Probing expressed as percentages. Oral hygiene instructions were given to all the subjects by showing a brushing technique for orthodontic patients and information on microburst device according to manufacturer's guidelines. A computer-generated random list was created and based on it all the patients performed oral hygiene procedures on one side (control) with a medium orthodontic toothbrush and on the other side (test) with the same device + microburst interdental device. Means and standard deviations for each analyzed parameter were calculated at baseline and follow-up. Linear mixed models were used to compare the changes between the sides. Stata 13.1 was used for these models with two-sided  $p < 0.05$  considered statistically significant.

**Results:** There was a statistically significant reduction of PCR in both sides, significantly higher on test side. There was a statistically significant reduction of BoP only on test side.

**Conclusion:** A combination of manual toothbrush and sonic interdental device demonstrated a better control of plaque and gingival inflammation levels in orthodontic patients compared to manual toothbrush alone.

## P0139

### Prevalence of b-lactam (blaTEM) and metronidazole (nim) resistance genes in the oral cavity of Greek subjects

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**Aim:** To investigate the prevalence of bla<sub>TEM</sub> and nim genes that encode resistance to b-lactams and nitroimidazoles, respectively, in the oral cavity of systemically healthy Greek subjects.

**Material and Methods:** After screening 720 subjects, 154 subjects were enrolled in the study, including 50 periodontally healthy patients and 52 cases each of gingivitis and chronic periodontitis. Clinical parameters were assessed with an automated periodontal probe. Samples were collected from the tongue, first molars and pockets >6 mm, and analysed by polymerase chain reaction-amplification of the bla<sub>TEM</sub> and nim genes, using primers and conditions previously described in the literature.

**Results:** There was a high rate of detection of bla<sub>TEM</sub> in plaque and tongue samples in all periodontal conditions (37% of plaque and 60% of tongue samples, and 71% of participants). The bla<sub>TEM</sub> gene was detected more frequently in the tongue samples of the periodontally healthy (56%) and chronic periodontitis (62%) groups compared to the plaque samples from the same groups (36% and 29%, respectively; z-test with Bonferroni corrections-tests,  $p < 0.05$ ). The nim gene was not detected in any of the 343 samples analysed.

**Conclusion:** The oral cavity of Greek subjects often harbour bla<sub>TEM</sub> but not nim genes, and therefore the antimicrobial activity of b-lactams but not metronidazole, might be compromised in the treatment of periodontal infections in the investigated population. Tongue appears to be an important source of harbouring and therefore possibly disseminating bla<sub>TEM</sub> gene, conferring resistance to b-lactam antibiotics. High rates of consumption of b-lactams in the investigated Greek population, might account for the relevant findings.

## P0140

### Essential oils from Ugandan medicinal plants show strong inhibitory effects on periodontopathogenic bacteria

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**Aim:** To study, in-vitro, the inhibitory effects of essential oils (E.Os) extracted from aromatic Ugandan medicinal plants [Bidens pilosa (B.pi), Cymbopogon nardus (C.na), Ocimum gratissimum (O.gr), Zanthoxylum chalybeum (Z.ch)] used in traditional treatment of oral diseases on periodontopathogenic Porphyromonas gingivalis, Aggregatibacter actinomycetemcomitans and cariogenic Streptococcus mutans, Lactobacillus acidophilus.

**Material and Methods:** E.Os were obtained from fresh plant materials through steam distillation process. A. actinomycetemcomitans, P. gingivalis were suspended in Peptone Yeast Glucose Medium, S. mutans in Brain Heart Infusion and L. acidophilus in Lactobacilli MRS Broth. Inhibitory effects of

the E.Os on the bacteria were assessed using broth dilution method at final concentrations of 1%, 0.1% and 0.01%. Inhibitory activity was expressed as a percentage of colony forming units (CFU) in the test plate to the CFU in the control. Possible major constituents in E.Os were explored by Gas chromatography–mass spectrometry analysis.

**Results:** The most active E.O was from C.na. It completely inhibited *P. gingivalis* and *A. actinomycetemcomitans* at all the three concentrations tested. E.Os from B.pi, Z.ch, O.gr completely inhibited *P. gingivalis* and *A. actinomycetemcomitans* at 1% and 0.1% concentrations. *S. mutans* was completely inhibited by C.ci and Z.ch at only 1% concentration. None of the E.Os showed complete inhibition of *L. acidophilus* at the concentrations studied. The major compounds in C.na and Z.ch were mainly oxygenated sesquiterpenes and oxygenated monoterpenes respectively. B.pi and O.gr were mainly composed of aromatic compounds.

**Conclusion:** The E.Os from studied plants shows strong inhibitory effects on periodontopathogens and limited effects on cariogenic pathogens. These offer opportunities for further studies and possible development of the oils into perio-care products.

## P0141

### Effects of a stannous fluoride based antigingivitis toothpaste: triple blind randomised controlled clinical study

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**Aim:** This triple blind controlled randomised clinical study was designed to evaluate the efficacy in terms of plaque and BOP reduction of a stannous fluoride based toothpaste after a 15 days use.

**Material and Methods:** 50 adult patients affected by gingivitis (Gingival Index  $\geq 1$ , PPD  $< 5$ ) were enrolled and randomly allocated in two groups: Control Group, Sodium Fluoride toothpaste (Crest Caries Protection) and Test Group, Stannous Fluoride toothpaste (Crest Gingival Protection). Patients were instructed to brush their teeth twice a daily with the assigned toothpaste and soft-bristled toothbrush (Oral B P-35). Modified Turesky Plaque Index (1970), Bleeding on Probing and Gingival Index (L e and Silness 1963) were registered at baseline and after 15 days of treatment by a blinded and inter and intra calibrated operator. Intraoral digital photos were also taken. Statistical analysis was performed by a third unaware operator using Pearson's chi-squared test inter and intra-groups.

**Results:** 50 patients with a mean age of 35.7 years (20–50 y) completed the study. 4 drop out since they didn't attend the recall visit. Reduction in Plaque, Gingival and Bleeding Indexes were reported for both groups between the baseline and the follow-up visit, although the differences between them were not statistically significant ( $p < 0.05$ ).

**Conclusion:** No statistically significant differences were found between the anticaries and the antigingivitis toothpaste in terms of gingivitis reduction.

## P0142

### Effect of propolis on excisional palatal wound healing: a clinical and histomorphometric study in rats

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**Aim:** Propolis collected by honeybees from various plant sources is a resinous hive product possessing a broad spectrum of biologic activities. Propolis has been extensively used in medicine, dentistry, and cosmetics, which is known to have antioxidant, antiinflammatory, antibacterial, antiviral, immunostimulant and local anesthetic effects. The aim of this study was to investigate wound healing effects of propolis on rat palatal mucosa.

**Material and Methods:** Excisional wounds, 3 mm in diameter, were made at the centre of the palate of 42 Wistar rats. The rats were divided into two groups; propolis and control. Six animals were sacrificed at baseline as baseline wound (0 day). Propolis was locally administered at a rate of 1 ml/day. The animals were sacrificed from each group at 7, 14 and 21 days. After death of the animals, maxillae were separated and every wound areas were evaluated clinically using photography at 7, 14 and 21 days post-operatively. The palatal specimens were then processed for histological evaluation.

**Results:** The mean wound area between the epithelial margins decreased significantly with time in propolis and control groups ( $p < 0.05$ ). A significant rate of wound area reduction was observed following the use of propolis at 7, 14 and 21 days compared to control. On day 21, the inflammatory cells were observed still in control group.

**Conclusion:** We concluded that there was a significant reduction in the wound area over a period of time in both groups. The wound healing process was more regular and rapid in the propolis group.

## P0143

### The effect of three different mouthwashes on staining of plaque free enamel surface: in vitro study

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Trabzon/Turkey

**Aim:** The aim of this study was to investigate the persistence of staining after the use of different oral rinses. The aim of this study was to investigate the persistence of staining after the use of different oral rinses.

**Material and Methods:** A total of 40 extracted central tooth was used for the study. Teeth were immersed in 4 different solutions; three different oral rinses (%0.15 benzidamin HCl and %0.12 chlorhexidine (BC); essential oils (EO); %0.06 chlorhexidine and cetylpyridinium chloride (CC) and saline solution as a control (C). The color values (L\*, a\*, and b\*) of each tooth were measured with a colorimeter before and after exposure of 1 day, 1 week, 2 weeks. Color changes ( $\Delta E$ ) were calculated according to the CIE L\*, a\*, b\* system. One-way ANOVA, Tukey HSD tests were used for statistical analyses ( $p < 0.05$ ).

**Results:** Comparison of  $\Delta E$  values after immersion revealed no significant differences for all periods ( $p > 0.05$ ). The lowest color change was observed in (CC) ( $2.9\Delta E$ ) after immersion of 1 day; while Listerin exhibited the most after 2 weeks ( $5.3 \Delta E$ ). There were significant differences between the  $\Delta L^*$  values of (EO) and (CC) at 1 day ( $p = 0.046$ ). For all periods there were significant differences of  $\Delta a^*$  values between (C) and (BC); and between (BC) and (CC) ( $p < 0.05$ ). there were no significant differences between the  $\Delta b^*$  values for all periods between the groups ( $p > 0.05$ ).

**Conclusion:** Although there were no significant differences between the discoloration affect of the oral rinses, discolorations were found clinically unacceptable; as only (C) groups exhibited  $\Delta E$  values lower than 3.5 units. For long-term esthetic results choosing (CC) oral rinse seems to be more effective.

## P0144

### Evaluation of antiinflammatory activity of arctiin on experimental periodontitis model

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**Aim:** The aim of this study was to test the hypothesis that arctiin, a plantery lignan, may avoid or downregulate the periodontal tissue destruction via host modulation. We managed to investigate the impact of this substance biochemically on the levels of interleukin-1 $\beta$  (IL-1 $\beta$ ) and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) in gingiva after the period of experimental periodontitis.

**Material and Methods:** 30 Sprague–Dawley rat were used for this study. Experimental periodontitis were developed by injection of lipopolysaccharit (LPS) to the interproximal conjunction line of left maxillar first and second molar teeth of animals except control group (Group 1: only solvent given by systemic gavage,  $n = 10$ ). After the development of experimental periodontitis rats were divided into two groups randomly (Group 2: periodontitis group + solvent,  $n = 10$ ; Group 3: periodontitis group + arctiin for 21 days,  $n = 10$ ) and arctiin was systemically given to one of them. At the end of the experiment, gingival samples which were obtained from sacrificed animals were investigated biochemically using IL-1 $\beta$  and TNF- $\alpha$  ELISA.

**Results:** According to the results of biochemical analysis of gingival samples, the levels of IL-1 $\beta$  and TNF- $\alpha$  in control group were found significantly lesser than in periodontitis groups ( $p < 0.001$ ). The levels of IL-1 $\beta$  and TNF- $\alpha$  in periodontitis group who were systemically given arctiin were found statistically lesser than in the other periodontitis group ( $p < 0.001$ ).

**Conclusion:** With in the limitations of this study, our results demonstrated that arctiin may reduce the severity and the destructive effects of periodontal disease, after the experimental periodontitis development period, via the modulation of host response.

## P0145

### The eradication of Candida spp. from removable dentures exposed to ozonated water

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**Aim:** The aim of this study was to evaluate a method of Candida eradication with the use of ozonated water from acrylic dentures.

**Material and Methods:** The swabs were obtained before ozone depuration from fitting surface of acrylic dentures previously cleaned with a singleuse brush. The samples were inoculated onto Sabouraud's medium and incubated at 24°C for 72 h. Dentures were completely submerged in 150 ml of water. Candida eradication was performed with the high-volume ozone generator ZY-H103 (HDH System) producing 600 mg of ozone per hour. The estimated ozone concentration in the water was 0.01 mg/l after 10 min, 0.07 mg/l after 20 min and 0.11 mg/l after 30 min. After the depuration additional, control swabs were collected and incubated. Fourty patients using at least one acrylic dentures with verified Candida species infection were included into the study.

**Results:** A preliminary study on ten patients showed partial antifungal effect. The subsequent 10, 15, 20 min of depuration dentures with ozone did not completely eradicate Candida species. There was statistical difference in the growth of Candida colonies after each time period (ANOVA Friedman test,  $p < 0.05$ ). Thirty minutes of depuration with ozone in 60°C water resulted in a complete Candida elimination in all the cases of the 30 patients. As the control dentures were kept in the bathtub with 60°C water for 30 min and no antifungal action were observed.

**Conclusion:** A prolonged exposure of acrylic dentures to highly concentrated ozonated water at an increased temperature of 60°C seems to be an efficient method of Candida species removal.

## P0146

### The effects of 980 nm low-laser as an adjunct therapy in the treatment of chronic periodontitis

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**Aim:** While lasers have been used in dentistry since 1980s, low-level laser therapy (also known as laser bio-stimulation) has been utilized less frequently in periodontology. The aim of this split-mouth, single blinded controlled clinical trial was to evaluate the effect of low power 980 nm diode laser as an adjunct to non-surgical periodontal treatment.

**Material and Methods:** Twenty-five systemically healthy patients with probing pocket depth (PPD)  $\geq 5$  mm involving at least 2 premolar teeth in two-split quadrant were included. Bleeding on probing (BOP), gingival index (GI), plaque index (PI) clinical attachment level (CAL) and PPD were recorded at baseline and at 1, 3 and 6 month. Gingival crevicular fluid (GCF) samples were taken at baseline and, 1 week and 1 month after the treatment. Twenty-seven biomarkers in GCF were examined using a multiplex bead immunoassay (MAGPIX).

One week after the clinical examination all teeth were scaled and root planned (SRP). After the non-surgical periodontal treatment, the test side selected randomly and treated with low laser four times (0th, 1st, 3rd and 7th days). Energy density was adjusted 7.64 J/cm<sup>2</sup>. In statistical analysis Wilcoxon tests were used within the groups while Mann Whitney U tests were used between the groups.

**Results:** PPD, GI and CAL showed that statistically differences between groups at 3rd and 6th month ( $p < 0.005$ ). Both treatment modalities resulted in significant improvements in clinical and biochemical parameters but biochemical markers in GCF showed no differences between the groups.

**Conclusion:** Adjunct use of 980 nm low laser may provide additional clinical benefit.

## P0147

### Is antibioprophyllaxis necessary to prevent postoperative infectious complications in periodontal diabetic patients? A systematic review

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**Aim:** The aim of this review is to assess the need for antibiotic prophylaxis after periodontal and dental procedures in diabetic patients.

**Material and Methods:** We systematically searched electronic databases, and included relevant papers discussing postoperative risk of infectious complications and perioperative management of the diabetic patients.

**Results:** The use of antibiotic prophylaxis for preventing the risk of infection in well or even moderately controlled diabetics (HBA1c  $\leq 8\%$ ) is not justified. Poorly controlled diabetics (HBA1c  $>10\%$ ) should be referred for improved control of their blood sugar.

**Conclusion:** There is no scientific evidence in the literature to support the need for antibiotic prophylaxis after routine periodontal and dental procedures in diabetic patients.

## P0148

### Antibacterial properties of polyhexamethyleneguanidine phosphate against oral pathogens

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**Aim:** Test the antimicrobial activity of two different antiseptics against periopathogenic and cariogenic microorganisms.

**Material and Methods:** Antibacterial activity of polyhexamethyleneguanidine phosphate (PHMG-P) versus chlorhexidine (CHX) has been investigated using the quantitative suspension method with *P. gingivalis*, *A. actinomycetemcomitans*, *S. mutans*, and *L. acidophilus*. Test microorganisms were exposed to antiseptics at various concentrations for different timepoints. Activity of antiseptics was evaluated by reduction factor (RF) calculated as a difference between logarithms of colony forming units count before and after exposure to antimicrobials.

**Results:** Highly diluted CHX and PHMG-P (0.05%) acting for 3 min did not eliminate *A. actinomycetemcomitans*. The lowest concentration of PHMG-P that completely suppressed *A. actinomycetemcomitans* within 30sec was 0.5%, which was higher than for CHX (0.2% – 30sec). Both antiseptics at concentration 0.2% provided swift (30sec) bactericidal effect against *P. gingivalis*. PHMG-P and CHX at 0.05% required prolonged exposition  $\geq 3$  min to exhibit bactericidal activity. To achieve bactericidal effects against *S. mutans* PHMG-P and CHX at 0.05% required 5 min, whilst 0.2% solution of antiseptics required 3 min. Neither PHMG-P nor CHX had any bactericidal activity against *L. acidophilus*, although absence of bactericidal effect cannot be interpreted that a substance does not affect bacteria.

**Conclusion:** The substance PHMG-P displayed antibacterial activity against periopathogens and *S. mutans*, even after a 20-fold dilution. The use of the antiseptic could have potential applications in dentistry for the management of oral diseases.

## P0149

### In vitro antibacterial activity of selected Moroccan essential oils against Aggregatibacter actinomycetemcomitans serotype b JP2 clone

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**Aim:** Aggregatibacter actinomycetemcomitans serotype b JP2 clone is a well known periopathogen, strongly associated with aggressive periodontitis in adolescents in Morocco, which is a real public health problem in this country. Nowadays, there is sufficient evidence that antibiotic resistance has increased in the periodontal flora over the last decades, and searching for a new adjunctive treatment has become a necessity. The main objective of the present study was to investigate the in vitro antibacterial activity of natural agents; selected Moroccan essential oils of *Origanum compactum* (oregano), *Cymbopogon martini* (Palma rosa), *Thymus vulgaris* (Thyme), *Mentha pulegium* (Pennyroyal), *Cymbopogon citratus* (Lemongrass), *Citrus aurantium* (Sour orange) against the highly virulent JP2 clone of Aggregatibacter actinomycetemcomitans (Aa).

**Material and Methods:** The essential oils were analyzed by gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS). Their antimicrobial activities were determined by agar well diffusion and broth microdilution methods against a clinical Moroccan isolate sampled from aggressive periodontitis patients.

**Results:** All the tested essential oils induced significant inhibition zones for JP2 strain in agar well diffusion method and showed bactericidal effect. The MICs and MBCs were ranged respectively from 0.03% to 0.3% (v/v) and from 0.07% to 0.6%. *Origanum compactum* (oregano) has been found to be the most effective with 0.03% of MIC and 0.07% of MBC.

**Conclusion:** the present findings exhibit that the selected Moroccan essential oils tested inhibit the growth of the highly virulent JP2 strain of *A. actinomycetemcomitans*, suggesting their usefulness as potential antimicrobial agents in aggressive periodontitis.

**P0150****The efficacy of the Cervitec Gel and Cervitec Liquid as the supportive agents in the treatment of periodontal disease – a 28-day observation**

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**Aim:** To evaluate the benefit from the additional use of Cervitec Gel or Cervitec Liquid in the basic treatment of the periodontal disease.

**Material and Methods:** 45 individuals (age 35–70) were enrolled into study. At the baseline they were subjected to the routine examination of the selected periodontal parameters. Full scaling was performed afterwards, and the individuals were randomly divided into three equal subgroups. In addition to standard oral hygiene procedures, the first group was using Cervitec Gel for 14 days, the second was using Cervitec Liquid (also for 14 days), and the control group did not use any antimicrobial agents. All the parameters were recorded again at the 7th, 14th and 28th day counting from the baseline.

**Results:** At the baseline all the clinical parameters' values were similar in the studied subgroups. The second examination revealed significantly lower plaque index [%] in the Cervitec Liquid group (15.9%) than in two other groups (29.0% Gel group, 37.6% control group). This was not observed in the further examinations (Day 14 and Day 28). Longitudinal analysis has shown the significant improvement of almost all parameters studied in both subgroups using Cervitec. Comparison of the parameters' change shows also the significant reduction of plaque index and bleeding on probing in the group using Cervitec Liquid compared to the control group (–38.1% vs. –16.9% and –22.9% vs. –9.2%, respectively).

**Conclusion:** The use of chlorhexidine-containing mouthwash and gel significantly influenced the improvement of clinical parameters of periodontal state.

**P0151****Effect of systemic antibiotherapy on Porphyromonas gingivalis and Aggregatibacter actinomycetemcomitans following non-surgical periodontal treatment**

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**Aim:** To investigate the microbiological effect of the association of amoxicillin plus metronidazole on Porphyromonas gingivalis (Pg) and Aggregatibacter actinomycetemcomitans (Aa) concentrations following non-surgical periodontal therapy.

**Material and Methods:** Two independent reviewers conducted an electronic search in medical databases, trial registers and main dental journals prior to November 2014. Authors included randomized clinical trials (RCTs) with at least 3-month follow-up. RCTs comparing patients positive for Pg and/or Aa before and after non-surgical periodontal therapy with or without amoxicillin plus metronidazole were analyzed. Difference between groups in the variation of positive patients was calculated using the inverse variance method with a random effects model.

**Results:** The reduction of Aa+ patients was 35% [CI<sub>95%</sub> 18–51%] and 53% [CI<sub>95%</sub> 35–71%] more frequent with than without antibiotics regimen, at 3-month and 6-month, respectively. The corresponding reduction of Pg+ patients was 49% [CI<sub>95%</sub> 21–77%] and 43% [CI<sub>95%</sub> 26–61%].

**Conclusion:** The combination of amoxicillin plus metronidazole with non-surgical periodontal therapy significantly decreases the number of patients positive for P. gingivalis and A. actinomycetemcomitans when compared to non-surgical periodontal therapy alone or with a placebo.

**P0152****Effect of systemic doxycycline and mechanical therapy on GCF-  $\beta$  Glucuronidase levels in chronic periodontitis patients**

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Aligarh/India

**Aim:** This interventional study evaluates the effectiveness of systemically administered doxycycline compared with non surgical therapy alone or in combination with non surgical therapy, on gingival crevicular fluid  $\beta$ -Glucuronidase levels and clinical parameters over a 20 week period in patients with similar chronic periodontitis severity.

**Material and Methods:** An interventional Study comprising sixty patients with chronic periodontitis were selected and divided into three groups of 20 patients each. Plaque index, gingival index, probing depth and clinical attachment levels were recorded and Gingival Crevicular Fluid samples collected. Group 1: treated with scaling and root planing Group 2: systemic doxycycline. Group 3: systemic doxycycline along with scaling and root planing. After 2, 6, 10 and 20 weeks their periodontal conditions and gingival crevicular fluid  $\beta$ -Glucuronidase levels were re-evaluated.

**Results:** The level of gingival crevicular fluid  $\beta$ -Glucuronidase and clinical parameters was higher when treatment was initiated and its level decreased after treatment. No significant difference in  $\beta$ -Glucuronidase level when SRP and doxycycline were used alone. In comparison when combined doxycycline and SRP the level of  $\beta$ -Glucuronidase decreased significantly.

**Conclusion:** The present study indicates the usefulness of doxycycline as an adjunct to non surgical periodontal therapy in lowering the gingival crevicular fluid  $\beta$ G levels and clinical parameters.

**P0153****Effect of full-mouth disinfection treatments with systemic antibiotics on periodontal disease**

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**Aim:** To investigate effects of full-mouth disinfection treatment modalities with systemic antibiotics (FMDA) on clinical parameters of patients with periodontitis.

**Material and Methods:** Retrospective clinical analysis of 35 patients with severe periodontitis who were treated in three groups with different protocols of FMDA: Group 1 (n = 12)

was treated with a standard FMDA protocol in a periodontal private practice; Group 2 (n = 12) was treated with an intensive FMDA protocol in the university clinic; Group 3 (n = 12) was treated with a standard FMDA protocol in the university clinic. The periodontal parameters probing pocket depth (PPD), clinical attachment level (CAL, main parameter) and bleeding on probing (BOP), number of teeth with CAL  $\geq 5$  mm (CAL5), were evaluated at baseline, after 3 and 6 months. Differences within and between groups were analysed with Kruskal-Wallis and Mann-Whitney tests at alpha 0.05%

**Results:** All periodontal parameters improved significantly within the three groups at 3- and 6-months intervals. There was a statistically significant change in CAL within all groups between baseline and 3- and 6-months ( $p < 0.05$ , respectively). Between 3- and 6-months, the improvement of the parameter CAL remained stable in all groups. Interestingly, the change in the main parameter CAL between the groups was not significantly different between baseline and 3- and 6-months ( $p > 0.05$ ).

**Conclusion:** Our results demonstrate improvement of periodontal parameters with all treatment modalities of full-mouth disinfection in combination with systemic antibiotics (FMDA). Further studies need to clarify the role of the systemic antibiotics on the clinical effects of full-mouth disinfection periodontal treatment.

## P0154

### Germicidal and fungicidal influence of nanosilver on the *Candida albicans*, *Streptococcus mutans* and *Aggregatibacter actinomycetemcomitans*

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**Aim:** The analysis of the germicidal and fungicidal activity of nanosilver solution against selected oral pathogens depending on the concentration of solution and exposure time.

**Material and Methods:** Nanosilver solution of 40 ppm was diluted into the following concentration: 10 ppm, 20 ppm, 30 ppm, 40 ppm.  $1.5 \times 10^5$  CFU/ml suspension of selected strains was prepared. Microorganisms were exposed to specified nanosilver solutions. After 2, 15, 30, 60 and 120 min of incubation at ambient temperature each sample was mixed thoroughly. Subsequently, 20  $\mu$ l of each sample suspension was placed and distributed evenly over the appropriate solid surface plate. After 24 and 48 h of incubation of the above-mentioned surfaces at the temperature of 35 and 37°C respectively, using automatic colony counter aCOlyte (Symbios, Cambridge, UK), colonies of examined microorganism strain were counted.

**Results:** Observed various activity of nanosilver against standard strains of microorganisms in severity depends on the concentration of nanosilver and exposure time. Total reduction of bacterial growth of *S. mutans* occurred after 60 min incubation with nanosilver solution of 40 ppm. *A. actinomycetemcomitans* were put in the same test, after 120 min of exposure to solution of 30 ppm, no colony was grown, in case of *C. albicans* strain, no growth of microorganism was recorded with 120 min exposure to 40 ppm nanosilver solution.

**Conclusion:** Germicidal and fungicidal properties of the above-mentioned solutions were demonstrated. The effectiveness was

directly proportional to the concentration of solution and exposure time.

## P0155

### Timing of azithromycin intake as an adjunct to scaling and root planing may affect treatment outcome

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**Aim:** The antibiotic drug azithromycin enables a long half-life in plasma and granulocytes. The aim of this systematic review was to identify evidence from randomized controlled trials with respect to the most beneficial time point of systemic azithromycin intake as an adjunct to non-surgical periodontal therapy of chronic periodontitis patients.

**Material and Methods:** The literature was systematically screened for studies published by 31st March 2014 using electronic databases and hand search. Out of the 231 titles identified, six randomized controlled trials with a follow-up  $\geq 6$  months were included. A synthesis of results using a vote counting method was applied.

**Results:** Heterogeneity was observed regarding the start of antibiotic intake. In three studies comprising data from 156 chronic periodontitis patients in which azithromycin was administered 3 days before or at the first scaling and root planing visit (500 mg once daily for 3 days), a significant beneficial effect ( $p < 0.05$ ) of azithromycin was documented. Among the three studies (96 patients) prescribing azithromycin at the last session of scaling and root planing, one reported a beneficial effect of azithromycin in terms of probing pocket depth reduction or clinical attachment level.

**Conclusion:** The administration of azithromycin prior to non-surgical treatment seems to allow better outcomes compared to drug ingestion after scaling and root planing. These findings need further evaluation in order to support a distinct treatment protocol in non-surgical therapy with adjunctive systemic azithromycin of chronic periodontitis patients.

## P0156

### Effect of low-level light exposure on human oral epithelial cells

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**Aim:** The aim of this study was to identify the specific light-emitting diode (LED) irradiation parameters required to trigger beneficial biological responses in human oral epithelial cells. Mitochondrial metabolic activity, cell proliferation, and reactive oxygen species (ROS) production were assessed in the response to LED irradiation utilising a range of wavelengths and doses.

**Material and Methods:** Spectral irradiance for each wavelength was determined using a calibrated fibre-based spectrometer (USB4000, Ocean Optics). A gingival epithelial cell line (H400) was seeded (3000 cells/well) in 96-well plates in DMEM (supplemented with 5% FCS) and incubated at 37°C in 5% CO<sub>2</sub>. Cultures (24 h post-seeding) were exposed to a bespoke LED array (625–830 nm wavelength) with a dose of between 0 to

12.1J/cm<sup>2</sup> (0–105s). At 24 h post-irradiation mitochondrial metabolic activity was evaluated by the MTT assay whilst BrdU assay assessed cell proliferation. ROS production levels were measured using a luminol-based chemiluminescent assay. Statistical analyses were performed using ANOVA and Tukey post-hoc tests ( $p < 0.05$ ).

**Results:** Following LED irradiation, mitochondrial metabolic activity was significantly increased at wavelengths of 650, 660, 800, 820 and 830 nm following 8s of exposure (0.1–0.9J/cm<sup>2</sup>) with cell proliferation significantly increased at 780 nm. Furthermore, levels of ROS production were also significantly increased after 8s (0.1–0.9J/cm<sup>2</sup>) LED irradiation (625–830 nm).

**Conclusion:** Data demonstrated that LED exposures enhanced cell proliferation, mitochondrial metabolic activity and ROS generation in oral epithelial cell cultures. The enhanced cellular responses reported here may indicate the utility of LED irradiation to provide a novel therapeutic strategy for the management of periodontal disease.

## P0157

### The eradication of *Candida* spp. from removable dentures exposed to 0.033% chlorhexidine solution

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**Aim:** Oral candidiasis in the form of *Candida*-associated denture stomatitis (CaDS) is associated with *Candida* adhesion and biofilm formation on the surface of polymethyl methacrylates (PMMA) dentures. CaDS can be treated with topical antifungal therapy, however, the incidence of relapse is high. It is important to seek for an alternative treatment modality. The aim of this study was to evaluate a method of *Candida* eradication with the use of 0.033% chlorhexidine solution from acrylic dentures.

**Material and Methods:** The swabs were obtained before chlorhexidine deputation from acrylic dentures previously cleaned with a singleuse brush and a 0.9% NaCl. The samples were inoculated onto Sabouraud's medium and incubated at 24°C for 72 h. Dentures were completely submerged in 150 ml of 0.033% chlorhexidine solution at a room temperature. After 10, 20 and 30 min of deputation additional, control swabs were collected and incubated. Finally, photographic documentation of the material was made. Fourteen patients using at least one acrylic dentures with verified *Candida* species infection and no previous antifungal treatment were included into the study.

**Results:** There was a statistical difference in the growth of *Candida* colonies after each time period (ANOVA Friedman test,  $p < 0.05$ ). The subsequent 10, 20 min of deputation acrylic dentures with 0.033% chlorhexidine solution did not completely eradicate *Candida* species, although 30 min of deputation resulted in a complete *Candida* elimination in all the cases.

**Conclusion:** Thirty minutes deputation of acrylic dentures with 0.033% chlorhexidine solution at a room temperature completely eradicates *Candida* species, which could be an adjunctive treatment of *Candida*-associated denture stomatitis.

## P0158

### Biochemical, histological and radiographic evaluation of carvacrol application's effects on periodontal tissues in experimental periodontitis in rats

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**Aim:** The aim of this study is to evaluate systemic carvacrol application's immunomodulator effects in experimental periodontitis in rats biochemically, histologically and radiographically.

**Material and Methods:** In this study, 24 weeks old 24 male Sprague-Dawley rats weighing 200–220 g were used. Rats were divided into 3 groups, each consisted of 8 animals. 1. Control 2. PED 3. CAR-PED group. For periodontitis induction rats' first mandibular molars were ligatured submarginally for 30 days. After ligature removal, rats in CAR-PED were treated with a dose of 50 mg/kg carvacrol by oral gavage for 15 consecutive days. IL-1 $\beta$ , IL-6, TNF- $\alpha$ , b-ALP and CTx levels were analyzed in rats' serum samples after sacrifice. Histopathological changes, RANKL and OPG positive cell densities were evaluated in histological samples. Alveolar bone levels were compared radiographically on mandibula samples.

**Results:** Serum IL-1 $\beta$ , IL-6 and TNF- $\alpha$  levels decreased significantly in CAR-PED group compared to PED group. CTx levels decreased and b-ALP levels increased significantly in CAR-PED group compared to PED group. RANKL-positive cell density increased significantly and OPG-positive cell density decreased significantly in PED group compared to control group. RANKL-positive cell density decreased significantly and OPG-positive cell density increased significantly in CAR-PED group compared to PED group. Periodontal tissue destruction and PMNL cell infiltration decreased significantly in CAR-PED group compared to PED group. MBL and DBL increased significantly in CAR-PED group compared to PED group.

**Conclusion:** CAR administration showed beneficial effects against inflammatory alveolar bone resorption in experimental periodontitis rat model and it's been inferred that CAR can be used as an immunomodulator agent for periodontitis treatment.

## P0159

### Chemical analysis, in vitro cytotoxicity and biological effects of essential oils from *Croton blanchetianus* Baill. against periodontal pathogens

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**Aim:** To evaluate the chemical composition, in vitro cytotoxicity, antimicrobial and antibiofilm activities against periodontal pathogens, of essential oils of bark (EOB) and leaves (EOL) from *Croton blanchetianus* Baill.

**Material and Methods:** EOB and EOL obtained by hydrodistillation were analyzed by Gas Chromatography coupled to Mass Spectrometry (GC-MS). In evaluation of the antibacterial activity were determined the minimum inhibitory concentrations (MICs) against periodontal pathogens, American Type Culture Collection (ATCC), *Porphyromonas gingivalis*, *Prevotella inter-*

media, *Aggregatibacter actinomycetemcomitans* and *Fusobacterium nucleatum*; for the latter bacterium was also evaluated anti-biofilm activity in vitro in microtiter plates. In vitro cytotoxicity, cell viability assays were performed using RAW 264.7 macrophages.

**Results:** Data analysis by GC-MS indicated that the EOL and EOB have similar chemical compositions, but the EOL has a higher proportion of phytochemicals, particularly  $\alpha$ -pinene (57.23%),  $\gamma$ -cadinene (7.16%) and  $\beta$ -pinene (5.57%). The *F. nucleatum* was the pathogen for which a lower MIC, 250  $\mu\text{g/ml}$  to EOB and 62.5  $\mu\text{g/ml}$  to EOL. Both oils inhibited biofilm formation between the concentrations of 1000 to 125  $\mu\text{g/ml}$ , with no significant difference between EOB and EOL ( $p > 0.05$ ). At the concentration of 50  $\mu\text{g/ml}$  only the EOB showed no cytotoxicity against macrophages ( $p < 0.01$ ).

**Conclusion:** The essential oils of *Croton blanchetianus* Baill showed antibacterial activity against planktonic periodontal pathogens and in the antibiofilm test, suggesting that they may be used in the treatment of periodontal diseases.

## P0160

### Additional clinical and microbiological effects of amoxicillin plus metronidazole after initial conservative severe chronic periodontitis therapy in Lithuanian population

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**Aim:** To evaluate the clinical and microbiological effects of initial periodontal therapy (IT) and to determine the additional and adverse effects of systemic amoxicillin plus metronidazole therapy (AbT) in patients with severe chronic periodontitis (ChP).

**Material and Methods:** 28 patients with (ChP) completed the trial. Random assignment resulted in 14 patients in the control (C) group and 14 patients in the test (T) group. Clinical measurements and microbiological assessments were taken at baseline and 3 months after completion of IT with/-out additional AbT. T-group patients received medication of 500 mg amoxicillin plus 250 mg metronidazole every 8 h for 7 days. Every person filled the questionnaire after applied AbT.

**Results:** At baseline, no statistically significant differences between groups were found for any of the clinical parameters. Except for the plaque, there was a significantly larger change in the bleeding, probing pocket depth (PPD) and clinical attachment level (CAL) in the T-group as compared to the P-group after therapy. The greatest reduction in PPD was found at sites with initial PPD of  $>7$  mm, 2.5 mm in the C-group and 3.2 mm in the T-group. The improvement in CAL was most pronounced in the PPD category  $>7$  mm and amounted to 1.5 mm and 2.0 mm in the C- and T-groups, respectively. Mean total DNA probe counts and counts of the majority of the 5 test species were significantly reduced over time in both groups, with no significant differences detected at any time point between groups.

**Conclusion:** AbT has some advantages when used treating severe chronic periodontitis.

## P0161

### Inhibition of *Eikenella corrodens* lysine decarboxylase by tranexamic acid and its effects on gingival inflammation in humans

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**Aim:** A week of oral hygiene restriction (OHR) increases dento-gingival biofilm within which the enhanced lysine decarboxylase (LDC) activity converts lysine to cadaverine. Biofilm lysine falls below the minimal level in blood and becomes collinear with measures of gingival inflammation (gingival crevicular fluid (GCF) exudation) and biofilm accumulation (J Periodontol 2012; 83(8): 1048–1056). *Eikenella corrodens* (ECoR) is a source of biofilm LDC, and immunization with LDC retard experimental gingivitis in beagle dogs (Vaccine 2012; 30(47): 6706–6712). We examined whether the lysine analogue tranexamic acid (TA) would inhibit ECoR-LDC, and reduce biofilm accumulation and GCF exudation during OHR in human experimental gingivitis.

**Material and Methods:** ECoR cell surfaces provided LDC-rich extracts to which antibodies raised in goats were used to detect ECoR-LDC on Western immunoblots and inhibit cadaverine production. ECoR-LDC activity was measured at pH 4.0–11.0, and its TA dissociation constant ( $K_i$ ) at pH 7. Young adults used a 5% or 10% TA mouthwash thrice daily during OHR for a week.

**Results:** ECoR-LDC had optimal activity between pH 5.0 and 10.0. Biofilm LDC was active at pH 7.0 and was inhibited by ECoR-LDC antibodies.  $K_i$  of TA for ECoR-LDC was 0.942 mmol/l. TA reduced biofilm accumulation, its cadaverine content, LDC activity and GCF exudation without biofilm lysine increasing to minimal blood plasma levels. Surprisingly, GCF exudation correlated positively with mean daily salivary TA content, but not with accumulated biofilm.

**Conclusion:** ECoR-LDC predominates in biofilms where it is inhibited by TA, but TA's stronger anti-fibrinolytic action inhibits plasmin production and GCF exudation, biofilm lysine's source. Prolonged TA therapy may therefore starve epithelial attachments of lysine, suggesting that more selective LDC inhibitors may manage periodontal inflammation more effectively.

## P0162

### UK specialists' and GDPs' use of systemic and local antimicrobial administration in periodontal therapy: a questionnaire study

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**Aim:** The aim of the present study was to evaluate the use of antimicrobials, the prescription patterns and the reason(s) for prescribing antimicrobials when treating periodontal disease in selected UK General Dental Practitioner (GDP) and Periodontal Specialists.

**Material and Methods:** The questionnaire consisted of 21 questions and was sent to 488 Periodontal Specialists and 488 GDPs. Data management and analysis was performed using Microsoft Excel, SPSS® version 22.0 software and frequency distributions, cross tabulation tables and graphs were constructed from the data. Any association between variables was tested at the 5% level of significance ( $p \leq 0.05$ ).

**Results:** The questionnaires were completed by the Specialists (38.72%) ( $n = 189$ ) and 23.36% ( $n = 114$ ) of the GDPs. The results indicated that the use of systemic and local antimicrobial followed the current guidelines. Specialists prescribed more systemic antimicrobials than the GDPs, although Specialists limited the use of local antimicrobials. The GDPs reported that decision making was difficult when to use local antimicrobials although recognised that using local antimicrobials were more effective than root surface debridement alone. Other reasons for using antimicrobials were based either on the patient request or patient satisfaction with the treatment. Lower frequency of antimicrobial use were reported in regeneration and implant procedures by both Specialists and GDPs although the Specialists were more inclined to use antibiotics/antimicrobials in these procedures.

**Conclusion:** The results of the study suggested that there was a need for dentists to follow current guidelines when prescribing antibiotics/antimicrobials in order to avoid unnecessary prescriptions, antibiotic resistance and adverse drug reactions.

## P0163

### Effect of topically-applied hyaluronic-acid on palatal epithelial wound closure

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**Aim:** To investigate the secondary healing outcome of free gingival graft donor sites covered with topical hyaluronic-acid versus periodontal dressing.

**Material and Methods:** Thirty one patients (21–56 years of age) requiring free gingival graft augmentation were included. After harvesting the grafts from palatal mucosa, 0.2% and 0.8% hyaluronic-acid gels (Gengigel®) were used in the test group I ( $N = 12$ ) and test group II ( $N = 7$ ), respectively. Gels were applied on the donor site and protected with periodontal dressing (Peripac®). In the control group ( $N = 12$ ) the wound was covered only with Peripac. At days 3, 7, 14 and 21, the subjective parameters as pain and burning sensation were recorded by using a visual analog scale (VAS) as well as objective parameters as colour match (VAS) and epithelialisation (none/complete) at days 3, 7, 14, 21 and 42.

**Results:** Both test groups showed significantly lower pain scores at 3 and 7 days when compared to the control group ( $p < 0.05$ ). The mean VAS scores for colour match at all times, were significantly higher in the test group I compared to the control group whereas the burning sensation only at day 3 ( $p < 0.05$ ). Complete epithelialisation of the wound was achieved at day 21 in both test groups, whereas at day 42 in control group.

**Conclusion:** Within the limits of this study topical application of 0.2% or 0.8% hyaluronic-acid on free gingival graft donor sites can improve epithelial wound closure and decrease post-operative pain.

## P0164

### Efficacy of amine fluoride/stannous fluoride mouthrinses on the reduction of plaque and gingival inflammation

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**Aim:** To evaluate the efficacy of an experimental amine fluoride/stannous fluoride mouthrinse on plaque during home-use. A secondary outcome is to investigate the efficacy on gingivitis and staining potential.

**Material and Methods:** For this 3-month randomized, investigator-blinded and clinically controlled study in parallel groups, 240 adult participants with gingivitis were recruited. The test group ( $n = 80$ ) rinsed with the experimental product for 30s twice daily. The positive control group ( $n = 80$ ) rinsed with meridol® (amine fluoride/stannous fluoride) in the same manner. In both rinsing groups habitual toothbrushing was performed. The negative control ( $n = 80$ ) performed toothbrushing only. Plaque index (Silness & Loe 1964), gingival index (Loe 1967), discoloration index (Brex et al. 1993) and safety were recorded at screening, baseline, after 3 and 12 weeks. ANOVA and Bonferroni adjusted post-hoc tests at a significance level of  $\alpha = 0.05$  were applied.

**Results:** Both mouthrinses led to a statistically significant plaque reduction compared to the negative control after 3 and 12 weeks. However, no differences existed between test and positive control. A statistically significant gingivitis reduction was observed between test and negative control groups after 3 weeks. Tooth discoloration occurred in all groups but was higher in the rinsing groups. No difference existed between test and positive control.

**Conclusion:** Rinsing with amine fluoride/stannous fluoride formulations in addition to toothbrushing inhibits plaque in comparison to brushing alone. With exception of gingivitis reduction up to 3 weeks, no further advantage of the test rinse compared to the positive control rinse was found.

## P0165

### Effect of antimicrobial photodynamic therapy in treatment of periodontitis associated with Fanconi anemia – a case report

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**Aim:** The purpose of this report was to evaluate the effectiveness of photodynamic therapy (PDT) on periodontal regeneration and subgingival microbes in a patient with periodontitis associated with Fanconi anemia.

**Material and Methods:** Patient, diagnosed with Fanconi anemia (FA), had a severe periodontal disease. Treatment duration of 10 months was designed thorough full oral cavity disinfection followed by PDT. At the baseline and every 2 months periodontal parameters were evaluated [plaque index (PI), periodontal probing depth (PPD), bleeding on probing (BOP), and clinical attachment level (CAL)]. Oral mucosa swab, for presence of *Candida albicans*, and subgingival plaque samples were collected. In plaque samples presence of pathogens were evaluated: *Aggregatibacter actinomycetemcomitans* (AA), *Porphyro-*

monas gingivalis (PG), Prevotella intermedia (PI), Tannerella forsythia (TF) and Treponema denticola (TD).

**Results:** Clinical results of PDT therapy showed significant improvement in all periodontal parameters evaluated. PPD proportions of sides with depth of  $\geq 4$  mm were decreasing: 38.66%, 16%, 8.66%, 4%, 1.33% and zero percent at the baseline, after 2, 4, 6, 8 and 10 months, respectively. Opposite, PPD with  $\leq 2$  mm showed an increase: from 10.66%, 13.33%, 14.66%, 33.33%, 44.66% to 54.66%. BOP was 100% at the first, second and third visit of the patient and 79%, 72% and 60% at 6, 8 and 10 months. All five bacterial species and *Candida albicans* were reduced significantly.

**Conclusion:** Periodontal disease is one of common oral manifestations in patients with FA. It seems that PDT effectively influence periodontal regeneration and reduce periodonto-pathogenic bacteria without damaging the patient's tissues.

## P0166

### The development of an inflammation-responsive hydrogel to facilitate the recovery of periodontitis

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**Aim:** This study aimed to develop an inflammation-responsive hydrogel based on the pH change to deliver N-phenacylthiazolium bromide (PTB), a breaker of the advanced glycation end-products, to effectively facilitate the recovery of periodontitis in vivo.

**Material and Methods:** Based on the pH-responsive characteristics, a chitosan-based hydrogel encapsulating PTB was fabricated, and the release profile under pH 5.5–7.4 was evaluated in vitro. Male Sprague-Dawley rats were utilized and divided into four groups with a split-mouth design, including (1) control group without periodontitis induction, (2) experimental periodontitis, (3) experimental periodontitis plus hydrogel without PTB, and (4) experimental periodontitis plus hydrogel with PTB. The recovery of periodontal bone loss (RBL) was evaluated by micro-computed tomography, and the inflammation profile was assessed by histology, after 4- and 14-days of hydrogel application.

**Results:** Initially burst release of PTB was noted in pH 5.5–6.5, and the release profile was relatively slow and consistent in pH 7.4. RBL was significantly greater in the PTB-treated group at days 4 and 14 ( $p < 0.05$ ), with relatively reduced inflammatory cell infiltration in the PTB-treated group at day 4. The remission of collagen matrix was apparently faster in the PTB-treated group at day 14.

**Conclusion:** A chitosan-based inflammation-responsive hydrogel encapsulating PTB was successfully fabricated and showed favorable result in the recovery of experimental periodontitis. Further investigations in the combination of regenerative signals and scaffolds were warranted. The study was supported by the National Health Research Institute EX103-10313EC.

## P0167

### Impact of resveratrol decreases on the progression of periodontitis in induced arthritis – an experimental study

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**Aim:** This study investigated the effect of systemic administration of resveratrol on the progression of experimental periodontitis in experimentally induced rheumatoid arthritis (RA) in rats.

**Material and Methods:** 40 rats were submitted to experimental RA by immunizations of collagen type II and injections of complete Freund's adjuvant (CFA). After, animals were randomly assigned to: RESV (n = 20): 10 mg/kg of resveratrol or PLA (n = 20): placebo solution. Periodontitis was induced on rats in one of the first molars chosen to receive a ligature. The therapies were daily administered systemically for 30 days – for 19 days before periodontitis induction and then for another 11 days. Then, the specimens were processed for morphometric analysis of bone loss.

**Results:** Inter-group comparisons of the morphometric outcomes revealed lower bone-loss values in ligated molars in the RESV group than PLA group ( $p < 0.05$ ).

**Conclusion:** Administration of resveratrol may reduce periodontal breakdown in arthritic rats.

## P0168

### Efficacy of Meridol Halitosis<sup>®</sup> and Daycare<sup>®</sup> on 3-day supragingival plaque regrowth: a randomized crossover clinical trial

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**Aim:** The aim of this study was to evaluate the antiplaque effects of an alcohol-free essential oil mouthwash (EO-) (Daycare<sup>®</sup>) and an anti-halitosis amine fluoride/stannous fluoride with zinc lactate mouthwash (ASF-Zn) (Meridol Halitosis<sup>®</sup>), compared to a positive control of 0.2% chlorhexidine mouthwash (CHX) (Corsodyl<sup>®</sup>), using an in vivo plaque regrowth model of 3 days.

**Material and Methods:** The study was designed as a double-masked, randomized, crossover clinical trial, involving 20 volunteers to compare two different mouthwashes, using a 3-day plaque accumulation model. After receiving thorough professional prophylaxis at baseline, over the next 3 days, each volunteer refrained from all oral hygiene measures and performed two daily rinses with 20 ml of the test mouthwashes. A 0.20% chlorhexidine (CHX) rinse served as a positive control. At the end of each experimental period, plaque was assessed, and the panelists completed a questionnaire. Each subject underwent a 14-day washout period, and then there was another allocation.

**Results:** The ASF-Zn mouthwash has shown a better inhibitory activity on plaque regrowth compared to the EO mouthwash in the whole mouth (plaque index = 1.93 against 2.45 respectively), but there was less of an effect compared to the CHX group, with a overall plaque index of 1.41. The differ-

ences of 0.52 between EO and ASF-Zn and between ASF-Zn and CHX and of 0.96 between EO and CHX were all statistically significant ( $p < 0.001$ ).

**Conclusion:** The essential oil mouthwash without alcohol seemed to have less of an inhibiting effect on plaque regrowth than the amine fluoride/stannous fluoride with zinc lactate mouthwash and the chlorhexidine control.

## P0169

### An alternative adjunct antimicrobial regime in the treatment of generalized aggressive periodontitis: a randomized clinical trial

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**Aim:** The aim of this randomized clinical study was to evaluate the effect of systemic administration of moxifloxacin compared to amoxicillin and metronidazole, combined with non-surgical treatment in patients with generalized aggressive periodontitis (GAgP) in a 6-month follow-up.

**Material and Methods:** A total of 39 systemically healthy patients with GAgP were evaluated in this randomized clinical trial. Periodontal parameters were recorded at the baseline during the 1st, 3rd and 6th month. Patients received either 400 mg of moxifloxacin per os once daily or 500 mg of metronidazole and 500 mg amoxicillin per os three times daily for 7 days consecutively.

**Results:** No significant differences between groups were found in any parameters at the baseline. Both groups led to a statistically significant decrease in all clinical periodontal parameters compared to the baseline (PI;  $p < 0.001$  and GI, PD, BOP, CAL,  $p < 0.01$ ). There were no differences between the 1st and 3rd months or the 3rd and 6th months for clinical parameters in the groups. Also, no intergroup difference was observed in any parameters at any time, except the gingival index at 6th months.

**Conclusion:** Within the limitation of the present study, although both antibiotic regimes together with nonsurgical treatment provided similar and favorable end results at 6 months, moxifloxacin use could be preferred by both dentists and the patients due to compliance because of the reduced number of tablets and the single-dose per day, as well as in patients with allergies, intolerance, or lack of response to amoxicillin and metronidazole. Nevertheless, antimicrobial treatment should be based on individual characteristics of the patients.

## P0170

### Effects of methanandamide on inflammatory response of human periodontal ligament cells

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**Aim:** Endocannabinoid system is shown to modulate immune response in periodontitis. Methanandamide (Meth-AEA) is synthetic and stable selective agonist of cannabinoid receptor type 1. Previous study shows that long-term topical Meth-AEA treatment significantly reduces alveolar bone loss and inflammatory cytokine production in rat periodontitis model. The aim of the present study was to examine the effects of Meth-AEA on

the proliferation/viability and cytokine/chemokine production of human periodontal ligament cells (hPdLCs) upon stimulation with *Porphyromonas gingivalis* lipopolysaccharide (LPS).

**Material and Methods:** The proliferation/viability of hPdLCs was measured by 3,4,5-dimethylthiazol-2-yl-2,5-diphenyl tetrazolium bromide (MTT) assay. The expression of interleukin-6 (IL-6) and monocyte chemoattractant protein-1 (MCP-1) levels in *P. gingivalis* LPS stimulated hPdLCs was examined on gene and protein levels by real-time PCR and ELISA, respectively.

**Results:** Meth-AEA (0.1–20  $\mu\text{mol/l}$ ) did not reveal any significant effects on proliferation/viability of hPdLCs neither in the presence nor in the absence of *P. gingivalis* LPS (1  $\mu\text{g/ml}$ ). Stimulation of hPdLCs with *P. gingivalis* LPS resulted in a significantly increase in the gene expression levels and protein production of IL-6 and MCP-1 ( $p < 0.01$ ). *P. gingivalis* LPS induced production of IL-6 and MCP-1 was significantly decreased by 10  $\mu\text{mol/l}$  Meth-AEA on both gene and protein levels ( $p < 0.05$ ).

**Conclusion:** Meth-AEA appears to have an important modulatory effect on inflammatory response of hPdLC to *P. gingivalis* LPS. Further studies are needed to clarify possible role of cannabinoid system in progression of periodontal disease and evaluate the therapeutic potential of Meth-AEA.

## P0171

### Antibacterial activity of medical-grade manuka honey against oral bacteria in vitro

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**Aim:** To assess the antibacterial effect of manuka honey against oral microorganisms based on the assumption that this honey – derived from manuka (*Leptospermum scoparium*) – is rich in methylglyoxal, a known antimicrobial compound.

**Material and Methods:** Manuka (Comvita<sup>®</sup>, New Zealand) and white clover (*Trifolium repens*) honey (Hollands<sup>®</sup>, New Zealand), which served as a control honey, were compared for their minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against four representative oral bacterial species. Honey was added to brain heart infusion (BHI), inoculated with the test microorganisms and incubated anaerobically at 37°C for 18 h. MIC was determined by measuring optical density and MBC by spot-plating samples on BHI agar and incubating anaerobically.

**Results:** Both manuka and clover honeys inhibited growth of *Streptococcus sanguinis* and *S. gordonii* at 12.5% (w/v) and killed the bacteria at 25% (w/v) after 18 h of incubation. *S. mutans* was resistant to both honeys at 50% (w/v), the highest concentration tested. *Fusobacterium nucleatum* (four strains) was killed after 4 h incubation at 25% and 6% (w/v) for manuka and clover honeys, respectively.

**Conclusion:** Since both honeys were antibacterial against three of the tested plaque-associated species, adjunctive antimicrobial treatment of periodontitis by subgingival delivery of manuka honey merits further investigation. However, the resistance against *S. mutans* to honey (fermentable carbohydrate concentration range of 61–84% [w/v]) argues for caution during clinical trials.

## P0172

### Antibacterial activity of the essential oils and 0.2% chlorhexidine on oral biofilm: ex vivo vs. in vivo exposure

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**Aim:** To study if the way of antiseptic application (ex vivo or in vivo exposure) conditioned the antibacterial immediate effect of two different antiseptics.

**Material and Methods:** A randomized observer masked cross-over study was conducted. Fifteen healthy volunteers wore a specific intraoral device, holding three glass disks where biofilm was formed for 48 h. One of these disks was used as a baseline, another one was immersed in Essential Oils (EO) and last was kept in the intraoral device for the EO mouthwash application. After a 2-week washout period, this same protocol was repeated with 0.2% Chlorhexidine (0.2%-CHX). Samples were analysed for bacterial vitality (BV) with the confocal laser scanning microscope after previous staining with Live/Dead<sup>®</sup> Bac-Light<sup>™</sup>.

**Results:** The EO showed similar antibacterial effect to the 0.2%-CHX after the mouthwash application (% of BV =  $1.15 \pm 1.00\%$  vs.  $5.07 \pm 5.79\%$ , respectively), being more effective in the deepest layer ( $p < 0.001$ ). In the immersion, both antiseptics were significantly less effective (% of BV =  $26.93 \pm 13.11\%$ , EO vs.  $15.17 \pm 6.14\%$ , 0.2%-CHX); in the case of EO immersion, there was not a significant change in the bacterial vitality of the deepest layer in regard with the baseline.

**Conclusion:** The way of application conditioned the antibacterial activity of the EO and 0.2%-CHX on the oral biofilm. The in vivo active mouthwash was more effective than the ex vivo passive immersion in both antiseptic solutions. There was more penetration of the antiseptic inside the biofilm with an active mouthwash, especially with the EO.

## P0173

### Autologous conditioned serum as an adjunct to nonsurgical periodontal therapy of aggressive periodontitis

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**Aim:** The aim of this research was to determine the effectiveness of autologous conditioned serum (ACS) as an adjunct to nonsurgical periodontal therapy on a group of patients with aggressive periodontitis.

**Material and Methods:** This prospective randomized study included 14 patients with moderate and severe aggressive periodontitis. All patients were treated with nonsurgical periodontal therapy. 170 teeth with at least one baseline probing depth  $>5$  mm were selected for this study. There were 87 teeth treated with nonsurgical periodontal therapy and ACS (test group), and 83 teeth treated with nonsurgical periodontal therapy alone (control group). ACS was generated according to the manufacturer's instructions, and applied on 5 occasions into designated pockets. Probing depth (PD), gingival recession (RE) and clinical

attachment level (CAL) were measured on baseline and after 3 and 6 months.

**Results:** Periodontal treatment, either with or without ACS, led to improvement for all patients except for one. PD and CAL were significantly reduced after 3 and 6 months in both groups ( $p < 0.001$ ). In comparison with the control group, the test group did not show statistically significant differences in the PD and CAL after 3 and 6 months ( $p > 0.05$ ). Despite no significance was reported, a trend of lower PD and CAL values was observed in the test group with respect to the control group, especially after 6 months.

**Conclusion:** These results indicate that ACS could be a beneficial adjunct in the treatment of aggressive periodontitis. However, future studies with a larger patient sample and longer follow-up are required for further investigation of this topic.

## P0174

### Ozone therapy as an antibacterial part of the complex therapy of inflammatory periodontal diseases and its effect on the microcirculation of periodontium

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**Aim:** The aim of this study was to evaluate the clinical and microbiological results of treatment with gaseous ozone application as adjuncts to initial periodontal therapy in inflammatory periodontitis patients.

**Material and Methods:** Forty patients with chronic inflammatory periodontal disease were randomly divided into two groups, each composed of 20 individuals. Groups of patients received: (1) Scaling and root planning (SRP) alone; (2) SRP + topical gaseous ozone. We studied condition of periodontal indexes (HI, PMA, BOP, etc.), orthopantomography microbiological research and microcirculation of periodont at all stages of treatment.

**Results:** At the end of the observation period, statistically significant improvements in clinical parameters were observed within each group. Parallel to the clinical changes, all treatments reduced the number of total bacteria and the proportion of obligately anaerobic microorganisms. Although intergroup comparisons of microbiological parameters showed significant differences, clinical findings were found to be statistically significant in favor of the SRP+gaseous ozone. In the main group (1) was observed reduction of index PMA on 15–20% lower than in the control group (2) ( $p < 0.05$ ). Ultrasound Doppler flowmetry showed significant increase of the leaner and volume velocity values of periodontal blood flow in the main group.

**Conclusion:** It is known that ozone has the set of positive properties. Our studies about the influence of the use of ozone not only as an initial stage of treatment but also for improving the microcirculation of periodont demonstrated high efficiency, which enables us to suggest it for use in the complex therapy of inflammatory periodontal diseases.

**P0175****Comparative study between Er,Cr:YSGG laser therapy and antibacterial agents with mechanic instrumentation on periodontal treatment**

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**Aim:** The aim of this study was to compare the erbium;chromium:Yttrium-scandium-gallium-garnet (Er,Cr:YSGG) laser therapy and non-surgical hand instrumentation as an adjunct to three different antibacterial agents in adults with chronic gingivitis.

**Material and Methods:** Fourty-five patients with chronic gingivitis were divided into 3 groups and the mouth of each patient was divided into 4 equal parts (split-mouth). Upper-right sides by mechanical instrumentation only; upper-left sides antibacterial agents with mechanical instrumentation; lower-left sides by Er,Cr:YSGG laser with mechanical instrumentation and lower-right sides by both Er,Cr:YSGG laser, antibacterial agents with mechanical instrumentation. Hydrogen peroxide, 0.12% chlorhexidine gluconate and 10% povidine-iodine were used in each 15 patients respectively. Upper-right sides were decided as a control group. Gingival crevicular fluids (GCF) were obtained before treatment, at 1 week and 1 month to determine mediators. The change in the amount of IL-1 $\beta$ , TNF- $\alpha$ , human  $\beta$ -defensin-1 and human  $\beta$ -defensin-3 in GCF were observed during this period. The presence of the mediators were analyzed with a linked immune-sorbent assay.

**Results:** IL-1 $\beta$ , TNF- $\alpha$ , human  $\beta$ -defensin-1 and human  $\beta$ -defensin-3 were significantly decreased in three groups but different ratios compared to control group ( $p < 0.05$ ). Using the Er,Cr:YSGG with chlorhexidine gluconate was determined the most effective method on decreasing levels of IL-1 $\beta$ , TNF- $\alpha$ , human  $\beta$ -defensin-1 and human  $\beta$ -defensin-3 in GCF.

**Conclusion:** In this study, we can conclude that using of Er,Cr:YSGG laser system with or without antibacterial agents is highly effective method in treatment of chronic gingivitis. New studies can further elucidate the effects of Er, Cr:YSGG laser in gingivitis.

**P0176****Antibiofilm efficacy of povidone-iodine and chlorhexidine on dental biofilms**C. Von Ohle<sup>1</sup>, E. Decker<sup>1</sup>, M. Hülber-Januschowski<sup>1</sup>, M. Brex<sup>2</sup><sup>1</sup>Tuebingen/Germany, <sup>2</sup>Brussels/Belgium

**Aim:** Povidone-iodine (PVP-I) and chlorhexidine (CHX) are widely used in periodontal therapy. The aim of this study was to investigate the antibiofilm activity of PVP-I and CHX solutions in varying concentrations on in vivo grown dental biofilms using space-resolved confocal laser scanning microscopy (CLSM) and microbiological cultivation.

**Material and Methods:** Dental biofilms were grown intraorally on standardized human dentine surfaces for 24 h. Afterwards, the biofilms were treated ex vivo with PVP-I (0.1% for 30s and additionally for 1 min and 3 min in order to investigate the effect of an increased exposure time of a low concentrated solution; 2% and 10% for 30s each) or CHX (0.06% and 0.2% for 30s each). Untreated biofilms served as control. Biofilm mor-

phology and vitality were investigated in situ after fluorescence staining (Syto9/propidiumiodide) by CLSM. CFU/mm<sup>2</sup> were recorded after anaerobic cultivation for 48 h. Statistical analysis was performed using ANOVA and the Tukey-Kramer test ( $\alpha = 0.05$ ).

**Results:** On the one hand a statistically significant reduction of the mean biofilm vitality was found by PVP-I 0.1% (42%) after 3 min treatment only, CHX 0.06% (26%), CHX 0.2% (7%) and PVP-I 10% (1%) compared to the control (57%). On the other hand only PVP-I 10% and CHX 0.2% lead to a significant reduction of CFU/mm<sup>2</sup>.

**Conclusion:** PVP-I 10% and CHX 0.2% showed strong and clinically relevant antibiofilm activity. Three-dimensional CLSM analysis showed dissimilar diffusion behaviour, penetration and antibacterial efficacy for both substances and consequently PVP-I and CHX different mechanisms of action on biofilms.

**P0177****Aminothiazoles targeting prostaglandin E synthase inhibit osteoclastogenesis and PGE<sub>2</sub> production in RAW 264.7 cells**

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**Aim:** Periodontitis is characterized by chronic inflammation and osteoclast-mediated bone loss. The anti-inflammatory compounds aminothiazoles inhibiting prostaglandin E synthase (PGES) have recently been reported to reduce bone resorption in experimental periodontitis in rats as well as abolish prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) production in gingival fibroblasts in vitro. The aim of this study was to investigate the effect of aminothiazoles on osteoclastogenesis and PGE<sub>2</sub> production in vitro using the osteoclast precursors RAW 264.7 cells.

**Material and Methods:** RAW 264.7 cells were treated with receptor activator of nuclear factor  $\kappa$ B ligand (RANKL) or lipopolysaccharides (LPS) alone or in combination with the aminothiazoles 4-([4-(2-naphthyl)-1,3-thiazol-2-yl]amino)phenol (TH-848) or 4-(3-fluoro-4-methoxyphenyl)-N-(4-phenoxyphenyl)-1,3-thiazol-2-amine (TH-644). After 1, 3 or 4 days, the cell layers were either fixed and histologically stained for tartrate resistant acid phosphatase (TRAP), or collected for mPGES-1 protein expression analysed by flow cytometry, or for mRNA expression analysed by RT-qPCR. The amount of PGE<sub>2</sub> in the cell supernatants were determined by enzyme immunoassay.

**Results:** Aminothiazoles TH-848 and TH-644 decreased the number of multinucleated TRAP-positive osteoclast-like cells in cultures of RANKL or LPS stimulated RAW 264.7 cells. In parallel with decreased osteoclastogenesis, the PGE<sub>2</sub> production was also reduced by TH-848 and TH-644 in the supernatants of RANKL or LPS treated cells. Neither mRNA or protein expression of mPGES-1 was significantly affected by aminothiazoles in either LPS nor RANKL treated cultures.

**Conclusion:** Aminothiazoles reduced osteoclastogenesis and PGE<sub>2</sub> production in RAW 264.7 cells, suggesting these compounds as potential inhibitors for future treatment of bone resorption in chronic inflammatory diseases, such as periodontitis.

## P0178

### Antimicrobial effect of propolis. Clinical application

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**Aim:** To assess the clinical and the microbiological effect of the subgingival irrigation of the propolis extract in patients with chronic periodontal disease.

**Material and Methods:** 20 patients, who followed a treatment for chronic periodontitis were selected using a double blind protocol. The Test group was subgingivally irrigated after finishing the treatment, while the Control group was not irrigated. No anesthesia nor antibiotic treatment was in the procedure. A microbiological quantitative analysis of subgingival samples was performed for *Tannerella forsythensis*, *Porphyromonas gingivalis*, and *Prevotella intermedia* y *Treponema denticola*. These samples were taken immediately before dehybridization, and 30 days after finishing the treatment.

**Results:** Wilcoxon's test was performed and we found significant differences in four species of bacteria tested ( $p < 0.05$ ). To compare the Efficiency of the propolis versus the control group, we compared the % of bacteria decrease with the Mann-Whitney's Test. We found statistically significant reductions for *Tannerella forsythensis* ( $p = 0.0001$ ) and *Porphyromonas gingivalis* ( $p = 0.011$ ). The binomial test was used for the Gingival Index. Significant differences were found in the ratios of both groups ( $p = 0.032$ ) we recorded a major reduction of the bleed index, depth of the bag and the levels relative to the insertion.

**Conclusion:** We have demonstrated that periodontal maintenance avoids the recurrence of gingival inflammation, diminishes the risk of periodontal disease progression. However, if we add the antiseptic and antibacterial effects of the propolis, the result is promising as a complementary regime for periodontal therapy and as a preventive treatment for possible peri-implant disease.

## P0179

### Systemic antibiotics in periodontal treatment of diabetic patients: a meta-analysis

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**Aim:** To systematically review the effects of systemic antibiotics in combination with nonsurgical periodontal treatment on clinical periodontal parameters, tooth loss and quality of life in diabetic patients.

**Material and Methods:** Two independent reviewers screened for controlled clinical trials with at least 6-month follow-up in six electronic databases, registers of clinical trials, meeting abstracts, and four major dental journals. After duplicates removal, 1574 records were selected and 18 full-text articles were independently read by two reviewers. Data regarding characteristics of study population, interventions, outcomes, length of follow-up, and potential of bias were independently extracted by two reviewers and disagreements were solved by discussion with two other reviewers. To evaluate the additional effect of antibiotic usage, pooled weighted mean differences and 95% confidence intervals were calculated using a fixed effects model.

**Results:** Five studies met the inclusion criteria, four of which were included in the meta-analysis. Meta-analysis showed a significant effect favouring scaling and root planing plus antibiotic for reductions in mean probing pocket depth (PPD) ( $-0.22$  mm [ $-0.34$ ,  $-0.11$ ]) and mean percentage of bleeding on probing (BOP) ( $-4\%$  [ $-7$ ,  $-1$ ]). There was no significant effect for clinical attachment level gain and plaque index reduction. No study reported on tooth loss and quality of life.

**Conclusion:** Adjunctive systemic antibiotic in diabetic patients provides an additional benefit regarding reductions in mean PPD and mean percentage of BOP. However, considering the small effect size and concerns about antibiotic resistance, caution is advised in translating these results into clinical practice.

## P0180

### Efficacy of four photodynamic therapy systems (PDT) on a mixed culture of periodontal pathogens

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**Aim:** To compare antimicrobial efficacy of four commercially available PDT systems, using either toluidine blue (TBO) or methylene blue (MB) photosensitizers with different light sources (light emitting diodes [LED] or diode lasers [DL]) in a mixed culture of 6 periodontal pathogens including *A. actinomycetemcomitans* and *P. gingivalis*.

**Material and Methods:** 6 bacterial strains were grown under anaerobic conditions to create a periodontal pathogen model in a planktonic environment. The bacteria were treated with four clinically used PDT-systems: Fotosan<sup>®</sup> [CMS-Dental, 630 nm LED, 0.01% TBO], PAD-Plus<sup>®</sup> [Orange-Dental, 635 nm LED, 0.00127% TBO], PACT<sup>®</sup>[CumDente, 635 nm DL, 0.005% TBO] and Helbo<sup>®</sup> [Bredent medical, 660 nm DL, 1% MB]. The photosensitizers of the various systems were used with (default) or without being exposed to their corresponding lights. Treatment with saline solution served as control. Microbial vitality was determined after fluorescence staining. Microbiological growth (cfu/ml) was evaluated following anaerobic growth for 5 days.

**Results:** Without light exposure only TBO 0.1% and MB 1% showed a statistically significant antimicrobial effect: mean  $\log_{10}$  cfu/ml 8.63 and 8.56 compared to saline treatment 9.1. Default treatment caused a more pronounced cfu reduction, which was significantly stronger for the LED-systems (mean  $\log_{10}$  cfu/ml: Fotosan 7.19, PadPlus 7.15, PACT 8.25, Helbo 8.45). Microbial vitality results were comparable to cfu results.

**Conclusion:** The investigated PDT-systems showed varying antimicrobial efficacy, apparently depending on the applied light source. The LED-systems were more effective than the DL-systems, whereas it is questionable whether this difference will have any clinical relevance.

**P0181****Effects of melatonin on experimental periodontitis induced by *Escherichia coli* lipopolysaccharide in diabetic rats**M. Cengiz<sup>1</sup>, Z. Yılmaz<sup>2</sup>, F. Baba<sup>3</sup>, C. Dalkılıç<sup>1</sup><sup>1</sup>Zonguldak/Turkey, <sup>2</sup>Şanlıurfa/Turkey, <sup>3</sup>Konya/Turkey

**Aim:** The aim of this study is to determine the protective effect of melatonin on periodontitis model established via *Escherichia coli* lipopolysaccharide (LPS) in Alloxan induced diabetic rats, and to analyze the parameters related to diabetes and periodontitis.

**Material and Methods:** Forty-eight female adult rats were randomly assigned to four groups: (1) Control + LPS (n = 12); (2) LPS + Melatonin (n = 12); (3) Diabetes + LPS (n = 12); (4) Diabetes + LPS + Melatonin (n = 12). Induction of diabetes was performed by intraperitoneal administration of Alloxan. Fasting glucose levels were evaluated and rats with glucose levels above 200 mg/dl were accepted as diabetic. Experimental periodontitis was induced by injecting 10 ml *Escherichia coli* LPS into the gingiva between the first and second right mandibular molars. Equal amount of saline injections were made on left mandibular region of the rats for control. For each rat in the treatment groups melatonin was introduced intraperitoneally. Samples were evaluated histopathologically for edema, inflammation, abscess formation, gingival vascular proliferation, periodontal ligament vascularization, alveolar bone loss. Fasting blood sugar level and weight of each rat were evaluated on the 3th and the 32th day.

**Results:** Alloxan induced diabetic rats fasting glucose levels were increased and body weights were decreased. The application of melatonin did not affect these parameters. Both LPS and saline injections induced edema and abscess formation. In the control group application of melatonin decreased the edema and abscess formation.

**Conclusion:** According to this study melatonin positively effected on edema and vascularization, but did not decrease the ABL levels in LPS induced experimental periodontitis sites in diabetic rats.

**P0182****Comparison of in vitro efficacy of a commercially available photodynamic therapy (PDT) system and antiseptic agents**

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**Aim:** To compare the antimicrobial efficacy of PDT treatment (Fotosan<sup>®</sup>, CMS Dental) to that of the conventional antiseptic agents chlorhexidine (CHX) and povidone iodine (PVP-iodine), which are frequently used in clinical periodontal therapy.

**Material and Methods:** An anaerobically grown planktonic culture system of 6 periodontal pathogens (*A. actinomycetem-commitans*, *A. viscosus*, *F. nucleatum*, *P. gingivalis*, *S. gordonii*, *V. atypica*) was treated as follows: (1) saline solution (negative control), (2) photosensitizer without light exposure (Toluidine blue [TBO]), (3) photosensitizer with light exposure (TBO+630 nm light emitting diode[TBO\_LED]), (4) CHX 0.2% and (5) PVP-iodine 10%. Afterwards, colony forming units (cfu/ml)

were evaluated after anaerobic incubation for 5 days. Microbial vitality was investigated using fluorescence microscopy.

**Results:** TBO\_LED, CHX 0.2% and PVP-iodine 10% resulted in a statistically significant reduction of the cfu counts and microbial vitality compared to the control. The mean log<sub>10</sub> cfu/ml obtained in the negative control were 9.00, furthermore 8.60 (TBO); 6.39 (TBO\_LED); 0.5 (CHX), and 0.22 (PVP-iodine). The cfu reduction of CHX and PVP-iodine was considerably stronger compared to TBO\_LED. There was neither a statistically significant difference between the TBO treatment alone and the control nor between CHX and PVP-iodine.

**Conclusion:** PDT was an effective method for antimicrobial treatment in the planktonic mixed-culture system used. However, CHX 0.2% and PVP-iodine 10% showed a much stronger antibacterial effect.

**P0183****Microbiological and immunological aspects of photodynamic therapy by 450 nm laser**

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**Aim:** The purpose of this study was to evaluate the antibacterial effect of the direct laser and photodynamic therapy inside periodontal pocket in patients with chronic periodontitis and simultaneous modulation of IL-1 $\beta$  in gingival crevicular fluid.

**Material and Methods:** Samples of subgingival plaque in 2 affected teeth on the left side and right side of mandible of 15 patients were cultivated under anaerobic conditions and the total number of CFU was determined. Gingival crevicular fluid was collected by means of strips of filtration paper and IL-1 $\beta$  levels were investigated using ELISA. Teeth on the right side were irradiated with MicroLED 450 nm (max.300W/cm<sup>2</sup>) for 3 min (laser group). In the teeth on the left side periodontal pockets were filled with chitosan-curcumin nanoparticles 2 min before irradiation and the same parameters of laser irradiation were used (PDT group). After 2 days bacterial examination and IL-1 $\beta$  detection was repeated.

**Results:** The laser group showed significant decrease of CFU and more efficient effect was detected in PDT group (p < 0.001). Analogous results showed changes in IL-1 $\beta$  levels. Apparent decrease was visible in laser group, but statistically significant (p < 0.005) decrease was typical for PDT group.

**Conclusion:** Blue light (405–470 nm) without the addition of exogenous photosensitizers has intrinsic antimicrobial effect. Also curcumin shows antimicrobial activity and conjugation with nanoparticles enables deeper effect. Moreover, curcumin has significant regulatory effects on inflammatory mediators and cumulative effect of curcumin and laser irradiation seems to be responsible for positive bacteriological and antiinflammatory effects.

**P0184****Multiple non surgical therapy protocol: conservative therapy of perimplantitis**M. Mensi<sup>1</sup>, A. Pilloni<sup>2</sup><sup>1</sup>Brescia/Italy, <sup>2</sup>Roma/Italy

**Aim:** Show the results of the MNST protocol use in a case series of patients affected by acute periimplantitis.

**Material and Methods:** 24 sites of 6 patients affected by acute perimplantitis (Bleeding On Probing -BOP-, Pus, Probing Pocket Depth -PPD> 6 mm and Bone Resorption -RO->2 mm). PPD, Relative Attachment Level (RAL) and Gingival Margin (GM), BOP, Pus, RO and symptomatology were assessed at t0 (baseline), t1 (1 week), t2 (3 months) and t3 (6 months). The therapy was divided in two steps. Step one: drainage, supra-gingival decontamination with abrasive systems (Airflow Master Piezon EMS<sup>®</sup> with Eritritol Powder Plus<sup>®</sup>), pocket cleaning with clorexidine 0.20% and subgingival application of topic doxycycline 14% (Ligosan Heraeus Kulzer<sup>®</sup>). Step 2: after 1 week, supra and sub gingival debridement with piezo-electric systems (Piezon EMS<sup>®</sup>), Perioflow EMS<sup>®</sup> with Eritritol PowderPLUS<sup>®</sup>, manual curettage to remove granulation tissue and second subgingival application of Ligosan<sup>®</sup>. At t2 supra and subgingival full mouth Air-polishing therapy was performed.

**Results:** Initial mean PPD, RAL, GM, BOP and Pus were respectively (8.04 ± 1.88) mm, (8.42 ± 1.79) mm, (0.38 ± 0.82) mm, 100% positive and 100% positive. At t2 the parameters were respectively (3.88 ± 1.03) mm, (5.46 ± 1.47) mm, (1.58 ± 1.28) mm, 100% negative and 100% negative. All patients were asymptomatic already at t1.

**Conclusion:** MNST protocol was effective in solving symptoms already at t1 and achieved clinically significant results at t2. Measurements for t3 (6 months) are currently in progress.

## P0185

### Effects of locally-administered tiludronic acid on experimental periodontitis in diabetic rats: a microtomographic analysis

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**Aim:** The purpose of this study was to evaluate the effects of local administration of Tiludronic Acid (TIL) on ligature-induced periodontitis in diabetic rats using microtomographic (microCT) analysis.

**Material and Methods:** Experimental diabetes mellitus was induced by streptozotocin in 24 adult male rats. The animals were randomly assigned to one of three groups (n = 8): C, EP, EP-TIL (C-Control group, EP-Experimental Periodontitis groups). In EP groups, ligatures were placed in the cervical area of mandibular 1st molars at day 1. In group EP-TIL, TIL solutions (3 mg/kg body weight; Tildren<sup>®</sup>, Ceva Saúde Animal Ltda., Paulínia, SP, Brazil) were injected into the buccal gingival margin adjacent to mandibular 1st molars every other day. The animals were euthanized at day 11. MicroCT analyses were performed and data were statistically analyzed (ANOVA, Tukey, p < 0.05).

**Results:** In the furcation area of mandibular 1st molars, group EP presented significant greater bone porosity and less percentage of bone volume when compared with group C (p < 0.05). The animals treated with TIL (group EP-TIL) presented significant greater percentage of bone volume and less bone porosity in relation to group EP (p < 0.05).

**Conclusion:** Within the limits of this study, it can be concluded that locally-administered TIL solutions reduced alveolar bone loss in EP in diabetic rats.

## P0186

### In vitro antibacterial activity of platelet rich fibrin

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**Aim:** The aim of this study is to evaluate the potential antibacterial effects of Platelet Rich Fibrin (PRF) against *Enterococcus fecalis* and *Escherichia coli*.

**Material and Methods:** Blood samples were obtained from 20 healthy volunteers. According to the PRF protocol the samples were immediately centrifuged at 2700 rpm for 12 min. PRF clots were easily separated from the red corpuscles base with sterile tweezers and scissors, transferred to sterile PRF Box to obtain PRF membrane. Antibacterial activity of PRF was evaluated against *Enterococcus fecalis* and *Escherichia coli* ATCC standard strains by using Kirby-Bauer disc-diffusion method. Ampicillin disc is used as control. After 24 and 48 h incubation at 37°C, the diameter of the zones of complete inhibition was measured as described by Clinical and Laboratory Standards Institute (CLSI).

**Results:** Although expected results were obtained with control disc, no inhibition zones were observed with PRF.

**Conclusion:** This preliminary study shows that PRF does not show antibacterial activity against *Enterococcus fecalis* and *Escherichia coli* standard strains. Further in vitro and in vivo studies are needed to show its antibacterial activity.

## P0187

### Efficacy of photodynamic therapy in patients with fixed orthodontic appliances

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**Aim:** Patients with fixed orthodontic appliances often tend to develop gingival inflammation caused by the aggrandized plaque retention niches and difficulties in oral hygiene measures. Photodynamic therapy (PDT) is an approach, which is reported to be effective in reduction of gingival inflammation. The present study compared its antibacterial effect to a 0.12% chlorhexidine (CHX) containing rinsing solution.

**Material and Methods:** 41 adolescent FOA-Patients suffering from gingival inflammation were screened and enrolled into the study. Thereafter, they have been randomized and divided into two groups; PDT-group and CHX-group. In the PDT-group, inflamed gingiva surfaces were applied with methylene blue for 60 s and irradiated with soft laser ( $\lambda = 670$  nm) for 60 s subsequently. The CHX-group was instructed to rinse with CHX (0.12%) twice a day (30 s) for 1 week. All patients were monitored over a 9-week period.

**Results:** The mean age in the PDT-group was 15.6 ± 1.2 years and 14.6 ± 1.7 in the CHX-group. Both groups showed a notable improvement in gingival inflammation. In the PDT-group the gingiva index (GI) was reduced from 1.5 to 1.1; Plaque index (PI) decreased from 1.7 to 1.0. In the CHX-group, GI was reduced from 1.3 to 1.1 and PI was reduced from 1.3 to 0.8.

**Conclusion:** This study showed that the efficacy of PDT is comparable to CHX. A remarkable advantage is the fact that in

a single treatment with PDT, comparable results could be obtained without any side effects. PDT seems to be a safe promising approach in the support of oral health.

## P0188

### Partial results of the effect of clindamycin on the microbiota associated with generalized aggressive periodontitis

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**Aim:** The study is evaluating the effect of Clindamycin as an adjunct to one-stage full-mouth disinfection (OSFMD) on the microbiota associated with generalized aggressive periodontitis.

**Material and Methods:** This paper is part of a prospective uncontrolled study elaborated on 17 patients with generalized aggressive periodontitis. Clinical and microbiologic parameters were collected at baseline, 3 months (12 patients) and 6 months (10 patients) after OSFMD and prescription of Clindamycin 600 mg twice/7 days. Subgingival samples from moderate (4–5 mm) and deep ( $\geq 6$  mm) were analyzed using a polymerase chain reaction (PCR) for *Aggregatibacter actinomycetemcomitans* (Aa), *Porphyromonas gingivalis* (Pg), *Treponema denticola* (Td) and *Tannerella forsythia* (Tf).

**Results:** Clindamycin as an adjunct to OSFMD resulted in significant improvements in clinical and microbiologic parameters. After 3 months, probing depth (PD) decreased from  $5.75 \pm 1.1$  to  $3.41 \pm 0.6$  mm and the clinical attachment level (CAL) was reduced from  $3.4 \pm 1.1$  to  $1.83 \pm 0.2$  mm. After 6 months, CAL was reduced  $0.3 \pm 0.01$  mm. At 3 months recall, percentages of moderate and deep sites free of pathogens were 46% and 32%. *Aggregatibacter actinomycetemcomitans* was detected in 5 cases (0.87%) and was reduced (0.03%) after OSFMD and Clindamycin 600 mg twice/7 days.

**Conclusion:** Clindamycin as an adjunct to OSFMD may be a viable approach to deal with generalized aggressive periodontitis. Further research is necessary.

## P0189

### The perspectives of using peptide complexes with unique chains of amino acid, acting as anti-inflammatory and regenerator data carriers in therapy of periodontal diseases

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**Aim:** The aim of this research was to evaluate the perspectives of using the products created on the basis of peptide complexes with unique chains of amino acid, acting as data carriers for every single cell and aimed to treat the periodontal diseases.

**Material and Methods:** 107 patients with chronic inflammatory periodontal disease were randomly divided into two groups: the main (1–55) and the control (2–52). Groups of patients received: (1) Scaling and root planning (SRP) with local anti-septic therapy; (2) SRP + local therapy with using peptide complexes. We studied condition of periodontal indexes (OHI-s, PMA, PI, CPITN, BOP), orthopantomography and microcirculation of periodont at all stages of treatment.

**Results:** At the end of the observation period, clinical parameters were statistically analyzed. The main group presented a decrease in Probing pocket depth (PD) and a clinical attachment gain significantly higher than in control group at 90 days [PD –5 mm baseline ( $p < 0.05$ )]. Statistically significant improvements in clinical parameters were observed within each group. 3 months later the PMA in the main group was  $15 \pm 2\%$ , the same index in control group was  $27 \pm 3\%$ . Ultrasound Doppler monitoring demonstrated significant increase of the leaner and volume velocity values of periodontal blood flow in the main group (1).

**Conclusion:** It is proved the high anti-inflammatory and healing clinical efficiency of the products on the basis of tissue-specific peptid complexes on the cellular level restoring the damaged periodont structures.

## P0190

### Evaluation of nitric oxide levels in chronic periodontitis treated with SRP+ probiotics

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**Aim:** The aim of this study was to assess the levels of nitric oxide (NO) in gingival crevicular fluid (GCF) together with clinical parameters in chronic periodontitis treated with probiotic lozenges as an adjunct to scaling and root planing (SRP).

**Material and Methods:** Thirty CP patients, with at least 2 teeth having one approximal site with a probing depth (PD) of 5–7 mm and gingival index (GI) of  $\geq 2$  in each quadrant, were randomly divided into 2 groups. Group I treated with SRP + ProDentis® (*L. reuteri*) lozenges, Group II treated with SRP + Placebo (xylitol). Plaque index (PI), GI, PD, Bleeding on Probing (BoP) and attachment level were measured and GCF sampling was performed at baseline and days 21, 90, 180. The biochemical estimation of NO in the collected GCF was performed using the Griess colorimetric method.

**Results:** At the end of the experimental period, statistically significant improvements in PI, GI, BOP PD and attachment level, as well as reductions in the NO levels were observed within each group. Intergroup comparisons of both clinical and NO levels revealed statistical differences in favor of SRP+probiotic group at all evaluation periods.

**Conclusion:** The adjuvant usage of *L. reuteri* containing lozenges significantly reduced NO levels and clinical parameters compared to SRP + placebo group up to 6-month follow-up period.

## P0191

### Comparison of the effects of systemic metronidazole or probiotic lozenges as an adjunct to non-surgical periodontal therapy

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**Aim:** The objective of this randomized clinical trial was to compare the clinical and microbiological results obtained by treatment with systemic metronidazole and probiotic lozenges as

adjunctives to mechanical subgingival debridement in chronic periodontitis (CP).

**Material and Methods:** Thirty CP patients were randomly divided into 3 groups. Groups of patients received: (1) Scaling and root planing (SRP) + systemic metronidazole (G1) + (2) SRP + *L. reuteri* containing lozenges (G2) (3) SRP + placebo (xylitol)(G3). Each individual has at least 2 teeth having one approximal site with a probing depth (PD) of  $\geq 5$  mm and gingival index (GI)  $\geq 2$  in each quadrant for sampling. The microbiological and clinical effects of the treatments were evaluated over 90 days. Total viable cell count and proportions of obligate anaerobic bacteria were determined by culturing.

**Results:** At the end of the observation period, statistically significant improvements in plaque index, GI, BOP, PD and attachment level, as well as reductions in the number of total bacteria and proportions of obligately anaerobic microorganisms were observed within each group. Although intergroup comparisons revealed no significant microbiological differences, clinical parameters were found significantly higher in the Group 2 compared to the other groups.

**Conclusion:** Although no statistical significant differences were detected between G1 and G2 group, SRP+ probiotic group showed clinical and microbiological superiority when compared to G1 and G3 group.

## P0192

### Evaluation of the effects of *L. reuteri* containing lozenges or local sodium piperacillin as an adjunct to initial periodontal therapy: a clinical and biochemical study

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**Aim:** The objective of this study was to evaluate the clinical and biochemical effects of local sodium piperacillin (Periofilm<sup>®</sup>) and *L. reuteri* containing lozenges (Prodentis<sup>®</sup>) used as adjunctives to scaling and root planing (SRP) in chronic periodontitis patients.

**Material and Methods:** Thirty patients with probing depth (PD)  $\geq 5$  mm and gingival index (GI)  $\geq 2$  in at least 2 single-rooted teeth were included. Group 1 (n = 10) received SRP + Prodentis<sup>®</sup>, Group 2 (n = 10) SRP + Periofilm<sup>®</sup> and group 3 (n = 10) SRP + placebo (xylitol). At days 0 and 90, plaque index, GI, bleeding on probing, PD, and relative attachment level were measured. Gingival crevicular fluid samples were also collected. Matrix metalloproteinase-8 and tissue inhibitor of matrix metalloproteinase-1 levels were measured by ELISA.

**Results:** At the end of the day 90, statistically significant improvements in both clinical and biochemical parameters were observed within each group ( $p < 0.05$ ). Intergroup comparisons revealed significant differences in favor of SRP + Probiotic group for both clinical and biochemical parameters ( $p < 0.05$ ).

**Conclusion:** Under the light of these findings, adjunctive usage of probiotic lozenges significantly improved the clinical and biochemical outcomes of the therapy compared to Periofilm and placebo application.

## P0193

### The antimicrobial effect of mastic extract against oral and periodontal pathogens

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**Aim:** The rationale of the present study was to determine the antimicrobial effect of the natural extract mastic on oral microorganisms in comparison to chlorhexidine and hydrogen peroxide.

**Material and Methods:** Seven different oral and periodontal pathogens (*P. gingivalis*, *A. actinomycetemcomitans*, *S. mutans*, *F. nucleatum*, *S. oralis*, *P. intermedia*, *P. nigrescens*) were treated with six different concentrations of mastic solution solved in ethanol as well as with 0.2% chlorhexidine or 0.2% hydrogen peroxide solutions. For the agar diffusion test, paper discs were placed on the inoculated agar surfaces, and subsequently, coated with 20  $\mu$ l of each chemical.

**Results:** Mastic led to significantly increased inhibition zones for each, but one bacterium (*P. gingivalis*  $19 \pm 4$  mm, *A. actinomycetemcomitans*  $11.5 \pm 2.5$  mm, *F. nucleatum*  $6 \pm 4.6$  mm, *S. oralis*  $11.9 \pm 3.5$  mm, *P. intermedia*  $10.3 \pm 1.9$  mm, *P. nigrescens*  $8.7 \pm 1.3$  mm, *S. mutans* – no effect) when compared to hydrogen peroxide ( $7.8 \pm 2.6$  mm,  $p < 0.001$ ). Additional analysis of the antimicrobial traits of mastic revealed a correlation between the high solubility of mastic in ethanol and its inhibitory effect.

**Conclusion:** The results of the present study suggest that mastic could be considered as an alternative antibacterial agent in the prevention of periodontal disease.

## P0194

### Histological and clinical evaluation of the efficacy of low-level laser therapy in oral lichen planus

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**Aim:** The aim of the present prospective study was to investigate the effectiveness of low-level-laser therapy (LLLT) in patients with oral lichen planus (OLP).

**Material and Methods:** Twenty-three consecutive patients with OLP at the Department of Dermatology (medical university of Mainz) were screened. Nine patients (7 females, 2 males) with bilateral lesions (diameter  $\geq 1$  cm) met the inclusion and exclusion criteria and were recruited for the study. After a careful medical evaluation and their agreement to participate in the study, biopsies were taken from both lesions. When histology confirmed the diagnosis of OLP, patients were enrolled for further procedures. Four weeks after biopsies were taken, one of the lesions was randomly irradiated with low laser ( $\lambda = 810$  nm, power = 1W) for 60 s whereas the other side remained untreated. LLLT was performed for 4 weeks. One week after the last treatment, new biopsies were taken for histological reevaluation. Photographic documentation was performed at each visit.

**Results:** The analysis of the photographic data showed morphological improvement of symptoms in all participants (an improvement of 66.6% in the treated side in comparison to

11.11% in the untreated side,  $p = 0.023$ ), this was concordant with patients' subjective outcomes. The evaluation of the histological specimens confirmed the morphological findings. Lymphocytic infiltration was significantly reduced in the treated side as compared to the untreated side ( $p = 0.03$ ).

**Conclusion:** Morphological and histological improvement of OLP was demonstrated in LLLT-treated sides. Further studies with larger numbers of participants and optimization of power/wavelength of LLLT are needed to improve the outcome.

## P0195

### Short-term study of chemical oral malodor treatments – patient reported outcomes

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Bonn/Germany

**Aim:** In this randomized controlled cross-over design study the subjective perception of a zinc-lactate containing mouthwash was investigated.

**Material and Methods:** Sixteen non-smoking subjects (age 18–65 years) in good general health and in periodontal maintenance were invited to participate. The study was approved by the university's ethics committee. Inclusion criteria was an organoleptic score (Rosenberg et al. 1991)  $\geq 2$ . Following rinses were used: test-mouthwash 1 [A: meridol®HALITOSIS (10 ml for 30 s)]; test-mouthwash 2 [B: meridol®HALITOSIS (15 ml for 60 s)]; a conventional mouthwash [C: Odol®Original Mundwasser (3 droplets into 10 ml of tap water for 30 s)] and a negative control [D: tap water (10 ml for 30 s)]. The subjects' perception of the mouthwash was evaluated 3 h after rinsing. "Taste", "Change of mouth feeling", "Feeling of freshness", and perceived "Effectiveness" were determined by a questionnaire (scaled-visual-analog-scale (VAS) from 0 to 10). For statistical analysis chi-square-tests were applied. Level of significance was 0.05.

**Results:** Significant differences were found between the four rinses for "Taste" ( $p = 0.003$ ), for "Change of mouth feeling" ( $p = 0.001$ ), for "Feeling of freshness" ( $p = 0.002$ ) and for "Effectiveness" ( $p = 0.002$ ). Subjects were most satisfied (VAS: 7–10) with the taste of rinse A and B (both 69%), followed by rinse C (44%). The same trend was found for "Change of mouth feeling" (A/B/C: 69%/81%/50%), "Feeling of freshness" (A/B/C: 69%/75%/44%) and "Effectiveness" of the rinse (A/B/C: 57%/46%/13%). Subjects were less pleased with rinse D (negative control) regarding all four questions.

**Conclusion:** In this short term study favorable patient reported outcomes were found for a zinc-lactate containing mouthwash.

## P0196

### Short-term study of oral malodor treatments: results of a cross-over designed RCT

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**Aim:** In this randomized controlled cross-over design study the short-term effect of a special zinc-lactate containing mouthwash was investigated.

**Material and Methods:** Sixteen non-smoking subjects (age 18–65 years) in good general health and in periodontal maintenance were invited to participate. Inclusion criteria was an organoleptic

score (OLS, Rosenberg et al. 1991)  $\geq 2$ . Following rinses were used: a test-mouthwash 1 [A: meridol®HALITOSIS (10 ml for 30 s)]; a test-mouthwash 2 [B: meridol®HALITOSIS (15 ml for 60 s)]; a conventional mouthwash [C: Odol®Original Mundwasser (3 droplets into 10 ml of tap water for 30 s)] and a negative control [D: tap water (10 ml for 30 s)]. Each formulation was evaluated by two blinded examiners comparing OLS and volatile sulphur compounds [VSC; by means of a gas-chromatograph (OralChroma™)] before, and one and 3 h after rinsing. Linear mixed models were used to compare all parameters simultaneously with respect to the four treatment groups. After an overall test of significance of any difference between the four groups, Bonferroni adjusted pairwise comparisons of the four treatment groups were computed if the overall test was significant for a significance level of  $\alpha = 0.05$ .

**Results:** The total amount of the sulfur compounds were significantly reduced by rinses A and B after 1 and 3 h compared to rinses C and D ( $p < 0.05$ ). The organoleptic scores were also significantly reduced by rinses A and B compared to rinses C and D after 3 h ( $p < 0.006$ ).

**Conclusion:** The results indicate that a zinc-lactate containing mouthwash can reduce the VSC and OLS over a period of 3 h.

## P0197

### Gingival enlargement during orthodontic treatment – effectiveness of antimicrobial photodynamic therapy

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**Aim:** The aim of the study was to evaluate effectiveness of the antimicrobial photodynamic therapy (aPDT) in treatment of gingival enlargement.

**Material and Methods:** 21 subjects ( $16.1 \pm 3.5$  years) with gingival enlargement in the upper dental arch, wearing fixed orthodontic appliances, were involved in the study. We used "the split-mouth model", where one side of the upper dental arch was treated with ultrasound (US) and the other with the combination of US and aPDT. A periodontal probe was used to measure probing depth, the 3D imaging system (Rapidform 2006, Inus Technology) to evaluate the change in the size of the interdental papilla and the molecular microbiological method (GenoType Test System) to evaluate the number of periodontopathogenic bacteria in the periodontal pockets at the beginning of the study (T0), 1 week (T1), 1 month (T2) and 3 months after treatment (T3).

**Results:** The periodontal pocket depth has significantly decreased ( $p < 0.01$ ) in both treatment areas. The change in the size of interdental papilla was statistically insignificant in both areas ( $p < 0.05$ ). The share of periodontopathogenic bacteria has similarly decreased in both treatment areas at T1, but not statistically significantly ( $p > 0.05$ ), and then increased again at T2 and T3. The quality of microbial composition was more pathogenic in the area where only US was used.

**Conclusion:** No treatment led to significant decrease of the gingival enlargement. The use of aPDT only showed short-term positive effects on the quantity of microbial composition.

**P0198****In vitro-activity of a sodium hypochlorite containing gel on periodontopathogens**

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**Aim:** Sodium hypochlorite solution has been shown to be effective in reducing supragingival plaque and gingival inflammation. For subgingival application a sodium hypochlorite containing gel (NaOCl-gel), (PERISOLV™, RLS Global AB), was introduced to the market recently. It consists of two components (C1: 0.95% NaOCl, C2: gel vehicle). After combining the components different chloramines are synthesized from free sodium hypochlorite. The purpose of this in-vitro-study was to analyze the antimicrobial activity of NaOCl-gel and its components in comparison with 0.1% chlorhexidine digluconate on microbial species associated with periodontitis.

**Material and Methods:** Minimal inhibitory and minimal bactericidal concentrations (MICs, MBCs) were determined against 19 bacterial strains (4 Porphyromonas gingivalis, 4 Tannerella forsythia) and one 6-species mixture. Moreover, the activity on formation and on an established 6-species biofilm was proven.

**Results:** MICs and MBCs of NaOCl-gel against grampositive and gramnegative capnophilic bacteria were between 5% and >10% of final concentration. MICs against Porphyromonas gingivalis and Tannerella forsythia strains were <1% thus being in the range of the CHX formulation. Against these anaerobe species NaOCl-gel was more active than C1. C2 was active against these strains (<0.5%) too, but inactive against grampositive species. NaOCl-gel clearly inhibited biofilm formation up to 24 h (reduction by 5 log<sub>10</sub> cfu) with a higher activity than the single components. However the activity on an established biofilm was limited.

**Conclusion:** The selective inhibition of anaerobe gramnegative species and the inhibition of biofilm formation indicate NaOCl-gel as a potential adjunctive antimicrobial in periodontal therapy.

**P0199****Clinical and biochemical evaluation of Lactobacillus reuteri containing lozenges as an adjunct to non-surgical periodontal therapy in chronic periodontitis**

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**Aim:** This study evaluates the adjunctive effects of probiotic supplementation to initial periodontal therapy in chronic periodontitis (CP) patients regarding clinical and biochemical parameters.

**Material and Methods:** Thirty CP patients were included and divided into 2 groups. Every patient had at least 2 teeth with one approximal site each with a probing depth (PD) of 5–7 mm and gingival index (GI) of  $\geq 2$  in each quadrant. Test group received scaling and root planing (SRP) and L. reuteri containing lozenges. Control group received SRP and placebo lozenges. Plaque index (PI), GI, bleeding on probing (BoP), PD and attachment gain were measured. Gingival crevicular fluid (GCF) was sampled for the analysis of matrix metalloproteinases-8 (MMP-8) and tissue inhibitor of metalloproteinases-1 (TIMP-1) with ELISA. All evaluations were performed at baseline and on days, 21, 90, 180 and 360.

**Results:** Intergroup comparisons of PI, GI, BoP, and PD was found to be significant ( $p < 0.05$ ) in favor of the test group at all time points. Similar observations were made for GCF MMP-8 and TIMP-1 levels at all time intervals with the exception of day 360 ( $p < 0.05$ ). Mean values of attachment gain were significantly higher in test group compared with control group on days 90, 180 and 360.

**Conclusion:** L. reuteri containing lozenges may be a useful supplement in moderately deep pockets of CP patients. Low MMP-8 and high TIMP-1 levels may indicate the role of the lozenges in reduction of inflammation-associated markers. This supplementation resulted in significant clinical improvements over 1 year.

**P0200****Clinical and microbiological effects of probiotic lozenges in the treatment of chronic periodontitis: a 1-year follow-up study**

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**Aim:** The objective of this study was to evaluate the effects of lozenges containing L. reuteri as an adjuvant treatment to initial periodontal therapy for chronic periodontitis patients and to detect the level of L. reuteri colonisation in the periodontal pockets of treated patients.

**Material and Methods:** 40 patients were selected and randomly divided into 2 groups. Each patient had at least 2 teeth with one approximal site each with a probing depth (PD) of 5–7 mm and gingival index (GI) of  $\geq 2$  in each quadrant. Group I received scaling and root planing (SRP) plus L. reuteri-containing lozenges, and Group II received SRP plus placebo. The plaque index (PI), GI, bleeding on probing (BoP), PD, and relative attachment level were measured. Microbiological sampling was performed at baseline and on days 21, 90, 180 and 360 and were analysed by culturing.

**Results:** After treatment, the measured PI, GI, BoP, and PD as well as the total viable cell counts and the proportions of obligate anaerobes were significantly ( $p < 0.05$ ) lower in Group I compared with Group II at all time points. Similar observations were made for the total viable cell counts and the proportions of obligate anaerobes with the exception of day 360. In Group I, significantly fewer patients required surgery on  $\geq 3$  sites.

**Conclusion:** L. reuteri-containing lozenges may be a useful adjuvant agent to slow recolonisation and improve clinical outcomes of chronic periodontitis. Further studies are needed to clarify the optimal dose of the lozenges.

**P0201****An in vivo study of a possible chemical antibacterial effect of chewing stick made from Salvadora Persica**

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**Aim:** To evaluate a possible chemical effect on the subgingival microflora in patients with moderate periodontitis

**Material and Methods:** In A double-blind, cross-over trial, 28 participants were randomly allocated to use either the chemically active or inactive miswak for a three week period. Subgingival plaque samples and GCF were taken at base line and after 3 weeks of using the Miswak two times a day. After five weeks "washout" period, the study was repeated with participants swapping of the types of miswak. Plaque samples were analyzed by DNA-DNA hybridization technique.

**Results:** compared with the pretreatment values, 16 species of bacteria showed increase ( $p < 0.05$ ) after the use of inactive Miswak while no species showed an increase after the use of active Miswak.

**Conclusion:** This study indicates that chewing stick made from *Salvadora persica* have a chemical antibacterial effect.

## P0202

### LLLT and aPDT for treatment of experimentally induced periodontitis in ovariectomized rats under systemic nicotine

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**Aim:** Nicotine and estrogen deficiency delay the process of periodontal repair after scaling and root planing (SRP). The aim of this study was to compare aPDT (Antimicrobial photodynamic therapy) and Low Level Laser Therapy (LLLT) as an adjunctive therapy to SRP for treatment of experimentally periodontitis (EP) induced in ovariectomized rats that were or were not treated with nicotine.

**Material and Methods:** A total of 180 rats were divided into 2 groups: OVX-SS, ovariectomized rats plus saline solution administration and OVX-Nic, ovariectomized rats plus nicotine administration. Mini-pumps containing saline or nicotine were inserted 30 days before induction of EP. EP was induced through of introduction cotton thread around the first left mandibular molar. After 7 days, the ligature was removed, and the animals were randomly divided into the following local treatment groups: SRP, SRP plus saline solution; LLLT, SRP plus LLLT; and aPDT, SRP Phenothiazin dye irrigation followed by LLLT. Ten animals from each group were euthanized at days 7, 15, and 30 after dental treatment. Bone loss (BL) in the furcation region was evaluated using histometric and immunohistochemical analyses.

**Results:** Animals treated with nicotine showed greater BL. aPDT treatment resulted in lesser BL compared to SRP. Additionally, aPDT affected the RANK/RANKL/OPG system, resulting in downregulation to RANKL more intense than LLLT and SRP. Furthermore, aPDT-treated rats exhibited reduced numbers of TRAP-positive cells and more PCNA-positive cells compared to SRP treatment regardless nicotine status.

**Conclusion:** aPDT was an effective adjunctive therapy for treatment of periodontitis in ovariectomized rats, regardless nicotine status.

## P0203

### Antimicrobial photodynamic therapy as an alternative to systemic antibiotics: results from a double-blind, randomized, placebo-controlled, clinical study on type 2 diabetics

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**Aim:** This double-blind, placebo-controlled clinical study compared a multiple application Antimicrobial Photodynamic Therapy (aPDT) treatment protocol with systemic doxycycline as adjuvant to scaling and root planning on type 2 diabetic patients on clinical, systemic and immune-inflammatory outcomes.

**Material and Methods:** Thirty two patients with HbA1c  $> 7\%$  were randomly allocated in two groups, SRP+Doxy ( $n = 16$ ) using systemic doxycycline 100 mg and SRP+aPDT ( $n = 16$ ) with multiple applications (0, 3, 7 and 14 days). Monitored parameters of plaque score (PS), bleeding on probe (BOP), probing depth (PD), suppuration (S), gingival recession, and clinical attachment level (CAL), glycated haemoglobin (HbA1c) were measured at baseline and 3 months after therapy, the cytokine profile was assessed at 0, 1 and 3 month to measure IL1- $\beta$ , TNF- $\alpha$  and TGF- $\beta$  on Gingival Crevicular Fluid.

**Results:** The SRP+aPDT group showed advantage (in percentage) on reducing moderate pockets in unirradicular teeth at 3 months. SRP+aPDT presented better results at 3 months on IL1- $\beta$  levels. There were no difference between TNF- $\alpha$  and TGF- $\beta$  trough experimental periods.

**Conclusion:** Both treatments were effective in improving clinical and systemic outcomes in diabetic patients. SRP+aPDT is indicated in patients with Moderate PPD on unirradicular teeth, and may be a good substitute to systemic antibiotics on type 2 uncontrolled diabetic patients. (Clinicaltrials.org ID NCT01595594).

## P0204

### Quantitative confocal-microscopy-based methods to assess the anti-plaque activities of CPC mouthrinses

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**Aim:** Confocal laser scanning microscopy (CLSM) facilitates visualization of the effects of antibacterial actives on intact oral biofilms through plaque penetration and the profiling of bacterial inactivation. In the current investigation three quantitative confocal microscopy methods were used to assess the effects of mouthrinses formulated with cetylpyridinium chloride (CPC) on intact oral biofilms.

**Material and Methods:** In vitro plaque biofilms, derived from fresh saliva were grown on hydroxyapatite discs for 24 h then exposed to a mouth rinse containing CPC (C+) or an identical formulation without CPC (C-) for two minutes. Treated biofilms were rinsed with buffer and stained using a combination of fluorescent dyes (propidium iodide and Syto9, LIVE/DEAD stain) prior to CLSM analyses that independently evaluated mean fluorescence intensity, biofilm depth profiles and biovolume of plaques.

**Results:** Treatment with C+ caused a significant decrease in viability according to all three quantitative methods i.e. biovolume measurements, viability depth profiles and mean fluorescence intensity ( $p < 0.05$ ) in comparison to C-.

**Conclusion:** The novel application of quantitative methods can provide a powerful means of quantifying the effects of anti-biofilm agents on oral biofilms. Here they have been applied to show that CPC-based mouth rinses successfully penetrate oral biofilms and significantly reduce their viability when compared to an identical formulation without CPC.

## P0205

### Laboratory and Clinical study of the efficiency of using bacteriophage-based gel in the treatment of inflammatory periodontal disease

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**Aim:** Assess the effectiveness of the topical bacteriophage based gel "Phagodont" in (i) the Clinical treatment of inflammatory periodontal disease (ii) based on the results of clinical and laboratory microbiological studies.

**Material and Methods:** The gel comprises of bacteriophages active against 20 pathogens species associated with periodontal disease, each of which are matched against 2–4 species of virulent bacteriophages. 172 patients with inflammatory periodontal disease were treated, using "Phagodont" gel which was introduced into the areas of the gingivitis or periodontitis after undertaking professional cleaning. Bacterial flora in the periodontal pockets of patients was cultured in vitro. The indicators of the general microbial count was studied comparing undisturbed cultures on a standard medium with ones where "Phagodont" gel was added.

**Results:** Applying "Phagodont" gel significantly (by 30–40%) accelerates the period of relief of inflammatory processes in the Periodontium. The addition of "Phagodont" gel to the culture medium reduces the total bacterial count in the further cultivation of bacterial mix in 58.2% of cases

**Conclusion:** Applying "Phagodont" gel improves the efficiency of the treatment of inflammatory periodontal diseases. It can be considered as an alternative to the use of antimicrobial agents that have a negative impact on the oral flora.

## P0206

### The effect of melatonin in diabetic periodontitis: an in vivo study

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**Aim:** The purpose of this study was to evaluate effects of systemically administered melatonin on alveolar bone loss, histopathological changes, serum IL-1b levels, iNOS and proapoptotic protein (bax) expression in ligature-induced periodontitis in diabetic rats.

**Material and Methods:** 50 Wistar rats were divided into seven experimental groups: 1; non-ligated (NL, n = 6) group, 2; ligature only (LO, n = 6) group, 3; Streptozotocin only (STZ,

n = 6) group, 4; STZ and melatonin group (STZ+Mel, n = 8), 5; STZ and ligature (STZ+L, n = 8) group, 6; Ligature and Melatonin (L+Mel, n = 8) group, 7; STZ, ligature and melatonin group (STZ+L+Mel, n = 8) group. Diabetes was induced by 60 mg/kg streptozotocin. Melatonin was administered by intraperitoneally with a dose of 10 mg/kg/day for 30 days. Silk ligatures were placed at gingival margin of lower first molars of mandibula. Animals were sacrificed at the end of 30 days. Changes in alveolar bone levels were measured and tissues were examined. Serum IL-1beta, iNOS and bax protein expressions and TRAP+ osteoclast numbers were also evaluated.

**Results:** Alveolar bone loss was significantly higher in STZ+L group compared to other groups ( $p < 0.05$ ). Melatonin in STZ+L+Mel and L+Mel groups significantly decreased alveolar bone loss compared to STZ+L group ( $p < 0.05$ ). TRAP+ osteoclast numbers were highest in STZ+L group and melatonin significantly decreased osteoclast numbers and increased osteoblast numbers ( $p < 0.05$ ).

**Conclusion:** Within limits of this study, it can be suggested that melatonin, when administered systemically, may reduce alveolar bone loss, increase osteoblastic activity and decrease osteoclastic activity in diabetic rat model.

## P0207

### Antibacterial and cytotoxic properties of Nano crystalline diamond particles against *Streptococcus mitis* and *Candida albicans*.- an in vitro study

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Chennai/India

**Aim:** With the recent development in nanoscience and nanotechnology, carbon-based nanomaterials are receiving much attention due to their remarkable mechanical and biological properties. The aim of the study is to evaluate the cytotoxic and antimicrobial properties of nanocrystalline diamond particles against *Streptococcus mitis* and *Candida albicans* in vitro.

**Material and Methods:** Nano crystalline diamond particles (NCD) (average particle size of 4–5 nm) manufactured by International Technologies Center, Research triangle park, NC, USA was obtained from the department of Nanotechnology, IIT-Madras. The antimicrobial activity of NCD particles suspended in DMSO solution was analysed against *S.mitis* and *C. albicans* at the department of microbiology, Sri Ramachandra Medical College, Chennai using serial dilution techniques. The cytotoxicity of the NCD particles were assayed using MTT technique.

**Results:** The control plate showed the growth of both the organisms. The growth of *S.mitis* was completely inhibited at a concentration of 100 mg. Minimal growth of *C.albicans* was seen at 100 mg whereas growth of *C.albicans* was seen at other concentrations. The control group showed 100% cell viability. However the viability of the cells reduced with increasing concentration.

**Conclusion:** Nano crystalline diamond particles has been found to exhibit an antimicrobial effect on *Streptococcus mitis* and *Candida albicans* species. Cell viability reduced with increasing concentration of NCD.

**P0208****Effect of melatonin on in-vitro cytotoxicity of acrylic resin, filler particulate composite resin and thermoplastic material**

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**Aim:** The aim of this study was to compare the cytotoxic effects of heat curing and self curing acrylic resins, indirect composite resins and a thermoplastic material on the viability of L-929 fibroblast cells at different incubation periods by storing them in artificial saliva (AS) and AS with melatonin.

**Material and Methods:** Disk-shaped test samples were prepared according to manufacturers instructions. The samples were divided into two groups; artificial saliva (Group AS) and AS with melatonin (Group M). Fibroblast cell culture was used in the study. Measurements were performed by MTT (3-(4,5)-dimethylthiazol-2-yl)-2,5-diphenyl tetrazoliumbromide) assay. Test extracts were retrieved at at 1st hour, 24th hour, 72th hour, 1st week and 2nd week for the MTT test.

**Results:** Statistical significance was determined by ANOVA. There was not a significant difference between the groups; M and AS ( $F = 0.796$ ;  $p = 0.373$ ). There was a significant difference for both materials and incubation periods ( $p < 0.001$ ).

**Conclusion:** The findings of the present study revealed that storing resins in melatonin solution may reduce cytotoxic effects on the fibroblast cells especially showing the maximum effect in the 24 h period.

**P0209****Use of topical desiccant agent as an adjunct to ultrasonic debridement in the initial treatment of chronic periodontitis: a clinical and microbiological study**

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**Aim:** To clinically and microbiologically evaluate the short-term efficacy and safety of adjunctive topical administration of a hygroscopic liquid solution (HBX) (HybenX<sup>®</sup> Oral Tissue Decontaminant. – Epien Medical, Inc. St. Paul, MN USA) in association with the subgingival ultrasonic debridement (UD).

**Material and Methods:** At baseline, UD and UD+HBX were randomly applied to the left or right side of 20 patients. Treatments were repeated after 6 weeks. Clinical parameters were assessed initially (T1), after 6 weeks (T2), and after 3 months (T3). At each examination interval, subgingival microbiological samples were collected prior to treatment. Primary clinical efficacy variable was change in BOP.

**Results:** Only 16 of the 20 originally enrolled patients were available for final analysis. Significantly lower BOP score was found in the UD-HBX group than in the UD group at T2. At T3 statistical analysis failed to demonstrate significant differences in BOP scores between groups. No greater gingival recession nor increased side effects nor more time spent for treatment was observed between groups at any interval times.

Compared with UD, HBX-UD provided a significantly greater reduction in anaerobic bacterial load at T1 immediately after the treatments and at T2, but not at T3.

**Conclusion:** HBX-UD treatment provided after 6 weeks gingival inflammation and subgingival bacterial load reductions, comparable with those provided after 3 months by repeated UD treatments. No greater incidence of unwanted side effects, no greater time spent for treatment, no significant effects on PPD, CAL and GM have been observed.

**Topic: Diagnosis and risk factors****P0210****Clinical detection of *Tannerella forsythia* using an antigen-antibody assisted dielectrophoretic impedance measurement method**

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**Aim:** To evaluate the clinical use of a novel apparatus utilizing antigen-antibody reaction assisted dielectrophoretic impedance measurement (AA-DEPIM) method for the detection of a prominent periodontopathic bacteria, *Tannerella forsythia*.

**Material and Methods:** A total of 15 patients with clinical diagnosis of chronic periodontitis and 5 periodontally healthy/mild gingivitis volunteers were subjected to clinical and microbiological examinations. Saliva samples were analyzed for the presence of *T. forsythia* using AA-DEPIM, PCR-Invader and real-time PCR methods.

**Results:** Using the prototype apparatus with tentative cut-off values, *T. forsythia* was detected from 14 (12 periodontitis and 2 healthy/gingivitis) out of 20 samples. The measurement value of *T. forsythia* by AA-DEPIM method showed a significant positive correlation with detection by PCR-invader ( $r = 0.541$ ,  $p = 0.0138$ ) or real-time PCR method ( $r = 0.834$ ,  $p < 0.0001$ ). When PCR-Invader method was used as reference, the sensitivity and specificity of AA-DEPIM method were 76.5% and 100%, respectively. There was a weak but not significant positive correlation between the measurement value by AA-DEPIM method and percent sites  $>4$  mm probing depth or mean clinical attachment level.

**Conclusion:** The results from this study suggested that AA-DEPIM method has a potential to be used effectively as well as the conventional PCR-based methods in assessing the prevalence of *T. forsythia* and the possible relationship with periodontal disease status.

**P0211****Profile of chronic and aggressive periodontitis among Senegalese**

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Dakar/Senegal

**Aim:** To describe the profile of chronic and aggressive periodontitis among Senegalese (West Africans) attending the Institute of Dentistry of Dakar.

**Material and Methods:** A retrospective study was conducted with an inclusion period running from 2001 to 2008. The sample included 413 chronic periodontitis and 151 aggressive periodontitis cases, among them 299 males and 265 females selected from 2274 records. A Student's independent *t*-test and Pearson chi-squared test was used for data analysis.

**Results:** The proportion of females with aggressive periodontitis was significantly higher than those with chronic periodontitis (64.9% vs. 40.4%,  $p < 0.001$ ). The aggressive periodontitis patients had an average age of  $28.1 \pm 8.9$  years, and had lost less than 3 teeth. Less than a third of them reported using a toothbrush. Attachment loss was as high as 8 mm and severe lesions had spread to an average of 12 teeth with maximum alveolar bone loss up to 80%. The chronic periodontitis patients had an average age of  $44.9 \pm 14.0$  and had lost on average less than 3 teeth. Nearly 75% used a toothbrush. Attachment loss was significantly higher and lesions were more extensive in the aggressive periodontitis. Chronic periodontitis is associated with risk factors such as smoking or diabetes mellitus in 12.8% versus 0.7% in aggressive periodontitis ( $p < 0.001$ ). Differences between the two groups for most clinical and radiographic parameters were statistically significant.

**Conclusion:** The profile of aggressive periodontitis is characterized by more severe lesions than chronic periodontitis, whereas tooth loss experience is similar in both forms.

## P0212

### "PERI-O-NCOLGY" -Effect of radiation therapy on the periodontium-A systematic review

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Mumbai/India

**Aim:** Radiotherapy, Surgical resection and Chemotherapy, either used singly or in combination, are the three most common modalities used in head and neck cancer treatment. These modalities are effective in eradicating the tumor. Periodontal disease in head and neck cancer patients treated with radiation therapy may lead to acute and chronic complications. Periodontal infection may exacerbate during cancer therapy and may result in damage to the oral structures.

**Material and Methods:** A review was conducted using articles from the Journal of Periodontology, Journal Of Clinical Periodontology, The International Journal of Periodontology, Journal of International Academy of Periodontology, Journal of cancer research and therapeutics, Periodontology 2000, Journal of Indian Society of Periodontology, PubMed and Journal of Periodontal Research.

**Results:** A systematic review is conducted and it revealed a significant risk of acute & chronic effects on the periodontium following radiation therapy. In this presentation, by meta-analysis conducted; 200 studies are included and data from 55 papers is collected and reviewed by a single reviewer. Significant periodontal changes like mucositis, xerostomia, dysphagia, trismus, osteoradionecrosis are seen with respect to short term & long term radiation therapy and discussed in detail. As significant heterogeneity was found, various sub-group analysis was performed.

**Conclusion:** A significant relationship exists between radiotherapy and periodontal side-effects. It is very important to properly diagnose and treat periodontal problems during radiotherapy. Radiologist should play an active role in identifying the high-risk patients and refer them to Periodontists for periodontal evaluation and appropriate treatment to minimize the leading issues.

## P0213

### Does tissue biotype correlate with the bone structure underneath?

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Jerusalem/Israel

**Aim:** To examine the correlation between soft and hard tissues in human subjects, assessing the clinical and the practical values of these findings.

**Material and Methods:** Thirty five subjects were enrolled. The labial plate thickness was measured by cone beam computerized tomography (CBCT). The correlation between these and the clinical measurements obtained by probe transparency through the sulcus was analyzed by collecting data from two groups according to tooth type – canine or central incisor. The data was further analyzed for possible correlation to gender and smoking status.

**Results:** Fifty seven percent (20/35) of the patients were females. 23% (8/35) were smokers. Considering gender differences, the thickness of the buccal plate of the lower jaw in males was wider than in females (1.21 mm vs. 1.01 mm respectively). Seventy eight percent (25/32) of upper teeth had thin biotype compared to 50% (19/38) of lower teeth. 62% (10/16) and 32% (6/19) of patients had thin biotype in upper and lower teeth respectively. More than 30% of subjects demonstrated different biotypes in the same jaw at different sites. In the upper jaw of smoking subjects, a negative correlation was found between CEJ–alveolar crest distance and facial bone plate width. The probe transparency through the soft tissue at the upper canine was positively correlated with the width of the facial bone plate at the alveolar crest.

**Conclusion:** Biotype can vary in the same subject at different sites. Only the biotype of the upper canine correlated in our study with the facial plate width.

## P0214

### Tooth loss among Senegalese periodontitis patients

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Dakar/Senegal

**Aim:** To compare tooth loss type in aggressive (AgP) and chronic periodontitis (ChP).

**Material and Methods:** A retrospective chart comparative study was conducted on patients attending at the undergraduate dental clinic of periodontics, Institute of Dentistry of the University Cheikh Anta Diop of Dakar (Senegal, West Africa). Two hundred periodontitis patients including ChP ( $n = 100$ ) and AgP ( $n = 100$ ) were randomly selected. Independent *t*-test, chi-squared test and Spearman's rho calculation were performed to compare clinical parameters between groups.

**Results:** Tooth loss experience in whole sample was 66.5% and no significant difference was founded between the two group (52.6% in ChP vs. 47.4% in AgP,  $p = 0.924$ ). Number of missing teeth in whole sample was 527 and amount was significantly higher in ChP (61.9%) than in AgP (38.1%) ( $p < 0.0001$ ). The average of missing teeth was significantly 2 times higher in chronic periodontitis than in aggressive periodontitis ( $3.4 \pm 4.0$  in ChP vs.  $2.3 \pm 3.3$  in AgP;  $p = 0.032$ ). Tooth loss was positively correlated with age (Spearman rho = 0.403,  $p < 0.001$ ).

First molars and incisors were the predominant teeth lost (30% and 28.2%). Loss of 1st molars, second molars and premolars were also significantly higher in chronic periodontitis. In aggressive periodontitis, mandibular central incisors were the most frequently lost, followed by 1st molars and lateral incisors and in maxillary teeth, loss of 1st molars was predominant followed by premolars and second molars.

**Conclusion:** Molars appear most likely to be lost in chronic periodontitis. Central incisors and mandibular 1st molars are more exposed in aggressive periodontitis. Early diagnosis would prevent tooth loss.

## P0215

### The prevalence of chronic periodontitis in a selected obese population

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**Aim:** In Malaysia, prevalence of chronic periodontitis (CP) and severe CP is estimated at 48.5% and 18.2% respectively. Chronic periodontitis (CP) is associated with obesity. Thus, it is anticipated the prevalence of CP is higher in obese compared to the general population. The aim of this study is to determine the prevalence of CP among obese Malaysians.

**Material and Methods:** This cross-sectional study, using convenience sampling of obese participants, involved answering questionnaires and obtaining biometric and clinical measurements. Obese is defined as an individual with BMI  $\geq 27.5$  kg/m<sup>2</sup>. Ethical approval was obtained (DFOP1213/0079(L)). Case definition for CP was based on probing pocket depth and clinical attachment loss. SPSS version 22 was used.

**Results:** A total of 165 participants, 67 (40.6%) males and 98 (59.4%) females, mean age 43.9 (SD8.9) participated. Prevalence of CP and severe CP was 73.9% and 40.6% respectively. Using mean (95% Confidence Interval (CI)) values, no significant association between periodontal parameters and measures of obesity were observed. CP was significantly related to BMI ( $p < 0.05$ ), with odd ratios 1.08 (0.99–1.18), after adjusting for age, gender, race, smoking and educational levels. However, no significant relationship was observed for CP with waist circumference ( $p = 0.77$ ) and waist-hip ratio ( $p = 0.54$ ).

**Conclusion:** Prevalence of CP is high among obese Malaysians. CP and BMI were significantly related, with odds indicating a weak association.

## P0216

### Study regarding relationship of anxiety with periodontal disease

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Constanta/Romania

**Aim:** The aim of this study is to assess the possible relation of anxiety with clinical parameters of periodontal disease.

**Material and Methods:** 150 patients (mean age 38.9 years), both sexes, from Constanta, Romania took part at this study. Probing depth was recorded at six sites per tooth and plaque indices were also recorded. Subjects were assigned to three groups in accordance with their levels of probing depth (PPD):

control group (PPD  $< 3$  mm,  $n = 80$ ), test group 1 (at least four sites with PPD between 3 and 6 mm,  $n = 47$ ) and test group 2 (at least four sites with PPD  $\geq 6$  mm,  $n = 23$ ). All subjects were submitted to stress and anxiety evaluations. The instruments used to assess the psychological variables (anxiety, stress) were: the State-Trait Anxiety Inventory (STAI) and Modified Dental Anxiety Scale (MDAs).

**Results:** Positive association of periodontitis with age ( $p < 0.05$ ) was confirmed. MDAs scores are: low in group 1 (mean 10, SD 4.8, moderate in group 2 (mean 12.7, SD 5.3) and high in group 3 (mean 14.6, SD 4.6). STAI-trait scores are correlated with the severity of periodontal involvement ( $p < 0.05$ ). STAI-state scores are correlated with existence of periodontal disease ( $p = 0.007$ ). PPD is not correlated with STAI-state, which means that probing depths could not increase due to stress.

**Conclusion:** Based on the results of this study, individuals with high levels of trait anxiety appeared to be more prone to periodontal disease. Also, the dental anxiety increases in people with periodontal involvement as compared with healthy individuals.

## P0217

### Comparison of the clinical applicability of two classification systems of gingival recession

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**Aim:** The aims of the present study were to (i) find the percentage of clinical applicability of Miller's as well as Kumar and Masamatti's classification of gingival recession, and (ii) compare the percentage of clinical applicability of Miller's criteria with Kumar and Masamatti's criteria.

**Material and Methods:** A total of 104 patients (1089 recession cases) were included in the study wherein they were classified using both Miller's and Kumar and Masamatti's classification systems of gingival recession. Percentage comparison of application of both classification systems was done.

**Results:** Data analysis showed that though all the cases of recession were classified by Kumar and Masamatti's classification, only 34.61% cases were classified by Miller's classification, with only 19.10% cases being completely and 15.51% cases being only partially classified. Also, 29.75% cases of recession with interdental loss and marginal tissue loss coronal to mucogingival junction remained uncategorized by Miller's classification; categorization of palatal/lingual recession was possible with Kumar and Masamatti's classification.

**Conclusion:** The elaborative evaluation of both buccal and palatal/lingual recession by the Kumar and Masamatti's classification system can be used to overcome the limitations of Miller's classification system, especially the cases with interdental loss and having marginal tissue loss coronal to mucogingival junction.

## P0218

### Gingival Phenotype – Radiographic and photographic study of dimensions of dentogingival unit – Pilot Study

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Viseu/Portugal

**Aim:** The dentogingival unit is a key factor to determine the aesthetic of the anterior sector. During the treatment planning, it is essential to consider the gingival phenotype and how it may influence the results. The aim of this study is to characterize the gingival phenotype of a sample of students from Portuguese Catholic University, through the analysis of digital radiographs and photographs.

**Material and Methods:** 50 standardized photographs and radiographs were taken in 50 patients (13 men and 37 women). The photographs were assessed: (1) Crown Form; (2) Height of Keratinized Gingiva; (3) Papilla Height; (4) Gingival Angle. Through radiographs was possible to analyze: (A) Thickness of Free Gingiva (G1 and G2); (B) Thickness of Gingiva in the Supracrestal Attachment (G3, G4 and G5); (C) Thickness of Attached Gingiva (G6); (D) Thickness of Alveolar Bone; (E) Distance from Amelo-Cementum line to the Alveolar Crest (AC-CA Distance); (F) Distance from Amelo-Cementum line to the Free Gingival Margin (AC-MG Distance).

**Results:** For  $p$ -value  $< 0.01$ , the correlation between Papilla Height and Gingival Angle is one of the strongest ( $r = -0.734$ ), obtaining, for Papilla Height, higher values for men and for Gingival Angle, higher values for women. The correlation between Crown Form and Thickness of Attached Gingiva (G6), shows no values with statistical significance ( $r = -0.815$ ).

**Conclusion:** The most statistically significant correlations are: (i) Papilla Height and Gingival Angle and (ii) Papilla Height and AC-MG distance. By gender, there is a strong association between: (A) Thickness of Attached Gingiva and male gender; (B) Thickness of Alveolar Bone and male gender.

## P0219

### Gingival biotype assessment using clinical parameters and visual evaluation

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Zagreb/Croatia

**Aim:** The aim of this study was to determine the objective parameters that describe different gingival biotypes and determine the reliability of visual biotype assessment compared with objective clinical measurements.

**Material and Methods:** The data were collected using a questionnaire that contained information about respondents, periodontal status and following measurements: the shape of the teeth, the width/length crown ratio, papillary height, width of attached gingiva, gingival scalloping and traumatic brushing signs. Gingival biotype was also visually assessed. 56 dental school students at the University of Zagreb were included. Statistical significance was tested by Fisher exact test,  $\chi^2$ -square test, Mann-Whitney U test and t-test.

**Results:** Cluster analysis of the following clinical parameters was performed: gingival recession, width of attached gingiva, the ratio of width and length of the tooth crown, papilla height, gingival

scalloping and the teeth form and revealed the distribution of data into three clusters according to the gingival biotype, thin biotype (A), and two thick biotypes (B1) and (B2). These observed groups were significantly different for all clinical parameters. There was a significant correlation between the cervical defects and cluster A. Subjective assessment of dichotomous gingival biotype did not significantly coincide with the resulting cluster solution.

**Conclusion:** The existence of different gingival biotypes has been proven using simple and reproducible method. The visual evaluation of gingival biotype is subjective and depends on the therapist's experience, hence it is insufficient compared to the cluster groups. A standardized protocol or method that could provide information about the biotype in simple, atraumatic and objective way is required.

## P0220

### Relationship between salivary lactate dehydrogenase activity and gingivitis in young adults

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**Aim:** Although previous studies have demonstrated the usefulness of the salivary levels of lactate dehydrogenase (LDH) in the diagnosis, prognosis and evaluation of therapy in periodontal disease, laboratory works are required for its measurement. The aim of this study was to determine the usefulness of a new kit, which can evaluate salivary LDH activity in real time, in screening for gingivitis of young adults.

**Material and Methods:** A total of 50 systemic healthy volunteers [20 males and 30 females, mean age ( $\pm$ SD);  $24.5 \pm 2.3$  years] participated in the present study. After unstimulated saliva was collected, LDH activity was evaluated in real time using the kit (colour-changing sheet on a scale of one to ten). A dentist measured probing pocket depth (PPD), clinical attachment level and the proportion of sites with bleeding on probing (BOP) at six sites on all teeth. Gingivitis was diagnosed when BOP was greater than or equal to 20%.

**Results:** Mean PPD and BOP of all participants were  $1.7 \pm 0.2$  (mm) and  $9.9 \pm 8.4$  (%), respectively. There was no attachment loss in the participants. Salivary LDH activity was positively correlated with mean PPD (Pearson's correlation coefficient; 0.57,  $p < 0.001$ ) and BOP (coefficient; 0.81,  $p < 0.001$ ). With use of a 8.0 cutoff value for LDH activity, the sensitivity and specificity values were 0.83 and 0.98, respectively.

**Conclusion:** The new kit for measurement of salivary LDH activity may be a useful tool for screening for gingivitis of young adults, which contributes to early detection of periodontitis.

## P0221

### MALDI-TOF mass spectrometry validation of a phenotypic *Porphyromonas gingivalis* identification scheme

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**Aim:** Accurate identification of *Porphyromonas gingivalis* is critical in periodontal microbiology analysis. This study assessed

with matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry the accuracy of a rapid phenotypic-based *P. gingivalis* identification scheme widely utilized by clinical periodontal microbiology laboratories.

**Material and Methods:** 47 fresh subgingival cultivable isolates from chronic periodontitis patients were presumptively identified as *P. gingivalis* on anaerobically-incubated enriched Brucella blood agar primary isolation plates based on their dark-pigmented colony morphology, lack of red autofluorescence under long-wave ultraviolet light, and a positive CAAM fluorescence test for trypsin-like enzyme activity (Slots, 1987). Each clinical isolate was subjected to MALDI-TOF mass spectrometry analysis using a benchtop Microflex LT mass spectrometer equipped with MALDI Biotyper 3.1 software containing mass spectra for *P. gingivalis* in its reference library of bacterial protein profiles (Bruker Daltonics, Billerica, MA, USA). A MALDI Biotyper log score of  $\geq 1.7$  was required for taxonomic classification of the clinical isolates. Kappa analysis determined the extent of *P. gingivalis* identification concordance between the phenotypic identification scheme and MALDI-TOF mass spectrometry test results.

**Results:** All 47 presumptive *P. gingivalis* subgingival clinical isolates were definitively identified as *P. gingivalis* with MALDI-TOF mass spectrometry analysis. A kappa value of 1.0 was found between *P. gingivalis* identified by the phenotypic scheme and MALDI-TOF mass spectrometry.

**Conclusion:** Rapid phenotypic identification of cultivable *P. gingivalis* in human subgingival biofilm specimens was confirmed as highly accurate with MALDI-TOF mass spectrometry analysis. These findings provide validation for the continued use of research data employing this phenotypic identification scheme for periodontal *P. gingivalis*.

## P0222

### Tooth surface characteristics following cervical enamel projections removal

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**Aim:** The aim of this study was to compare the tooth surface characteristics following cervical enamel projection removal in human teeth using three different rotating instruments by scanning electron microscope (SEM).

**Material and Methods:** Thirty extracted molars with grade (by Masters and Hoskins) II and grade III enamel projection were tested. There were 15 molars in each grade. Cervical enamel projections were removed by piezoelectric ultrasonic scaler (P-MAX, Satelec, France with No.H4R tip), 368 014 5ML periodontal bur ("PARO" Periodontology Kit, Diatech, Swiss) and thin tapered SF104R diamond bur (Shofu Inc., Kyoto, Japan). After enamel projections were removed, all specimens were evaluated under Scanning electron microscope (SEM) under x20, x200, x1000 magnification.

**Results:** SEM photographs showed that diamond bur group provided the smoothest surface and the most flawless enamel removal, but it was also harmful to the tooth structure near the cervical enamel projections. This tendency was especially significant on grade III. Piezoelectric ultrasonic scaler group showed the roughest surface but it was not harmful to the tooth structure near the furcation entrance. In the periodontal bur group, enamel remnants were observed under x200 magnification SEM. But this group showed smooth surface and only upper layer of furcation cementum was removed during the procedure.

**Conclusion:** It seemed that the most effective instrument is diamond bur at grade II enamel projection removal. However at the removal of grade III enamel projection, diamond bur can destroy both tooth structure and periodontal apparatus. Careful using of periodontal bur could be a proper substitute in that case.

## P0223

### Periodontal pocket presenting due to retained roots and odontogenic cyst formation: a multidisciplinary approach to diagnosis

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**Aim:** A 38 year old female, presented to Kings College Hospital periodontal clinic with a five year history of recurrent abscesses and pain. The referring practitioner had identified a periodontal abscess associated with an isolated pocket relating to the region of the UR6,7. Initial non surgical debridement with local anaesthetics had not improved the probing depths and it was questioned whether surgical periodontal treatment was required. Examination revealed UR6,7 were unrestored with no identifiable cracks or tenderness to percussion. An isolated pocket of 11 mm was identified on the UR6 distobuccal surface with exudate of pus.

**Material and Methods:** Sensibility testing using endofrost and electrical pulp testing was used to assess the vitality of UR6,7. DPT and periapical films were taken for a radiographic assessment. A provisional diagnosis led to multidisciplinary input from Endodontic, Restorative, Maxillofacial and Oral surgery consultants to reach a more definitive diagnosis. Further investigation using CBCT was recommended.

**Results:** DPT highlighted a radiolucent area and opacity related to UR6,7. Accuitomo CBCT scan revealed a 19 mm unilocular round radiolucent lesion which was associated with the roots of UR6,7. The lesion had a smooth well demarcated outline with no evidence of bony expansion. It was reported to be a odontogenic cyst associated with a root fragment following an UR8 extraction. This was subsequently surgically removed and confirmed by histopathology.

**Conclusion:** Diagnosis of unusual dental presentations and pathologies often requires a multidisciplinary approach and effective communication between different dental specialties. The incorporation of additional investigations such as CBCT enhances diagnosis and effects treatment outcomes.

## P0224

### Severe gingival enlargement induced by dihydropyridines in a child

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**Aim:** Introduction: Gingival enlargement or gingival overgrowth has been associated with inflammatory, pharmacologic and neoplastic factors. Chronic inflammation, secondary to dental plaque accumulation, is the most common cause of gingival overgrowth. Drug-induced gingival enlargement (DIGE) is an adverse reaction associated with the use of phenytoin,

cyclosporine A and calcium antagonists (dihydropyridines, verapamil and diltiazem).

**Material and Methods:** Not Applicable.

**Results:** Case report: A 3-year-old boy presented to the paediatric dentistry department with a serious gingival enlargement. He had a remarkable medical history: idiopathic arterial calcification with secondary arterial hypertension, mixed cardiopathy (hypertrophic and congestive), hyper-reninaemic hyperaldosteronism, congenital hypothyroidism and a ductus arteriosus surgery. He took nifedipine 3.2 mg/8 h during the first 2 years of life but 1 year prior this dihydropyridine was changed to amlodipine 10 mg/12 h. The patient presented a severe DIGE according to the vertical Gingival Overgrowth index (GOi) and the horizontal Miranda & Brunet index (MBi). Considering the deterioration of child's condition, a resective periodontal surgery under general anaesthesia was contraindicated. In the meantime, his parents were instructed on thorough oral hygiene using chlorhexidine. Discussion: Dihydropyridines calcium channel blockers include nifedipine and amlodipine. They are often used to reduce systemic vascular resistance and arterial pressure. These drugs may affect the gingival fibroblasts activity. Consequently, an inhibition of the collagen metabolism may favour its accumulation increasing the risk of DIGE.

**Conclusion:** The present case report is relevant because this extreme gingival dimorphism is very uncommon at our patient's age. Additionally these clinical images prove that DIGE may even appear at the first stages of development.

## P0225

### A cross-sectional study of non-carious cervical lesions among periodontitis patients in Trinidad, West Indies

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**Aim:** To investigate non-carious cervical lesions (NCCLs) among periodontitis patients at the Dental Polyclinic, School of Dentistry, the University of the West Indies.

**Material and Methods:** Consecutively presenting adult ( $\geq 18$  years) patients with Basic Periodontal Examination (BPE) scores of 4 or 4\* were selected for the study ( $n = 130$ ). Demographics, histories and an oral hygiene questionnaire were completed. A six-point periodontal charting, a record of NCCLs and dentine sensitivity (DS) were completed by one calibrated examiner.

**Results:** The study population ( $n = 130$ ) consisted of 40% ( $n = 52$ ) males and 60% ( $n = 78$ ) females with mean age 51 years (19–78 years). The prevalence of NCCLs among the total patients was 38.5% ( $n = 50$ ) with 52% ( $n = 26$ ) males and 48% ( $n = 24$ ) females. There were NCCLs in 20.4% (245 teeth) of the 1201 total teeth among the NCCL group. The mean number of NCCLs per patient was 5. There were statistically significantly (Pearson Chi-Square;  $p = 0.009$ ) more patients with DS in the NCCL group (86%;  $n = 43$ ) compared to the non-NCCL group (65%;  $n = 52$ ). There were also statistically significantly (Independent  $t$ -test;  $p < 0.05$ ) greater mean values for full mouth plaque scores (FMPS) and full mouth bleeding scores (FMBS) for the non-NCCL group compared to the NCCL group. A high proportion (96%) of patients reportedly used a hard toothbrush.

**Conclusion:** The NCCL group compared to the non-NCCL group presented with significantly lower FMPS and FMBS

despite significantly higher prevalence of DS. This may suggest that NCCLs and dentine sensitivity may not be limiting factors to patient oral hygiene measures for periodontitis patients.

## P0226

### Orofacial granulomatosis in a 13-year-old male patient

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**Aim:** Orofacial granulomatosis (OFG) is a chronic inflammatory disorder characterized by persistent lip swelling, but it may also affect periodontal tissues. OFG usually occurs as a separate clinical entity, but a small proportion is associated with established Crohn's disease. The disease usually presents in male adolescents. While the underlying cause of OFG is not completely understood, dietary restrictions have proved effective in the management of OFG.

**Material and Methods:** A 13-year-old systemically healthy boy was diagnosed with atypical gingival inflammation and enlargement. Only slight clinical improvement was achieved after anti-infective periodontal treatment. A clinical diagnosis of OFG was confirmed by a biopsy, which revealed granulomatous inflammation. Although serum calprotectin, a marker of inflammation in the bowel, was elevated, endoscopy did not reveal signs of Crohn's disease. The symptoms improved after the patient started to follow a cinnamon and benzoate (CB)-free diet.

**Results:** The success of a CB-free diet in alleviating symptoms is not clear, but may be based on the fact that a patient with OFG experiences contact hypersensitivity to cinnamon and benzoates, which are avoided as part of a restricted diet. In our case, it seemed that the local irritation from plaque was potentiated by a hypersensitivity reaction resulting in an atypical gingival reaction.

**Conclusion:** OFG should be taken into account when treating young patients with atypical gingival inflammation, especially if associated with lip swelling. To avoid topical or systemic immunomodulatory therapies, the primary treatment should include a CB-free diet in addition to conventional periodontal therapy.

## P0227

### Gingival crevicular fluid beta-crosslaps (beta CTX) and osteocalcin – bone resorption biomarkers for periodontal disease

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**Aim:** The aim of our study is to detect two bone resorption biomarkers in gingival crevicular fluid (GCF) samples of chronic periodontitis patients, in order to use these parameters in periodontal diagnosis.

**Material and Methods:** The clinical periodontal parameters that we have examined are plaque index, bleeding on probing index, probing depth and clinical attachment level. In each subject GCF samples were collected from 4 sites, with greater

pocket depth. GCF beta-crosslaps (beta CTX) and osteocalcin levels were analyzed by enzyme-linked immunosorbent assay (ELISA).

**Results:** Our results revealed statistically significant higher values for GCF beta-crosslaps and osteocalcin in periodontitis group versus controls ( $p < 0.01$ ,  $p < 0.01$ ). The increased values for GCF beta-crosslaps and osteocalcin pointed out the process of bone resorption in periodontitis. Our results also revealed a statistically significant correlation of GCF beta CTX values with probing depth in periodontitis group ( $r = 0.86$ ;  $p < 0.01$ ). We found no correlation of GCF osteocalcin levels with probing depth.

**Conclusion:** GCF beta CTX and osteocalcin are very important and promising biomarkers for active bone destruction in periodontal diseases. Our results also suggest that beta CTX is a potential predictor of future alveolar bone loss. Biochemical mediators evaluated in this study are useful for determination of current periodontal status and noninvasive monitoring of periodontal disease.

## P0228

### Evaluation of the periodontal status of abutment teeth in removable partial dentures

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**Aim:** To evaluate if the use of removable partial denture affects the periodontal status of abutment teeth when compared to non-abutment teeth.

**Material and Methods:** An observational cross-sectional research was developed based on a sample of patients rehabilitated with RPD between 2010 and 2013 in the Clinic of the Catholic University of Portugal. These were recalled for follow-up appointment in which a questionnaire and a clinical examination were made to collect data on the variables analyzed in this study: probing depth, gingival recession, plaque index, mobility and gingival index. The data collected were subjected to a descriptive and inferential statistical analysis using SPSS.

**Results:** Of 145 patients contacted by telephone, 54 joined the follow up appointment requested (37.2%). The mean age was  $59.09 \pm 11.12$ , 42.6% were male and 57.4% female. The mean follow-up time for the RPD was 26 months. The abutment teeth had higher values in all periodontal variables ( $p < 0.001$ ) and it was possible to verify that occlusal clasps had worse results in relation to clasps with a gingival approach ( $p < 0.005$ ). The mandibular abutments teeth in Kennedy classes I and II had a higher mobility relative to the mandibular abutments teeth rehabilitated in class III ( $p < 0.048$ ).

**Conclusion:** Considering the results obtained, it is essential to establish a recall program for patients rehabilitated with RPDs, in the area of Removable Prosthesis and Periodontology, in order to control the RPD status, the occlusal scheme and maintain periodontal health of the supporting tissues.

## P0229

### Periodontal status and periodontal treatment need of Chronic Kidney Disease patients. A Pilot study

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**Aim:** To evaluate the periodontal status of patients with chronic kidney disease.

**Material and Methods:** All the patients with chronic renal disease who presented at the renal out-patient clinic of the Lagos University Teaching Hospital were recruited into the study. Data was collected using self-administered questionnaires with open and closed questions consisting of demographic details like age and gender, year of diagnosis of kidney disease, stage of disease, medication and possibly dialysis. Simplified Oral Hygiene Index (OHI-S) of Green and Vermilion and Community Periodontal Index of Treatment Need (CPITN) were used to assess the patients' periodontal status

**Results:** Participants' age ranged between 21 years and 73 years with mean age of  $45.14 \pm 14.14$ . Of the 65 participants, males were 64.6% and females 35.5%. More than half of the participants were diagnosed within the last 5 years (54.6%). The cause of renal disease in forty-one of them (63.1%) was hypertension. Other causes like chronic glomerular nephrities (4.6%), diabetes mellitus (4.6%), hypertensive heart tatus. disease (3.1%) were also mentioned. 6.2% had no known cause. About a fifth of the participants (16.9%) had other systemic condition like diabetes. Their mean OHI-S was  $1.96 \pm 0.90$ . About two thirds of the participants had CPI score 2 and the major treatment needed was code 2 consisting of scaling, polishing and root planing. None had codes 3 and 4.

**Conclusion:** Majority of the Chronic renal disease patients reviewed had poor periodontal status with code 2 treatment need. We therefore recommend non-surgical periodontal treatment for all CKD patients to improve their oral health and forestall the systemic effects of periodontal pathology.

## P0230

### The inflamed gingival unit: a multi-level analysis of associated factors in a 21-day experimental gingivitis trial

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**Aim:** To evaluate the effect of patient-related and site-specific factors on the risk for gingivitis occurrence at the site level.

**Material and Methods:** Ninety-six systemically and periodontally healthy patients underwent a 21-day experimental gingivitis trial. Each subject was characterized for different cytokine gene polymorphisms (IL-1A<sup>+4845</sup>, IL-1B<sup>-511</sup>, IL-1B<sup>+3953</sup>, TNF-A<sup>-308</sup>, LT-A<sup>+252</sup>, IL-1RN, IL-6<sup>-597</sup>, IL-6<sup>-174</sup>). At day +21, Plaque index (PII) and Gingival Index (GI) were assessed at two sites (buccal and mesio-buccal) for 6 maxillary teeth. A logistic multi-level model was constructed, with site-specific GI<sub>bin</sub> as the binary outcome event (if GI = 0, GI<sub>bin</sub> = 0; if GI  $\geq$  1, GI<sub>bin</sub> = 1).

**Results:** The mean probability for any site to have GI<sub>bin</sub> = 1 was 36%. Statistically significant odds ratios (ORs) for GI<sub>bin</sub> = 1

were found for: (i) the rare alleles of IL6<sup>-174</sup> and IL-6<sup>-597</sup> (OR = 3.90 and 0.84, respectively) versus the respective common alleles; (ii) incisors and premolars versus molars (OR = 5.32 and 3.16, respectively); (iii) mesio-buccal versus buccal sites (OR = 2.31); PII = 2 and PII = 3 versus PII = 0 (OR = 13.86 and 3.74, respectively). The final logistic multi-level model explained 46% of the observed variability in GI<sub>bin</sub>.

**Conclusion:** The probability for a site to manifest clinical signs of gingivitis over a 21-day experimental gingivitis trial is influenced by IL-6<sup>-174</sup> and IL-6<sup>-597</sup> genotype as well as site-specific factors (i.e. PII, tooth type and aspect).

## P0231

### Analysis of genetic polymorphisms in the Interleukin 10, NOS2A and ESR2 genes in chronic and aggressive periodontitis

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**Aim:** Some genes such as interleukin 10 (IL10), inducible nitric oxide synthase 2 (NOS2A) and estrogen receptor  $\beta$  (ESR2) play important roles in immune and inflammatory host response and in bone metabolism. The aim of this study was to investigate the association of single nucleotide polymorphisms (SNP) in the promoter region of the IL10, NOS2A and ESR2 genes with chronic periodontitis (CP) and aggressive periodontitis (AgP).

**Material and Methods:** Three groups of patients were evaluated: CP (n = 61), AgP (n = 50) and periodontally healthy (control group = 61). Periodontal clinical and radiographic examinations were performed. Genomic DNA was extracted from oral epithelial cells and used for genotyping by real time polymerase chain reaction (RT-PCR) using TaqMan<sup>®</sup> probes. The investigated SNPs were: -1087G>A (rs1800896), -819C>T (rs1800871) and -592C>A (rs1800872) in the IL10, +2087G>A (rs2297518) in the NOS2A and +1730G>A (rs4986938) in the ESR2 gene. Differences in the genotypes and alleles frequencies of each polymorphism and some characteristics of individuals were analyzed using the chi-square test and multivariate logistic regression analysis.

**Results:** Patients carrying the genotype +2087GG in the NOS2A gene were genetically protected against development of CP (p < 0.05; OR = 0.44; 95% IC = 0.20–0.95). Analysis of the +2087G allele of NOS2A gene showed a tendency of significant association with periodontal disease (AgP or CP), while the analysis of genotypes and/or haplotypes of the IL10 and ESR2 genes did not show significant association with the disease.

**Conclusion:** Subjects with GG genotype for the SNP +2087 in the gene NOS2A were protected against the development of periodontitis.

## P0232

### Oral Health awareness of Hungarian adult population in 2014. A representative electronic survey

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**Aim:** In 2004 a representative pathfinder study showed poor oral hygiene and worse periodontal conditions of Hungarian adults compared to Western counterparts. The objectives of the present electronic survey was to check if any improvement has occurred in recent decade in the adult's oral health attitude and awareness.

**Material and Methods:** 1400 adults aged 18–50 were selected from the Research Center's electronic database for the electronic survey on the Facebook. The questioner contained 32 multiple choice questions. The response compliance was good, 1247 sent back the questionnaires.

**Results:** The survey was representative according to age and sex distribution, geographic location, and education. One third of the responders reported to brush their teeth less than once a day, only 22% used dental floss and 5% interproximal tooth-brushes. 31% did not see a dentist in the past 12 months and 42% visited dental office just in case of pain. Only 50% reported regular dental office attendance. 61% did not know about dental plaque and its role in oral disease 33% did not know that bleeding gum is the sign of gingival inflammation, and 25% neglected swollen gum, 22% tooth mobility and 88% dry mouth. The majority was aware of the harmful effects of tobacco smoking and sugar consumption. Approx. 90% of the responders uses chewing gum and were aware of the benefits of the sugar free gums.

**Conclusion:** The Hungarian population's oral health knowledge is still poor and the young uneducated males are the most endangered.

## P0233

### Post orthodontic recession: fact or fiction

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**Aim:** Recession occurs when the marginal tissue has been displaced apical to the cemento-enamel junction and root surface is exposed. With orthodontic treatment, if a tooth is moved to a position outside the alveolar plate, bone loss and recession can occur. There are retrospective case-controlled studies that suggest there is an association between orthodontic treatment and gingival recession but a recent systematic review concluded there is not enough high quality evidence to definitively support a link.

**Material and Methods:** This report details a series of cases where post-orthodontic gingival recession has occurred. In one case, the management required the extraction of the tooth and its replacement with an immediate bridge using the crown of the extracted tooth. In the other cases, the recession defects were managed by means of periodontal surgery.

**Results:** These cases illustrate undesirable (biological and aesthetic) consequences associated with post-orthodontic gingival recession. In each case, management techniques were employed

appropriate to the circumstances. In the case where an extraction was required, treatment aimed to alleviate pain and provide a temporary restoration to allow time for remodelling to occur. In the cases where surgery was performed, the treatment aimed to improve aesthetics and decrease sensitivity.

**Conclusion:** The incidence and progression of gingival recession defects can be associated with periodontal disease, plaque-control difficulties, traumatic tooth brushing, piercings and bruxism. Management of post-orthodontic recession defects requires a careful appreciation of the contributing factors and an ability to establish an appropriate treatment strategy with a clear aim and end-point in mind.

## P0234

### Evaluation of salivary flow in periodontal individuals addicted to crack and cocaine

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**Aim:** Maintaining a regular salivary flow is important to help preventing some oral diseases, such as periodontal diseases. Therefore, several conditions that are capable of reducing salivary flow may affect periodontal health. The aim of this work was to evaluate the salivary flow in individuals addicted to crack and cocaine.

**Material and Methods:** Full-mouth periodontal examinations were performed on a sample of 40 crack and cocaine users ( $\geq 19$  years). Probing depth (PD) and the cement-enamel junction to the free gingival margin (CEJ-GM) distance were measured at six sites per tooth. Measurements were made in millimeters and rounded to the next whole millimeter. Clinical attachment loss (CAL) was calculated as the sum of the PD and CEJ-GM measurements. Destructive periodontal disease as defined as individuals with  $\geq 2$  proximal sites with CAL  $\geq 4$  mm, not on the same tooth or  $\geq 2$  proximal sites with PD  $\geq 5$  mm, not on the same tooth or individuals with  $\geq 2$  proximal sites with CAL  $\geq 6$  mm, not on the same tooth and  $\geq 1$  proximal site with PD  $\geq 5$  mm. Unstimulated salivary flow (USF) was evaluated. Data were analyzed using Independent Samples T-Test ( $p \leq 0.05$ ).

**Results:** USF was significantly lower in periodontal patients ( $1.92 \pm 1.52$ ) compared to non periodontal ( $4.30 \pm 2.46$ ) subjects ( $p = 0.003$ ).

**Conclusion:** In individuals addicted to crack and cocaine destructive periodontal disease was associated with reduction of salivary flow.

## P0235

### The knowledge of gynecologists about periodontal treatment needs in pregnant women

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**Aim:** Researches have shown that periodontal disease is associated with several other diseases. Therefore, treating periodontal diseases may not only help manage oral status but may also help with the management of other systemic conditions. The aim of

this study was to determine the knowledge and the clinical attitude of Turkish gynecologists regarding periodontal diseases.

**Material and Methods:** All Turkish gynecologists from northern city Ordu/Turkey were selected for this cross-sectional study. Their periodontal knowledges were assessed using a questionnaire.

**Results:** The questionnaire was completed by 15 gynecologists. Among responses, most gynecologists were not aware of the etiology of periodontal diseases and did not concern the negative effect of these diseases during pregnancy and various hormonal phases. However, all of them knew the oral symptoms in pregnancy. But a few of gynecologists referred patients to the dentists.

**Conclusion:** Pregnant women must have special periodontal health care considerations and increasing dental health awareness among gynecologists would significantly improve women's health and pregnancy outcomes. We suggest that medical and dental education programs, and scientific information exchange between medical professionals, may provide better quality healthcare services to the community.

## P0236

### Periodontitis and arterial stiffness: a systematic review and meta-analysis

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**Aim:** Patients with periodontal diseases have a higher risk of cardiovascular diseases, particularly atherosclerosis, although a causal relationship between these conditions remains unclear. Arterial stiffness is considered a surrogate marker of atherosclerosis and a risk factor for cardiovascular diseases. A systematic review of the literature and a meta-analysis on clinical studies using pulse wave velocity (PWV) to assess arterial stiffness in patients with periodontitis was carried out to answer two questions: 1) Do patients with periodontitis have impaired arterial stiffness compared to non periodontal diseased patients? 2) Is periodontal treatment effective to improve arterial stiffness in patients with periodontitis?

**Material and Methods:** Literature search was done by two independent reviewers on different online databases up to September 2014. All clinical observational and interventional studies using PWV in patients with periodontitis were retrieved for a full-text evaluation.

**Results:** A total of 10 studies were included (8 observational studies, 1 prospective clinical series, 1 randomized controlled trial). Overall, patients with periodontitis (with and without comorbidities like diabetes or hypertension) have increased arterial stiffness compared to controls (PWV mean difference  $+0.85$  m/s; 95%CI: 0.53–1.16;  $p < 0.00001$ ). The only 2 interventional studies showed contradictory results on the effects of non-surgical periodontal treatment on PWV.

**Conclusion:** Patients with periodontitis appear to have higher values of PWV compared to controls. The role of periodontal treatment in improving arterial stiffness remains unclear. The overall low level of evidence and the high risk of bias of the included studies must be taken into account before drawing definitive conclusions.

## P0237

### The effectivity of oral hygiene routines depending on the method of patient education

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**Aim:** The aim of the research was to determine whether intra-oral individual instructions are advantageous correlated to extra-oral practical instructions or not, and to assess if change of clinical parameters can be achieved this way.

**Material and Methods:** 30 subjects were randomly divided into two groups. Periodontal status, plaque index (FMPS), gingival index (FMBS), and interdental bleeding index (FMIDBI) had been recorded at the start, and ultrasonic scaling also had been performed. At the next stage, the control group (C) received oral practical instructions on toothbrushing and interdental cleaning, demonstrated on a model; oral healthcare products, and written information about the right cleaning techniques. The test group (T) besides these, received individual instructions in their mouth tailored to the given oral conditions according to the principles of Individually Trained Oral Prophylaxis (iTOP). It means that only the members of T group could experience how the correct technique is performed, so they were trained how to use the devices properly.

The reevaluation of the patients was performed 1.3 and at least 5 months after the first appointment.

**Results:** The results of the C group:

FMPS: 30.3% FMBS: 21.0% FMIDBI: 23.9%

The results of the T group: FMPS:12.6% FMBS:12.4% FMIDBI:13.0% The achieved average changes in the clinical parameters:

C group: FMPS: -20.5% FMBS: -12.4% FMIDBI: -44.6%

T group: FMPS: -39.3% FMBS: -18.1% FMIDBI: -46.7%

**Conclusion:** The individually trained group showed significantly better results at the end of the research period regarding the clinical parameters (FMPS) and the average of improvement too. It can be stated, that individually tailored oral hygiene instructions improve the efficacy of motivational efforts.

## P0238

### The distribution of local and systemic condition for patients with periodontal disease

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**Aim:** To assess the local and/or systemic condition for patients with periodontal disease.

**Material and Methods:** 200 patients with periodontal disease were examined for the presence of local and systemic disorders noticed in relation with a periodontal disease.

**Results:** There weren't many differences in gender distribution of the study group (55% female, 45% male), and the average age was 49.71. 80% of patients had periodontitis and 20% gingivitis. Except for 2 patients (1%) who didn't show any local or systemic disorders, 2 patients (1%) had 1 factor and the majority of patients (98%) had shown the presence of 2 or more local/systemic favorable conditions for periodontal disease. 17% of patients had only local factors, 1:1 gingivitis: periodontitis. The

presence of local factor was 92% calculus, 78% dental caries, 78% prosthetic restoration, 43% occlusal trauma, 36% edentulous without restauration and 21% orthodontic disorders. Regarding systemic disorders, 27% patients have 1 factor, 22%- 2 factors, 16.5%- 3 factors, 9%- 4 factors, 7.5%- 5 or many factors. The most frequent were cardiovascular diseases 44.5%, followed by neurological disorders 14.5%. Thyroid disorders, diabetes mellitus, and osteoporosis were above 8.5% each, 3.5% hematological diseases, and 2% hepatic disorders. The periodontitis incidence increase from 41.67% without systemic factors to 66.67%- 4 factors. 20% patients had allergic condition.

**Conclusion:** Although the presence of the local condition is very high, 82% of patients with periodontal disease have a systemic condition as well. The association of many systemic factors have no influence on gingivitis incidence but increase the risk for periodontitis.

## P0239

### Periodontal and peri-implant probing. Is there a difference in discomfort/pain?

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**Aim:** It seems that patients feel more discomfort after peri-implant probing than after periodontal probing. However, up to now there is not one single study to address this clinical impression. Thus, this study was designed to compare discomfort after peri-implant and periodontal probing.

**Material and Methods:** Each of 3 dentists recruited and examined 20 patients each contributing one pair of one dental implant and a contralateral natural tooth. Periodontal and peri-implant probing depths (PPD) and attachment level (AL) were assessed. It was assigned by random whether the implant or the tooth was measured first. Immediately after probing the patients scored discomfort/pain using a visual analogue scale (VAS).

**Results:** 60 patients (median; lower/upper quartile: age 62.5; 47.5/69.0 years; 35 females, 5 smokers) were included. With the exception of PPD at the deepest site (implant: 4.0; 3.0/5.5 mm; teeth: 3.0; 3.0/4.0 mm;  $p = 0.032$ ) clinical parameters (PPD, AL, bleeding on probing, suppuration) were well balanced between implants and teeth. Significantly ( $p = 0.011$ ) more discomfort was recorded after peri-implant probing (VAS: 16.4; 8.7/28.2) than after periodontal probing (9.1; 4.6/18.2).

**Conclusion:** Significantly more discomfort was observed after peri-implant probing than after periodontal probing.

## P0240

### Clinical characteristics of patients with inflammatory periodontal diseases by prosthetic designs

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**Aim:** Modern dentistry offers a large number of fixed and removable prosthetic structures used in the treatment of partial and total absence of teeth. However, the influence of various structural materials used in prosthetics, oral health and overall health neglected. The work is aimed at investigating the clinical characteristics of oral health in patients with inflammatory periodontal diseases and defects of hard tissues and dentition.

**Material and Methods:** In the course of our study were examined 3567 patients. In need of prosthetic treatment revealed 59.5%, of which the majority (73.2%) patients were in the age group over 50 years.

**Results:** Among patients requiring prosthetic treatment, revealed 44% with inflammatory periodontal diseases, most of them with chronic periodontitis (74%) and other with gingivitis (26%). We have determined that prosthetic treatment fixed structures received 40.6% of the patients, removable constructions – 37.6%, combined – 21.8%. As a result, the treatment of patients with prosthetic non-replaceable aesthetic designs using cermet was 78%, all-ceramics-14%, ceramic zirconium oxide – 8%.

**Conclusion:** A study on the linkages of various risk factors for the development of inflammatory periodontal diseases. Determined that the main factor influencing the development of inflammatory diseases of the oral cavity, is poor hygiene, and comorbidities and irrational prosthetics equally influence the development and severity of periodontal disease.

## P0241

### Periodontal presentation in Parry-Romberg Syndrome –first reported case in the literature

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**Aim:** To describe an unusual systemic condition (Parry-Romberg Syndrome) presenting as persistent periodontal destruction.

**Material and Methods:** An otherwise healthy 56 year-old female of African origin presented with intraoral signs consisting of an area of gingival erythema and recession local to the 12, 11 region intraorally. In addition necrosis of the interdental papilla, 9 mm periodontal probing depths as well as bleeding and discomfort on probing was found. A periapical radiograph demonstrated a moderate angular bony defect associated with the upper right lateral incisor and a provisional diagnosis of localised chronic periodontitis was made. The site showed little response to non-surgical periodontal treatment, adjunctive systemic antibiotic therapy or open flap debridement. Following the poor response to periodontal treatment prominence of the right zygomatic arch and a white fibrous labial band was noted. Further investigations (microbiological, haematological, histopathological and CBCT) were inconclusive. Two teeth were subsequently extracted and the area surgically debrided, and the patient provided with a removable prosthesis. Six months later, the facial asymmetry had worsened, and at this time the patient was diagnosed with PRS. Further treatment is currently ongoing.

**Results:** Parry Romberg Syndrome presented here with unilateral malocclusion and deviation of facial and dental midline. In other described cases delayed tooth eruption, crown and root dilacerations, root resorption, arrested tooth formation, odontogenic cysts and odontome formation have been reported. However, this appears to be the first reported case of periodontal destruction as an initial presentation.

**Conclusion:** Parry Romberg Syndrome should be considered as one of the varied systemic causes for recalcitrant periodontal lesions.

## P0242

### Association between dental and maxillary sinus pathologies, and ENT parameters

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**Aim:** The aim of the present study was to evaluate the correlation between subclinical pathologies in the maxillary sinus and their possible odontogenic source and to evaluate the association between these pathologies and various ENT parameters.

**Material and Methods:** A retrospective clinical trial was conducted on patients that were routinely referred to CT scanning prior to the consideration of implant therapy. All patients filled a standard ENT questionnaire. CT images were analyzed for (a) obstruction of the sinus ostium, (b) thickening of the Schneiderian membrane, (c) fluid accumulation at the sinus floor and (d) the presence of polyps. Presence of dental pathologies was estimated using the CT images, available x-rays and data collected during the clinical examination.

**Results:** A total of 40 subjects were included in the study. Mean age was 57.9 (range 21–78) and 52.5% were females. 57.9% had dental x-rays, and 65.7% had a periodontal chart. Statistically significant correlations were found between sensation of congested ears and the presence of polyps in the sinuses. Also, significant correlation was found between coughing and the presence of dental pathologies (Chronic Apical Periodontitis and periodontal disease), and a negative correlation between coughing and number of missing teeth. Another correlation was found between a decrease in the senses of smell and taste and the presence of maxillary sinus polyps, or dental pathologies (Chronic Apical Periodontitis and periodontal disease).

**Conclusion:** Subclinical sinus pathologies and dental pathologies were found to be associated with various ENT symptoms. These associations emphasize the need to consider odontogenic source in patients ENT complaints.

## P0243

### Toll-like receptors 4 gene polymorphisms affect periodontitis susceptibility of Chronic periodontitis patients with Porphyromonas gingivalis infection

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**Aim:** To investigate the relationship between TLR4 SNPs and chronic periodontitis susceptibility.

**Material and Methods:** There were totally 207 Chinese patients recruited. Human DNA was extracted from buccal swab samples, Porphyromonas gingivalis was detected in deposition of Whole unstimulated saliva before Full mouth periodontal examinations using polymerase chain reaction (PCR) method based on 16S rRNA. Eight SNPs of TLR4 gene were genotyped by the Sequenom MassARRAY system, rs11536889, rs1927906, rs1927911, rs2149356, rs4986790, rs4986791,rs6478317, rs7873784. Correlations between SNP polymorphisms of TLR4 and periodontitis susceptibility were analysed.

**Results:** None of the 8 gene alleles showed significant difference in genotype distributions between moderate/severe CP group and none/mild CP group in all the subjected. However, rs11536889, rs1927906, rs1927911, rs2149356,rs6478317

showed significant difference in genotype distributions between moderate/severe CP group and none/mild CP group, both with infection of Pg rs1927906(GG+AG/AA; OR = 6.939; 95% CI: 1.308–36.818,  $p = 0.023$ ), rs1927911(TT/CC+CT; OR = 5.367; 95% CI: 1.193–24.148,  $p = 0.029$ ) increased the risk of moderate/severe periodontitis regardless of age, gender, smoke status.

**Conclusion:** With Pg infection, TL4 gene polymorphisms of rs1927906, rs1927911 significantly correlated with chronic periodontitis susceptibility.

## P0244

### Oral health status in terminal kidney insufficiency patients

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**Aim:** There is evidence for an association of periodontitis and chronic kidney diseases (CKD), as well as for the positive effect of periodontal therapy on kidney function in CKD. The aim of the study was to determine the oral health status in patients suffering from terminal kidney insufficiency compared to a healthy control group without kidney insufficiency.

**Material and Methods:** 72 dialysis patients of the KfH-Kidney Center Chemnitz, Germany, were examined as well as 147 healthy controls. All study subjects received a complete clinical oral examination. A thorough history of systemic diseases, drug use, smoking, oral hygiene habits, and utilization of dental care was obtained by questionnaires and interviews. Parameter of kidney function were obtained from medical charts for dialysis patients. Data analyses included descriptive statistics, comparison of means, correlation analysis as well as multivariate regression.

**Results:** Hemodialysis patients had worse oral hygiene, less and more decayed teeth as well as worse periodontal conditions. Longer time on dialysis (>3 years) together with a worse efficiency of dialysis was associated with a higher risk for periodontitis. After dentist became known the necessity of dialysis, 57% of the patients did not receive changes in dental treatment, and only 15% of all dialysis patients were offered any prophylaxis.

**Conclusion:** Worse oral health was confirmed in hemodialysis patients compared to healthy controls. In dental practice, the awareness of this association is inadequately and has to be improved to reduce infectious burden as well as to prevent oral complications in these patients.

## P0245

### Prevalence of furcation involvements and intrabony defects in a Swedish adult population 40–70 years old. A radiographic epidemiological study

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**Aim:** The purpose of the study was to assess the prevalence of furcation involvements and intrabony pockets in 40, 50, 60 and 70 year old subjects participating in a cross-sectional epidemiological study in the community of Jönköping in 2003.

**Material and Methods:** The present study was performed on bitewing and apical radiographs in 329 subjects. Buccal furcations in molars were considered healthy if the furcation fornx

was covered with bone. The interproximal furcations (mesial and distal) were considered healthy if the interdental alveolar crest was seen above or at the same level as the furcation. All teeth with intrabony defects  $\geq 3$  mm, except teeth with an extraction indication and third molars, were examined.

**Results:** The prevalence of furcation involvement at molars in 40, 50, 60 and 70 year old subjects was 8.2%, 21.3%, 28.3% and 51.1%, respectively. Intrabony defects at these teeth were found in 9.3%, 6.4%, 8.7% and 14.6% individuals, respectively. In the same age groups, the prevalence of intrabony defects at non-molars was 1.1%, 4%, 3.5% and 3.1% respectively.

**Conclusion:** Furcation involvement was found more prevalent at first molars in all groups except in 40 year old subjects where second molars dominate. Intrabony defects were more prevalent at second molars than first molars in all groups. In non-molar teeth intrabony defects were most prevalent in premolars (4.6%) and canines (4.4%).

## P0246

### Periodontal status of the poles over 65 years of age

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**Aim:** Defining the periodontal condition on the basis of CPI score and periodontitis case definitions according Page and Eke (2007, 2012) in inhabitants of the Polish big and small cities in the age from 65 to 74.

**Material and Methods:** The investigations were carried in five large urban cities: Warszawa, Wroclaw, Szczecin, Bialystok and Torun as well as in four towns: Olawa, Police, Lobeż and Elk. After sampling people aged from 65 to 74 years for the study reported 875 persons. For aims of this work the evaluation of CPI score, measurements of PD and CAL (6 sites per tooth) and number of the teeth were chosen. All examiners were calibrated appropriately.

**Results:** Distribution of CPI codes values in the whole group was: CPI0-1.2%, CPI1- 9.5%, CPI2- 16.5%, CPI3- 22.2%, CPI4- 19.3% and the number of people excluded from examinations 31.3%. Average number of sextants with CPI codes was as follows: CPI0- 0.5, CPI1-4 – 3.4, CPI2-4 2.7, CPI3-4 1.6, CPI4- 0.5; 2.3 excluded. The periodontal condition was worse in big cities (CPI4 21.9% vs 18.8%) and in men (mean CPI4 0.6 vs. 0.4) with a higher number of excluded sextants in women. Prevalence of periodontitis was: 3.1% mild, 22.7% moderate and 17.1% severe. An average number of teeth was 13.7 and was higher in large urban areas and in men.

**Conclusion:** Periodontal condition of Polish seniors has not been improved in XXI century, but also does not significantly differ from an average European level. An average number of teeth of Polish seniors remains under a European average.

**P0247****Serum apolipoprotein B may modify the association of periodontitis with serum CRP levels**

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**Aim:** To study whether serum apolipoproteins A1 (ApoA1) and B (ApoB) modify systemic inflammatory response to periodontal infection.

**Material and Methods:** This study is based on a population-based Health 2000 Survey and includes a subpopulation of 30 to 49-year-old, non-diabetic, non-rheumatic subjects (n = 2709). The subjects were divided into groups according to the median values for ApoA1 (1.55 mg/ml) and ApoB (1.12 mg/ml). Systemic low-grade inflammation was assessed by serum C-reactive protein (CRP) and was dichotomized using a cut-off value of 3.0 mg/ml. Periodontal infection was measured by the number of teeth with deepened periodontal pockets 4 mm deep or deeper. Odds ratios (OR) and 95% confidence intervals (95% CI) were estimated using logistic regression models.

**Results:** A higher number of teeth with deepened periodontal pockets was associated with high serum CRP among subjects with a serum ApoB level above the median (OR 1.03; 95% CI 1.01–1.06 (continuous variable)). In contrast, no significant associations were observed among those whose ApoB level was equal to or below the median value. There was no significant association between the number of teeth with deepened periodontal pockets and serum CRP among subjects whose ApoA1 was equal to or below the median or subjects whose ApoA1 was above the median.

**Conclusion:** Serum lipoprotein levels may modify systemic inflammatory response to periodontitis. Subjects with high serum ApoB appeared to have a stronger systemic response to periodontal infection.

**P0248****Evaluate the risk indicators for periodontal disease using a mathematical model of response surface in adult Kiriri Indians from Northeast Brazil**

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 P.R. Cury  
 Salvador/Brazil

**Aim:** The aim of this cross-sectional study was to evaluate the risk indicators for periodontal disease using a mathematical model of response surface in adult Kiriri Indians from northeast Brazil

**Material and Methods:** In a sample of 180 individuals, 15 independent (sites numbers Pb  $\geq$  5 mm, index plaque, missing teeth, smoking, hypertension, diabetes, frequency of toothbrushing, relationship CAL-age, flossing, gender, income, body mass index, type of toothbrush, use of mouthwash, oral hygiene guidance, education level, bleeding on probing) and 06 dependent (05 different definition of periodontitis and 01 of risk periodontal) [P1] variables were selected. Various criteria based on loss of clinical attachment level, probing depth and bleeding on probing, were used for the definition of periodontitis. The risk diagram (Lang & Tonetti 2003) was used to characterize the periodontal risk. The mathematical model of response surface

was used to assess associations between different definition of periodontitis and its putative risk factors. High  $R^2$  were found for all dependent variables, for the selected models.

**Results:** The 3rd order model accounted for 83% ( $R^2$  0.89–0.98) of the sample, while 17% ( $R^2$  0.97) was represented by the 2nd. Missing teeth, hypertension, education level and bleeding on probing were associated with periodontitis in all analyzed categories.

**Conclusion:** Using the mathematical model of response surface, missing teeth, hypertension, education level and bleeding index on probing were associated with periodontitis

**P0249****Periodontal probing vs computed tomography: the accuracy and benefit for a proper diagnosis of periodontal disease**

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**Aim:** The aim of this study was to compare manual periodontal probing with Computed Tomography imaging measures in the same patient to detect and localize alveolar bone loss by comparing linear measurements of the height, depth and width of the defects and identifying combined bone defects.

**Material and Methods:** Thirty-eight patients with generalized chronic periodontitis were recruited. For each patient the examination consisted of 51 sites showing both horizontal and vertical bone loss (clinical examinations, periapical radiographs), and a CT scan that was performed and assessed by 3 trained examiners. Clinical recommendations comprised a minimal (e.g. supportive periodontal treatment) and a maximal invasive therapy (e.g. extraction and implant placement), based on clinical additional CT data and recommendations. Moreover, the probabilities of saving costs or time, and the numbers needing treatment were analysed with a cumulative distribution function.

**Results:** The results showed that there were no statistically significant differences between the imaging methods in terms of identification of the pattern of bone loss. Overall, 79% of the CT data was confirmed by the pre and intra-surgical findings (95% confidence interval: 0.576–1.0). While 9% of the sites were underestimated, (CBCT less than pre and intra-surgical value), in only 12% of the sites did the CT data lead to an overestimation compared with the pre and intra-surgical analysis (the molar furcation sites).

**Conclusion:** CT images compared to clinical examination demonstrates a high level of accuracy in assessing the loss of periodontal tissue and classifying the degree only in sites with furcation involvement.

**P0250****Impact of oral health on blood pressure: the IPC cohort**

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**Aim:** Chronic periodontal diseases involve bacteria-induced inflammation of the tissues supporting the teeth. An inflammatory origin for hypertension has been proposed, and periodontal

diseases are associated with an increased risk of vascular disease. The present observational study was performed to assess whether oral health conditions were associated with the risk of hypertension in adult population after controlling for confounding factors.

**Material and Methods:** The sample comprised 109,291 subjects who underwent medical and oral examinations between 2002 and 2011. A full-mouth clinical examination was performed using simplified plaque index, calculus index and simplified modified gingival index to assess dental plaque, dental calculus, and gingival inflammation. The number of teeth was recorded. Biological parameters, including blood pressure were assessed. A subset analysis according to age (< or ≥65 years) was conducted. The association between blood pressure and oral conditions was explored using a logistic regression approach.

**Results:** In subset analysis (≥65 years) we did not observe associations between each variables and the risk of hypertension. Unlike in subset analysis (<65 years), insufficient masticatory function and missing teeth (>10) were associated with hypertension with OR = 1.16 [CI<sub>95%</sub> 1.04–1.29] and OR = 1.20 [CI<sub>95%</sub> 1.09–1.32] respectively. Hypertension was also associated with a high level of dental plaque [OR = 1.92, CI<sub>95%</sub>, 1.57–2.34], dental calculus [OR = 1.30, CI<sub>95%</sub>, 1.17–1.44] and gingival inflammation [OR = 1.68, CI<sub>95%</sub>, 1.46–1.93].

**Conclusion:** The present study indicates that insufficient masticatory function, poor oral hygiene, and oral inflammation are associated with hypertension in patients <65.

## P0251

### Oral health status and dental consultation habits of upper aero-digestive tract cancer patients: A cross-sectional study in an Austrian population

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**Aim:** This study aimed to assess oral health status and dental consultation habits of patients treated for upper aero-digestive tract (UADT) cancer in an Austrian population.

**Material and Methods:** Eighty patients treated for UADT squamous cell carcinoma 6–60 months ago were asked to participate. Dental consultation pattern, oral hygiene level, presence of caries, clinical and radiographic periodontal parameters, and smoking status were assessed.

**Results:** Fifteen patients declined to participate; from the remaining 65 patients, 48 were dentate and 17 edentulous. 23% were never smokers, 60% former smokers, and 17% current smokers. After cancer diagnosis and prior to treatment only 52.1% consulted a dentist for a check-up; of those 41.7% received treatment and tooth extraction was most often performed (in 75%). Within the last year 69% consulted a dentist, but still 90% needed some type of dental treatment at the time-point of clinical examination. 80% had at least one tooth with caries (average: 5.1 ± 6.3 teeth; DMF-index: 25.3). 78.3% had periodontitis – 28.3% moderate and 50% severe periodontitis; no. of sites with PD≥5 mm: 1.1 ± 1.7 and 9.6 ± 7.2, respectively; radiographic alveolar bone loss: 4.2 ± 1.5 and 5.5 ± 1.6 mm, respectively. Professional tooth cleaning was never performed in 40% of the patients and average plaque index was 65.6%.

**Conclusion:** Half of patients did not consult a dentist prior to treatment for UADT cancer. Further, the vast majority needed at the time-point of clinical examination caries and/or active

periodontal treatment and oral hygiene appeared in general low prioritized. Hence, the multidisciplinary teams in cancer care might profit by regular inclusion of dental professionals.

## P0252

### Cardiovascular risk factors and gingivitis in an healthy pediatric population

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**Aim:** The role of periodontal diseases as a risk factor for the development of cardiovascular disease as been the subject of several studies. Studies have proven that cardiovascular diseases begin during childhood. Given that gingivitis is the most common periodontal problem in children, we aimed in this study to determine if there is a relation between the presence of gingivitis and the presence of cardiovascular disease risk factors in an healthy pediatric population.

**Material and Methods:** 110 children between 6 and 13 years old were included in this study. Anthropometric data, blood pressure values and analytic study were collected. HOMA index was also calculated. Children were classified as normal weight, obese, low weight and with or without abdominal obesity. The blood pressure values were used to identify hypertension. Analytic studies were performed to achieve dyslipidemia prevalence, insulin, ferritin and serum iron values. A single intra-oral examination of each patient was conducted to determine the number of teeth with gingivitis. Gingivitis associated with tooth eruption was not considered. Statistical procedures were performed to obtain the prevalence of gingivitis, cardiovascular, metabolic risks and metabolic syndrome. Association tests were also performed.

**Results:** Cardiovascular risk was present in 58.2% of the children and metabolic risk in 19.1%. The prevalence of gingivitis found in this population was 17.3%. It wasn't found a relation between metabolic risk, metabolic syndrome and gingivitis. There wasn't a statistically significant association between the presence of gingivitis and cardiovascular risk factors.

**Conclusion:** The presence of cardiovascular risk factors in children appears to have no relation with oral condition.

## P0253

### Gene expression profile in biopsy samples and saliva from generalized aggressive periodontitis patients

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**Aim:** This study aimed to evaluate gene expression in in-situ gingival biopsy and saliva samples from patients of generalized aggressive periodontitis using microarray experiment.

**Material and Methods:** Six patients diagnosed with generalized aggressive periodontitis were included, who presented severe and rapid loss of periodontal attachment at almost all teeth. Gingival tissue biopsies were taken from periodontitis lesions showing severe clinical attachment loss (>8 mm) and tissue inflammation, during periodontal flap operation. Saliva acquisitions (>5 ml) were performed immediately before tissue biopsy. All samples were preserved in the specific media. Gingival tissue RNA and saliva RNA were isolated, and target cRNA was prepared for microarray experiment. Labeled cRNA samples were hybridized

to bead-array chip (Illumina), and the signals were detected. Data from microarray experiments were processed by Lumi package; background correction, normalization, and gene annotation. Regression/correlation analysis between gingival tissue samples and saliva was taken by generalized estimating equations in generalized linear model and intraclass correlation coefficient.

**Results:** Gingival tissue biopsy and saliva acquisition showed comparable expression profiles of genes in pathways related inflammation, cell adhesion, and cell migration.

**Conclusion:** Similar patterns could be detected in gene expressions related pathways of inflammation between samples from gingival tissue biopsy and saliva acquisition in generalized aggressive periodontitis patients.

## P0254

### Ergonomic methods for diagnosis of the periodontal disease

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**Aim:** To establish a simple and ergonomic method to evaluate the periodontal status, especially for triage or for patients with disabilities.

**Material and Methods:** 50 patients with periodontal disease (54% female, 46% male, the average age 52) were evaluated regarding PI, CI, periodontal pocket index (PPI), bleeding on probing (BOP), gingival recession, tooth mobility, furcation involvement, periodontal diagnostic and CPITN. The examinations were done in 2 ways: standard, in 6 points/tooth and study method in 2 points/tooth, mesiofacial and distofacial. The data were analyzed by the paired t-test using STATISTICA v.8 software.

**Results:** Both methods have revealed the same diagnostic, 96% patients had periodontitis. The study method were 2.3 times faster (the average time 20.12 min, 8.76 min respectively). There were no significant statistical differences between the two methods for the values of PI, CI, BOP. The regression model showed good correlation of PPI ( $R = 0.9463$ ). "T-paired" test confirmed that there were no significant statistical differences ( $p > 0.05$ ) between the mean values of CPITN1 and CPITN2 for entire mouth (94% correspondence), as well as for II and V sextants (identical code for 94%, 96% respectively). Significant differences ( $p < 0.05$ ) were recorded for mean value of CPITN for the other sextants (86.5% correspondences). Tooth mobility is the same in both methods, the degree of furcation involvement must be separately recorded, and thus compensate for the differences obtained for CPITN.

**Conclusion:** The 2 points periodontal examination is more ergonomic and has no significant statistical difference than the standard method.

## P0255

### Hyposalivation: a true risk factor for periodontitis?

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Jerusalem/Israel

**Aim:** To retrospectively evaluate a suspected association between periodontal status and various salivation measurements of patients treated in the pre-graduate dental students' clinic.

**Material and Methods:** Patients in the students clinic go through a full dental, periodontal and risk assessment examination as a routine. Data of rapid periodontal examination, plaque and bleeding scores, mean and maximum probing depths and five different categorical salivation parameters was collected from patients files treated between the years 2008 and 2009. The data was evaluated using ANOVA.

**Results:** Out of 170 examined patients' files, 46 patients were diagnosed as suffering of periodontitis. We found a significant association between the mere diagnosis of periodontitis and lower rates of stimulated salivation. Furthermore, a significant association between mean probing depth, maximum probing depth, and lower values of saliva texture, stimulated saliva collection and saliva buffering capacity could be found. These associations were found to have a dose dependent pattern. We could not find any other affiliation between these salivary variables and other periodontal parameters (such as FMPS, FMBS etc.). Other salivary parameters, such as minor salivary gland secretion and pH were not found to have any association.

**Conclusion:** We found some dose-dependent association between saliva secretion and the periodontal status of patients being treated in the pregraduate students' clinic. These results merit further investigation through cross sectional and longitudinal observational studies.

## P0256

### Magnetic resonance imaging – a periodontal diagnostic device of the future?

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**Aim:** The technique of Magnetic Resonance Imaging (MRI) is a fast developing diagnostic tool in various medical domains. Aim of this study is to evaluate the potential of MRI to serve as a helpful diagnostic device for patients with periodontitis by reviewing current literature.

**Material and Methods:** A literature search was performed in PubMed, the Cochrane library, Embase and GoogleScholar. The search keys were "dental MRI" and "periodontal MRI". Articles that specifically made MR-Imaging of the periodontal tissue a subject of discussion were included. Literature was reviewed by one person (MR). In total 203 search results were found, of which 22 full-text articles were assessed.

**Results:** Three articles were found to meet the inclusion criteria. One was an in vivo study (Shinji et al. 2012), one an in vitro study (Gaudino et al. 2011) and one was a combined in vivo-in vitro-study (Schara et al. 2009). Shinji et al. compared MRI to PET-CT and showed a correlation concerning inflammation signs in the periodontium. Gaudino et al. showed a significant better detection of the periodontal tissue in MRI compared to MDCT and CBCT in pig jaws. Schara et al. showed an association between clinical parameters and relaxation times of gingival tissues in vitro. They also showed a contrast signal intensity decrease with improvement of clinical parameters in vivo.

**Conclusion:** MRI may have the potential to become a helpful three-dimensional diagnostic device, especially for early signs of periodontal inflammation and healing process. More research is needed to support this conclusion.

## P0257

### Association of physical activity and nutrition on experimentally induced gingivitis – a single-subject interventional study

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**Aim:** Aim of this clinical study was to assess the association of physical activity and food ingredients on local and systemic inflammatory signs in experimentally induced gingivitis. It was hypothesized that nutrition is associated with plaque formation and inflammatory markers.

**Material and Methods:** 30 healthy volunteers aged between 19 and 34 years with no signs of periodontal diseases were instructed to refrain from oral hygiene procedures at seven teeth of the right upper jaw over a period of 21 days. Routine oral hygiene was restarted at day 21. Clinical examinations included Plaque Index (PI), Bleeding on Probing (BOP), and Gingival Crevicular Fluid volume and blood samples were obtained to determine high sensitive C-reactive protein levels (hsCRP) at baseline, day 21 and day 42. During the experimental gingivitis phase volunteers documented their physical activity and nutrition by validated questionnaires. Physical activity was converted in Metabolic Equivalent (MET) and analysis of the questionnaire was performed using the nutrition consulting software Prodi Version 6.0 expert.

**Results:** Experimentally induced gingivitis was followed by increased local (BOP,  $p < 0.0001$ , Wilcoxon-test) and systemic (hsCRP,  $p = 0.038$ , Wilcoxon-test) inflammatory markers. Using a multivariate general linear regression analysis, the difference of BOP levels between day 21 and baseline correlated significantly with METs ( $p = 0.021$ ) and daily supplied Vitamin C levels ( $p = 0.037$ ). BOP levels correlated neither with PI nor with hsCRP.

**Conclusion:** High physical activity and Vitamin C levels were associated with reduced signs of local inflammation. It remains unclear how food ingredients affect plaque scores and local inflammation.

## P0258

### The effects of chronic periodontitis and obesity on total antioxidant/oxidant status and oxidative stress index

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**Aim:** Both obesity and periodontal disease are significant diseases that affect the quality of life, especially in developing countries. The aim of this study is to determine the pathophysiological relationship between obesity and periodontal disease by evaluating the clinical periodontal parameters and oxidative status.

**Material and Methods:** According to the study protocol, four groups each of were consisted of twenty participants were formed. Groups were as follows; periodontally healthy patients with normal weight (H), patients with chronic periodontitis and normal weight (CP), periodontally healthy patients with obesity (O) and patients with chronic periodontitis and obesity (OCP).

Clinical periodontal parameters were recorded and serum, saliva and gingival crevicular fluid (GCF) samples were obtained. Local and systemic levels of total antioxidant status (TAS), total oxidant status (TOS), oxidative stress index (OSI) were determined biochemically.

**Results:** The clinical periodontal parameters were examined, and we observed that obesity don't have statistically significant affect on these parameters. TAS, TOS and OSI values in serum and salivary were not statistically significant among the groups ( $p > 0.05$ ). GCF TAS values in S group were statistically significant higher compared to other groups ( $p < 0.05$ ). GCF TOS values were increased in obese groups (O, OCP) when compared to non-obese groups (H, CP) ( $p < 0.05$ ). As a result we can say that obesity and chronic periodontitis does not have statistically significant effect on oxidant/antioxidant levels in serum and saliva.

**Conclusion:** The most important reason of detecting statistically not significant values on obese and chronic periodontitis is; different factors such as individuals daily living conditions, stress and eating habits.

## P0259

### Clinical efficiency of a newly-developed Salivary Multi-test System-Longitudinal evaluation focused on periodontal disease

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**Aim:** In order to achieve comprehensive oral health assessment, a new salivary multi-test system has been developed. This system can simultaneously measure seven saliva analytes: [Dental caries] cariogenic bacteria, pH and buffer-capacity, [Periodontal disease] blood, leukocyte and protein, [Oral cleanliness] ammonia, as the reflectance value of test strip. This study was designed to evaluate the clinical efficiency of this saliva-test system through 6-month longitudinal period to compare with clinical symptoms of patients having necessary treatments visiting continuously to particular dental clinics. In this report, we focused on periodontal disease, and compared reflectance value of blood, leukocyte, and protein with conditions of periodontal disease [probing depth (PD) and the number of periodontopathogenic bacteria].

**Material and Methods:** Fifty-seven dental patients were examined at baseline, after 1, 3 and 6 months. At each examination-period, oral rinse samples (3 ml-DW, 10 sec-rinse) were collected, and reflectance of blood, leukocyte and protein were measured by this system. After collecting samples, PD was measured and periodontopathogenic bacteria was calculated by real-time PCR. Changes of reflectance through 6-month period were compared with those of conditions of periodontal disease. In addition, correlation between them at each examination-period was assessed (Spearman,  $p < 0.05$ ).

**Results:** The reflectance value measured by this system could pursue the changes of PD and periodontopathogenic bacteria through 6-month period. Furthermore, at each examination-period, there were significant relationships found between the reflectance value determined and PD and between the reflectance value and number of the bacteria.

**Conclusion:** This particular study revealed that the newly-developed salivary multi-test system was clinically useful for assessing conditions of periodontal disease.

## P0260

### Periodontitis prevalence and association with sociodemographic and behavioral factors in adults in Istanbul

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**Aim:** The purpose of this cross-sectional study was to assess periodontitis prevalence by full-mouth examination as it is accepted gold standard, and to assess the extent and severity of clinical AL and their associations with sociodemographic and behavioral parameters in a subpopulation of individuals in Istanbul.

**Material and Methods:** The data reported here were collected between September 2012- November 2013 in Istanbul, the most cosmopolitan and the largest Turkish city by population. The present survey included a total of 488 subjects, aged 35–74 years. A public health center where people attends for primary care, was selected as our survey center. Full-mouth measurements were recorded at six sites per tooth by two calibrated examiners. The evaluated parameters included probing depth (PD), clinical attachment level (CAL), bleeding on probing (BOP).

**Results:** The 72.3% of 488 individuals were females. Most individuals (77%) had an income lower than US \$750 per month and most individuals (76.6%) had low education level. Only 10.2% of individuals were diabetic and 29% were current smokers. The total prevalence of periodontitis in a subpopulation aged 35–74 years was 61.8% in our study. When the American Academy of Periodontology's case definition was applied individually, the prevalence of mild, moderate and severe periodontitis was 17.8%, 27.3% and 16.8%, respectively. Periodontitis prevalence was higher in older age groups, diabetics and married participants.

**Conclusion:** Public health strategy should support and increase access to preventive oral care especially for high risk subpopulations.

## P0261

### Gingival recession and oral health-related quality of life: a population-based cross-sectional study in Brazil

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**Aim:** To assess the association between gingival recession (GR) and oral health-related quality of life (OHRQL) in a Brazilian population of adults.

**Material and Methods:** A representative sample from Porto Alegre city was drawn in 2011 using a multistage probability sampling strategy. For this study, 740 individuals (39.7% males), 35–59 years of age and with  $\geq 6$  teeth were included. GR was assessed by two calibrated examiners at four sites in all present teeth. The Oral Health Impact Profile (OHIP-14) was used to assess OHRQL. Items answered "often" or "very often" defined one negative impact. The sum of negative impacts was calculated for each individual and this count outcome was modeled by negative binomial regression adjusting for age, gender, socio-

economic status, smoking and dental care. GR was included in the models as the number of teeth with GR. Incidence rate ratios (IRR) and 95% confidence intervals were calculated.

**Results:** 54.5% of the individuals had at least one negative impact. When all teeth and sites were considered,  $GR \leq 4$  mm did not impact OHRQL, whereas  $GR = 5$  mm was significantly associated higher OHIP scores (IRR = 1.04 95%CI 1.01–1.09). Buccal GR in upper and lower anterior teeth altogether was not related with OHRQL, but had a significantly negative impact in OHRQL in maxillary anterior teeth only. When proximal GR in upper anterior teeth was evaluated, the 3 mm threshold was already associated with poorer OHRQL (IRR = 1.14 95% CI 1.02–1.27).

**Conclusion:** OHRQL of this adult population decreases in the presence of GR, mainly in upper and anterior teeth.

## P0262

### Periodontal status and eating disorders

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**Aim:** Eating disorders (ED) are psychiatric diseases that impact patient's behaviours and health. Oral diseases are common in ED patients, particularly non-carious cervical lesions (NCCLs). NCCLs can be related to gingival recessions (GR), although little is known about the periodontal status in ED patients. The study aims 1) to review the current literature on the relationship between NCCLs, GR, and ED; and 2) to report the clinical experience of the Rothschild Hospital of Paris in the oral care management of ED patients.

**Material and Methods:** An electronic search was carried out on MEDLINE to assess the relationship between NCCLs, GR, and ED. Over a total of 128 articles, only 9 were retained because pertinent to the review questions. No RCT was found.

**Results:** Based on the available literature, NCCLs are found in more than 50% of teeth with GR; when the NCCL involves the root, this is always associated with GR. Bacterial plaque accumulation and pocket depth are negatively associated with NCCLs (OR = 0.385;  $p < 0.001$ , and OR = 0.669;  $p = 0.002$  respectively). The depth of cervical wear tends to increase as GR increased (OR = 2.583;  $p < 0.001$ ). In adult and adolescent ED patients, NCCLs are associated with erosion or abrasion of the incisal and occlusal surfaces in 96.2% of cases. Our clinical experience on 5 cases confirms these outcomes.

**Conclusion:** Although the lack of data about ED and periodontal status, it could be hypothesized a potential relationship between ED and GR, via NCCLs. Further studies are needed to confirm this hypothesis.

## P0263

### Matrix metalloproteinase 8 implication in orthodontic tooth movement

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**Aim:** Orthodontic therapy is an inflammatory process of bone remodeling around teeth. Inflammatory mediators, such as PGEs, cytokines, MMPs, are involved in both in orthodontic movement and periodontal disease. Our aim is to identify a

connection between the presence of MMP8 – a marker of inflammation, collagen degradation and bone turnover – and the risk of periodontal disease in orthodontic patients.

**Material and Methods:** The study was conducted on a group of ten patients from private practice (ages between 12 and 25 years old) who underwent fixed orthodontic therapy. After an initial periodontal examination, before therapy, they were deemed healthy, with no signs of inflammation. Samples of gingival crevicular fluid (GCF) were taken before and after 6 months of treatment. The levels of MMP 8 were identified using ELISA assay.

**Results:** The samples taken 6 months after initiation of tooth movement showed a significant increase of MMP 8 levels, compared to those taken before orthodontic treatment ( $p < 0.01$ ). Also, the periodontal parameters revealed an increased local inflammation after the orthodontic treatment.

**Conclusion:** The results of the present study indicate a correlation between the levels of MMP8 and periodontal inflammation susceptibility in orthodontic patients.

## P0264

### Changes in severity and prevalence of the periodontal disease during 20 years in a population in Northern Sweden

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**Aim:** Periodontitis is a common disease affecting the teeth supporting tissues. Clinically it can be verified by Community Periodontal Index (CPI). Epidemiological studies conducted in Scandinavia show prevalence between 10 and 20% of periodontitis.

The aim of this study is to evaluate the change in prevalence of periodontitis in a population in Northern Sweden during a period of 20 years.

**Material and Methods:** Random samples of individuals (approximately 1400) aged 35, 50, 65, 75, and 85 years were examined clinically in cross-sectional epidemiological studies performed 1991, 2001, and 2011 in the county of Norrbotten, Sweden. A questionnaire regarding general and oral health was used. The number of teeth and CPI were registered.

**Results:** Edentulousness has decreased and the proportion (%) for the samples of 50, 65, and 75 years were 11/0, 41/2 and 31/11 respectively in 1991/2001. The mean numbers of remaining teeth for dentate patients aged 35, 50 and 65 in 1991/2011 were 28/29, 17/28, 7/22. Patients aged 75 and 85 2011 had 15 and 8 teeth respectively.

The prevalence of severe periodontitis, CPI 4, has decreased in all age groups from 37% (1991) to 20% (2001) and 18% (2011). On the other hand a tendency of increased CPI 2–3 is seen.

**Conclusion:** Although the number of remaining teeth significantly increased over the years periodontal disease in the population is decreasing.

## P0265

### Prevalence, extension and severity of gingival recession in adults

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**Aim:** The aim of study was to investigate the prevalence, extension and severity of gingival recession in adult subjects.

**Material and Methods:** The participants in the study were 265 patients, 102 males and 163 females, 20 to 68 years (mean age of  $41.3 \pm 0.6$  years). All periodontal clinical examinations were assessed using the Florida Probe System, a dental chair and one examiner.

Presence of gingival recession was noted and further recorded according to the classification proposed by Miller (1985).

**Results:** Statistical analysis showed that 256 participants (96.6%) had periodontal disease. Mean number of teeth examined per subject was  $27.90 \pm 0.20$ . The mean number of teeth with gingival recession per subject was  $12.67 \pm 0.45$  (or  $45.8 \pm 1.6\%$ ). The prevalence of recession was 90.2%; only 26 subjects presented no sites with recession.

The mean number of teeth with recession on the mandible ( $7.01 \pm 0.26$ ) was higher, than on the maxilla ( $5.72 \pm 0.25$ ,  $p < 0.005$ ).

56.9% participants had generalized recession on the maxilla and 65.7% – on the mandible. Only 27.2% of people had the localized recession on the maxilla and on the mandible.

According to the Miller's classification, 49.8% participants had class I gingival recession ( $5.40 \pm 0.47$  teeth), 2.1% – class II, 90.8% – class III ( $9.43 \pm 0.41$  teeth) and 24.3% – class IV recession ( $5.28 \pm 0.65$  teeth), which are associated with periodontitis.

The prevalence of 1–3 mm recession was 99.2%, 3–6 mm recession – 44.8% and 6+ mm – 2.5%.

**Conclusion:** The high prevalence of gingival recession (90.2%) is established, that is connected with existence of periodontal diseases.

## P0266

### Idiopathic gingival enlargement: case report

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 Casablanca/Morocco

**Aim:** Idiopathic gingival enlargement is a rare condition with undetermined cause. It's a proliferative lesion of the gingival tissue that causes esthetic and functional problems.

**Material and Methods:** This poster will present the case of a 20 years female patient, with a gingival enlargement that affects the attached gingiva, as well as the gingival margin and interdental papillae of facial surface of the maxilla from premolar to premolar. The involvement of the superior and inferior lip mucosa with the same lesion aspect makes this overgrowth of the gingiva different from the typical aspect of the usual known gingival enlargements.

Routine blood investigations and drug history excluded any blood dyscrasias, sarcoidosis, tuberculosis, HIV, HVB, HVC and any drug-induced hyperplasia.

Corticotherapy reduced the inflammatory aspect of the lesion but it rebounds again after stopping the treatment.

We underwent the gingivectomy and the excision of the lesion that led to a small regression of the lesion but it is still persistent.

**Results:** Idiopathic gingival enlargement has been designated by such terms as gingivomatosis, idiopathic fibromatosis among others.

Usually the management of gingival overgrowth seems to be directed at controlling gingival inflammation through a good oral hygiene regimen. However, in some cases, surgical excision is the most preferred method of treatment, followed by rigorous oral hygiene.

**Conclusion:** All the biological investigations and treatment modalities been tried, didn't end up with neither diagnosing nor treating this idiopathic gingival enlargement in this case.

## P0267

### Knowledge and attitude towards E-cigarettes among health professionals

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Montpellier/France

**Aim:** To determine through this survey the attitude and habits in recommendations of public health actors towards e-cigarettes.

**Material and Methods:** A survey including 25 questions was diffused on a secure website during 4 weeks in February 2014 and the link send to all health professionals and students of the Dental school of Montpellier (France). Answers to multiple choice questions were analysed.

**Results:** A total of 236 practitioners, teachers and students responded. Almost all of them are aware of the negative effect of smoking on periodontal tissue and also informed about the existence of e-cigarette. 42% have already tried it and 5% of them are vaping regularly. 40% think that the vapour from the e-cigarette is mostly composed of water. Nearly 7 out of 10 consider the e-cigarette to be a useful nicotine alternative in smoking cessation and more than a third believe that it should be officially recognised and sold as such. 27% believe that e-cigarettes are less addictive but 57% see it as a new gateway in the nicotine addiction path. Other 19% think it is simply a fashion accessory. The knowledge of these health professionals is not reflecting the current knowledge of science.

**Conclusion:** Information about e-cigarettes and their impact on health should be included in the lectures and increased through official educational programs. Furthermore a regulation should be established to manage all aspects of this new product.

## P0268

### Impact of periodontitis on stroke incidence: a systematic review

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Montpellier/France

**Aim:** To systematically review the epidemiological evidence for an association between periodontitis and stroke.

**Material and Methods:** An electronic search was performed on the Medline database, using the association "periodontitis AND stroke". 142 articles were obtained, including 41 epidemiological studies that we obtained the full text articles. We

excluded studies assessing atherosclerosis, and to avoid any bias, studies evaluating the relationship between periodontal disease and stroke in a comorbid context, or not assessing periodontal disease by measurement of periodontal pockets or attachment loss.

**Results:** 8 studies were included in this review: 5 case-control studies, 2 cohort studies, and 1 cross-sectional study. All but one used a logistic regression in their calculation of periodontitis odds ratio, to adjust other vascular risk factors. The values obtained were significant for severe periodontitis and important tooth loss. Only one study did not use this type of calculation, and got an odds ratio which although significant, was very high because not adjusted and therefore not comparable to the results of other studies. These studies show that periodontitis acts independently for the installation of favorable conditions for the occurrence of stroke, especially ischemic. Its impact is more important in men and younger patients (under 60 years).

**Conclusion:** There is evidence for an increased risk of stroke in patients with periodontitis compared to patients without, but this may not apply to all groups of population. More studies in this field are needed.

## P0269

### Changes in serum microRNA expression in rat periodontitis model

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**Aim:** Many studies have reported an association between periodontal and systemic health. A change in serum microRNAs following periodontitis may affect systemic health. The purpose of this study was to identify serum microRNAs related to periodontitis in a rat model.

**Material and Methods:** Sixteen male Wistar rats (8-week-old) were divided into two groups of 8 rats each: the periodontitis group or the control group. The periodontitis group received the placement of a ligature around maxillary second molars for 4 weeks. The control group received no treatment for 4 weeks. We assessed the histopathological changes from tissue specimens of the periodontal tissue, liver and kidney. A microarray analysis was performed to determine the changes in serum microRNA expression profile.

**Results:** The periodontitis group showed alveolar bone loss greater than the control group. The expression of three serum microRNAs (rno-miR-207, rno-miR-338-5p and rno-miR-674-5p) in the periodontitis group was up-regulated and 22 microRNAs (rno-miR-323-3p, rno-let-7d-3p, rno-miR-335, rno-miR-148b-3p, rno-miR-151-5p, rno-miR-187-3p, rno-miR-200c-3p, rno-miR-543-3p, rno-miR-376b-3p, rno-miR-20b-3p, rno-miR-872-3p, rno-miR-495, rno-miR-875, rno-miR-761, rno-miR-23b-5p, rno-miR-93-3p, rno-miR-96-3p, rno-miR-137-5p, rno-miR-448-5p, rno-miR-493-5p, rno-miR-344i and rno-miR-344 g) were down-regulated greater than two fold in comparison with the control group. Furthermore, in the liver, the periodontitis group but not the control group exhibited transformation of the nucleus in hepatocytes and apoptotic cells. In the kidney, there were no obvious pathological changes in both the two groups.

**Conclusion:** Serum microRNA profile may be a potential predictor for hepatic injury following periodontitis.

## P0270

### A cross-sectional study on oral presentations of periodontitis and systemic complications of diabetes mellitus among chronic disease patients in Trinidad

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**Aim:** To investigate the systemic complications (microvascular, macrovascular, nephropathy, neuropathy, and retinopathy) and patient self-reported oral presentations (bleeding, swelling, halitosis, shaking teeth, black triangles, and drifting teeth) of periodontal disease in diabetic and non-diabetic patients.

**Material and Methods:** In this cross-sectional study (n = 379), 166 diabetic and 213 non-diabetic patients were recruited from the Diabetic and Cardiology Clinics at the EWMSC Hospital, Trinidad. Diabetic systemic complications and oral presentations of periodontitis were noted based on clinical records and interviewer administered questionnaire respectively. Diabetic control was determined from the latest fasting blood glucose (FBG) levels from patients' records (Normal 70–110 mg/dl).

**Results:** In the total sample (43.5% males, 56.5% females) there were 53.3% Indo-Trinidadians, 25.9% Afro-Trinidadians and 18.2% mixed ethnicity. Mean age was 56.4 years. A statistically significantly ( $p < 0.05$ ) higher percentage of diabetics (84.8%) had systemic complications compared to non-diabetics (43.9%). Although not statistically significant, 21.7% of the diabetic patients versus 15.5% of non-diabetics reported shaking teeth. Based on available FBG (n = 152), 68.4% of the diabetic patients were classed as controlled and 31.6% uncontrolled. A statistically significantly ( $p < 0.05$ ) higher percentage of uncontrolled diabetics (65.4%; n = 68) self-reported oral presentations of periodontitis compared to controlled diabetics (33.3%; n = 16).

**Conclusion:** Current diabetic control may be an important factor for self-reported oral presentations of periodontitis. In this study, systemic complications are more evident in diabetics compared to cardiovascular non-diabetics. Larger sample size and record of diabetic control (e.g. glycosylated haemoglobin) over a longer period may be needed. There is also need for better diabetic management and monitoring of oral complications.

## P0271

### Self-report gum bleeding in working age southern Chinese: perception, knowledge and behavior

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Hong Kong/Hong Kong

**Aim:** This study surveyed the perception, knowledge and behavior of working age individuals who self-reported prior experience of gum bleeding.

**Material and Methods:** The research commissioned Public Opinion Program, The University of Hong Kong for a structured population-based computer assisted telephone interview (CATI). The interview covered questions related to demography, perception and knowledge of gum health, dental attendance, oral health behavior and dental anxiety.

**Results:** Of 1265 25–60 year-old individuals were successfully contacted of whom 704 reported previous experience of gum

bleeding. 519 individuals (64.9% females, median 40–49 years) completed the CATI, 88.1% with secondary or higher education, 60.2% working full-time with median monthly income at USD\$1300–2500, 51.7% self-reported irregular dental attendance. 275 individuals (53.0%) could recall their first gum bleeding (22.6 ± 18.0 years). 321 (61.8%) reported gum bleeding over past 12 months. 93 (17.9%) self-reported having periodontitis and 237 (45.7%), 174 (33.5%), or 161 (31.0%), reported sensitivity, recession, gum swelling/pain, respectively. Regression analysis indicated self-reported gum bleeding over past 12 month significantly associate with non-smokers, concurrent poor oral hygiene, poor diet, sickness, and not attending dentist.

**Conclusion:** Within the limitations of this study, approximately half of the Hong Kong working age population surveyed reported gum bleeding and among the latter 60% had the problem within last 12 months and they were mainly non-smokers, not attended dentists while appreciate that they had poor oral hygiene, poor diet and was malaise over the period affected. Those suffered from gum bleeding shall be targeted for regular dental care, proper oral hygiene and perhaps better living life style.

## P0272

### Determination of glycated albumin and calprotectin in gingival crevicular fluid from patients with periodontitis and diabetes

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Tokushima/Japan

**Aim:** The purpose of this study is to investigate the levels of glycated albumin (GA), a diabetes mellitus (DM) marker, and calprotectin, an inflammatory marker, using gingival crevicular fluid (GCF) from patients with periodontitis and DM.

**Material and Methods:** Seventy-eight individuals participated in this study after obtaining informed consent. Subjects were divided into 4 groups; chronic periodontitis (CP), DM, DM-associated periodontitis (DM-P) and healthy controls (H). Using GCF and blood from subjects, GA and calprotectin were analyzed by ELISA and Western blotting. The levels among 4 groups were evaluated and the correlation of GA in GCF and GA or HbA1c in blood was determined. The cut-off value of GA for predicting of DM was calculated by ROC analysis.

**Results:** GA was identified in GCF from all groups. The amount and concentration of GA in GCF were significantly higher in DM and DM-P than in non-DM (H and CP). Calprotectin amount in GCF was significantly higher in CP and DM-P than in non-periodontitis (H and DM). GA level in GCF was positively correlated to HbA1c and GA levels in blood. From ROC analysis, the area under the ROC curves of GA amount and concentration in GCF were 0.842 and 0.798 and their cut-off value were 6.00 µg/site and 5.13 µg/µl GCF, respectively.

**Conclusion:** GA level in GCF was higher in DM patients and the determinations of GA and calprotectin in GCF may be useful for the diagnosis of diabetes-associated periodontitis.

## P0273

### Comparative study of the clinical and immunological characteristics of periodontal and peri-implant diseases and special emphasis on detection of metalloproteinase- 8 (MMP-8) in saliva, peri-implant and gingival crevicular fluid

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**Aim:** The study aimed to evaluate the clinical and immunological characteristics of periodontal and periimplant diseases, compare the reactions of periodontal and periimplant tissues and evaluate changes resulting from treatment. The levels of metalloproteinase- 8(MMP-8) in saliva, gingival crevicular fluid (GCF) and peri-implant sulcular fluid (PISF) were also compared.

**Material and Methods:** 43 patients treated with implants were divided into 3 groups: 15 periodontally healthy patients with healthy implants (Group A), 14 patients with gingivitis and periimplant mucositis (Group B) and 13 patients with periodontitis and peri-implantitis (Group C). Clinical recordings, sulcular fluid sampling and saliva collection were performed before and 3 months after treatment. Immunological characteristics were compared using metalloproteinase-8 (MMP-8) analysis.

**Results:** Group C exhibited higher levels of PPD (probing pocket depth), PPD max (maximum probing pocket depth), CAL (clinical attachment loss) and CAL max (maximum clinical attachment level) in implants and teeth. Implants and teeth differed in the PPD, CALmax and PI (plaque index) levels of group C. Therapy lowered the PPD and PI values of teeth and implants only in group C. The levels of MMP-8 in oral fluids were similar for all groups; in saliva, MMP-8 levels of group B were statistically higher. Saliva showed higher MMP-8 levels than GCF and PISF. MMP-8 levels were statistically unchanged after treatment.

**Conclusion:** The analysis of biomarkers in saliva offers certain advantages, in comparison with GCF and PISF analysis; differentiating among healthy sites, and those with early or severe stages of inflammation.

## P0274

### YKL-40 level in gingival crevicular fluid from patients with periodontitis and diabetes

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Tokushima/Japan

**Aim:** YKL-40 is a heparin- and chitin-binding glycoprotein that is associated with inflammatory reactions. The purpose of this study is to investigate the level of YKL-40 in gingival crevicular fluid (GCF) from patients with periodontitis and diabetes mellitus (DM).

**Material and Methods:** One hundred and twenty-four individuals participated in this study after obtaining informed consent. Subjects were divided into 4 groups; chronic periodontitis (CP), DM, DM-associated periodontitis (DM-P) and healthy controls (H). Probing depth (PD) and gingival index (GI) were measured, and GCF and blood were collected for YKL-40 assay. YKL-40 in GCF was analyzed by ELISA and Western blotting and the level was compared among 4 groups. Correlation of YKL-40 in GCF and PD, GI or blood HbA1c was determined.

**Results:** YKL-40 was identified in GCF from all groups. YKL-40 amount in GCF was significantly higher in CP and DM-P than in H and DM. YKL-40 concentration in GCF were significantly higher in CP and DM-P than in H. YKL-40 level in GCF was positively correlated to PD and GI regardless of blood HbA1c level.

**Conclusion:** YKL-40 level in GCF was higher in patients with periodontitis and the level was not affected by DM. YKL-40 level in GCF may be independently associated with periodontal inflammation with no definite relation to diabetic conditions.

## P0275

### Risk factors for progression of periodontal disease in Ljubljana citizens

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**Aim:** The aim of our study was to investigate the risk factors that influenced the progression of periodontal disease in Ljubljana citizens in a 20-year period.

**Material and Methods:** Our subjects were 247 Ljubljana citizens aged 35–85 that had been attending our longitudinal study on periodontal state of Ljubljana citizens for the past twenty years. We were investigating age, gender and interleukin-1(IL-1) genetic polymorphism among the non-modifiable risk factors for periodontal disease, and smoking, oral hygiene (frequency of toothbrushing, frequency of professional calculus removal in the past 10 years), body mass index (BMI), education and marital status among the modifiable risk factors.

**Results:** Bivariate analysis showed a statistically significant greater risk for progression of periodontal disease in the following variables: smoking ( $\geq 20$  cigarettes per day), less frequent toothbrushing, more frequent professional calculus removal in the past 10 years, BMI (obese and very obese subjects) and marital status (married and widowed). Multivariate analysis of risk factors showed statistically significant greater risk for progression of periodontal disease in the following variables: age, IL-1 genetic polymorphism (genotype 2 for IL-1), smoking ( $< 20$  cigarettes per day and  $\geq 20$  cigarettes per day), more frequent professional calculus removal in the past 10 years and BMI (obese and very obese subjects).

**Conclusion:** We are concluding that for prevention of progression of periodontal disease in Ljubljana citizens more attention should be given to better personal and professional oral hygiene, the elderly, patients with genotype 2 for IL-1, smokers and patients who are overweight.

## P0276

### Evaluation of metal levels in the gingiva and saliva samples from the patients with fixed orthodontic appliances

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**Aim:** The aim of this study is to determine whether or not presence of the certain trace elements and metal ion content in the gingiva and saliva samples in the patients with fixed orthodontic treatment.

**Material and Methods:** The study included 51 systemically healthy subjects. The test group consisted of 31 patients who had fixed orthodontic appliances. The control group consisted of 20 subjects without any type of fixed orthodontic appliances or metal restoration in the mouth. The metal ion determinations in gingival tissues and saliva samples were analyzed using an atomic absorption spectrophotometry.

**Results:** The nickel and chrome content in gingival tissue samples were significantly higher in orthodontics patients compared with the controls (respectively  $p = 0.003$ ;  $p = 0.023$ ). The mean salivary copper and zinc levels were statistically different between subjects with fixed orthodontic appliances and control groups ( $p = 0.002$ ;  $p = 0.004$ ).

**Conclusion:** Within in the limits of this study, it can be concluded that presence of fixed orthodontic appliances may leads to increased accumulated of nickel and chrome ions in the gingival tissues. Continued follow-up is needed to determine the long term significance of this metal ion contents.

## P0277

### Salivary transcriptome biomarkers: for the identification of periodontitis susceptibility

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**Aim:** Periodontitis is a chronic infectious disease affecting the supporting tissue around the teeth. Bacteria cause the infection and activate the natural inflammatory host response. The response to bacterial infection varies between individuals. Identifying individuals susceptible to periodontitis will enable focused patient management and timely preventive intervention. A readily available and non-invasive source of potential biomarkers is saliva. The “salivary transcriptome” defines the mRNA present in saliva. Significant changes to the salivary transcriptome of oral cancer patients have been described. The aim of this study is to discover the potential use of salivary transcriptome as a biomarker of periodontitis susceptibility.

**Material and Methods:** Using an Oragene<sup>®</sup> RNA kit, total mRNA was purified from the saliva of 10 chronic periodontitis patients and 10 with the health/gingivitis group. The quantity and quality of the total RNA was determined, and a measure of gene expression via cDNA was undertaken using the Affymetrix Microarray system. The microarray profiling result was further validated by real-time quantitative PCR.

**Results:** The result showed that there was acceptable quality and quantity of total RNA from saliva but a high proportion of it was of microbial origin and there was insufficient human salivary transcriptome for expression studies.

**Conclusion:** Detecting the human salivary transcriptome is difficult as it is mostly partially fragmented and degraded in saliva. Nevertheless, the prospect of identifying a saliva biomarker in the gene expression profile of susceptible patients is novel however; further work is required to enhance the extraction process of human mRNA from saliva.

## P0278

### “Periodontitis-atherosclerosis syndrome”, presented in a two case studies of ancient Egyptian mummies

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**Aim:** Here we will describe the “periodontitis-atherosclerosis syndrome” analysis of two cases from the Swiss Mummy Project and characterise chronic periodontitis (PD) as a probable contributing factor in the pathogenesis of atherosclerotic disease (AD) in these historic individuals.

**Material and Methods:** Two ancient Egyptian mummies from Swiss museums (Museum of Yverdon and MEN, Neuchâtel) were investigated by computed tomography (CT) to assess pathological changes of great arteries and their periodontal status.

**Results:** In both cases, several atherosclerotic calcifications of the great arteries and generalised alveolar bone loss were observed.

**Conclusion:** The dissections of ancient Egyptian Mummies since the 19th century revealed a significant incidence of AD. Recent CT studies have confirmed these findings. Besides the well-known risk factors, other characteristics for the lifestyle of the ancient Egyptian population are described. Surprisingly, chronic infection of the oral cavity is only rarely mentioned in the modern literature. However, recently, the relationship between PD and AD, their common predisposing factors and the etiologic mechanisms has been increasingly understood. Therefore, we present this likely interaction of PD and AD in unique historical individuals based on detailed radiological analysis. Historical models can help us to understand the evolutionary association between periodontitis and cardiovascular disease, especially when considering environmental and lifestyle factors.

## P0279

### The effects of menopausal status and achieved systemic risk factors on periodontal parameters

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**Aim:** The objective of this study was to consider the effects of menopausal status on clinical periodontal parameters in individuals with periodontal disease and its achieved systemic risk factors.

**Material and Methods:** 172 middle-aged, non-smoker women were enrolled in this cross-sectional study. Women were categorized to menopausal status as pre-menopause (Pre/M) ( $n = 112$ ) or post-menopause (Post/M) ( $n = 60$ ). Systemic risk factors were based on The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria and classified as no risk factor to five risk factors. Sociodemographics and clinical periodontal parameters were evaluated.

**Results:** Increased number of risk factors was associated with higher body mass index (BMI), abdominal obesity, osteoporosis and lower tooth brushing frequency and education level in Pre/M group. Clinical periodontal parameters were higher as number of risk factors increased in both Pre/M and Post/M groups. When the number of risk factors was adjusted, Post/M group

had higher BMI, abdominal obesity, osteoporosis and clinical periodontal parameters.

**Conclusion:** Increased number of risk factors was associated with higher periodontal parameters in Pre/M group. Post/M group had higher clinical periodontal parameters than Pre/M group when the number of risk factors was adjusted. Menopausal status seems to be related with poor systemic and periodontal status.

## P0280

### The Impact of a modified electronic probe tip design on patient perception of discomfort during periodontal probing

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**Aim:** To evaluate pain perception associated with use of a modified electronic probe tip during periodontal probing.

**Material and Methods:** Twenty adult patients with chronic periodontal disease received periodontal probing using a controlled-force, electronic probe at 2 separate visits. At Visit 1, a random arch was probed with either test (ball-ended, 0.6 mm diameter) or control (straight-end, 0.45 mm diameter) probe tip. The opposing arch was then probed using the other tip design. Subjects recorded discomfort associated with probing in each arch on a 100 mm visual analogue scale (VAS). At Visit 2, tip assignments were alternated. Paired t-test and correlations was conducted to compare VAS levels by probe tip, different arches and visits. Non-parametric tests were used whenever data was not normally distributed.

**Results:** Mean VAS values for each tip were low (VAS ~ 14), indicating probing was associated with relatively little discomfort. However, a few patients provided notably higher values. There were no significant differences in VAS values for each probe tip overall. However, the control tip was associated with decreased VAS scores in the maxilla ( $p < 0.01$ ). VAS values did not differ by arch or by study visit. Individual VAS scores showed high levels of correlation within patients and between study visits.

**Conclusion:** Both test and control probe tip designs were associated with low levels of pain on probing. Probe tip design did not affect overall perception of discomfort. However, in the maxilla, use of the standard probe tip may be recommended.

## P0281

### Carriage of *Aggregatibacter actinomycetemcomitans* -A putative risk factor for aggressive periodontitis among young individuals with interleukin-1 $\beta$ polymorphism

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**Aim:** Presence of *Aggregatibacter actinomycetemcomitans* and its leukotoxin is associated with aggressive periodontitis (AgP). Individuals that carry the interleukin-1 $\beta$  (IL-1 $\beta$ ) polymorphism show an increased expression of proIL-1 $\beta$ . This biologically inactive molecule is stratified in the cells and released by the

leukotoxin. We hypothesize that young individuals infected with *A. actinomycetemcomitans* and carrying IL-1 $\beta$  polymorphism are at great risk for developing AgP. The aim of this study is to investigate the leukotoxicity of *A. actinomycetemcomitans* isolates and to analyze the distribution of IL-1 $\beta$  polymorphism among young individuals with AgP.

**Material and Methods:** Fifteen individuals (age range: 15–34 years) were selected from consecutively referred patients to the Department of Periodontology in Umeå. The clinical and radiographic examination ascertained the criteria for AgP according to currently used classification system. Subgingival plaque was collected from the affected sites. The carrier status of *A. actinomycetemcomitans* was determined based on results obtained by cultivation and PCR. Saliva- and oral mucosa samples were collected and used for determination of the IL-1 $\beta$  polymorphism.

**Results:** The prevalence of *A. actinomycetemcomitans* was high (60%) among these studied individuals and one individual (7%) was infected with the JP2 genotype of the isolated bacteria. The leukotoxicity of the *A. actinomycetemcomitans* isolates showed a great diversity where some serotype b isolates of the non-JP2 genotype was as leukotoxic as the JP2 genotype. Highly leukotoxic *A. actinomycetemcomitans* induced abundant secretion of IL-1 $\beta$ . The presence of IL-1 $\beta$  polymorphism was analyzed in the studied group.

**Conclusion:** This study further confirms the link between highly leukotoxic *A. actinomycetemcomitans* and AgP.

## P0282

### Investigation into attitudes of academic staff and students to medical screening of patients in the Dental Setting

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**Aim:** To investigate the attitudes of staff and students working within an academic dental setting towards chairside medical screening in a dental setting.

**Material and Methods:** An anonymous questionnaire was used to assess the attitudes of 23 Staff and 27 student clinicians towards the importance of conducting medical screening in the dental setting. The perceived importance of screening for specific disease and disease risk factors including Hypertension, Cardiovascular Disease, Diabetes, Hepatitis, HIV and BMI were considered. Participants' willingness to conduct screening and collect samples, plus views on perceived issues with incorporating medical screening in the dental setting were also evaluated.

**Results:** The majority of participants thought it was very important to conduct medical screening within the dental setting (83%). Participants thought that it was very important to conduct screening for specific disease and disease risk factors including Hypertension, Cardiovascular Disease, Diabetes, Hepatitis and HIV, but were unsure whether it was important to screen patients BMI. Most participants indicated that they would be willing to conduct chair side screening (71.7%) and collect samples from patients, including oral fluids (86.7%), blood pressure measurements (76.7%), blood collection via finger stick (38.3%), injection (75%), height (38.3%) and weight (40%) measurements. Participants rated patient willingness (93.3%), cost (73.3%), time (88.3%) and additional administration (78.3%) as very important issues to consider when incorporating medical screening in the dental setting.

**Conclusion:** Chair side medical screening is potentially well suited to the dental setting and our analysis identified that the majority of dentists and students in an academic dental setting are willing to incorporate this into their clinical practice.

## P0283

### Link analysis between chronic periodontitis and hyperlipidemia

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**Aim:** There is abundant literature delving that chronic periodontitis and atherosclerosis has common chronic inflammatory mechanism. A major participant in the mechanism is P. gingivalis, that disrupts transport of lipoprotein. The aim of the study was to analyze a possible link between chronic periodontitis severity and hyperlipidemia. The research was conducted in Lithuanian university of health sciences Dental and Oral Pathology clinic.

**Material and Methods:** Eighty eight patients were randomly selected during the course of periodontic consultations. Average age of the patients is  $51.45 \pm 10.7$  years. Analysis methods included measuring of clinical parameters (CPITN index, plaque index (PI), bleeding on probing (BOP), pocket depth (PPD)) and appreciation of biochemical parameters (total cholesterol, low – density lipoprotein cholesterol (LDL – C), high – density lipoprotein cholesterol (HDL – C) and plasma trygliceride levels (TG)).

**Results:** CPITN score assessment revealed that even 72.8% of the patients had moderate and severe periodontitis (CPITN score 3 or 4). Elevated total cholesterol parameters were discovered in even 63.64% of the individuals. Average of total cholesterol concentrations was significantly higher in groups that achieved higher CPITN scores,  $p < 0.0001$ . LDL – C, HDL – C, although TG average levels were independent of higher CPITN scores. CPITN score values were discovered to be statistically independent of gender.

**Conclusion:** Results link the severity of periodontitis (CPITN score 3 or 4) to higher total cholesterol levels in blood and increased risk of developing atherosclerosis.

## P0284

### Oral health status and mortality in France. The IPC Cohort

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**Aim:** Several lines of evidence show that poor oral health status plays a key role in increasing cardiovascular disease, which are the most frequent mortality causes. Oral health status has been shown to be associated with the cardiovascular mortality. However, there is a lack of studies regarding non cardiovascular mortality. The present longitudinal prospective study aims to assess potential relationships between oral health status and non-cardiovascular mortality, in a premature death large adult sample of individuals in France.

**Material and Methods:** The cohort includes 67195 subjects who underwent medical and oral examinations between 2002

and 2008. A full-mouth clinical examination was performed using simplified plaque index, calculus index and simplified modified gingival index to assess dental plaque, dental calculus, and gingival inflammation. The number of teeth was recorded. Mortality data for all-causes were prospectively collected from national database with a follow-up of  $6.7 \pm 2.1$  years. The association between mortality (cardiovascular death and non-cardiovascular death) and oral parameters was explored using hazard ratio after adjustment for confounding variables.

**Results:** Non cardiovascular mortality was significantly associated with dental plaque [HR = 2.93, CI<sub>95%</sub>, 2.00–4.30], dental calculus [HR = 1.51 CI<sub>95%</sub>, 1.08–2.12], gingival inflammation [HR = 2.59, CI<sub>95%</sub>, 1.89–3.54], functional masticatory units (<5) [HR = 1.70, CI<sub>95%</sub>, 1.28–2.26], and missing teeth (>10) [HR = 1.46, CI<sub>95%</sub>, 1.09–1.96].

**Conclusion:** Non-cardiovascular mortality and oral parameters were significantly associated.

## P0285

### Gingivoperiodontal state of children with cleft lip and palate

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**Aim:** Cleft lip and palate is the most frequently occurring congenital craniofacial malfunction in humans, affecting 1/800 newborns. It is commonly accompanied by dental malocclusions and areas of gingivo-alveolar scarring that compromise and hinder bacterial plaque control.

**Material and Methods:** This clinical cases series evaluated the gingivo-periodontal state of children with cleft lip and palate, finding that all the parameters that indicate gingival disorders were increased (indices as shown).

**Results:** A preliminary literature review indicated that all individuals with cleft lip and palate, both uni and bilateral, show higher gingivitis and bacterial plaque indices than control subjects. Plaque indices show greater differences in areas close to fissures than in more posterior areas and higher indices in combined lip and palate fissures than in exclusively labial or palatine fissures. These children present a greater predisposition to periodontal destruction at teeth adjacent to the fissure and to anterior tooth loss, in comparison with control subjects, indicating that periodontal management and/or therapy are recommendable.

**Conclusion:** In general, the presence of a cleft presents unfavourable periodontal parameters. Children with these malformations show a higher predisposition to gingivo-periodontal disease due to the difficulty of maintaining adequate bacterial plaque control and to the need for corrective therapy by means of orthodontic apparatus. More frequent brushing under parental supervision and more frequent and regular dental check-ups are recommended.

**P0286****Periodontal status in Japanese institutionalized elderly, covering 7 years**

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**Aim:** The present investigation describes prevalence and distribution of periodontal diseases in a Japanese institutionalized elderly over the 7 years.

**Material and Methods:** Between 2006 and 2007, a cross-sectional study was performed in 11 nursing homes in Taito-ku, Tokyo and Yamanashi prefecture in Japan. A total of 215 dentate residents aged 56–101 years were given a clinical examination comprising recordings of Plaque Index (PII), bleeding on probing (BOP), clinical attachment level (CAL) and probing pocket depth (PPD) in 4 sites of all teeth present except third molars. Basic demographic information was also collected. Another cross-sectional study was performed in 218 dentate residents aged 60–98 years in 6 nursing homes in Taito-ku, Tokyo in 2013–2014.

**Results:** The mean number of teeth increased from  $11.0 \pm 8.0$  to  $11.6 \pm 8.2$ . In 2006 and 2007, number of surfaces which harbouring plaque was  $70.9 \pm 25.0\%$ . It was decreased to  $60.7 \pm 26.1\%$  in 2013 and 2014. Percentage of subjects who had probing depth  $\geq 6$  mm was also decreased from 38.5% to 23.0%. However mean probing depth a, clinical attachment levels frequency of bleeding of probing remained unchanged.

**Conclusion:** Oral hygiene and prevalence of deep periodontal pocket improved significantly in Japanese institutionalized dentate elderly over the 7 years. However, with respect to mean probing depth and clinical attachment level, such improvement was not found.

**P0287****Oral lichen planus and its associations with systemic health and stress**

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**Aim:** To examine if different OLP clinical forms relate to systemic health and stress.

**Material and Methods:** Clinical manifestations of OLP were assessed clinically and histologically. Self-reported data included information about these risk determinants: systemic health, experience of negative life events and family history of systemic diseases. The risk determinants were assessed employing logistic regression analysis and the threshold for statistical significance was set at  $p < 0.05$ .

**Results:** OLP group included 133 patients with a histologically confirmed diagnosis. Clinical assessments of OLP were evaluated by one examiner. There were more females ( $N = 109$ ) than males ( $N = 24$ ) and the majority of patients were older than 50 years. The reticular form (45.1%) was the most prevalent clinical OLP form followed by the erosive-ulcerative form (33.8%). There were multiple sites of OLP lesions and extra-oral involvement (skin and genitals) was observed in 22.0% of cases. Reticular and ulcerative clinical manifestations were most prevalent OLP forms and buccal mucosa and gums were the most commonly affected sites. Due to lack of variation in sys-

temic health risk factors, we were unable to determine the effects of smoking or alcohol abuse.

**Conclusion:** Except for the medication use, there were no statistically significant associations between different clinical OLP forms and different systemic health and stress related risk determinants. Majority of OLP patients had a family history of systemic diseases, while a family history of LP was rare.

**P0288****Comparison of hemodialysis, peritoneal dialysis and transplant patients' prevalence of dental visit and effects on oral and dental health**

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**Aim:** Chronic renal failure, a progressive loss of renal function is a clinical condition that cause kidney failure in regulation and excretion function. Renal replacement therapy contains hemodialysis (HD), peritoneal dialysis (PD) and renal transplantation (RTX). Provide of oral and dental health is very important in these patients and can be supplied with regular visits to dentists. In this study we aimed to evaluate the oral and dental health statuses of HD, PD, RTx patients with into account the effect of dental visit frequencies.

**Material and Methods:** 30 transplantation, 30 hemodialysis and 48 peritoneal dialysis patients were included in our study. Decayed, missing, filled teeth index (DMFT) scores, Silnes-Löe plaque index (PI) and debris index (DI) were calculated. Statistical analysis was performed. To compare the frequency of dental visits of HD, PD, RTx patients used chi-square test. Compare of DMFT, PI and DI values with the frequency of dental visits was evaluated by Anova test.

**Results:** Significant differences were found between the patients in RTx and PD or HD groups in terms of dentist visit frequencies ( $p = 0.026$  and  $p = 0.00$  respectively), while no significant differences were found between the patients in HD and PD groups ( $p > 0.05$ ). A significant increase was found in PI when frequency of dental visits decreased in RTx, PD and HD groups. No statistically significant difference was found in DMFT, DI.

**Conclusion:** The results of this study showed that RTx patients had a better accuracy to visits of dentist. Additionally visit of dental clinics had a positive effect on decreasing of PI values.

**P0289****The Brazilian criteria of economic classification "critério brasil" in the periodontal risk assessment**

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**Aim:** Periodontal disease is a multifactorial process, and its main etiology is dental biofilm. The Brazilian Criteria of Economic Classification (CCEB) has been widely used as an economic stratification tool for a population. Based on scientific evidence, a diagram with six parameters was developed to determine the risk of occurrence and progression of periodontitis, the periodontal risk polygon (PRP). The objective was to assess the

distribution of three CCEB levels (low, medium, and high) in the three periodontal risk levels (low, moderate, and high) of the PRP in patients admitted to the Periodontal Clinic I of the Faculty of Dentistry during the 2011–2012 academic year

**Material and Methods:** The information for 37 individuals was analyzed, 28 (75.6%) of whom were female. The average age was 56 (17–80) years.

**Results:** Of the individuals with low CCEB ( $n = 25$ ), 72% demonstrated high periodontal risk, 20% demonstrated moderate, and 8% low periodontal risk. Of those with medium CCEB ( $n = 7$ ), 57.14% exhibited high and 42.8% moderate, periodontal risk, respectively. Of the individuals with high CCEB ( $n = 5$ ), none demonstrated high periodontal risk, 80% demonstrated moderate, and 20% low periodontal risk.

**Conclusion:** It was concluded that a low level of CCEB may be associated with high periodontal risk in the study population, with broader studies being needed to confirm these findings.

## P0290

### Oral health behaviour and self-perceived oral health in adult population in Istria area, Croatia

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**Aim:** Achievement and maintenance of oral health relies upon the education and motivation of dental patients. The purpose of this study was to assess the oral health behaviour, self-assessed oral health and motivation among the adult population in Istria area, Croatia.

**Material and Methods:** A total of 200 randomly chosen subjects scheduled for a dental appointment at private practice took part in this study. Subjects completed the self-administered questionnaire comprising of 5 following categories: self-rated oral health, tooth brushing habits, food habits, use of oral hygiene aids and dental status. Data were analysed using descriptive statistics in addition to chi square tests to evaluate the association between gender and dental status and t-test for independent samples.

**Results:** Results indicate good oral hygiene habits – a total of 87.5% of examinees brush their teeth twice daily or more often. Use of oral hygiene aids is not as frequent – 45% of subjects use mouthwash products, while 58% of them use dental floss irregularly. Less than half of all examinees (42%) evaluated their oral health as satisfying, yet 92% of them agree their oral health could be improved. This study also showed discouraging results in terms of inadequate education on the importance of supragingival scaling as a professional procedure in preservation of oral health.

**Conclusion:** Oral health education and consequently patients' oral health habits should be improved. Despite patient motivation, excellent oral health standards cannot be accomplished without the support of a national dental program and consistent patient education.

## P0291

### Attachment loss in hypophosphatemic rickets: the result of a constitutional root cementum defect?

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**Aim:** Hypophosphatemic rickets (HR) is a rare genetic disorder that prevents the proper mineralization of bones and teeth. It is unknown whether HR affects mineralized periodontal tissues. The purpose of this study was to evaluate the periodontal status of patients with HR and to investigate possible constitutional defects of the periodontium.

**Material and Methods:** We examined 28 adult patients diagnosed with HR, followed in the National Reference Center for this disease (mean age 37.7 [min-21; max-63]) and compared clinical and radiological indices to those available for the general population.

**Results:** Using CDC-AAP case definitions of periodontitis, 4.5, 45.5 and 31.8% of HR patients had mild, moderate and severe periodontitis, as compared to 8.7, 30.0 and 8.5% patients in NHANES 2009–2010. Generalized mild, moderate or severe alveolar bone loss was observed in 46.2, 23.1 and 7.7% of HR patients. 73.1% of these patients presented with at least one infrabony defect. Some HR patients had benefited from an early pharmacological management of their rickets during growth with vitamin D analogs and phosphate supplements, and no (60%) or mild (40%) periodontitis were observed in these HR patients, whereas all non treated HR patients presented with mild (7.1%), moderate (50.0%) or severe (42.9%) periodontitis. Finally, using histological sections of extracted teeth, we observed a reduced thickness of acellular cementum in HR patients.

**Conclusion:** HR could therefore be a risk factor for periodontal disease and the increased risk may be related to a constitutional defect of the root cementum, as observed in some cases of aggressive periodontitis.

## P0292

### A possible dependency model of single nucleotide polymorphisms in the development of periodontitis in the Hungarian population

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**Aim:** Genetic variabilities e.g. single nucleotide polymorphisms (SNP) are hot spot area on investigating the background of multifactorial diseases. Confused data exist about the role of SNPs in the development of periodontitis in several countries, however a complex analysis is missing up to now. We aimed to see not only the prevalence of 17 SNPs of 12 genes in the Hungarian population, but also to generate a potential dependency model with a novel complex statistical approach.

**Material and Methods:** We collected oral mucosal scrapings from 432 volunteers categorized into gingivitis (Gin,  $N = 97$ ), aggressive (AP,  $N = 65$ ) and chronic (CP,  $N = 166$ ) periodontitis, and control (Con,  $N = 104$ ) groups. Genotyping was made

by RT-PCR. Over the conventional frequentist statistical approach, Bayesian network based multilevel analysis of relevance (BN-BMLA) was also applied.

**Results:** Except for TNFa-1031 all the investigated SNPs were in Hardy-Weinberg Equilibrium. From several per se significant SNPs only the IL1b+3954, ANRIL (AP-Con) and IL-6-1363 (Gin-Con) remained relevant after corrections for multiple hypothesis testing and were also confirmed by logistic regression. With the BN-BMLA method we created a possible dependency model in which ANRIL, IL1b+3954, IL-6-1363, CD14-260 take part as covariates.

**Conclusion:** We investigated the possibility to create a complex model containing the dependency relationships between AP, CP and gingivitis and their relevant factors. As results we detected some unique interactions, which were not detected with conventional statistical methods previously. These findings supplemented with additional studies may provide firm basis for the development of new diagnostic strategies and provide novel tools for early detection and primary control of periodontitis.

## P0293

### Relationships between genetic polymorphisms of inflammatory cytokines, CRP levels and periodontitis

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**Aim:** Periodontitis has been established as one of the risk factors for a moderately increased C-reactive protein level (CRP). Cytokine's polymorphisms have been reported to have positive associations with periodontitis. Increased cytokine production caused by genetic polymorphisms may enhance the relevance of periodontitis to elevated serum CRP levels. Therefore, we investigated the relationships between genetic polymorphisms of inflammatory cytokines, CRP levels and periodontitis.

**Material and Methods:** A total of 291 postmenopausal Japanese women who lived in Yokogoshi area, Niigata City, participated in this study. Periodontal parameters, including probing pocket depth (PPD) and clinical attachment level (CAL) were measured at mesial points per tooth. Severe periodontitis was defined having  $\geq 2$  sites with CAL  $\geq 6$  mm and  $\geq 1$  site with PPD  $\geq 5$  mm. Genomic DNA was extracted from peripheral blood. IL-1 $\beta$  -31A/G, IL-6 -572G/C and TNF- $\alpha$  -863C/T genotypes were determined. Serum high sensitivity CRP (hsCRP) was determined by a latex nephelometry assay.

**Results:** There was no significant difference of periodontal parameters between each of those three genotypes. Body mass index (BMI) in women with IL-1b AA and AG genotype were significantly lower than those in women with GG genotypes ( $p = 0.030$ ). Serum hsCRP was significantly correlated with NTx, BMI and cholesterol. As a result of the logistic regression analysis, serum hsCRP  $\geq 1$  mg/l was significantly associated with severe periodontitis adjusted for age, BMI, genotypes of IL-1 $\beta$ , IL-6 and TNF- $\alpha$ .

**Conclusion:** Genetic polymorphisms in IL-1 $\beta$ , IL-6 and TNF- $\alpha$  were not independent risk factors for periodontitis in postmenopausal Japanese women. However, these polymorphisms might modulate the association between severe periodontitis and serum hsCRP  $\geq 1$  mg/l.

## P0294

### The prevalence of periodontitis in patients with ischemic cardiopathies seen at the University Hospital Professor Edgard Santos (HUPES)

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**Aim:** To evaluate the prevalence of periodontitis in patients with ischemic heart disease (IHD) at the University Hospital of the Federal University of Bahia (HUPES).

**Material and Methods:** A trained periodontist ( $\kappa > 0.9$ ) measured the probing depth (PD) at 6 sites of every tooth in 131 individuals (75 men, 56 women) aged 35–99 years. Periodontitis was diagnosed when a clinical attachment level (CAL)  $\geq 4$  mm associated with a PD  $\geq 4$  mm was observed in at least 4 sites of different teeth. The following patient demographics and clinical parameters were evaluated: gender, age, ethnicity, marital status, smoking habit, teeth brushing frequency, sedentary life-style, dyslipidemia, hypertension, congestive heart failure (CHF), diabetes mellitus (DM), plaque index (PI), and gingival index (GI).

**Results:** The total edentulism rate in the study population ( $N = 135$ ) was 2.9% ( $N = 4$ ). Of 131 eligible patients, 73 (55.7%) had periodontitis. There was a significant positive correlation between periodontitis and CHF, PI and GI ( $p < 0.001$ ) and DM ( $p = 0.02$ ).

**Conclusion:** The periodontitis prevalence in patients with IHD was 55.7%. In this exploratory study, there was a positive correlation between periodontitis and CHF, DM, PI, and GI. Future studies are necessary to confirm that periodontitis is an underlying cause of CHF and DM.

## P0295

### Accuracy of metallic and plastic tips of the Vivacare® true pressure-sensitive periodontal probe system

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**Aim:** The aim was to verify the accuracy of metallic and plastic tips of the Vivacare® true pressure-sensitive periodontal probe in terms of standardized *in vitro* applied forces.

**Material and Methods:** The sample consisted of 97 flexible plastic tips (TPS-Vivacare®) and 49 rigid metallic tips (TPS-Vivacare®), each connected to a TPS-Vivacare® handle. One single investigator used a centesimal digital scale (Micronal) adapted to a California Bearing Ratio (CBR) test equipment. The mean value of three readings of each tip was used as the basis for statistical variance analysis, with confidence of 95%.

**Results:** A mean value of 23.47 g (SD = 1.77) was observed in the flexible plastic tip probes whereas 23.63 g (SD = 2.77) was the mean value for the metallic tip probes. These readings are in agreement with the World Health Organization guidelines for reliable periodontal probing forces (20–25 g).

**Conclusion:** Our findings allow to the conclusion that both tested Vivacare® true pressure-sensitive periodontal probe tips are accurate for use.

## P0296

### Behavioural aspects and their influence on periodontal disease – an epidemiological study in a group of Romanian students

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**Aim:** To identify possible risk indicators and the prevalence of periodontitis in a young population representative for the North-Western part of Romania.

**Material and Methods:** The study is a cross-sectional epidemiological survey. The sample size of the population was calculated. The subjects were students randomly sampled. A total of 623 subjects aged 16–35 years were included and evaluated. Information on behavioural aspect were collected using a structured questionnaire. Periodontal data was collected using a full-mouth methodology. The periodontitis cases were chosen according to a recent case definition.

**Results:** The older the subject, the more frequent the tooth brushing and dental visits were. The prevalence of periodontitis was 0.96%. Alcohol consumption played a role in periodontitis development. Low frequency of tooth-brush changing was identified to influence the development of periodontitis.

**Conclusion:** Further extensive screenings are required in order to better know the prevalence of periodontal diseases and identify periodontitis cases as well as to evaluate the impact of specific behavioural factors on the disease development in individuals and population levels. Periodontal prevention programs focussing on oral health behaviour are mandatory. Acknowledgments. This study was partially supported by the Iuliu Hatieganu University of Medicine and Pharmacy (Grant 1491/13/28.01.2014).

## P0297

### Ligneous periodontitis: a case report

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**Aim:** Ligneous periodontitis is a rare autosomal recessive hereditary disorder. It is strictly associated with ligneous conjunctivitis. We report a case with both ligneous conjunctivitis and ligneous periodontitis in association with plasminogen type I deficiency. Diagnosis was based on the clinical and histological findings and most importantly, decreased serum level of plasminogen type I.

**Material and Methods:** A 24 years-old female patient was referred to the Selcuk University, Department of Periodontology with the complaint of gingival bleeding and swelling. In intra-oral examination, we observed painless, massive, fragile gingival enlargements, covered with white-yellowish membranes, increased probing depth and clinical attachment loss involving both maxilla and mandible. Bone loss was seen on panoramic radiography. She had a medical history of ligneous conjunctivitis. After the medical evaluation, scaling, root planing and gingival curettage was applied and chlorhexidine mouthrinse was recommended 2 times a day for 1 week. A week later, the patient came for control.

**Results:** A week later, the healing was not as expected and the patient didn't continue to treatment.

**Conclusion:** For ligneous periodontitis, a week later healing evaluation is not adequate because delayed healing procedure can be observed. So we may have not seen expected improvement. And also different treatment options can be applied to improve treatment results.

## P0298

### Longitudinal effects of fibrinogen levels and white blood cell counts on periodontitis

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**Aim:** Systemic low-grade inflammation represents a central aspect of health and was recently proposed as the underlying mechanism linking factors like obesity or diabetes with periodontitis. However, the impact of inflammatory markers on periodontitis has not yet been investigated.

**Material and Methods:** The study population comprised 1784 subjects from the Study of Health in Pomerania with complete 11-year follow-up. As inflammatory markers, serum fibrinogen levels and white blood cell (WBC) counts were measured. Periodontitis was assessed by probing depth (PD) and clinical attachment loss (CAL).

**Results:** Multilevel regression analyses revealed significant ( $p < 0.001$ ) coefficients for the impact of fibrinogen and WBC counts on the percentage of sites with PD/CAL  $\geq 3$  mm. Increases of 1 g/l in fibrinogen were associated with 3.0% more sites with PD  $\geq 3$  mm and 2.7% more sites with CAL  $\geq 3$  mm. Corresponding values for an increase of 1 Gpt/l in WBC counts were 1.1% and 1.3%, respectively. Consistent results were found using mean values of PD and CAL.

**Conclusion:** Both, fibrinogen levels and WBC counts, showed consistent long-term associations with PD and CAL. Results indicate that systemic low-grade inflammation might indeed represent one possible pathway for effects of obesity, diabetes mellitus or other chronic inflammatory conditions on periodontitis.

## P0299

### Relationships among serum and GCF levels of IL-6, TNF- $\alpha$ , IL-1 $\beta$ , blood cell parameters and severity of chronic periodontitis

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**Aim:** The aim of this study was to investigate if the serum and GCF levels of IL-6, TNF- $\alpha$ , IL-1 $\beta$  and their associations regarding serum blood parameters may be linked with severity of chronic periodontitis (CP).

**Material and Methods:** A total of 200 systemically healthy patients aged above 40 years were included in the study. Of these, 150 CP patients were divided into three groups of differing periodontal disease severity based on clinical attachment level (including mild, moderate, and severe periodontitis;  $n = 50$  each). Remained 50 patients were healthy controls. Periodontal examination consisted of both GCF assessment and clinical parameters included clinical attachment level (CAL), probing depth, plaque index, gingival index, bleeding on probing. Blood

cell parameters were evaluated from peripheral blood samples. GCF and serum levels of IL-6, TNF- $\alpha$ , IL-1 $\beta$  were analyzed by ELISA.

**Results:** Severe periodontitis group showed lower erythrocyte and lymphocyte counts ( $4.86 \pm 0.65 \times 10^6/\mu\text{l}$ ;  $2.05 \pm 0.5 \times 10^3/\mu\text{l}$   $p < 0.05$ , respectively), increased total leukocyte and neutrophil counts ( $8.77 \pm 3.1$ ;  $4.43 \pm 1.01 \times 10^3/\mu\text{L}$ ;  $p < 0.05$ , respectively) compared to the healthy control and mild-moderate periodontitis group. The mean GCF and serum levels of IL-6, TNF- $\alpha$ , IL-1 $\beta$  were significantly elevated in patients with severe CP ( $17.25 \pm 12$ ;  $586.29 \pm 345$ ;  $30.49 \pm 1760$ ,  $19.6 \pm 15$ ;  $1421.51 \pm 1583$ ;  $15.3 \pm 7.5$   $p < 0.05$ , pg/ml, respectively) compared to subjects with mild, moderate periodontitis and healthy group. In the severe CP group, total leukocyte and neutrophil counts and GCF&serum IL-6 levels were positively correlated with clinical parameters, including mean values for CAL.

**Conclusion:** It could be concluded that GCF and serum levels of IL-6, TNF- $\alpha$ , IL-1 $\beta$ , and total leukocyte, neutrophil, and lymphocyte counts were significantly associated with loss of CAL.

### P0300

#### Safety of two manual toothbrushes with different degree of hardness and bristle design

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**Aim:** The aim of this study was to compare the safety of a new slim soft toothbrush with conically tapering bristle ends (TEST) compared to a standardized flat-trimmed soft toothbrush of the American Dental Association (CONTROL).

**Material and Methods:** In this clinical controlled, double-blinded, parallel designed study 89 healthy participants were included. According to randomization participants had to brush their teeth with the assigned toothbrush twice daily for 12 weeks. No instruction on brushing technique was given. After disclosing gums pre- and post-brushing gingival abrasion lesions were assessed at baseline and after 12 weeks.

**Results:** The increase from pre- to post-brushing lesions was significant for both groups at baseline (TEST:  $\Delta 4.5 \pm 4.9$ ; CONTROL:  $\Delta 5.7 \pm 5.9$ ;  $p < 0.001$  for both groups) with no statistically significance between groups. At 12 weeks, there was a statistically significant difference between groups ( $p = 0.008$ ) in favor of the TEST group. Pre- to post-brushing differences remained high for the CONTROL group ( $\Delta 2.5 \pm 2.8$ ,  $p < 0.001$ ) whereas there was no statistically significant difference for the TEST group ( $\Delta 0.7 \pm 3.2$ ,  $p = 0.091$ ). At 12 weeks the number of post-brushing lesions was also significantly lower in the TEST ( $4.4 \pm 4.3$ ) compared to the CONTROL group ( $7.5 \pm 5.2$ ;  $p = 0.004$ ).

**Conclusion:** Brushing with the Colgate slim soft toothbrush leads to a significant smaller amount of gingival damage over a 12 weeks period. The potential of gingival trauma in patients could be decreased by brushing with soft conically tapering bristle ends in comparison to a normal flat-trimmed reference toothbrush.

### P0301

#### Knowledge about hypoglycemia and relationship between diabetes and periodontal infection in students

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**Aim:** Aim of the study was to assess the knowledge about hypoglycemia and relationship between glycaemic control and periodontal disease in 4th and 5th grade students and to compare the results of the groups of students of 2009/11/13.

**Material and Methods:** Data were collected using a questionnaire. Students were asked to respond to structured/open-ended questions about hypoglycemia regarding definition/symptoms/risk factors/diagnosis/management and relationship between diabetes and periodontal disease.

**Results:** The study group comprised 83 students in 2009, 80 students/2011 and 79 students/2013. All students knew the hypoglycemia definition. Fasting glucose levels for healthy patients were well known by 8 students (9%) in 2009, by 24 students (30%) in 2011 and by 27 students (34%) in 2013. 18 Students (22%) in 2009, 24 students (30%) in 2011 and 26 students (32%) in 2013 gave the correct blood glucose levels for hypoglycemic patients. A vast majority of students, 79(95%)/2009, 71(89%) /2011 and 70(88%) in 2013 gave at least two correct symptoms which hypoglycemic patients can experience. Also a majority of students knew the recommended treatment for mild and moderate episodes of hypoglycemia: 69(83%) in 2009, 73(91%) in 2011 and 69(87%) in 2013. Only few students knew the correct parenteral treatment of severe hypoglycemia: 22(27%) /2009, 27(33%) /2011 and 27(34%)/2013. 41 Students (49%) in 2009, 44 students (55%) in 2011 and 42(53%) in 2013 gave some method of treatment for an unconscious patient. All students knew the connection between diabetes/periodontitis.

**Conclusion:** Although the students in 2011 and 2013 had somewhat better outcomes when compared to the students in 2009, the average level of knowledge of hypoglycemia was still poor. The outcome of this study should be taken into consideration for the future undergraduate education programme.

### P0302

#### The quantification of proinflammatory cytokines levels in serum and gcf in patients with osteoporosis and periodontal disease

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**Aim:** Chronic periodontitis is related to osteoporosis; TNF $\alpha$  has a potent resorbing activity on bone level, which affects the periodontal status. Therefore, the Aim of the study consisted in an evaluation of TNF $\alpha$  serum and gingival crevicular fluid levels in patients with osteoporosis and periodontal disease.

**Material and Methods:** We assessed 64 patients, divided in two groups: osteoporotic patients and systemically healthy subjects. The patients were clinically examined and TNF $\alpha$  levels were measured in GCF and serum samples by ELISA methods.

**Results:** The clinical parameters presented higher values in the study group; also, TNF $\alpha$  levels were significantly elevated for the osteoporosis patients.

**Conclusion:** The osteoporosis patients are prone to overproduce TNF $\alpha$ , which also activates the B cells and promotes the B cells activity in the periodontal inflammatory sites, aggravating the evolution of the periodontal disease. It may be suggested that elevated GCF and serum TNF $\alpha$  contributes to high number of B cells and T cells present in the inflammatory periodontal tissues, enhancing the periodontal tissue breakdown.

## P0303

### Cone beam computed tomography in assessment of periodontal bone defects

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**Aim:** To compare clinical measurements and cone beam computed tomography (CBCT) findings of bone level in periodontitis.

**Material and Methods:** In fourteen patients with severe periodontitis, 55 intrabony defects in molar and premolar regions were analyzed. Preoperative imaging were performed using the CBCT (SCANORA<sup>®</sup>3D, SOREDEX, Tuusula, Finland). CBCT findings of bone level were compared with clinical measurements obtained during surgical procedure. To provide identical reference point for clinical and CBCT measurements, individually prepared grooves on recording device (Bite Plate, Instrumentarium Oy, Tuusula, Finland) were prepared for each tooth involved with the study periodontal defect site. Data were analyzed using Wilcoxon signed rank test ( $\alpha = 0.05$ ).

**Results:** There were statistically significant differences between clinical and CBCT bone level measurements ( $p < 0.05$ ). The confidence interval of the differences between the two methods was between 0.35 mm and 0.56 mm and the median was 0.47 mm. Differences between clinical and CBCT bone levels were significant in the premolar region (median = 0.49 mm; confidence interval: 0.32–0.67 mm;  $p < 0.05$ ) as well as in the molar region (median = 0.41 mm; confidence interval: 0.22–0.57 mm;  $p < 0.05$ ). Differences between clinical and CBCT bone levels greater than the median value were most frequent around the following teeth: 25, 35 and 46, with three cases each. Differences between the two methods were more prominent in distal than mesial sites ( $p < 0.05$ ).

**Conclusion:** Difference between clinical and CBCT findings may not be considered clinically relevant as it was below the threshold of 1 mm. CBCT is a reliable diagnostic tool for periodontal bone defects assessment.

## P0304

### Pathogen burden in salivary diagnostics of periodontitis

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**Aim:** The aim of our study was to investigate the value of salivary concentrations of four major periodontal pathogens and their combination in diagnostics of periodontitis.

**Material and Methods:** The Parogene study included 508 subjects (mean age  $62.9 \pm 9.2$  years) with coronary artery disease diagnosis. The subjects underwent an extensive clinical and radiographic oral examination. Salivary levels of *Porphyromonas gingivalis*, *Prevotella intermedia*, *Tannerella forsythia*, and *Aggregatibacter actinomycetemcomitans* were measured by quantitative real-time PCR.

**Results:** The median salivary concentrations of *P. gingivalis*, *P. intermedia*, and *T. forsythia* were highest in subjects having  $\geq 7$  sites with pocket probing depth (PPD) of 4–5 mm or  $\geq 6$  mm, and in subjects with severe alveolar bone loss (ABL). The concentrations of *P. gingivalis*, *P. intermedia*, and *T. forsythia* were lower in subjects with more than 26 teeth compared to subjects with fewer teeth. *P. gingivalis*, *T. forsythia*, and the total amount of bacteria were associated with a high number of pockets with PPD 4–5 mm and  $\geq 6$  mm, and ABL, when adjusted for smoking, age, gender, and number of teeth. Only *T. forsythia* was associated with bleeding on probing. *A. actinomycetemcomitans* was not associated with any of the periodontal parameters. The combination of pathogen levels was associated with moderate – severe periodontitis more strongly than any of the pathogens alone (OR 2.40, 95% CI 1.39 – 4.13).

**Conclusion:** Salivary diagnostics of periodontitis has potential especially in population-based studies and health promotion. The combination of bacterial levels reflects the overall periodontal condition better than individual pathogens.

## P0305

### A NVM-public campaign to promote oral health among a Dutch population

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**Aim:** Almost three quarter of NVM-dental hygienists (72%) believes the NVM-public campaigns (e.g., oral health promotion at consumer exhibitions) are of great importance (Folgerts et al., 2014). This study aimed to get more insight in the oral health of a Dutch population in the past 5 years.

**Material and Methods:** In 2010 till 2014 visitors (N = 1145) of a public health consumers exhibition in Utrecht completed a written questionnaire. Besides a few demographics, questions about visiting oral health professionals were included. Moreover, among 835 visitors their periodontal status was screened using the Dutch Periodontal Screening Index (DPSI).

**Results:** The average age of the population was 43 years (SD = 17.54: range 6–86 years), including 21.4% male and 76.7% female. The reported DPSI outcomes showed that a third (33.3%) of the screened visitors has healthy gum or gingivitis (DPSI-score 0, 1 and 2). Two third (66.7%) showed an advanced stage of periodontal diseases (DPSI score 3, 3+ and 4). In 2014, 274 visitors reported in de last 5 years: never attended a dental hygienist (28.1%); visited 1–2 times a dental hygienist (33.9%); visited 3–5 times a dental hygienist (17.5%) and, 20.4% visited a dental hygienist more than 5 times.

**Conclusion:** The findings provide more insight in the oral health of a Dutch population regarding their periodontal status. Moreover, the findings suggest the importance of a periodontal screening provided by dental hygienists at NVM-public campaigns. There is a need of further research to refine oral health promotion among the public. Folgerts, O., van Splunter-Schneider, M. & Buunk-Werkhoven, Y.A.B. Public Health and Association's Membership: desires/

duties of Oral Health professionals. International Dental Journal. Special Issue: Abstracts of the 102nd FDI Annual World Dental Congress – September 2014. February 2015, Volume 65, Issue Supplement S1 Pages 1–232. [P286, p 205]

### P0306

#### Results of comparative study of periodontal pocket microbial flora with different microbiological techniques in patients with chronic and aggressive generalized periodontitis

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**Aim:** Comparative evaluation of level of informativeness of microbiological techniques – PCR and mass spectrometry – should be performed to develop guidelines for periodontists

**Material and Methods:** We examined 45 patients, 25–68 y.o. (mean age  $46.5 \pm 21.5$ ) with chronic (30) and aggressive (15) generalized periodontitis without severe somatic illness. The samples were taken with sterile paper points, that were introduced in periodontal pockets for 10 s, and then put in tubes with Brain Heart Infusion Broth, and after that the tubes were put in anaerobic jar. The samples were studied with PCR-based method (6 periodontal pathogens primer set) and mass-spectrometry.

**Results:** PCR-based diagnosis detected A.a. in 64% of examined patients, at that A.a. is the most often recognized in mild and moderate chronic generalized periodontitis cases, and A.a. is present in 100% cases of aggressive periodontitis. Other pathogens were also found (P.g. in 50% of examined patients, P.i. in 36%, P.e. in 14%, F.n. in 7%). P.g. and F.n. are most frequently encountered in samples of severe chronic generalized periodontitis. Treponema denticola was not found in any sample. In comparison with PCR-based diagnosis mass-spectrometry doesn't reveal obligatory periodontal pathogens in most cases. But it showed the presence of pathogens, non-specific for the oral cavity (Staph. aureus spp., Strept. pyogenes spp., St. epidermidis, Wolinella recta, Esherichia coli, Enter. faecalis, Klebsiella spp), that are usually found during inflammatory processes of skin, digestive, urogenital and respiratory systems.

**Conclusion:** PCR can be done for express diagnosis but mass-spectrometry should be performed for more profound examination of microflora (in case of complications).

### P0307

#### Analysis of the root surface property using the Raman spectroscopy

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**Aim:** Raman spectroscopy provides information about molecular vibrations that can be used for sample identification and quantitation. The aim of this study was to investigate what kind of change is observed in Raman spectrum when the root surface becomes clean.

**Material and Methods:** Thirty five extracted human teeth, partially covered with calculus on the root surface, were evalu-

ated using a portable spectrophotometer (Enwave Optronics, Inc. ProRaman-L). Four situations were estimated, (i) there were a lot of calculus on root surface, (ii) there were still the unevenness of the root surface after calculus removal, (iii) after debridement and exposed to healthy cementum (iv) kept doing debridement, it means overtreatment. A 785 nm, 100 mW laser was used for Raman excitation. Integration time was 10 s, and 10 times measured spectra were averaged. The corrected spectrum was normalized by hydroxyapatite Raman band intensity at  $960 \text{ cm}^{-1}$ .

**Results:** (i) When dental calculus is abundant, strong fluorescence was solely observed. (ii) With debridement of calculus, the fluorescence level was gradually decreased and a hydroxyapatite Raman band at  $960 \text{ cm}^{-1}$  was observed. (iii, iv) A similar trend was shown by the root planning. In addition, due to the lower level of fluorescence, other hydroxyapatite Raman bands at 440,  $580 \text{ cm}^{-1}$  and organic compound Raman band at  $\sim 2940 \text{ cm}^{-1}$  were also observed.

**Conclusion:** For dentist and dental hygienist, this method that can evaluate the condition of root surface quantitatively is useful. In the future, we expect that the root surface evaluation method using Raman spectroscopy will be used clinically.

### P0308

#### Mandibular alveolar bone dehiscences and fenestrations: a CT evaluation of 600 teeth in an Italian caucasian population

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**Aim:** The use of a cone beam computed tomography (CBCT) to measure horizontal width of facial alveolar bone overlying healthy mandibular incisors and canines to determine prevalence of alveolar bone dehiscences and fenestrations.

**Material and Methods:** 100 systemically healthy patients, aged between 18 and 30 years were selected. The thickness of the facial bone in sagittal scansions were measured perpendicular to the long axis of the tooth at two locations: 2 mm apical to the cemento-enamel junction and at the middle of the root. iCAT software primary and secondary reconstructions of the data were performed.

**Results:** Dehiscences have shown a mean value of  $6.78 \pm 1.90 \text{ mm}$  whereas fenestrations of  $4.89 \pm 1.74 \text{ mm}$ . The average bone width at 2 mm was assessed at  $0.81 \pm 0.23 \text{ mm}$ , while at the middle of the root was  $0.77 \pm 0.28 \text{ mm}$ . The overall prevalence of dehiscences was 89.16%, whereas for fenestration was 5.16%. Dehiscences were more frequent in older ( $6.87 \pm 1.99 \text{ mm}$ ) and female patients ( $6.80 \pm 1.81 \text{ mm}$ ). Fenestrations on the contrary were more frequent in younger ( $4.90 \pm 1.73 \text{ mm}$ ) and male patients ( $5.11 \pm 1.71 \text{ mm}$ ). Bone width at two mm was thinner in older patients ( $0.84 \pm 0.22 \text{ mm}$ ) and statistically significant (0.0007) thinner in female patients ( $0.71 \pm 0.13$ ).

**Conclusion:** CBCT was an effective and convenient tool for identifying and diagnosing fenestrations and dehiscences and for measuring vestibular bone width. The study evidenced high prevalence of a thin facial bone that may contribute to fenestrations, dehiscences and soft tissue recessions, which are important in both implant and/or orthodontic treatment planning. CBCT prior to treatment in some cases should be recommended for selecting the proper treatment approach.

## P0309

### A simple photometric tool design to create a true gingival color shade guide, 132 person and 528 tooth gingival color comparison study

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Van/Turkey

**Aim:** The objective of this study is determining the gingival tissue colour shades and create a clinically useful shade guide for practitioners with simple and reproducible tools

**Material and Methods:** In recent studies there is non sufficient sample size or submitted as “non smoker and healthy gingiva” conditions. A shade guide must be created from natural gingiva with healthy and non healthy people to create more affordable shade guide. In our study, 132 person ages with 5–70 with an average of 24.8 is included and a standardised photography machine with 8 White SMD-LED Diode near the objective used. 2 pieces plastic case is produced for standardise the distance and light conditions. For the colour measurements on the photographs GIMP 2.8.14 software was used and colour was expressed in the RGB and HSV colour system with color picker tool.

**Results:** In 76 women and 57 men, red value ranges from 27 to 78 with average of 55.1, Blue ranges from 17 to 66 with average of 39.9, and green ranges from 15 to 69 with average of 39.5. In HSV system Hue ranges from 277 to 359 degree and 0 to 34 degree and saturation is from 6 to 54 with average 30.19. And Value is from 27 to 78 with average of 55.23.

**Conclusion:** Gingival color of females is lighter than males and smoker females has less gingival hyperpigmentation than men. Endodontically treated tooth has darker gingiva than healthy tooth. Diabetes mellitus patients who has periodontitis has darker gingiva than healthy people.

## P0310

### Clinical study to compare a new electronic periodontal probe with a manual, pressure-sensitive probe

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**Aim:** To compare the clinical measurements taken with a new electronic probe (EP) to those taken with a manual, pressure-sensitive probe (MP), as well as pain experienced and time required to complete the measurements.

**Material and Methods:** In 21 participants, probing depths (PD) and gingival margin levels (GM) were measured at 2436 sites by clinicians with various levels of experience (dentist, students) using MP (Aesculap, Tuttlingen, Germany) and EP (paxon periometer, orangedental, Biberach, Germany) in a randomized order. The time to complete probing was measured in seconds and subjective pain was evaluated by a VAS (0 [no pain] to 10 [extreme pain]). Linear mixed models took sex, sequence of measurements, clinician and probe type into account.

**Results:** Mean PDs varied significantly between both probes ( $\Delta$ PD 0.38 mm,  $p < 0.001$ ), GMs did not ( $\Delta$ GM 0.07 mm,

$p = 0.197$ ), but there was a very good correlation of measurements (Pearson correlation coefficient GM: 0.717, PD: 0.722) between the probes. Thus, differences can be considered robust (no deviation in either direction). The 21 min for EP measurements was not a significant timesaver compared to 23 min with MP. The comparison in pain sensitivity did not result in statistically significant differences (MP: 3.61, EP: 3.31).

**Conclusion:** Despite differences between the probes, clinical relevance of these differences can be questioned since literature identifies up to 0.5 mm as natural human error. EP can be used as a practical alternative, as measurements are correlated very well.

## P0311

### Gingival metastasis from renal clear cell carcinoma: a case report

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Ancona/Italy

**Aim:** Renal clear cell carcinoma (RCCC) accounts for about 2–3% of adult malignancies and about 85% of kidney tumours. RCCC has different manifestations, including metastasis in uncommon sites and paraneoplastic syndromes. RCCC metastases to the head and neck region are rare, involving the soft tissues in about 33% of cases. Oral metastases from RCCC are the most frequent among the metastases in the oral tissues, appearing mainly in gingiva and tongue. The aim of this work is to present a rare case of a gingival metastasis from RCCC.

**Material and Methods:** A 76 years-old Caucasian male presented to our Institution with a growing epulis-like mass near to right premolar zone, which had been present for three weeks. His past history revealed left radical nephrectomy for RCCC, 12 years ago. Examination revealed a semihard, painless, mobile mass, covered by normal mucosa. A panoramic radiography was performed, showing no pathology related to underlying mandibular bone. Excision of the lesion was executed for histopathologic evaluation.

**Results:** Histopathologic evaluation revealed the presence of a solid nest of epithelial cells with clear cytoplasm and small, round hyperchromatic nuclei. Considering his medical history, the pathologist reported the presence of RCCC metastasis. The patient was referred onto the urological clinic of University Hospital in Ancona, for further assessment.

**Conclusion:** Although less than 100 cases of oral metastases from RCCC have been reported in literature, they are important to recognize in order to find occult malignancy or possible recurrence of previously treated tumors, even after several years.

## P0312

### Interleukin 1 beta gene variability and risk for periodontal disease – data from a cohort of 215 Polish patients

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**Aim:** To contribute to our knowledge concerning an involvement of IL-1B gene variability in the genetic background of a

periodontal disease. To determine whether the two following SNPs: -511T>C and +3954C>T could be indeed risk factors for aggressive and/ or chronic forms of periodontitis.

**Material and Methods:** A case-control genetic association analysis was performed in a cohort of 215 patients with aggressive (N = 62) and chronic (N = 153) periodontitis and 197 control subjects (without periodontitis) diagnosed according to the criteria of the IWC 1999. Genomic DNA was isolated from blood samples. Genotyping of the two known SNPs within the IL1-B gene was carried out by the PCR-RFLP approach. The  $\chi^2$  and Fisher tests were used for the statistical analysis.

**Results:** A distribution of IL-1B genotypes and allele frequencies was estimated in both analyzed groups of patients and controls. An overrepresentation of the IL-1B [-511]\*C allele (\*2) was observed only in patients with chronic periodontitis in comparison with controls (56% vs 39%,  $p < 0.03$ ). While, the frequency of the IL-1B [+3954]\*C allele (\*1) was statistically significant higher among patients with aggressive periodontitis. Nevertheless to a stratification of the results by the carrying of IL-1B [+3954]\*C allele revealed no significant differences, we found that a risk of the aggressive form development was 5.8 times higher for all IL-1B [+3954]\*C allele carriers (aggressive vs controls,  $p = 0.108$ , OR = 5.761) and 4.4 times higher for patients carrying the IL-1B [+3954]\*C allele (aggressive vs chronic,  $p = 0.199$ , OR = 4.425).

**Conclusion:** Our data confirmed a positive association between IL-1B T[-511]C polymorphism and chronic periodontal disease.

### P0313

#### Relationship oral health indicators and the CO content in the lungs of smokers from smoking duration

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**Aim:** The purpose of our study, to determine the relationship oral health indicators and CO in the lungs of patients with tobacco dependence smoking history.

**Material and Methods:** The objects of the study were 100 smoking patients. A study of dental status of patients was carried out by clinical examination, survey, specialized indices. Definitely CO levels in the lungs was performed by a gas analyzer MICRO CO.

**Results:** The studies revealed that smoking negative impact on the state of the mucous membrane of the gums, the periodontal tissues with increasing smoking history. According to the results of a screening test for CO, patients with experience of 5 years ranged from 0.80 to 1.4% COHB, patients with experience of 25 years showed results in 3.2 +% COHB. All patients were fully sanitized, taken to the clinical account. Reinvestigation showed that patients stop smoking, oral health has improved. Retesting CO test showed that persons, who stop smoking rates have fallen to values norms 0.64–1.12% COHB.

**Conclusion:** It was found that individuals continue to be actively smoking, even after rehabilitation oral health began to deteriorate. After our research we can conclude directly dependent length of smoking patients and their dental health, as well as the amount of CO in the lungs.

### P0314

#### Periodontal status and pregnancy or delivery complications of type 1 diabetes mellitus and healthy pregnant women

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**Aim:** To evaluate the association between periodontal disease (PD), periodontal parameters and pregnancy or delivery complications in healthy and type 1 diabetes mellitus (T1DM) pregnant women.

**Material and Methods:** Case-control prospective study as part of the study "Periodontal status of type 1 diabetes mellitus and healthy pregnant women". Periodontal parameters, HbA1c, pre-eclampsia, gestational week of birth (GWOB), C-section (CS) and birth weight (BW) were observed. Presence of CS and/or pre-eclampsia and/or GOWB  $\leq 37$  weeks and/or BW  $\leq 2500$  g were considered as pregnancy complications.

**Results:** Preliminary results show, that test group women gave birth significantly earlier (2 weeks) ( $p = 0.034$ ) than controls, but not before 37th week of gestation. Odds ratio (OR) for pregnancy or delivery complications was  $\sim 5$  times (95% CI: 0.8–36.9;  $p = 0.082$ ) bigger and for C-section (CS)  $\sim 6$  times (95% CI: 0.8–44.4;  $p = 0.079$ ) bigger in test group. The association between PD and pregnancy or delivery complications failed to show significance, although women with worse periodontal health had more complications during pregnancy and delivery. Presence of T1DM ( $p = 0.006$ ;  $R^2 = 0.35$ ), more bleeding on probing (BOP) ( $p = 0.014$ ;  $R^2 = 0.29$ ) and higher level of glycated haemoglobin (HbA1c) ( $p = 0.019$ ;  $R^2 = 0.27$ ) had significant influence on GWOB. HbA1c had significant influence on cumulative pregnancy and delivery complications ( $p = 0.024$ ) and on CS ( $p = 0.051$ ).

**Conclusion:** Presence of T1DM, HbA1c  $> 6.7\%$  or BOP  $> 57\%$  can cause pre-term birth. HbA1c can influence on pregnancy and delivery complications.

### P0315

#### Periodontal planning by means of cone beam tomography native software

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**Aim:** Cone beam tomography (CBT) captures the mandible and the maxilla in a single rotational take. CBT software is a simple and easy tool for periodontal diagnosis and treatment planning. The patient receives less radiation and CBT involves less economic cost.

**Material and Methods:** In a series of clinical images, this case report describes how digital imaging generated different views of the area under examination: panoramic, para-axial and three dimensional imaging, which can be used to assess diverse clinical issues, such as the need for periodontal surgery, scaling and root planing, ridge expansion, grafting, or sinus elevation.

**Results:** These digital techniques allow three dimensional periodontal diagnosis, making it possible to assess clinical situations such as the presence of periapical and periodontal lesions, the

presence of periodontal pockets and furcal affectation, and to assess areas where implant therapies are needed.

This type of imaging software provides three-dimensional anatomical information that allows the practitioner to identify pathologies and explore patient anatomy for harvesting intraoral grafts, maxillary sinus morphology prior to performing sinus augmentation, etc. without the need for complex or costly computer programmes.

**Conclusion:** CBT native software generates high quality images for use in periodontics and implant dentistry allowing the practitioner to make use of digital simulation in an easy-to-use medium and at low economic cost.

## P0316

### Dental anxiety and oral health-related quality of life levels of patients who applied periodontology clinics

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**Aim:** In our study, we aimed to investigate the possible dental anxiety and OHQoL relations by determining the dental anxiety and the OHQoL levels of the attendants who applied periodontology clinics.

**Material and Methods:** 119 participants were enrolled in the study. Socio-demographic characteristics, systemic conditions, oral hygiene habits, dental visit frequencies, earlier dental treatment experiences and individual perceptions of oral health conditions and perceptions of treatment needs were investigated. Dental anxiety was measured by using the Modified Dental Anxiety Scale (MDAS). The State-Trait Anxiety Inventory (STAI) form was also used to determine the anxiety levels. OHQoL levels were determined by using the Oral Health Related Quality of Life- United Kingdom (OHRQoL-UK) and Oral Health Impact Profile-14 (OHIP-14) scales. Full-mouth periodontal and dental examinations were performed.

**Results:** The results revealed strong correlations between dental anxiety and quality of life perceptions at  $p < 0.01$  level. OHRQoL-UK and OHIP-14 scales were found to be negatively correlated. OHRQoL-UK scores were found to be correlated with pocket depth, plaque index, gingival index, gingival recession levels and the number of missing and mobile teeth. OHIP-14 scores only correlated with gingival recession and the number of missing teeth.

**Conclusion:** Patients with high dental anxiety suffered considerably from decreased levels of oral health related quality of life. To alleviate dental anxiety and to improve dental health which is necessary for enhancement of oral health related quality of life, application of effective and atraumatic treatment methods with regular dental visits should be scheduled.

## P0317

### Periodontal status of type 1 diabetes mellitus and healthy pregnant women

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**Aim:** To compare periodontal status and size of periodontal wound in healthy and type 1 diabetes mellitus pregnant women.

**Material and Methods:** Case-control study with 30 healthy and type 1 diabetes mellitus (T1DM) primiparous pregnant women, who had full-mouth periodontal examination between 28th and 34th week of gestation. Periodontal parameters, glycosylated haemoglobin (HbA1c) and high sensitivity C-Reactive Protein (hs-CRP) were evaluated. Total periodontal inflammatory burden (TPIB) and surface of periodontal wound were calculated from probing pocket depth (PPD), ceval circumference of teeth and bleeding on probing (BOP).

**Results:** Test group had bigger deep and total bleeding periodontal wound (DBPW; TBPW), significantly more bleeding on probing BOP ( $p = 0.032$ ), higher plaque index (PI) ( $p = 0.027$ ) and HbA1c ( $p = 0.003$ ). Age and duration of diabetes were positively associated with the size of deep and total bleeding periodontal wound (DBPW; TBPW) and significantly associated with bigger total periodontal inflammatory burden (TPIB) ( $p = 0.049$ ;  $p = 0.031$ ). Duration of diabetes was also significantly associated with more BOP ( $p = 0.039$ ) in the test group. Body mass index (BMI) was positively associated with HbA1c in control group. Former smokers had significantly smaller healthy subgingival surface (HSS) ( $p = 0.038$ ), bigger loss of clinical attachment level (CAL) ( $p = 0.043$ ), deeper PPD ( $p = 0.041$ ) and bigger total periodontal inflammatory burden (TPIB) ( $p = 0.033$ ).

**Conclusion:** Longer lasting diabetes mellitus type 1, higher age and history of smoking contribute to bigger and more active periodontal wound during pregnancy.

## P0318

### Prognostic factors for the loss of molars – a retrospective long-term study over 18 years of supportive periodontal therapy in Kiel

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**Aim:** We aimed to identify prognostic factors for the loss of molars with different degrees of furcation involvement (FI) during periodontal supportive therapy (SPT) in compliant patients with moderate to severe periodontitis.

**Material and Methods:** 391 subjects (age  $45.9 \pm 10.2$  years) with baseline 2420 molars were examined at the beginning (T0), end of active periodontal therapy (T1) and after a mean of  $18.2 \pm 5.5$  [range 9–30.8] years of SPT (T2). Various tooth- and subject-related factors were considered as possible predictors for tooth loss. Kaplan-Meier survival statistics were calculated and a multilevel Cox regression model was developed using stepwise methods.

**Results:** During SPT, 439 molars were extracted (APT: 177). Regarding to the degree of furcation involvement molars had a 15-year survival rate with FI-0 = 91.9%, FI-1 = 85.8%, FI-2 = 74.7%, and FI-3 = 62.2%. After the stepwise selection process, the following variables at T1 were included in the final model: bone loss in % ( $p < 0.001$ ), probing depth (PD in mm) ( $p < 0.001$ ), FI ( $p < 0.001$ ), tooth mobility ( $p < 0.001$ ), jaw type ( $p = 0.001$ ), endodontic therapy ( $p = 0.010$ ), age ( $p = 0.016$ ), coronary heart disease ( $p = 0.072$ ), abutment tooth ( $p = 0.074$ ) and apical lesion ( $p = 0.11$ ). Compared to molars with FI-0, risk for tooth loss was significantly higher in molars with FI-2 (hazard ratio (HR): 1.69, 95% confidence interval (CI): 1.17–2.42,  $p = 0.005$ ) and FI-3 (HR: 2.62, 95% CI: 1.72–3.99,  $p < 0.001$ ).

**Conclusion:** FI degree 1 was not associated with tooth loss, whereas FI degree 2 and 3, bone loss >50%, tooth mobility and PD at T1 represented strong prognostic factors for tooth loss during regular SPT. However, retention even of periodontally compromised molars is possible over a long-term period.

## P0319

### Management of a lingual positioned peripheral giant cell reparative granuloma: a case report

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Izmir/Turkey

**Aim:** Peripheral giant cell reparative granuloma is a reactive and rare lesion of oral cavity with unknown etiology which is derived from periosteum and periodontal ligament. Inflammation or trauma is underlying causative factor of reactive proliferation. The aim of the present case report was to determine the surgical approach of the peripheral giant cell reparative granuloma.

**Material and Methods:** A 58 years old female patient who had gingival bleeding and enlargement on lingual region of teeth and discomfort during speaking was examined clinically and radiographically. According to clinical examination; a round shaped pedunculated mass which was approximately 4 cm in diameter was detected. Full mouth scaling and root planing were performed and oral hygiene instructions were given. 2 months following initial periodontal treatment, excisional biopsy was performed. To prevent clinical recurrence, bone remodelling and open flap surgery was performed. The lesion was diagnosed peripheral giant cell reparative granuloma after histopathological analysis. Standard photographs were taken following surgery, 10 days, 1, 3 and 6 months post-surgery.

**Results:** Peripheral giant cell reparative granulomas originate from gingiva or edentulous alveolar mucosa. The differential diagnosis of peripheral giant cell granuloma includes pyogenic granuloma, fibrous epulis, peripheral ossifying fibroma, inflammatory fibrous hyperplasia, peripheral odontogenic fibroma, and papilloma, all of which present with similar clinical and radiographic findings. Therefore, histopathological analysis is mandatory to establish the definitive diagnosis.

**Conclusion:** We presented an excision of peripheral giant cell reparative granuloma. Following surgical treatment, application of good oral hygiene shortening the healing period and recurrence of the lesion.

## P0320

### Prevalence of diabetes in patients with adult periodontitis referred to a specialized clinic for periodontology

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**Aim:** Studies have shown a weak to moderate association between diabetes mellitus (DM) and periodontal disease. The aim of this study was to assess, retrospectively, the prevalence of self-reported diabetes patients among a population of newly referred patients to a periodontal practice.

**Material and Methods:** In retrospect a cohort consisting of newly registered patients from the private periodontal clinic in The Netherlands over the period 2003 up to and including 2012

were examined. The studied population consisted of 5481 individuals with an initial diagnosis of adult periodontitis, as given by the periodontal specialist after full-mouth examination, based on the criteria as proposed by Van der Velden (2005). Data were prospectively recorded following an intake visit and included summaries of the periodontal diagnosis, smoking habits and the presence of self-reported diabetes mellitus.

**Results:** The age of the included individuals ranged from 32 to 86 years (mean: 50.3 SD 9.7) with a gender distribution of 55.3% females and 44.7% males. In addition, 35.5% stated to be a smoker and 28.7% to be a former smoker. In total 3.6% of the subjects reported having a condition of diabetes mellitus.

**Conclusion:** Given a national prevalence of DM of 7.5% (according International Diabetes Federation, 2013) in the Netherlands, it appears that the prevalence of diabetes among referred periodontitis patients is not higher. This does not support the reported association between diabetes and periodontal disease but may reflect a referral bias.

## P0321

### The relation between periodontal status and its achieved systemic risk factors in a Turkish population

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**Aim:** The aim of this study was to evaluate the effects of achieved systemic risk factors on periodontal parameters in a Turkish population.

**Material and Methods:** Of 226 individuals (94 male, 132 female), at least 20 years old were included in this cross-sectional study. Systemic risk factors were based on The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria and individuals were categorized according to the number of the risk factors as no risk factor to five risk factors. Periodontal parameters (plaque index, gingival index, probing depth, clinical attachment level, sulcus bleeding index, numbers of missing teeth) and sociodemographics were recorded.

**Results:** There were statistically significant relations between age, education level, body mass index, abdominal obesity, osteoporosis, tooth brushing frequency, flossing and the number of risk factors. Increase in the number of risk factors was associated with higher clinical periodontal parameters and number of missing teeth.

**Conclusion:** Our findings provide an important contribution to data that highlight the role of host response in interaction between periodontal diseases and achieved systemic risk factors.

## P0322

### State of local hemodynamics in periodontal tissues in patients with subclinical atherosclerosis (pilot study)

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A. Hatagov  
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**Aim:** One cause of periodontal microhemocirculation disorder is stenotic lesions of a.carotis externa and a.carotis communis.

Subclinical atherosclerosis of neck arteries causes development of cardio-vascular diseases (CVD) and periodontitis. Aim of study is to determine indices of periodontal microhemocirculation in moderate periodontitis (MP) or subclinical atherosclerosis (SA) patients.

**Material and Methods:** The 1st comparison group consisted of 20 patients with healthy periodontium. The 2nd– 20 MP patients without comorbidity. The main group contained 20 patients, non-smokers, 35–60 y.o., with MP and SA. Periodontal tissue microhemocirculation was assessed with capillaroscopy. ANOVA was used for statistical analysis.

**Results:** It was found that spasms of arterioles prevail, postcapillaries and venules are dilated, reduced blood flow and stagnation are noted in MP and SA patients. Capillaries are extremely curved with changes in luminal size. Diameter of periodontal venous capillaries in the main group was bigger than in the 1st ( $10.9 \pm 0.5 \mu\text{m}$  vs.  $9.0 \pm 0.3 \mu\text{m}$  ( $p = 0.003$ ) and 2nd ( $0.9 \pm 0.5 \mu\text{m}$  vs.  $5.0 \pm 0.3 \mu\text{m}$  ( $p < 0.001$ ) groups. Capillary density was lower in the main group than in the 1st ( $0.13 \pm 0.01$  vs.  $3.9 \pm 0.1$  ( $p < 0.001$ ) and 2nd ( $0.13 \pm 0.01$  vs.  $1.8 \pm 0.5$  ( $p < 0.001$ ) groups. Decrease of arterial blood flow was determined relative to both comparison groups respectively:  $21801.1 \pm 189.4$  vs.  $53832.6 \pm 109.8$  and  $32890.4 \pm 108.7 \mu\text{m}^3/\text{s}$  ( $p < 0.001$ ).

**Conclusion:** It was detected that microhemocirculation indices in MP and SA patients are significantly different from those in patients with healthy periodontium or MP without comorbidity. Capillaroscopy allows to determine structural and functional changes in microvessels, their bloodflow at different stages of disease, to give prognosis for the course of disease and to prevent subsequent complications.

## P0323

### Periodontal risk assessment in users of typical antipsychotics

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**Aim:** The aim of this study was to evaluate the risk for periodontal disease in psychiatric patients, and establish whether socioeconomic data and psychiatric assistential model are related to periodontal risk.

**Material and Methods:** Transversal study, having as target population 40 mental patients assisted at The Juliano Moreira Hospital, Bahia-Brazil, aged greater than or equal to 18 years old, being 20 women and 20 men and users of typical antipsychotics. The polygon of risk established by Lang & Tonetti (2003) was used. Periodontal examinations were performed by a single examiner. All teeth present (except third molars) were examined using a manual periodontal probe in six sites a tooth, and the data were analyzed according to the six parameters that make up the polygon of risk. From the analysis of these data the patients were categorized into low, medium and high periodontal risk.

**Results:** In the sample analyzed 10 of the participants (25%) presented low risk (35%), 14 medium periodontal risk and 16 (40%) showed high risk. There was no association between individual periodontal risk and the variables age, race/ethnicity, gender, socioeconomic conditions and psychiatric assistential model. The dental plaque index greater than or equal to 40% ( $p = 0.001$ ) was associated with high periodontal risk.

**Conclusion:** Patients in psychiatric treatment using daily typical antipsychotics can be categorized as high risk for periodontal diseases, requiring special attention to oral health, programming different frequency and approaches in supportive periodontal therapy.

## P0324

### Bacterial and fungal flora in saliva in children with diabetes mellitus type 1

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**Aim:** The purpose of this study was to estimate the bacterial and fungal flora in saliva in children with diabetes mellitus type 1

**Material and Methods:** The study included 17 children with diabetes mellitus type 1 and 17 healthy controls all 10–18 years old. Diabetic children were classified into two groups: well and poorly controlled based on glycosylated hemoglobin level. Personal, family data, medical and dental history were collected. The swabs from oral cavity were examined in all children. Culture and identification of microorganisms were performed according to the methods used in microbiological diagnosis.

**Results:** 27 species were isolated from saliva in healthy children. The most common were streptococcus mitis, sanguinis and salivarius. The yeasts were observed in 27% cases. Staphylococcus aureus MSSA was observed in one case. In children with diabetes 29 species were observed. The most common were also streptococcus species. The yeasts were isolated in 41%. In all children, healthy and with diabetes Neisseria spp was observed. Veillonella parvula was isolated in 2 cases in control group and in 4 cases in children with diabetes. Staphylococcus aureus MSSA, epidermidis MSCNS, Klebsiella pneumonia were observed in children with diabetes.

**Conclusion:** No significant differences existed between all groups regarding mean count of micro-organisms. However the opportunistic bacteria were more often observed in children with diabetes.

## P0325

### Life events and aggressive periodontitis in Morocco: a case control study

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Casablanca/Morocco

**Aim:** An association between stress and periodontal disease was suggested over 50 years ago and has subsequently been supported by numerous studies (Bansal and coll., 2014). The aim of this study is to provide an insight into the relationship between psychological stress and Moroccan aggressive periodontitis.

**Material and Methods:** For this purpose, A case-control study was conducted on 120 patients: 60 aggressive periodontitis and 60 control subjects aged between 15 and 30 years. Data collected included life-events, tobacco use, oral health behaviors and socio-demographics. Validated scale of Paykel (1983) was used as a measurement basis of the negative life- events.

**Results:** Results showed that the impact of life events was more severe among Aggressive periodontitis group. However, this difference was no more significant when the number of life events was considered. In a case control study, Croucher et al. (1997) found that the number and the negative impact of life events as well as being unemployed were all significantly associated with periodontitis.

**Conclusion:** It seems that stressful life events act by their negative impact on the development of aggressive periodontitis and that psychical factors were related to these diseases. Therefore, reducing stress and improving coping strategies may improve the periodontal prognosis.

## P0326

### Clinical, microbiological and enzymatic evaluation of orthodontic treated sites in patients with periodontitis: preliminary results on 7 cases

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**Aim:** The clinical, microbiological and enzymatic evaluation of sites treated of periodontitis in adults that undergo orthodontic treatment.

**Material and Methods:** 7 patients treated for chronic periodontitis underwent orthodontic treatment for alignment/re-alignment of displaced teeth. In each patient in recall (FMPS and FMBS < 25%), at 6 months after completion of treatment, before bracket placement, and at 2, 4 and 6 months, following parameters were registered at an orthodontic site with residual PPD ≥ 4 mm: PPD, CAL, GR, PII, BOP and Papilla-Presence-Index (PPI-Cardaropoli). Gingival crevicular fluid (GCF) was collected at baseline, 1 h, 4 h, 24 h, 1 week, 2 weeks and 1 month after brackets placement to assess the GCF volume, and the activities of IL1 $\beta$ , neutrophil elastase, and MMP8 using ELISA. Plaque was collected at baseline and 6 months for semi-quantitative analysis of five periodontal germs. Friedman's test was used to compare the distributions of values of clinical (PPI, PD, GR, CAL) and enzymatic (GCF volume, enzyme activities) parameters at subsequent timepoints. Q-Cochran test was used for the dichotomous variable BOP, Wilcoxon test was used to evaluate the detection scores of periopathogens.

**Results:** Clinical parameters tend to improve in general during first six months (n.s.), except PPI. There was a significant change in BOP after baseline ( $p < 0.05$ ). Detection values of sulcular microbiology did not change significantly. GCF volume remained relatively constant at all timepoints (n.s.) and the enzymatic activities reached in general a peak a few hours after beginning of treatment and a second peak at two weeks (n.s.). Only IL1 $\beta$  increased significantly compared to baseline ( $p < 0.05$ ).

**Conclusion:** Despite its limitations (reduced number of patients), the study demonstrates a relative stability of the clinical, microbiological and enzymatic values of periodontal patients during the first six months of orthodontic treatment.

## P0327

### Predictors of visible plaque and gingivitis in patients under integrated clinical dental care – a retrospective longitudinal study

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Porto Alegre/Brazil

**Aim:** To determine predictors of changes in visible plaque (VP) and gingivitis (GB) during integrated dental treatment.

**Material and Methods:** A retrospective longitudinal observational study was conducted by a census of patients treated in a Brazilian dental school in 2012. 204 records were considered eligible, whereas 113 were excluded (time between clinical examinations < 6 months or < 6 teeth present). 91 charts were analyzed and demographics (gender, race, age and patient's main complaint at first session), oral hygiene (frequency of toothbrushing and interproximal cleaning) and clinical data (number of teeth with probing depth > 6 mm, visible plaque index, gingival bleeding index and periodontal treatment performed) were collected. Changes in VP and GB (baseline minus follow-up) were modeled by multiple linear regression adjusting for time elapsed between baseline and follow-up records.

**Results:** The mean time elapsed between baseline and the last examination was 13 months. Significant reductions on VP ( $32.8 \pm 27.9\%$  to  $17.4 \pm 19.4\%$ ) and GB ( $27.1 \pm 23.8\%$  to  $18.5 \pm 17.3\%$ ) were observed after integrated dental treatment. Higher plaque reductions were predicted by higher baseline VP levels, shorter time (< 12 months) elapsed between VP recordings, and main complaints related to definitive treatment compared to dental emergencies. The shorter the time elapsed between measures of GB and higher baseline plaque levels were the two predictors of higher gingivitis reduction. No other predictors were significantly associated with changes in VP and GB during integrated treatment.

**Conclusion:** Supragingival plaque control improves in patients under integrated dental care. Higher benefits are observed for motivated patients and for more frequent recall visits.

## P0328

### Typological classification of periodontitis: about a new therapeutic approach

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Agen/France

**Aim:** We present a classification based on the typology of the periodontitis. The aim of this classification is to propose a new model of treatment of periodontal disease: It is a strategic approach.

**Material and Methods:** We used a Randomized selection of 50 clinical cases, with clinical photographs and radiographics status. We classified periodontitis through three parameters: the number of teeth supporting a periodontal disease, the distribution of the periodontal disease and the prognosis of affected teeth.

**Results:** Two groups have been established: a group of specific periodontitis and a group of non specific periodontitis. The first group present two types: type 1 – Single lesion and type 2 – several lesions. The second group present 3 types: type 1 –

generalized disease, type 2 – posterior disease, type 3 – anterior disease. Each type is characterised by a prognosis grade and a strategic guide line treatment.

**Conclusion:** Today, the etiologic treatment of the periodontitis is well known. On this point, we expect new advances of the research. That's why, this classification doesn't take into account the periodontal therapeutic and no more the etio-pathogenic aspects. The aim of this paper is to explain how a classification of periodontitis can support a treatment strategy. It may give more predictability and durability for the periodontal treatment planning. To valid this classification, we should later have a long-term cohort study.

## P0329

### Prepubertal periodontitis in children: a clinical case report

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Casablanca/Morocco

**Aim:** Prepubertal periodontitis (PPP) is a rare and rapidly progressive disease of young children that results in destruction of the periodontal support of the primary dentition.

**Material and Methods:** Prepubertal periodontitis (PPP) cases are treated by a periodontal treatment (curettage and Antibiotherapy) but plaque control is the only guarantee for lasting results. This work aims to present, through a clinical case the diagnosis and treatment of the PPP in a 3 years old child followed and supported by the department of pediatric dentistry in collaboration with the periodontics department – at the Centre of Consultation and dental treatment dental of Casablanca

**Results:** Our case is a 3 year old who consulted due to pain at the anterior sector. The clinical and radiological examination showed an ulcerated gingival with early childhood caries. Dental treatments allowed a Status of the oral cavity as sedative premedication. During follow-up sessions, we noticed the appearance of a progressive recession on 53, 83 with 4 mm pockets at the molars, which prompted us to complete the radiological assessment Radiographs revealed angular osteolysis at the lower side and incisive sectors, with a very pronounced lysis at the 53. Periodontal treatment of PPP consisted of a subgingival scaling followed by curative antibiotic therapy. After 2 years of follow up, the evolution of clinical cases is stable.

**Conclusion:** Prepubertal periodontitis, although rare, is a difficult condition to manage in children because it is discrete, its evolution is slow and requires a multidisciplinary approach.

## P0330

### Desquamative gingivitis differential diagnosis and oral management. A case report

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**Aim:** The purpose of this poster is to perform a literature review of the clinical management of desquamative gingivitis and to present a case report.

**Material and Methods:** A literature review was carried out. Case Report A 60 year old woman was referred to our department complaining of erosions, pain, gingivitis and blisters

located on her gingiva. She had generalized gingival inflammation, erythema, bleeding on probing.No wickham's striae were found. Generalized pockets were present. She also presented pruritic papular lesions on her scalp. The patient had emotional problems that could have triggered the episode. A biopsy was carried out and the final diagnosis was Bullous Lichen Planus (OBLP). Skin lesions were treated by the dermatologist with topical corticosteroids.We performed a scaling and root planing, removing all the irritant factors, calculus and plaque. Since erosive oral lesions only involved the gingiva, we performed a steroid carrier tray in order to give the patient a 0.05% clobetasol orabase.

**Results:** Inflammation diminished after the periodontal treatment. The lesions disappeared after 3 weeks. Since dysplastic changes may arise, we scheduled follow up appointments every 6 months, although patient comes to our department whenever she has an exacerbation.

**Conclusion:** Performing an adequate differential diagnosis of desquamative gingivitis is crucial for the dentist. Treatment depends on the etiology of the process. Identifying and eliminating multifactorial agents associated with OBLP is essential. Relief can be achieved in most of patients with topical steroids hygiene and periodontal treatment.Patient should also be kept under long-term follow up due to malignant tendency of LP.

## P0331

### Impact of periodontitis on mortality and commencement of renal replacement therapy (RRT) in Patients with Chronic Kidney Disease (CKD)

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Birmingham/United Kingdom

**Aim:** Patients with CKD have increased morbidity associated with RRT (dialysis/transplant) and increased mortality, both of which are correlated with increased levels of systemic inflammation. We aim to examine the impact of periodontitis on mortality and commencement of RRT in patients with CKD.

**Material and Methods:** The Renal Impairment In Secondary Care study (RIISC) is an on-going longitudinal observational study of patients with high-risk CKD. Patients undergo detailed medical and periodontal examinations including a full mouth periodontal examination. Periodontal status was assessed by recording probing depths, recession and bleeding on probing at interproximal sites for all teeth.

**Results:** Presented here is an interim analysis of the cohort. At the time of analysis, mean time under observation was 22 months (SD 9 months). Cox proportional hazards regression analysis revealed that patients with periodontitis were approximately 3 times more likely to experience RRT or mortality compared to periodontally healthy patients although this is not statistically significant.

**Conclusion:** Patients with CKD tend to experience more hard endpoints if they also suffer from periodontitis compared to periodontally healthy individuals with CKD.

**P0332****In vivo repeatability study for gingival thickness measurement using a new ultrasonic system**W. Bednarz<sup>1</sup>, A. Sender-Janeczek<sup>2</sup>, M. Ziętek<sup>2</sup><sup>1</sup>Gorlice/Poland, <sup>2</sup>Wrocław/Poland

**Aim:** This study evaluated the repeatability and reproducibility (R&R) of assessing gingival thickness (GT) measurement using Pirop<sup>®</sup> Ultrasonic Biometer obtained from newly defined locations.

**Material and Methods:** In 10 periodontally healthy subjects, the buccal GT of maxillary central and lateral incisors and canines were examined. The measurement points were located in the middle of keratinized tissue (GT1), 2 mm apical from mucogingival junction (GT2) and at proposed new points – Free GT (1 mm coronal than clinical attachment level – CAL), Supracrestal GT (1 mm apical than CAL), Crestal GT (1 mm coronal than mucogingival junction) and Mucosal GT (1 mm apical than mucogingival junction). The GT was assessed using ultrasonic system Pirop<sup>®</sup> (Echo-Son S.A., Poland) with an A-scan presentation and a 20 MHz frequency probe. The speed of sound in gingival tissue was assumed to be 1540 m/s. The mean value of GT and a coefficient of variance at different points were estimated. Repeatability of results obtained after 10-fold measurement GT each test point.

**Results:** At all measurement points obtained satisfactory repeatability, the best in points FGT and SGT (R&R < 4.71%), the smallest in the MGT and GT2 (9.78% > R&R > 8.56%). The average SGT was equal 1.24 ± 0.23 mm and CGT was equal 0.75 ± 0.19 mm with statistical significant difference ( $p < 0.0001$ ).

**Conclusion:** Supracrestal GT is higher in comparison with crestal GT what may be help to indicate biological width and edge of alveolar crest in noninvasive way.

**P0333****Comparative characteristic of the prevalence of periodontal disease of population of Ufa and Bashkortostan Republic. Republic dental clinic**

E. Soldatova, A. Bulgakova, I. Valeev, M. Gimranova

Ufa/Russian Federation

**Aim:** To do the comparative analysis of prevalence of periodontal disease in Ufa city and in Bashkortostan Republic.

**Material and Methods:** There was carried out a research of the 5932 outpatients records with periodontal diseases, referred from 2009 to 2014. For these comparative analysis patients were divided in two groups: first group (Ufa's citizens) and the second group (the population of Bashkortostan Republic).

**Results:** As a result of retrospective analysis we have defined that 50.2 percent were the citizens of Ufa and 49.8 percent were from the Bashkortostan Rep.

**Conclusion:** Comparing these to groups we gave diagnosed: 62% of patients with gingivitis from the first group and 8.5 percent from the second group, 12.9% with mild periodontitis from the first group and 11.7% from the second group, 19.9% with periodontitis of moderate (I gr) and 20.8% (II gr), 24.4% with severe periodontitis (I gr) and 31.4% (II gr), 22.6% with par-

odontosis (I gr) and 27% (II gr), 0.03% with idiopathic periodontal disease – I gr and 0.4% (II gr).

**P0334****Presence of a root canal filling per se does not have a significant negative influence on the marginal periodontium**K. Bertl<sup>1</sup>, N. Suljkanovic<sup>2</sup>, L. Suljkanovic<sup>2</sup>, S. Lettner<sup>2</sup>, A. Esfandeyari<sup>2</sup>, A. Moritz<sup>2</sup>, C. Bruckmann<sup>2</sup>, A. Stavropoulos<sup>1</sup><sup>1</sup>Malmö/Sweden, <sup>2</sup>Vienna/Austria

**Aim:** To evaluate the periodontal status of endodontically treated single rooted teeth without periapical pathology, correcting for various patient- and tooth-related factors.

**Material and Methods:** Clinical periodontal parameters (BoP, PD, CAL) of 240 endodontically treated (ET) and 240 vital contralateral teeth (CT) were recorded before and after non-surgical periodontal treatment. Patient-related (age, gender, smoking status) and tooth-related (presence and quality of an interproximal restoration, extent of the root canal filling, presence of a post, and tooth type) confounders were evaluated for any possible effect on periodontal status.

**Results:** At baseline, the frequency of BoP at an interproximal site at ET vs. CT was 70.42% vs. 65.00%, respectively. The frequency of teeth with an interproximal PD  $\geq 5$  mm was 47.92% vs. 42.92% and with a CAL  $\geq 5$  mm was 54.58% vs. 49.58%, respectively, at ET and CT teeth. Interproximal PD and CAL at ET vs. CT were 3.86 vs. 3.61 mm and 4.11 vs. 3.95 mm. Any significant differences disappeared after correcting for tooth-related factors. Presence of an improper restoration had a significant negative effect on BoP (OR 3.49 [95% CI 1.95–6.27;  $p < 0.001$ ]), PD (36.81% [95% CI 18.52–57.92];  $p < 0.001$ ), and CAL (27.01% [95% CI 12.67–43.18];  $p < 0.001$ ). No significant differences in the clinical outcome of non-surgical periodontal therapy were observed between ET and CT ( $p > 0.681$ ).

**Conclusion:** Presence of a root canal filling per se does not have a significant negative influence on the marginal periodontium or the outcome of non-surgical periodontal treatment, when correcting for the quality of the interproximal restoration.

**P0335****Prevalence of aggressive periodontitis among adults who attended the department of periodontology, UMF "VictorBabes" Timisoara, Romania**R. Buzatu<sup>1</sup>, A. Pogan<sup>1</sup>, I. Scrobota<sup>2</sup>, D. Onisei<sup>1</sup>, D. Onisei<sup>1</sup><sup>1</sup>Timisoara/Romania, <sup>2</sup>Oradea/Romania

**Aim:** To assess the prevalence of aggressive periodontitis and determine the periodontal status of an adult population from Timisoara city, who attended the Department of Periodontology between June 2013 and July 2014, also to correlate and compare the prevalence of aggressive periodontitis and periodontal parameters between male and female.

**Material and Methods:** The study involved 642 subjects, 354 female (151 smokers, 203 nonsmoker) and 288 male (115 smokers, 173 nonsmoker), with age range between 18 and 40. The periodontal parameters used were dental plaque index (Sil-

ness&Loe), gingival index (Silness&Loe), bleeding on probing, probing pocket depth and clinical attachment loss and were assessed at the baseline and after 6 weeks from the complete initial therapy.

**Results:** The number of affected patients with aggressive periodontitis was 29 among 642 patients, that is 4.5%. Results showed a higher prevalence in the female group (2.4%) than male group (2.02%) and higher prevalence in the smoker group (2.8%) than non-smoker (1.71%). A higher rate of aggressive periodontitis was found in the 18–30 years old group than 30–40 years old group, the most frequent affected being the female smoker group.

**Conclusion:** This population of adults had a high prevalence of aggressive periodontitis and its presence was associated with age, socioeconomic status, smoking and oral hygiene.

## P0336

### Efficacy of a prevention program to reduce incidence and outcome of osteonecrosis of the jaw in patients exposed to antiresorptive agents

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Ferrara/Italy

**Aim:** Antiresorptive agents effectively reduce skeletal-related events incidence in patients with metastatic bone cancer and multiple myeloma, thereby placing them at potential risk for developing osteonecrosis of the jaw (ONJ). It is very important to reduce the risk or prevent ONJ development.

**Material and Methods:** In collaboration with the Hematology and Oncology Unit of the University Hospital of Ferrara, Dental Unit developed a preventive program focused on primary prevention of ONJ onset and developed minimally invasive protocol to manage signs and symptoms in all cases of ONJ.

**Results:** During 18 months observation time 73 patients, eligible for bisphosphonates and denosumab treatment (cohort 1), mean age of 67 years (range 66–80), received complete dental preventive treatments, including dental extraction; 52 patients, previously exposed to bisphosphonates and denosumab treatment (cohort 2), mean age of 66 years (range 43–87), received only non surgical treatments. On average, patients received 9.7 drug treatment cycles (range 1–48). No ONJ was recorded (0.0%; 95% confidence interval [CI] 0.0–1.4) in cohort 1 during 18 months. 19 patients in cohort 2 developed ONJ, on average after 14 drug treatment cycles (range 9–48). Comparing cohort 1 and cohort 2 it was observed efficacy of preventive program in reducing risk for ONJ onset (relative risk reduction: 100%, 95% [CI] 86–100).

**Conclusion:** ONJ is a clinically significant adverse effect of antiresorptive agents. A mandatory preventive program for oral health, involving a multidisciplinary team should be developed for all patients eligible for antiresorptive agents.

## P0337

### Associations between oral health condition and the degree of dementia on institutionalized elderly in Finland

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Helsinki/Finland

**Aim:** The aim of this study is firstly to find out whether the degree of dementia affects the oral health of the institutionalized elderly. Secondly, we want to see if there is a difference between the oral hygiene maintained by the institutional staff to that of the elderly themselves.

**Material and Methods:** We examined oral health from 100 randomly selected institutionalized elderly in Helsinki, Finland. Dentate subjects (N = 79) were analyzed according to the degree of dementia (“no-mild”, “moderate-advanced”) and who is responsible of daily oral hygiene.

**Results:** Dentate subjects had mean  $\pm$  SD number of teeth  $15.7 \pm 8.8$  and age  $82.3 \pm 8$  years. 45.6% (N = 36) had residual roots with mean  $\pm$  SD  $1.8 \pm 3.2$ , open caries lesions 60.8% (N = 48)  $2.5 \pm 1.7$ , mobile teeth 55.7% (N = 44)  $3.4 \pm 2.8$  and teeth with furcation lesions 31.6% (N = 25)  $2.3 \pm 1.9$ . Main (95% CI) visible plaque (modified VP, scale 0–4) measure was 2.6 (2.4–3.7), gingival index (GI, scale 0–3) 1.8 (1.7–1.9) and CPI 2.7 (2.6–2.9). 31% had “no-mild” dementia and 61% moderate-advanced. Only difference in clinical parameters between memory disorder groups was in number of residual roots: in “moderate-advanced” mean  $\pm$  SD  $4.3 \pm 4.3$ , in “no-mild”  $2.8 \pm 2.5$  ( $p < 0.001$ ). Most common clinical periodontal diagnosis for memory disorder groups was mild chronic periodontitis (almost 50% of subjects). There was no difference between groups in oral hygiene status (VP, GI) based on who was in charge of maintaining daily oral hygiene.

**Conclusion:** Mild chronic periodontitis is very common in dentate institutionalized elderly irrespective of the degree of dementia and of who takes care of daily oral hygiene.

## P0338

### Relationship between dietary intake and periodontal diseases

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Sivas/Turkey

**Aim:** Nutritional factors are implicated in several systemic diseases and conditions, including obesity, hypertension, dyslipidemia, type 2 diabetes, and cardiovascular diseases that are associated with periodontitis. Data suggests that diets containing foods rich in antioxidants are beneficial, whereas foods containing high levels of refined carbohydrates are detrimental to the inflammatory process. The aim of this study to investigate the relationship between dietary intake and different types of periodontal diseases.

**Material and Methods:** 104 periodontally healthy individuals (Control), 78 aggressive periodontitis (AgP) and 88 chronic periodontitis (CP) patients who are not obese (BMI  $< 25$  kg/m<sup>2</sup>) and smoking were included in the study. Dietary intake was assessed by a 24-h diet recall interview and the data from these records

were converted to dietary intake using BeBIS 7.2 version software. Periodontal indices and missing tooth also were evaluated.

**Results:** In AgP and CP groups, total energy intake was significantly higher than those of the Control group. There were no significant differences between CP and AgP groups regarding to total energy intake. The proportion of protein was significantly increased in AgP group compared to control group. In CP group, the proportion of carbohydrate was higher than those of the control group. There was no significant difference in terms of tooth loss among periodontitis groups.

**Conclusion:** When we evaluated daily percentage of protein, fat, carbohydrate, and total energy intake among groups, no association was found between CP and AgP.

### P0339

#### The investigation of visfatin levels in serum, saliva and gcf samples of non-diabetic chronic periodontitis patients and well-controlled and poorly controlled diabetic chronic periodontitis patients, and evaluation of the relationship with clinical and biochemical parameters of periodontitis

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**Aim:** The aim of this study is to investigation of visfatin levels in serum, saliva and GCF samples of non-diabetic chronic periodontitis patients and well-controlled and poorly controlled diabetic chronic periodontitis patients, and evaluation of the relationship with clinical and biochemical parameters of periodontitis

**Material and Methods:** According to the study protocol, 5 groups which each one were consisted of 15 subjects were planned as follows: periodontally healthy patients with systemically healthy (DM-P-); patients with systemically healthy and CP (DM-P+), periodontally healthy patients with diabetes (DM+P-), patients with diabetes and CP (DM+P+), patients with poorly controlled diabetes and CP (KDM+P). Serum, saliva and GCF samples were obtained before the recording of clinical periodontal parameters. Local and systemic levels of visfatin, TNF- $\alpha$  and IL-1 $\beta$  were determined as biochemically.

**Results:** The highest visfatin, TNF- $\alpha$  and IL-1 $\beta$  levels were seen in (KDM+P+) group. It was determined that, in patients with poorly controlled diabetes and periodontitis, all biochemical parameters were increased ( $p > 0.001$ ). Serum and salivary visfatin levels were the highest in diabetic (DM+P-) and (DM+P+) groups, and GCF visfatin levels were the highest and in periodontitis (DM-P+) and (DM+P+) groups ( $p < 0.05$ ). GCF TNF- $\alpha$  and IL-1 $\beta$  levels were highest and in periodontitis (DM-P+) and (DM+P+) groups ( $p < 0.05$ ). Significant positive correlations between GCF visfatin levels and GCF TNF- $\alpha$  and IL-1 $\beta$  levels were detected in (KDM+P+) group ( $p < 0.001$ ).

**Conclusion:** When periodontitis patient has poorly controlled diabetes, systemic and local visfatin, TNF- $\alpha$  ve IL-1 $\beta$  levels are detected significantly higher, GCF visfatin levels are associated with GCF TNF- $\alpha$  and IL-1 $\beta$  levels.

### P0340

#### Lack of correlation between Grit, Self-control and oral hygiene

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Ankara/Turkey

**Aim:** Toothbrushing frequency and low plaque levels are associated with personality traits like good self-efficacy, locus of control, optimism and sense of coherence. Grit in psychology is defined as perseverance and passion for long-term goals. The aim of this study is to evaluate the correlation of personality traits with plaque scores before phase I periodontal treatment.

**Material and Methods:** Fifty dentate patients participated to the study. Subjects answered short GRIT and self-control (SC) questionnaires on a 5-point Likert type scale. Plaque (PI) and gingival index, probing depth and gingival recession were recorded. Phase I periodontal treatment followed oral hygiene education.

**Results:** Shapiro-Wilk test showed that variables were normally distributed and Pearson's correlation test was used to determine correlations between parameters. No correlation between GRIT ( $3.6 \pm 0.57$ ), SC ( $42.33 \pm 6.13$ ) results and demographic variables including age and sex could be detected ( $p > 0.05$ ). There was no correlation between GRIT and SC scores with PI values or other periodontal parameters ( $p > 0.05$ ).

**Conclusion:** Individuals who are successful at long-term goals as a personality trait are estimated to have good oral hygiene levels and compliance to maintenance programs. Lack of correlation between GRIT, SC and PI scores could be related to low sample size and selection of subjects with periodontal treatment need.

### P0341

#### Determination of dental and gingival health status of mentally disabled schoolchildren in Istanbul

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Istanbul/Turkey

**Aim:** Through the studies it has been proved that oral health status of the people with intellectual disabilities are not better than healthy individuals. It is known that epidemiological data and analysis are required for developing and applying preventive health political tools for intellectually disable individuals. A study was carried out in Istanbul city to assess the dental caries and gingival status of mentally disabled schoolchildren.

**Material and Methods:** This descriptive cross-sectional study, conducted between October 2010 and May 2011, included all schoolchildren with moderate and severe intellectual disability attending schools for individuals with special needs in Istanbul. At the time this study was carried out, there were 1.115 children attending sixteen schools for mentally disabled individuals. Tooth caries and PI, GI, CSI of the students have been examined and evaluated clinically. Moreover, questions have been asked to parents and noted down.

**Results:** PI value of 79% students have been found to be under 2, of which GI value over 1. Moreover, decays have been detected in the milk and permanent teeth of 91% of the students. 87% of the students had no filling in teeth, while 1% of them had fissure cover only.

**Conclusion:** In accordance with the results of our survey, which turned out to have similar outcomes of the studies conducted abroad, it has been detected that the gingival health, number and abundance of decays in teeth and oral health status of the intellectually disable individuals are more inattentive comparing to the intellectually healthy people.

## P0342

### A rare case of necrotizing ulcerative gingivitis with palatal involvement: a case report

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Ankara/Turkey

**Aim:** Necrotizing ulcerative gingivitis (NUG) is a rare acute and periodontal disease characterized by pain, bleeding and necrosis of interdental papillae. NUG is associated by poor oral hygiene, smoking, emotional stress and immunosuppression. Among the patients suffering NUG palatal involvement is rarely observed. In this case we demonstrated a rare case of NUG with palatal involvement.

**Material and Methods:** A 20-year-old male patient referred to our clinic for gingival bleeding, pain and halitosis. clinical and radiographical examinations were carried out. Clinical examination revealed the excessive loss of interdental papillae. Also at the palatal gingiva pseudomembranes and necrotizing areas were observed.

**Results:** In this case of NUG an uncommon manifestation were observed. Palatal gingival areas were covered with white-yellow pseudomembrane and palatal interdental papillae were also lost. This unusual manifestation led us to a diagnosis of a rare form of NUG.

**Conclusion:** Necrotizing periodontal diseases are unique in their clinical presentation. Researches suggest that the etiology and pathogenesis of necrotizing periodontal diseases may also be distinctive from other periodontal diseases. Necrotizing ulcerative gingivitis (NUG) is a type of necrotizing periodontal disease in which the necrosis is limited to the gingival tissues. Especially buccal gingiva is affected. Nevertheless in this case we observed palatal lesions. In clinical examination palatal areas also should be controlled carefully.

## P0343

### An efficient way of mechanical plaque control

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Budapest/Hungary

**Aim:** The perfect individual oral hygiene is essential for prevention and also for periodontal therapy. Unfortunately our patients' general oral hygiene is still inadequate. We focused to introduce an effective and acceptable way of individualized prophylaxis. To examine the effectivity and the acceptability of the individually trained oral prophylaxis (iTOP) method.

**Material and Methods:** 500 standardized questionnaire was filled in advanced. In the clinical study 24 patients with untreated periodontitis were enrolled. After measuring the plaque score (FMPS) and the interdental bleeding index (IDBI) professional oral hygienic training was installed. According to iTOP's protocol a chair-side instruction was carried out with modified Bass method combined with soft toothbrush and individually calibrated interdental-brushes. The reevaluation was on

months 1, 3, and 12. Also a questionnaire was presented after 3 month to get the patients subjective feedback.

**Results:** Based on the first questionnaire, though the majority of our subjects brush their teeth twice a day, most of them experienced gum bleeding during toothbrushing. Generality brush with medium toothbrush and variable techniques, and doesn't use any interdental devices. The results showed a decrease of the mean FMPS from 64.65% to 29.19% at month 1 and then 21.12% at month 3; whilst the baseline IDBI changed from 78.12% to 24.34% at month 1 and to 8.5% at month 3. The final one year results showed 23.85% FMPS and 13.26% IDBI. According to the final patients' survey the method was easily applicable.

**Conclusion:** iTOP method was effective and acceptable for all. However a more frequent recall is needed to maintain the spectacular results.

## P0344

### Periodontal health in the population of rural Pomurje region

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<sup>1</sup>Gornja Radgona/Slovenia, <sup>2</sup>Ljubljana/Slovenia

**Aim:** Periodontal disease is an inflammatory disease that affects a large part of the world's population. Systemic diseases affect and modify the expression of periodontitis. The aim of the present clinical study was to determine the periodontal and systemic health in the rural Slovenian population and to estimate the effect of systemic diseases on severity and progression of periodontitis.

**Material and Methods:** In this study we included 90 patients (51 women and 39 men, aged 31 to 92 years). In all patients recordings of periodontal parameters were done at six sites of each tooth (probing depth (PD), gingival recession (R), bleeding on probing (BOP), the presence of bacterial plaque (P), and clinical attachment level (CAL). Precise medical and dental history was taken with emphasize to the systemic health of patients.

**Results:** Patients had on average 22.3 teeth in their mouths. The average probing depth was 3.5 mm; clinical attachment level 4.3 mm and BOP 38.7%. Plaque was present in 67.4% sites. 38.4% of subjects were smokers, and 40.0% were overweight, 7.3% had diabetes and 32.8% cardiovascular diseases. Local risk factors that affected periodontitis included the tooth type, site of a tooth, BOP, and P. Significant systemic risk factors involved gender, age, obesity, smoking, diabetes, cardiovascular disease, radiation therapy and chemotherapy, gastrointestinal disorders, thyroid disease and psychiatric illness.

**Conclusion:** The periodontal health in Pomurje is significantly influenced by the local risk factors predominantly with the level of oral hygiene along with the systemic diseases and conditions.

## P0345

### Association between coping strategies and chronic periodontitis severity

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**Aim:** Stress and coping strategies are considered as a risk factor for several chronic diseases including diabetes and heart diseases.

However, influence on gums diseases and especially chronic periodontitis that is characterized by irreversible tooth supporting tissues destruction, onset remains controversial. The aim of our study was to investigate the influence of patient's stress and coping strategies on moderate and severe chronic periodontitis onset.

**Material and Methods:** Stress level and coping strategies of twenty-four moderate chronic periodontitis patients and twenty-five severe chronic periodontitis were compared using different questionnaires: the State-Trait Anxiety Scale (STAI), the Depression Anxiety Stress Scale (DASS-42) and the Toulouse Coping Scale (TCS).

**Results:** No statistical differences were observed between groups for DASS-42 and STAI. Interestingly, multifactorial analysis of variance demonstrated an increased severity of chronic periodontitis associated with low scores of social support coping strategy. The variables that were correlated were the percentage of PPD >5 mm and PPD > 7 mm and BL ( $p < 0.05$ ).

**Conclusion:** Our clinical-psychometric study showed that emotion-focus strategy, specifically poor social support coping strategy, could be related to severe form of chronic periodontitis. This data may help clinician to better identify patient at risk.

## P0346

### Comparative analysis of dental status among pregnant women and diabetes mellitus pregnant women

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**Aim:** According to results of many researches of national and foreign authors, diabetes mellitus is one of the predisposing factors for the development of various dental diseases. Pregnancy can also influence upon condition of oral health. Aim To compare the dental status between pregnant women and diabetes mellitus pregnant women.

**Material and Methods:** We examined 2 groups of patients: 41 pregnant women with different types of diabetes mellitus (1group) and 25 pregnant women without this pathology (2 group). We used clinical and extra methods: completing questionnaire, hygiene index OHI-S, API, periodontal index BOP, PMA, index DMF, test of capillary functional resistant, pH-measurement and microbiological research of anaerobic microflora and Candida in periodontal liquid.

**Results:** According to the results of questionnaire 1 group of patients had more problems with condition of oral health ( $p < 0.05$ ). Objectively the clinical status of oral health was different between two groups. All indices in 1 group were significantly higher than in 2 group ( $p < 0.05$ ). Capillary functional resistant test showed lower results in 1 group ( $p < 0.002$ ). The pH of saliva was considerably lower in 1 group ( $p < 0.04$ ). Quantative and qualitative compound of anaerobes and Candida in 1 group was double higher than in 2 group ( $p < 0.05$ ).

**Conclusion:** The study showed that diabetes mellitus pregnant women have lower oral hygiene level and higher level of periodontal inflammation and caries than pregnant women without diabetes mellitus.

## P0347

### Relationship between tooth decay and aggressive periodontitis: A clinical study

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**Aim:** Aggressive periodontitis generally affects systemically healthy individuals and is characterized by a young age of onset, rapid rate of disease progression, and familial aggregation of cases. Dental caries is caused by the dissolution of enamel by acid-producing bacteria present in the biofilm. The Relationship between tooth decay and aggressive periodontitis has long been discussed. The aim of our study is to assess the presence of dental caries in patients with aggressive periodontitis.

**Material and Methods:** This is a cross-sectional study on a group of young patients in good general health, suffering from aggressive periodontitis. Information was collected on sociodemographic characteristics, oral hygiene and smoking habits. A microbiological sampling subgingival plaque, clinical parameters (pocket depth, attachment loss) and radiographic examination were also performed. Caries were detected and numbered by patient for the purpose of the study.

**Results:** The sample was comprised of 32 patients, aged 12–30 years. 100% of surveyed patients were non-smokers, and 9.4% of the sample doesn't brush their teeth at all. Our study showed no association between tooth decay and aggressive periodontitis.

**Conclusion:** Our study showed an inverse relationship between the presence of dental decay and aggressive periodontitis. Data from literature suggest that a low caries level is a useful clinical sign for the identification of aggressive periodontitis. This clinical sign could be used for diagnosis, especially in developing countries, where the microbial test is not always available, the periodontitis are common periodontal diseases and where differential diagnosis can be difficult in some situations.

## P0348

### Endoscopic-controllable SRP

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**Aim:** Periodontal Scaling and root planning (SRP) don't provide visual control. According to statistics, more than 20% of subgingival plaque remains after SRP, which linked with keeps of the inflammation. The purpose of the study was estimation of the efficiency of endoscopy controlled SRP.

**Material and Methods:** 20 patients with moderate chronic periodontitis in ages 30–45 years without any severe of somatic pathology were involved in the study. Patients of the main group (10 people) SRP were performed by manual and ultrasound scalers with endoscopic control in real-time mode. In the control group (10 patients) SRP was done using standard methods of control – tactile and control probing. Estimation of efficiency of treatment was performed by dental endoscope "Perioscopy" and based on recording frequency of subgingival plaque and the use of the modified indices OHI-S and PMA.

**Results:** After treatment, there was modified OHI-S  $0.3 \pm 0$ , in the main group and  $0.9 \pm 0.3$  for the control group. The baseline level of PMA index in the main group was  $18 \pm 4.5\%$ , while in the control  $16.6 \pm 2.5\%$ . 2 weeks after the SRP PMA

in the main group was  $3 \pm 1.5\%$ , while in the control  $6.4 \pm 2\%$ .

**Conclusion:** Visualization of pathological changes of the root surfaces during the SRP – is an effective method of optimizing the conservative treatment of chronic periodontitis. The only available method of visualization –endoscopic control – significantly increases the efficiency of SRP.

## P0349

### Role of interleukin-1 polymorphisms in the progression of periodontitis after non-surgical therapy with and without systemic antibiotics

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**Aim:** Studies have indicated that patients with periodontitis that are carriers of the polymorphisms IL-1A-889 or IL-1B+3954 are at higher risk for chronic periodontitis in the Caucasian population. The aim of the present study was to evaluate the prognostic value of the IL-1 genotypes on the progression of periodontitis after non-surgical therapy.

**Material and Methods:** Genomic DNA was obtained from 209 periodontitis patients who were part of a prospective longitudinal study analyzing the effects of non-surgical therapy alone (placebo) or in combination with systemic metronidazole plus amoxicillin (antibiotics). Single nucleotide polymorphisms at positions C (-889) T and C (+3954) T in the interleukin-1 gene were analyzed using real-time PCR. Periodontitis progression was assessed by the proportion of sites per patient with new clinical attachment loss (PSAL)  $\geq 1.3$  mm between baseline and the 27.5 month visit. Descriptive statistics were used and Median data and 25%/75% quantiles are presented.

**Results:** Antibiotics patients carrying the IL-1A-889C/T or IL-1B+3954C/T variation showed PSAL of 9.7% (3.0%/11.7%) or 10.8% (3.3%/20%) vs. non-carriers 7.3% (3.7%/11.5%) or 7.3% (3.9%/11.2%), respectively ( $p = 0.9013$  and  $p = 0.3733$ ). Placebo patients carrying the IL-1A-889C/T or IL-1B+3954C/T variation showed PSAL of 7.9% (4.7%/11.9%) or 10.3% (3.9%/12%) vs. non-carriers 8.7% (4.9%/13.2%) or 9.7% (5.4%/13.5%), respectively ( $p = 0.8307$  and  $p = 0.8804$ ).

**Conclusion:** Irrespective of the chosen therapy, the IL-1A-889C/T or IL-1B+3954C/T variations show no influence on periodontal disease progression. Therefore, from a clinical point of view, knowledge of the patients' genotype status is of questionable relevance. The patients were a subsample from AB-PARO. This trial was supported by Deutsche Gesellschaft für Zahn-, Mund und Kieferheilkunde-Research-Grant (No.62880362) and German-Research-Foundation (EH3651-1).

## P0350

### The effect of smoking on microbiological and clinical characteristics of patients with aggressive periodontitis

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**Aim:** Cigarette smoking represents a potential risk factor for the onset and progression of periodontal disease (tissues). Oral cavity has a large number of different types of microorganisms, and some are considered to be putative periodontal pathogens, such as *Aggregatibacter actinomycetemcomitans* (Aa), *Porphyromonas gingivalis* (Pg), *Prevotella intermedia* (Pi), *Tannerella forsythia* (Tf), *Treponema denticola* (Td). The aim of this study is to show any difference in the prevalence of periodontal bacteria, as well as the state of periodontal tissues in smokers and non-smokers suffering from aggressive periodontitis.

**Material and Methods:** The study included 46 subjects of both sexes, aged 25–47. There were 21 smokers and 25 non smokers. Assessment of oral hygiene and gingival inflammation was performed using FMPS and FMBS. Identifying the state of the deeper periodontal tissues was performed by probing depth, and determining the severity of periodontal tissue destruction was performed by using clinical attachment level. Microbiological assessment of swabs, taken from 5 deepest periodontal pockets, 5 putative periodontal bacteria (Aa, Pg, Pi, Tf, Td), was performed by PCR analysis.

**Results:** PCR analysis shows no significant difference in the prevalence of certain periodontal bacteria between smokers and non-smokers. There is no significant difference in FMPS and FMBS. CAL shows a significantly greater periodontal tissue destruction in smokers (4.01 compared to 3.47 in non-smokers).

**Conclusion:** There is no difference in the microbiological profile of patients with aggressive periodontitis between smokers and non-smokers. Periodontal tissue in smokers is destroyed to a greater extent.

## P0351

### Oral manifestations of epidermolysis bullosa: a case report

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**Aim:** Epidermolysis Bullosa (EB) is a group of rare inherited skin and mucous membrane disorder in which recurrent blister formation occurs as a result of structural fragility. In this case report, the intraoral findings of a patient who diagnosed and medically treated with EB was presented.

**Material and Methods:** A 14 year-old male applied our clinic with the complaint of oral wounds. EB simplex was diagnosed when he was two due to the dermatological examination and biopsies taken from skin bullae and blisters with scarring. No similar history was depicted in his family. Intraoral examination showed bullae formation at palate, labial mucosa and petechiae on tongue and scar formations. Also enamel hypoplasia and erosive tooth decays were examined. Phase I periodontal therapy including oral hygiene instructions, scaling and preventive flou-

ride application, treatment of decays were performed. Parents were suggested 3 months recall intervals.

**Results:** EB depicts a group of rare genetic disorders that involves the skin and mucous membrane by vesicle and bullae formation. The oral and dental manifestations of EB disrupt the patient's oral health and hygiene and exhibit a challenge for the dental professionals.

**Conclusion:** Dentists should consult with dermatologist for the differential diagnosis of EB if they encounter with blister formations in oral mucosa with skin, enamel hypoplasia and erosive tooth decays. Dental preventive programme with strict oral hygiene instructions for patients and parents along with frequent professional cleaning and fluoride therapy is important for EB patients.

## P0352

### Comparing the modified Bass vs. the Fones technique with regard to clinical and motivational factors – results of three RCTs

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**Aim:** Tooth brushing is important to sustain or regain oral health. However, little is known about which tooth brushing technique would be the best. In a series of three RCTs we thus compared two common techniques, the modified Bass and the Fones technique.

**Material and Methods:** Parallelized computer-based trainings of the modified Bass and the Fones technique were developed. Participants were randomly assigned to a training of basics of tooth brushing alone (control group) or to a training of the basics of tooth brushing plus the modified Bass vs. the Fones technique, respectively. Studies were run with students (N = 67), a random sample of 18 year olds (N = 70), and patients wearing fixed dentures (N = 79). Effects on oral cleanliness at gingival margins after thorough oral hygiene and on self-efficacy and decisional balance were assessed after 6, 12 and 28 weeks.

**Results:** In young adults significant ( $p < 0.05$ ) improvements of oral cleanliness after brushing as compared to controls were found in the Fones groups, only. In patients wearing fixed dentures Bass and Fones did not differ from each other. Similarly, in young adults psychological data improved only in the Fones group while Bass and Fones did not differ in patients wearing fixed dentures.

**Conclusion:** Though the modified Bass technique is often recommended the current studies indicate no meaningful advantage of this technique as compared to the Fones technique. Instead, it appears to be the inferior technique in young adults both with respect to oral hygiene skills and psychological parameters important for oral health behaviour.

## P0353

### Lateral periodontal cyst revealed by gingival swelling: case report and review of literature

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**Aim:** Lateral periodontal cyst is an uncommon development odontogenic cyst, representing about 0.4% of all odontogenic

cyst. Most cases are discovered on routine radiological examination since usually these lesions are initially asymptomatic. In this work a case of lateral periodontal cyst revealed by an asymptomatic gingival swelling is reported.

**Material and Methods:** A 50-year-old male patient was referred to department of oral surgery for an intraoral asymptomatic slowly growing nodular lesion that had been present for one year. The patient was in good general health without any remarkable past medical history. Intra oral examination showed a well-delimited gingival swelling located between the lower lateral incisor and canine. The mass was firm, painless to palpation, covered by normal mucosa. Periapical radiography revealed a well-circumscribed radiolucent, unilocular lesion, located in the andible laterally and between the lower lateral incisor and canine about 1.0 cm in diameter. Thermal test revealed pulpal vitality of the two teeth adjacent to the lesion. Periodontal examination excluded a lesion of inflammatory origin. Lateral periodontal cyst was the most likely clinical and radiological diagnoses. Under local anesthesia, complete surgical excision of the lesion was performed, without intracurrences.

**Results:** Histopathologically the lesion consisted of a cyst cavity lined by simple nonkeratinizing squamous epithelium. According to clinical radiographic, and histopathological features, a diagnosis of lateral periodontal cyst was established.

**Conclusion:** One of the features of greatest importance in the differential diagnosis is the fact that the associated teeth are vital. The treatment of choice is surgical removal.

## P0354

### Monitoring biomarkers in gingival crevicular fluid with multiplex bead immunoassay: a cross sectional study

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**Aim:** Cytokines, chemokines and growth factors play an important role in the pathophysiologic mechanisms involved in periodontal disease initiation and progression. Identifying biomarkers activity in gingival crevicular fluid (GCF) has become important in the diagnosis and treatment of periodontal diseases. The aim of this study was to determine the GCF levels of 27 biomarkers commonly involved in inflammatory processes in periodontal disease.

**Material and Methods:** Clinical examinations were performed and GCF samples were collected from 25 healthy, 24 gingivitis and 24 periodontitis patients. GCF samples were analyzed using multiplex bead immunoassay for 27 cytokines, chemokines and growth factors. Mann-Whitney U test was used to compare differences between groups.

**Results:** Interleukin (IL)-1 $\beta$ , IL-6, interferon-inducible protein (IP)-10, macrophage chemotactic protein (MCP)-1 and vascular endothelial growth factor (VEGF) levels were significantly higher in patients with periodontal disease while IL-15 levels were significantly higher in healthy subjects.

**Conclusion:** GCF is a good source to identify biomarkers in periodontal health and disease. Multiplex bead assays can be a useful tool in determining new biomarkers and better understanding the differences in cytokine profiles in periodontal disease and health. Within the limitations of this study IL-1  $\beta$ , IL-6, MCP-1, IP-10 and VEGF were identified as biomarkers

related with periodontal disease and IL-15 as a biomarker related with periodontal health.

## P0355

### Does Periodontitis weak the muscles? Cross-sectional analysis of the Study of Health in Pomerania (SHIP-2)

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**Aim:** The aim of this data analysis is to clarify the relationship between muscle strength and periodontitis in a representative population study.

**Material and Methods:** The subjects of an 11-year follow-up study (SHIP-2) were used for a cross-sectional study. The linear regression analysis included 2130 subjects declaring 1136 women and 994 men. Periodontally relevant variables were the clinical attachment loss, bleeding on probing and number of teeth, as well as additional predictors such as age, sex, weight and elevated blood sugar levels. Muscle strength was measured by hand grip strength of the subjects on the left and right hand.

**Results:** There are significant correlations between periodontal as well as additional predictors and grip strength. Muscle strength was significantly higher in men than in women and decreased with each passing year. Grip strength decreased in subjects with periodontal diseases, too. It increased with each remaining tooth. However, grip strength decreased with higher clinical attachment loss by 0.44 kg/mm in men and 0.19 kg/mm in women. These effects were evident in all weight classes but were more pronounced in subjects with BMI over 30 than in normal weight. However, the muscle strength increased with each BMI unit in men more than in women. It decreased in diabetes risk subjects compared to healthy subjects.

**Conclusion:** The periodontal disease is clearly a risk for the loss of muscle strength and muscle mass just as obesity and diabetes. Furthermore, it has to be clarified if decreasing muscle strength may also be a risk for periodontitis.

## P0356

### Role of periodontists in tobacco de addiction counselling – A pilot study

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**Aim:** Effectiveness of counselling as a part of tobacco de addiction measures is somewhat unexplored. This study documents that, such counselling can be performed by patients attending doctor and is especially effective when performed by oral health care professional. Aim: To study effect of counselling as a step in tobacco de-addiction measures. To comparatively evaluate the effects of counselling performed by dentists specialising in different branches of dentistry.

**Material and Methods:** Questionnaire survey- 1. A questionnaire survey was conducted to evaluate (i) the knowledge and attitude about tobacco consumption and (ii) effectiveness of the present anti tobacco campaign on Central Indian population. 2. This survey was conducted on 800 tobacco users. 3. A tobacco de-addiction counselling protocol was made and circulated amongst 180 dentists from different specialities of dentistry who

were attending to patients having oral complaints along with concurrent presence of tobacco induced oral conditions 4. The study was conducted over a period of one year. 5. Comparative analysis of effectiveness of counselling by different dental specialists was carried out.

**Results:** Periodontists were comparatively more effective (68%) than other dental specialists in tobacco de-addiction counselling.

**Conclusion:** Of the myriads of condition resulting from tobacco use the population was most aware of those affecting gums and teeth and sought the treatment for the same. This indicates that treatment demand (perception that need exists) and effective demand (action by the individual to have that need met) for periodontal treatment was fairly high amongst tobacco users. Our study documented that de addiction counselling when performed by the patients attending periodontist is especially effective.

## P0357

### Associated factors of tobacco cessation successful rate after second-generation cessation program in Taiwan

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**Aim:** Smoking is a well-established independent risk factor for periodontitis. The second-generation tobacco cessation program in Taiwan has been started since March 2012. We investigated the change of successful rate and associated factors that influence success in new cessation program.

**Material and Methods:** The participants for this retrospective study were recruited from 2011 to September 2013. All participants were collected with modified Fagerström test for nicotine dependence. Successful cessation was investigated by telephone survey three months after program end. The influence of medication-providing period on successful cessation was conducted by Cochran-Armitage test. The relation between successful rate and new cessation program was assessed using multivariate logistic regression.

**Results:** 143 participants in 1st generation cessation program and 247 participants in 2nd generation cessation program were involved. Smoking history including smoking period and cigarettes consuming per day showed no statistically different between two groups ( $p > 0.05$ ). In 1st generation, nicotine dependence and cigarettes consuming had significant negative correlation with successful cessation. In 2nd generation, only cigarettes consuming had significant negative correlation. Medication providing period was positively related to successful rate ( $p$  for trend  $< 0.0001$ ). The opportunity of smoking cessation was significantly higher after adjusting for confounding factors (Odd ratio [OR] 1.90, 95% confidence interval [CI], 1.19 to 3.05).

**Conclusion:** This retrospective study showed higher successful rate after new cessation program. Smoking cessation had a positive influence on periodontitis, dentist/oral hygienist may promote this program intensively to improve periodontitis occurrence and periodontal healing.

## P0358

### Clinical evaluation of relationship between rheumatoid arthritis and periodontitis

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**Aim:** Our aim is to clinical evaluate periodontal status to patients with rheumatoid arthritis. In addition we want to investigate if patients with rheumatic disease shows a pattern of more severe or accelerated periodontal destruction.

**Material and Methods:** 68 patients with rheumatoid arthritis (RA) were included in this study. Periodontal status was determined by measuring the periodontal pocket depth (PPD), attachment loss (CAL) and bleeding on probing (BOP). We calculated inflammatory gingival surface, periodontal inflamed surface area (PISA) and the total gum surface that can be affected by periodontitis, periodontal epithelial surface area (PESA). Periodontitis was defined into severe, moderate or low / absent. The activity of RA was defined as DAS28.

**Results:** The study population was 58.3 ± 14.9-old year with a ratio of 2: 5 between men and women. 31.2% of patients had high disease activity (DAS28 > 5.1) and 48.6% had moderate activity (3.2 < DAS28 ≤ 5.1). 87.6% of patients were treated with biotherapy. The average PISA was 304.9 mm<sup>2</sup> ± 333.6 and the ratio PISA / PESA was 35.1% ± 28.6. Our study shows that only 6% of patients had no periodontitis (or low periodontitis).

**Conclusion:** We found that more than half of the dental surfaces were covered by the plate. This high index can be explained by the important HAQ score (impotence due to illness) but also of oral hygiene habits deficient. In RA as in many arthritis, there is a breach of ATM and other body joints causing limitation of mouth opening and gross motor limitations.

## P0359

### Phenotypic analysis of B cells in gingiva and blood of patients with periodontitis: pilot study

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**Aim:** Periodontal diseases are inflammatory diseases with a predominant participation of B cells. The objective of this research is to characterize the phenotype of B cells in gingiva and blood of patients with periodontitis (chronic and aggressive). In order to understand their physiopathology, we seek to characterize immunological profiles of B cells in the various clinical forms of these diseases.

**Material and Methods:** We analyzed gingival explants and whole blood by flow cytometry of 5 patients suffering from periodontitis. We have distinguished chronic forms and aggressive forms. The recovery of gingival cells was carried out by simple grinding of gingival explants removed during surgery. The flow cytometry analysis following a 10 colors panel with gingival explants (RANK-L, CD45, CD27, CD38, IgD, DRAQ7, IgM, CD8, CD5, CD19), and three 9–10 colors panels in whole blood (B:RANK-L CD25 CD38, CD27, IgD, CD24, IgM, CD3, CD5, CD19, B1: RANK-L, CD43, CD5, CD27, CD11b, CD24, CD20, CD3, CD69; T:RANK-L, CD45RA, CD27, CD62L, CD38, CD3, CD4, CD8, CD25) were per-

formed immediately after sampling. The results on whole blood were compared with those of 3 healthy patients.

**Results:** The results highlight variable profiles depending on the patient. We suspect an increase of Bm5 subset in gingiva and blood, especially in switched B memory.

**Conclusion:** Conclusion This pilot study shows particular profiles of the B cells in patients with periodontitis. These profiles have to be specified and confirmed over a larger sample.

## P0360

### Quality of life and its correlation with dental and periodontal conditions in an adult population in Brazil

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Nova Friburgo/Brazil

**Aim:** The aim of this study was to evaluate oral health status of patients attending the Faculty of Dentistry of Federal Fluminense University-UFF in Nova Friburgo, Rio de Janeiro, Brazil, seeking to observe its relationship with the general condition of well-being and quality of life.

**Material and Methods:** This study was clinical, descriptive, cross-sectional. Patients were randomly selected. Sociodemographic, dental, periodontal and radiographic evaluation were performed. The questionnaire Oral Health Impact Profile (OHIP-14) was applied. Clinical and questionnaire data were transferred to Microsoft Excel and expressed as percentage and to SPSS Statistics 22.0, for analysis.

**Results:** Oral health conditions of 70 patients, 19 men and 51 women, with a mean age of 46.3 (±12.2) years, were evaluated. Average DMFT index was 20.7 (±7.5). 4 individuals in the sample were edentulous. 194 teeth were decayed (9%), 762 missing (36%), 502 filled (24%) and 654 healthy (31%). 30 individuals (43%) had gingivitis, 26 periodontitis (37%) and 14 periodontal health (20%). OHIP score was 7.7 (±4.9). 10 subjects made no correlation between oral conditions and OHIP questionnaire. The highest scores were observed in OHIP items shame (61%), discomfort to eat (65%), meal interruption (52%), unsatisfying diet (51%) and pain (51%). Pearson correlation analysis of OHIP and periodontal condition showed no significance. Correlations were positive for lost teeth and OHIP values ( $r > 0.57$ ,  $p < 0.005$ ).

**Conclusion:** OHIP-14 instrument showed links between oral condition and some items of the questionnaire, such as pain, discomfort and embarrassment and may be useful to assess quality of life associated with oral health.

## P0361

### Periodontal status in patients with rheumatoid arthritis

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**Aim:** There is a growing evidence in the association between oral health and autoimmune and inflammatory disease. The aim of our study was to evaluate the periodontal status of patients with rheumatoid arthritis (RA).

**Material and Methods:** The association between periodontal disease (PD) and RA was examined in 37 subjects with RA and PD (study group) and 46 healthy controls (with PD and without RA), matched by age and gender. Periodontal parameters included plaque index (PI), gingival index (GI), bleeding index (BI), probing depth (PD), and clinical attachment loss (CAL). Potential risk factors for periodontal disease, such as smoking, education, alcohol consumption, and body mass index (BMI), as well as chronic diseases associated with RA and periodontal disease were assessed. Laboratory parameters included the erythrocyte sedimentation rate (ESR) and protein C reactive protein (CRP). The significance between groups was determined using T-test,  $\chi^2$ -test, and Mann-Whitney test.

**Results:** The mean age were 52.1( $\pm$ 2.7) years and 48.2 ( $\pm$ 0.8) years for groups study and control, respectively. The mean percentages of sites with PD  $\geq$  4 mm were significantly higher in study group (3  $\pm$  5.2) than in control group (1.2  $\pm$  1.6) ( $p = 0.012$ ). The mean percentages of sites with proximal CAL  $\geq$  4 mm were 3.7( $\pm$ 4.4) in the study group and 2.1 ( $\pm$ 1.1) in the control group ( $p = 0.212$ ). The median ESR was 58 mm/h in the study group and 15 mm/h in the control group ( $p = 0.042$ ) and the median hs-CRP was 3.9 and 0.8 mg/l, respectively ( $p = 0.001$ ).

**Conclusion:** Patients with PD and RA present more periodontal attachment loss, higher marginal bleeding and poor oral hygiene than controls.

## P0362

### The assessment of GCF periodontal pathogens in patients with chronic kidney disease

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**Aim:** The periodontal disease may represent a risk factor in patients with chronic kidney disease; we proposed an evaluation of the periodontal pathogens in patients with periodontal disease, with and without chronic kidney disease.

**Material and Methods:** The periodontal status of the patients, divided in two groups (test group – with chronic kidney disease and a control group, without systemic diseases) was assessed by clinical examination and samples of gingival crevicular fluid were taken to detect the periodontal pathogens by Polymerase Chain Reaction methods.

**Results:** The frequency of the sites with probing depths  $\geq$  5 mm was lower in the control group. In the control group the most frequent pathogen was *Eikenella corrodens*, followed by *Porphyromonas gingivalis*, *Prevotella nigrescens*, *Treponema denticola*, *Tannerella forsythia* and *Fusobacterium nucleatum*. In this group we could not detect the presence of *Aggregatibacter actinomycetemcomitans* or *Prevotella intermedia*. In the test group the most frequent periodontal pathogen was still *E. corrodens*, followed by *P. gingivalis*, *T. denticola*, *T. forsythia*, *P. nigrescens*, *F. nucleatum*, *P. intermedia* and *A. actinomycetemcomitans*. Although the frequencies of these pathogens were higher in the test group, the significance level was obtained only for *P. gingivalis*, *T. forsythia* and *T. denticola*.

**Conclusion:** The red complex periodontal pathogens were more frequent in patients with chronic kidney disease. The high frequencies of aggressive periodontal pathogens and of severe forms of periodontal disease determine a rigorous approach in these patients, with frequent control visits.

## P0363

### Familial mediterranean fever and periodontal health

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**Aim:** Rheumatological and periodontal diseases are characterized by dysregulation of the host inflammatory response. Both diseases shares several clinic and pathogenic characteristics. The aim of this study was to determine the prevalence of periodontal disease among with familial mediterranean fever (FMF) in Gaziantep, to evaluate whether periodontal disease is related to attack period in patients with familial mediterranean fever and to determine the possible relationship between periodontitis and familial mediterranean fever.

**Material and Methods:** Fifty-one subjects with familial mediterranean fever (26 female and 25 male; mean age 27.24  $\pm$  12.08 years) were included in this study. Demographic, periodontal and rheumatological parameters were recorded. Patients' periodontal status were evaluated using the gingival index (GI), plaque index (PI), proping pocket depth (PPD) and clinical attachment levels (CAL).

**Results:** The results of this study showed that the percentage of patients with gingivitis was 66%, patients with chronic periodontitis was 18%, patients with periodontally healthy was 16% and the scores of gingival index was 1.34  $\pm$  0.37, plaque index was 1.56  $\pm$  0.57, proping pocket depth was 2.35  $\pm$  0.78 mm, clinical attachment levels was 2.40  $\pm$  0.84 mm. There were no statistically significant differences between FMF-AP (attack period) group and FMF-AFP (attack free period) groups regarding clinical periodontal parameters.

**Conclusion:** Within the limitations of this study we can say that periodontal parameters are not significantly affected in the attack period of familial mediterranean fever patients.

## P0364

### Insulin modulates the association between salivary levels of bone metabolism markers and periodontal status

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**Aim:** It is suggested that bone acts as an endocrine organ to regulate glucose metabolism, the relationship between bone and energy metabolism being dual. Here we examined receptor activator for nuclear factor  $\kappa$ -B ligand (RANKL), osteoprotegerin (OPG), osteocalcin (OC), and osteopontin (OPN) as potential biomarkers of periodontitis and whether the glycemic status and serum lipid profile relate to their levels and periodontal status.

**Material and Methods:** Altogether 220 subjects, divided in groups based on the number of teeth with deepened pockets (generalized periodontitis (GP), localized periodontitis (LP1 and LP2), and controls), were included. Alveolar bone margin from the mesial and distal surfaces of each tooth and furcation areas of molar teeth were measured on orthopantograms. Salivary RANKL, OPG, OC, OPN, and insulin were detected using the Luminex technology and commercial kits. In serum, glucose concentrations after 4 h fasting were measured with the hexokinase method, insulin concentrations with a radioimmuno-

assay kit, and cholesterol levels (total, HDL, LDL) enzymatically.

**Results:** Salivary OPG levels were elevated in GP and LP2 subjects compared to controls, whereas RANKL, OC, and OPN did not differ between the periodontal groups. A significant association was found between OPN and insulin in saliva. The association between increased OPG levels in saliva and GP was attenuated by salivary insulin.

**Conclusion:** Salivary levels of bone remodeling markers are prone to insulin in saliva, affecting the validity of RANKL, OPG, OC, and OPN as biomarkers of periodontitis in salivary diagnostics.

## P0365

### Correlations between diabetes and biomechanical resistance indices of the abutment teeth

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**Aim:** The aim of this study was to evaluate the correlations between diabetes and biomechanical indices of the abutment teeth in partial edentation.

**Material and Methods:** We have conducted a retrospective study based on the statistical analysis of the charts of 252 patients which received dental treatment upon request. The study group was formed out of 136 females and 116 males with ages between 26 and 65 years. For evaluating the general status of the patients we took into consideration the type of diabetes (I or II), the age of the disease and the followed treatment. At the oral level we have examined the odontal and periodontal status.

**Results:** The sex distribution of the sample population didn't present any statistical significance. The average age was 45 years. Out of the sample population 30 patients presented type 1 diabetes and 222 presented type 2 diabetes. The odontal affection degree was evaluated using the CAO indice and it was 12.82% increasing with age. Periodontal affection degree most frequently met in all patients was marginal chronic profound periodontitis.

**Conclusion:** Diabetes represents one of the most important risk factors which throughout the modifications they induce at the odontal and periodontal level decrease the indices of biomechanical resistance of the abutment teeth.

## P0366

### Bisphosphonate – associated osteonecrosis

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**Aim:** Bisphosphonates are the gold standard for treatment of metabolic osteopathies. However it has recently been reported about a lot of jaw osteonecrosis incidence cases in response to dental treatment in patients receiving bisphosphonates.

**Material and Methods:** Case report: Patient S., DoB: 1977, was treated for breast cancer and bone metastases in 2009. Cytostatic agents, antineoplastic antibiotics, bisphosphonates (Zometa, 4 mg as an intravenous infusion every 28 days during 3 years) were prescribed. She applied for dental treatment in 2013. Hyperemia and edema of alveolar mucosa around exposed cortical bone were detected 2 months after prosthetically indi-

cated alveolar bone excision in the area of tooth 46. Diagnosis: Bisphosphonate-related osteonecrosis of alveolar bone. Bisphosphonate treatment was interrupted, daily irrigation of the necrosis site with 0.05% chlorhexidine, chloramphenicol+methyluracil applications, course of bone-seeking antibiotics, systemic enzymes, 4 courses of fluorouracil, ozone therapy were recommended. Osteonecrosis focus (size 1.0×0.5×0.4 mm) separated in 10 months. Histopathologic Report: Osteocyte-depleted cortical bone fragment with loss of cement lines, degraded and homogeneous areas. Bone looks like homogeneous purple mass represented mainly by calcium phosphate.

**Results:** Surgical interventions of jawbones in patients receiving intravenous bisphosphonates for cancer may cause jaw osteonecrosis development. Bone-seeking antibiotics combined with systemic enzymes are necessary to treat osteonecrosis.

**Conclusion:** Patients receiving intravenous infusions of bisphosphonates should be treated with care and bisphosphonate treatment should be combined with systemic enzymes.

## P0367

### Zoledronic acid increases incidence and severity of osteonecrosis of the jaws in a collagen induced arthritis mouse model

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**Aim:** Rheumatoid arthritis (RA), an autoimmune inflammatory disorder results in severe bone and cartilage destruction. Bisphosphonates (BPs) are frequently utilized in RA management. However, BPs are associated with osteonecrosis of the jaw (ONJ). Here, using an ONJ mouse model, we are exploring interactions between RA and ONJ incidence and severity.

**Material and Methods:** 24 DBA1/J mice were divided in 4 groups: control, ZA (zoledronic acid), RA, and RA-ZA. Animals were pre-treated with vehicle or ZA. Periapical disease and RA was induced. Vehicle or ZA treatment continued for 8 weeks. RA development was assessed by visual scoring of paw-swelling and by micro-CT of interphalangeal and knee joints. ONJ indices were measured by micro-CT and histological examination.

**Results:** RA and RA-ZA groups developed severe arthritis. Interphalangeal and knee joints of RA mice revealed decreased BV, BV/TV, Tb.Th, and Tb.N and increased Tb.Sp. ZA treatment in RA-ZA animals strikingly reduced bone erosions and trabecular bone loss. Mandibles and maxillae of control and RA mice showed periapical bone loss, PDL-space widening, lamina-dura loss and buccal cortex thinning in the diseased site. ZA prevented these changes in ZA and RA-ZA groups. Epithelial to alveolar-crest distance was increased in the control and RA mice. This distance was preserved in ZA or RA-ZA animals. Interestingly, empty osteocytic lacunae and areas of osteonecrosis were present in ZA and RA-ZA but more extensively in RA-ZA animals, indicating more severe ONJ.

**Conclusion:** ZA protects inflammation-induced bone loss irrelevant of the initiating mechanism (infectious vs. autoimmune). ONJ incidence and severity were more pronounced in mice with RA.

## P0368

### The association between periodontal status and dyslipidemia via IL-1 profile

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**Aim:** Although there is strong evidence that suggests possible roles of specific IL-1 isoforms in the progression of periodontal disease-PD, the extent to which dyslipidemia influences the progression of PD or vice versa is not very clear yet. Our study aimed evaluating the role of interleukin 1 isoforms in this association, and the effect of periodontal treatment on interleukin levels.

**Material and Methods:** Fifty one patients, systemically healthy (n = 25) and dyslipidemic (n = 26) were examined through a detailed dental, periodontal and general exam, their systemic status being recorded through plasma lipid profile as well as serum and gingival fluid levels of IL-1 $\alpha$  and IL-1 $\beta$ .

**Results:** Both interleukin isoforms were significantly higher in gingival fluid than in serum suggesting that the local response seem to be predominant in patients with periodontitis. Following non-surgical therapy, the periodontal parameters were not improved significantly, but a tendency of decrease in probing depth and a mild improvement in the clinical attachment after 2 months, and more significant at 6 months follow-up session could be noticed. There was a correction for gingival fluid values of both IL-1 isoforms following periodontal treatment.

**Conclusion:** Our study showed that for both IL-1 isoforms, significantly increased levels could be found mainly in gingival fluid, turning this liquid into a valuable tool for monitoring the immune response of the periodontally impaired host. However, if blood sampling would be considered as additional indicator in parallel with periodontal evaluation, possibly measurements of lipid metabolic status rather than IL-1 levels, could be a better predictor for evolution of PD.

## P0369

### The odontal and periodontal status in a population with hemodialysis from the NE region of Romania

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**Aim:** The purpose of the study was to assess the op status in patients with end-stage CKD and hemodialysis, in correlation to the history of renal impairment.

**Material and Methods:** The present study was conducted on a number of 364 patients with end-stage CKD, who were following a hemodialysis regime, longer than 6 months. The data regarding the age, gender, environment, associated diseases were obtained from the clinical charts. The patients were submitted to an odontal and periodontal clinical examination. Each patient filled a questionnaire which offered data regarding the oral hygiene habits, diet, vicious habits and the presence/absence of xerostomia.

**Results:** The main cause for end-stage chronic kidney disease was a PKD, followed by diabetes mellitus and arterial hypertension. A high percentage of the patients presented severe chronic

periodontitis (with significant clinical attachment loss), deep carious lesions, tooth abrasion and terminal tooth loss. The questionnaire data revealed that a high percentage of the patients accused frequent xerostomia and also presented poor oral hygiene, correlated to the calculus deposits.

**Conclusion:** There is a close link between the systemic changes in the CKD patient and the oral manifestations. Even two of the main causes of CKD (hypertension and diabetes mellitus) exert important changes on the tissues in the oral cavity, leading to significant tooth loss and masticatory impairment, thus, to a poor quality of life.

## P0370

### Association of single nucleotide gene polymorphism at interleukin-1beta +3954 in chronic periodontitis patients with Inflammatory Bowel Disease: preliminary results

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**Aim:** The aims of the present study were to analyse interleukin (IL)-1beta (+3954) genotype and allele frequency in patients with inflammatory bowel disease (IBD) with those without IBD.

**Material and Methods:** The study consisted of 140 Brazilian individuals including 42 IBD patients (n = 23 with periodontitis, n = 19 without periodontitis) and 98 individuals without IBD (n = 52 with periodontitis, n = 46 without periodontitis). DNA was obtained through an oral mucosa scraping. Real-Time PCR was used to identify the single nucleotide polymorphism at IL-1beta +3954 C/T (rs 1143634). Differences in the allele and genotype frequencies were assessed by Chi-square test (p < 0.05).

**Results:** All three genotypes were observed both in IBD (CC = 69.4%; CT = 25.5%, TT = 5.1%) and non-IBD subjects (CC = 66.7%; CT = 30.9%, TT = 2.4%). The distribution of genotypes and allele frequencies for IL-1 beta (+3954) were similar between IBD and non-IBD subjects (p = 0.65). Subjects with periodontitis had a significantly higher frequency of the polymorphic allele than subjects without periodontitis both in IBD (60.9% vs. 10.5%; p = 0.001) and non-IBD subjects (42.3% versus 17.4%; p < 0.001).

**Conclusion:** These preliminary results showed that the presence of periodontitis is associated with the carriage of the IL-1 beta +3954 T allele in Brazilian individuals. The presence of inflammatory bowel disease did not increase the frequency of this association.

## P0371

### Abnormal collagen fibrils presence in hereditary gingival fibromatosis with a high recurrence rate – report of a case

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**Aim:** Introduction Gingival fibromatosis (GF) is an abnormal, diffuse or localized growth of gingiva. Hereditary gingival

fibromatosis (HGF) may manifest as an autosomal-dominant or, less commonly, an autosomal-recessive mode of inheritance, as an isolated disorder or as part of a syndrome.

**Material and Methods:** Case report A 11-year-old girl reported to the clinic with a lesion that caused difficulties with mastication, speech and oral hygiene maintenance. Patient did not use any medications that would induce overgrowth, however the presence of GF was found in patient's grandfather, mother and sister. Patient underwent surgical excision of the lesion. Gingival biopsies were used to perform molecular and microscopic analyses of the lesion.

**Results:** Discussion Control examination shown complete recurrence of the lesion two weeks after treatment. Fibroblasts proliferation and collagen I expression were significantly higher as compared to controls ( $p < 0.0001$ ,  $p < 0.00001$ ). The overall content of collagen was also more prominent than in controls. The structure and organization of collagen fibrils from HGF patient differed significantly from controls and other family members with GF and resembled fibrils of fibrotic lesions.

**Conclusion:** We report a case of a 11-year-old patient with an uncommon form of HGF characterized by a high recurrence rate and the presence of atypical collagen fibrils. The analysis of collagen fibrils structure by employing transmission electron microscopy (TEM) is a valuable tool to study the pathogenesis of GF. Its consideration as a diagnostic tool seems to be interesting. Further studies will verify whether the presence of abnormal collagen fibrils is related to the prognosis of the condition.

## P0372

### Construction of a structure for the replication of intraoral images: preliminary results on its application to computerised quantification of stained dental plaque

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**Aim:** To design and construct a completely adjustable Structure for the Replication of Intraoral images (SRI-images) of stained dental plaque, and assessing the system validity.

**Material and Methods:** The design of the SRI-images was based on ensuring the positional standardisation of all its components and the following features: system stiffness and stability, adjustment of its different parts in the highest number of possible locations, capacity to numerically record them and ease to use and transport. The amount of disclosed plaque on frontal and lateral vestibular surfaces from five subjects was calculated through computerised planimetric analysis, and correlated to the values provided by the Turesky plaque index, after three different situations: a 48-h period without oral hygiene, a 40-s manual toothbrushing, and a dental prophylaxis.

**Results:** The SRI-images allowed a wide range of quantifiable shifts on each of its components. The structure configuration was supported by a cross-shaped framework, with a principal crossbeam on which a chin rest, a lighting frame and a camera rest were placed. The amounts of dental plaque from the three experiments were:  $22.80 \pm 14.44\%$ ,  $8.38 \pm 4.20\%$  and  $4.12 \pm 2.28\%$ , respectively. These percentages and the Turesky index punctuations were positively correlated.

**Conclusion:** With the SRI-images it was possible the capture of standardised intraoral frontal and lateral facial images, over-

coming the greatest limitation of these techniques, which was the impossibility to replicate intraoral images other than the intercanine region. Besides, the preliminary results of planimetric analysis were consistent with those achieved by the conventional plaque index.

## P0373

### Microbiological rationale for root canal treatment of teeth with endoperio lesions and secondary endodontic involvement

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**Aim:** To prove necessity of endodontic treatment of teeth in patients with endoperio lesions and secondary endodontic involvement.

**Material and Methods:** GI, electro-odonto-diagnosis, periodontal pocket depth (PD) were used to assess condition of periodontium and pulp in 70 patients of 28–60 y.o. Alveolar bone was evaluated using cone-beam computerized tomography (CBCT). The main group included 50 teeth with retrograde pulpitis in severe generalized periodontitis patients. Control group consisted of 20 teeth in periodontally healthy patients with pulpitis. PCR was used for microbiological evaluation of content of periodontal pocket (PP) and of root canal (RC).

**Results:** Periodontal pathogen detection rate in patients of the main group was as follows: P. i. RC – 26.9% and PP – 26.9%; T. f. RC – 57.7% and PP – 46.2%; T. d. RC – 26.9% and PP – 26.9% A. a. RC- 50%, PP – 61.5%. P. g. RC- 53.5% and PP – 53.8%. Patients of the control group showed the following rate of periodontal pathogen detection: P. i. RC and gingival sulcus (GS) – 0%. T. f. RC- 8.3% and GS – 0%; T. d. RC and GS – 0%. A. a. RC – 16.7% and GS – 25%; P. g. RC- 16.7% and GS- 16.7%.

**Conclusion:** It was established that microbial composition of content of root canals surrounded by deep bone defects is identical to microflora of a periodontal pocket. Thus root canal treatment for secondary endodontic involvement is indispensable before surgery.

## P0374

### Modelling of periodontal attachment lost from microCT data

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**Aim:** The lost area of periodontal attachment is important to estimate the prognosis of a tooth. The aim of this study was to create a statistical model to estimate the lost area of periodontal attachment from percentage of root length.

**Material and Methods:** Five extracted mandibular first bicuspids were scanned by micro-computed tomography and reconstructed 3-dimensionally by using Skyscann software packages. A number of microCT 2D tomography slices 19.14  $\mu\text{m}$  thick were obtained from the region of the dental root comprised between the apical limit of connective adherence and the apical point of the root (ROI). The lateral area of each root slice was estimated by planimetry method and converted to a percentage of total ROI area, thereafter the cumulative amount of

percentage of periodontal ligament lost was calculated. Different regression models were fitted to data and statistics procedures were performed for the evaluation and comparison of models.

**Results:** The best predictor model was an eighth degree polynomial function with parameters estimated by maximum-likelihood method. The model was statistical significant for a 95% confidence level ( $p = 0.0498$ ), well fitted ( $R^2 = 0.99$ ), and well balanced between the goodness of fit of the model and the complexity of the model ( $AIC = 1.43$ ), when compared with the other models.

**Conclusion:** These results allow us to conclude that it is possible to obtain a good estimate of the area of periodontal lost adherence for the mandibular first bicuspid. The selection of models should take into account the various features.

## P0375

### Epigenetics and periodontitis- is there a link?

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**Aim:** The aim of this presentation is to review the literature on the relationship between epigenetics and periodontitis

**Material and Methods:** A literature search on MEDLINE and EMBASE using the keywords: epigenetics, DNA methylation, histones, acetylation and periodontitis identified 72 papers, 13 of them being clinical studies

**Results:** Epigenetics may be defined as the heritable changes to phenotype that are due to mechanisms not directly related with the underlying DNA sequence, that have the ability to turn genes on, off or fine-tune their expression. Epigenetic changes can contribute to the development of cancer, autoimmune or inflammatory diseases, including periodontitis. Collectively, gingival tissues from periodontitis patients seem to have altered epigenetic patterns, particularly at inflammation-related genes. Several studies identified significant differences in DNA methylation variation in pro-inflammatory genes, including cytokines (IL-6, IL-8, IL-10, IFN- $\gamma$ , TNF- $\alpha$ ), cytokine receptors, receptor antagonists, growth factors, transcription factors, and cell membrane proteins, and other genes implicated in the immune response. Methylation variations in the key genes of T cell differentiation were also detected. Few studies are available on histone modifications in periodontitis. Limited research has been done using HDAC or DNA methylation inhibitors as treatments (Epidrugs) for periodontitis.

**Conclusion:** Knowledge of the role of epigenetics in the development of periodontitis is still limited. The literature highlights that epigenetic changes occur in the oral mucosa in response to bacteria and the inflammatory processes and may influence the development of periodontitis. Future studies using epigenetics as a treatment option may improve or personalize treatment approaches to periodontitis patients.

## P0376

### Aclasta<sup>®</sup> impact on jawbone in rats

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**Aim:** Determine experimentally maximum tolerated dose that promotes the risk of development of bisphosphonate-induced osteonecrosis of jawbones

**Material and Methods:** Experiments were made in 30 female Wistar rats, aged 1 year, mean weight:  $399 \pm 0.2$  g. Rats were treated according to GLP protocol. Animals were divided into three groups. The 1st group (10 rats) was healthy control. In the 2nd group (10 rats) ovaries were removed and Aclasta (0.4 ml) was injected. In the 3rd group surgery was imitated and 0.4 ml of Aclasta was injected. One lower incisor was extracted in all rats from all groups. Animals were decapitated after 14 days and histology samples of jaw and femoral bones were prepared.

**Results:** Two months after the injection half of the rats from the 2nd group developed coagulation osteonecrosis with subsequent development of chronic inflammation and partial resorption of bone. According to the results of morphological evaluation, extensive site of lower jaw necrosis was defined. Signs of bone loss of different extent were observed, that was more evident in compact bone. Cellular components and vessels were not detected in compact osteocyte-depleted bone and its canaliculi, only homogeneous eosinophilic mass of tissue debris were observed. Increased number of vessels, relatively numerous hysteocytes, and, to the lesser extent, neutrophils were detected in interosseous space. Bone elements with multiple resorption lacunae, increased number of osteocytes and signs of periosteocyte osteolysis.

**Conclusion:** Intravenous injection of zoledronic acid in 10 fold therapeutic dose (0.4 ml/kg leads to jawbone osteonecrosis development in rats after ovariectomy.

## P0377

### Oral health and salivary (MMP-8) chair side- test in adolescents

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**Aim:** Our aim was to investigate if salivary chair-side point-of-care test Periometer based on collagenase-2 (MMP-8) immunoassay finds patients with oral inflammatory burden.

**Material and Methods:** This study was carried out in Kotka Health Center, Finland. First, Periometer chair side-test was performed to participants (adolescents aged 15–17 year-old,  $n = 30$ ), and the result was read based on color change within 5 min. Secondly, oral health was examined including periodontal examination. Clinical parameters between test positive and negative participants were compared. The study protocol was approved by the Ethics Committee of Helsinki University Central Hospital, Helsinki, Finland. Results were analyzed with SPSS statistical program by cross tabulation, Fisher's Exact Test.

**Results:** Of the participants 8 of 30 were test positive. Their median (95% CI) values for VPI%, BOP%, PPD (number of  $\geq 4$  mm pockets) were 22.5% (11.1–51.2), 20.9% (10.0–45.4), 11.5 (6.5–20.1,  $p = 0.014$ ), respectively. Respective values for test negative subjects were 9.0%, (7.6–17.7), 8.8% (7.4–15.7), and 0.5 (0.5–2.1).

**Conclusion:** Periometer chair side-test analyzing salivary MMP-8 showed promising results in recognition of oral inflammatory burden in this preliminary study in adolescents.

**P0378****Periodontal health of athletes participating in the London 2012 Olympic Games**

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London/United Kingdom

**Aim:** To assess the periodontal health of athletes participating in the London 2012 Olympic Games.

**Material and Methods:** Following informed consent, cross-sectional survey of the oral health of participating athletes presenting to the Olympic Polyclinic including Basic Periodontal Examination (BPE) and questionnaire. Ethics registration 12/YH/0187. All athletes were eligible other than those for whom periodontal probing was contraindicated.

**Results:** 302 athletes were recruited from 25 sports, median age 25 years (range 16–47), 57% male. Proportion of athletes with worst BPE finding were: gingivitis (BPE1-2) 75.9%, periodontitis (BPE 3-4) 15.1%, periodontal health (BPE = 0) 9%. At least half the sextants were affected by gingivitis or periodontitis in 76.8% and 13.3% athletes respectively. In relation to health behaviours, 46.5% athletes had not received a dental examination or scaling within 12 months, 79.1% used a manual and 20.2% a powered toothbrush with 26.3% carrying out daily interdental cleaning. No health behaviours were associated with periodontal status. In terms of ethnicity, white athletes had better periodontal health than either black ( $p = 0.006$ ) or 'other' athletes ( $p = 0.001$ ).

**Conclusion:** The periodontal health of this sample of young elite athletes was poor. Further research is needed to establish the causes with an understanding of the complexity of determinants of health in the elite athlete population. In view of the impact of periodontal disease on quality of life and systemic inflammation, the possible impact of these conditions on athletes' health, well-being and performance should be investigated.

**P0379****Standards for reporting chronic periodontitis prevalence and severity in epidemiologic studies- Proposed standards from the Joint EU/USA Periodontal Epidemiology Working Group**B. Holtfreter<sup>1</sup>, J.M. Albandar<sup>2</sup>, T. Dietrich<sup>3</sup>, B.A. Dye<sup>4</sup>, K.A. Eaton<sup>5</sup>, P.E. Eke<sup>6</sup>, P.N. Papapanou<sup>7</sup>, T. Kocher<sup>1</sup>

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**Aim:** Periodontal diseases are common and their prevalence varies in different populations. However, prevalence estimates are influenced by the methodology used, including measurement techniques, case definitions, and periodontal examination protocols. These methodological differences impede comparisons of study results between populations, and hamper inferences regarding the global variation in periodontal disease prevalence.

**Material and Methods:** To overcome these limitations, the authors suggest standardized principles for the reporting of the prevalence and severity of periodontal diseases in future epidemiological studies.

**Results:** These principles include the comprehensive reporting of the study design, the recording protocol, and specific subject-related data. Further, a range of periodontal data should be reported in the total population and within specific age groups. The periodontal parameters should include the prevalence and extent of clinical attachment loss (CAL) and probing depth (PD) on site and tooth level according to specific thresholds, mean CAL/PD, the CDC/AAP case definition, and an assessment of periodontal inflammation, preferably bleeding on probing.

**Conclusion:** Consistent implementation of the proposed standards in future studies will minimize inconsistencies due to reporting, and may permit meaningful comparisons of the prevalence of periodontal diseases across populations. This could provide better insights into the determinants and risk factors of periodontal diseases.

**P0380****Significance of a simplified method for periodontal risk assessment in predicting periodontitis recurrence during supportive periodontal therapy: a retrospective cohort study**L. Minenna<sup>1</sup>, R. Farina<sup>1</sup>, L. Checchi<sup>2</sup>, V. Checchi<sup>3</sup>, M. Nieri<sup>4</sup>, L. Toselli<sup>1</sup>, A. Zaetta<sup>1</sup>, L. Trombelli<sup>1</sup>

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**Aim:** To evaluate whether patient-related risk scores generated with a simplified method for periodontal risk assessment (UniFe; Trombelli et al. 2009) may predict periodontitis recurrence during supportive periodontal therapy (SPT).

**Material and Methods:** At 2 clinical centers, data were retrospectively obtained from the record charts of 109 patients (age range: 22–62 years). According to the individual treatment plan, patients had undergone active periodontal therapy (APT) and had been enrolled in a SPT program for a mean of  $5.6 \pm 2.2$  years. Patient-related risk scores referred to the first visit following APT were calculated on a scale from 1 (low risk) to 5 (high risk) according to UniFe. Patients were grouped according to risk scores and compared for tooth loss as well as changes in radiographic bone levels and pocket probing depth (PPD) occurred during SPT.

**Results:** After APT, 5, 6, 20, 65, and 13 patients showed a risk score of 1, 2, 3, 4 and 5, respectively. The mean number of teeth lost during SPT ranged from 0 to  $1.8 \pm 2.5$  teeth in patients with a risk score of 1 and 5, respectively ( $p = 0.041$ ), with a mean yearly rate between 0 (risk score 1) and  $0.32 \pm 0.51$  teeth/year (risk score 5) ( $p = 0.053$ ). Mean bone loss and PPD increase during SPT were both  $\leq 0.50$  mm in all risk groups, without inter-group differences.

**Conclusion:** Within its limits, the present study indicate that risk assessment according to the UniFe method may help to identify patients at risk for tooth loss during SPT.

**P0381****Alcohol use and development of periodontal disease  
A four-year longitudinal study**

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**Aim:** To study the association between alcohol use and development of infectious periodontal disease in a four-year longitudinal study.

**Material and Methods:** The study comprised 178 subjects, who participated in both the Health 2000 Survey and the Follow-up Study on Finnish Adults' Oral Health and who did not have any deepened periodontal pockets at the baseline examination. They were aged 30 years or older, non-diabetics, non-smokers, and non-rheumatics. The extent of periodontal infection at the follow-up was measured by means of the number of teeth with deepened periodontal pockets  $\geq 4$  mm and alcohol use was measured by means of quantity (grams/week) and frequency of alcohol consumption at the baseline examination. Incidence rate ratios were measured using negative binomial regression models.

**Results:** Overall, alcohol use did not associate with periodontal disease development. In the adjusted negative binomial regression analysis, more frequent and high alcohol intakes (grams/week) were found to be inversely associated with periodontal pocketing. A more or less 'U shaped curve' was found between different amounts of alcohol intake and development of periodontal pockets. However, these associations were not statistically significant.

**Conclusion:** This study showed that alcohol use did not associate with increased risk of periodontal disease.

**P0382****Antimicrobial activity of betel against gram-positive and gram-negative bacterial**

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**Aim:** The main goal of this study was to evaluate in vitro antimicrobial activity of the betel with and without tobacco against *Escherichia coli* and *Staphylococcus aureus*. These represented models Gram-negative and Gram-positive bacteria respectively.

**Material and Methods:** The study was performed in vitro by using 10 balls of betel (5 with tobacco and 5 without tobacco). The balls were placed in a sterile stomacher bag containing (30 ml) of Ringer and were mashed in a simulator of mastication (Stomaker). Aliquots were plated onto Trypticase Soy Agar (TSA) for viable microbial counting. The suspension obtained was then filtered through a 2  $\mu$ m pore-size filter. The antibacterial potential of the drug was tested. Susceptibility to the antimicrobial agents was determined using the broth microdilution method in Mueller-Hinton broth for bacteria and RPMI for *C. albicans* as recommended by the Clinical Laboratory Standards Institute (CLSI) and expressed as Minimal Inhibitory Concentration (MIC). Time-Kill Kinetics for betel with and without against *S. aureus* and *E. coli* were studied. All experiments were performed in triplicate.

**Results:** Although betel was initially highly contaminated by different types of bacteria, mainly Gram-positive, it has the ability to partially inhibit *S. aureus* growth. On the contrary, in some cases tobacco-containing betel resulted to be an enhancer of bacterial growth. Data reported pointed out the different effect that betel can play on oral bacterial population

**Conclusion:** The data suggest that betel can act in different ways on oral bacterial populations.

**P0383****Association between salivary lactate dehydrogenase activity and periodontal parameters of young adults in a large-scale epidemiological survey**

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**Aim:** A new test kit to assess salivary lactate dehydrogenase (LDH) activity within 1 min has been developed. The aim of this study was to investigate the association between salivary LDH activity and periodontal parameters of young adults in a large-scale epidemiological survey.

**Material and Methods:** A total of 1946 university students (995 males and 951 females) were included in this analysis. Community Periodontal Index (CPI), Calculus Index-Simplified (CI-S), Debris Index-Simplified (DI-S) and the percentage of bleeding on probing (%BOP) of representative 10 teeth were examined. After collecting unstimulated saliva, LDH activity was evaluated in real time using the kit (a colour-changing sheet on a scale of 1–10). Un-paired t-test or Chi-squared test was used to examine any significant differences ( $p < 0.05$ ) between the high ( $\geq 8$ ) and low ( $< 8$ ) LDH groups. Odds ratio (OR) and 95% confidence interval (CI) were calculated using a series of logistic regression models.

**Results:** LDH activity was related to gender, probing pocket depth (PPD)  $\geq 4$  mm, %BOP, CI-S and DI-S ( $p < 0.05$ ). According to logistic regression analysis, the high activity of LDH was associated with the presence of PPD  $\geq 4$  mm (OR: 2.874; 95%CI: 1.825–4.572;  $p < 0.001$ ), %BOP (OR: 1.015; 95%CI: 1.006–1.025;  $p < 0.01$ ) and DI-S (OR: 2.624; 95%CI: 1.419–4.852;  $p < 0.01$ ).

**Conclusion:** Using a new test kit, salivary LDH activity was related to periodontal parameters of young adults in this large-scale epidemiological survey.

**P0384****Impact of supportive periodontal therapy on periodontal prognosis as assessed with a simplified method for risk assessment: a retrospective cohort study**

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**Aim:** To evaluate the impact of supportive periodontal therapy (SPT) on periodontal prognosis, as assessed with a simplified method (UniFe; Trombelli et al. 2009).

**Material and Methods:** At 2 clinical centers, data were retrospectively obtained from the record charts of 109 patients (age range: 22–62 years). According to the individual treatment plan, patients had undergone active periodontal therapy (APT) and had been enrolled in a SPT program for a mean period of  $5.6 \pm 2.2$  years. At the completion of APT (T1) and the most recent SPT visit (T2), patient-related periodontal risk scores were calculated according to UniFe on a scale from 1 (low risk) to 5 (high risk).

**Results:** The mean risk score was  $3.7 \pm 0.9$  and  $3.7 \pm 1.0$  at T1 and T2, respectively, with no significant difference between T1 and T2. Also, no significant difference in the distribution of patients according to risk score were observed between time intervals. Patient mobility through risk groups from T1 to T2 was observed, with 21% of patients showing a decrease in risk score (–1 score: 16%; –2 scores: 3%; –3 scores: 2%), while 28% showing an increase (+1 score: 26%; +2 scores: 2%). The increase in risk scores was mainly due to an increase in the severity and extension of bone loss and probing depths as well as an increase in full mouth bleeding scores.

**Conclusion:** In general, SPT may be effective in preserving patient-related periodontal prognosis following APT. When occurs, worsening of periodontal prognosis is mainly due to the recurrence of the clinical signs of the disease.

## P0385

### Assessment of occlusal grinding characters of patients with periodontitis

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**Aim:** The occlusal trauma is generally considered as a co-factor involved in the pathogenesis of periodontitis. However, significance of defining variety of occlusal trauma for occlusal rehabilitation of periodontal disease is still under discussion. Present clinic study aim to evaluate the relationship of occlusal grinding pattern to periodontal status of teeth with periodontitis.

**Material and Methods:** Our case-controlled and prospective clinic trials compared occlusal grinding characters of subjects with periodontitis and those with healthy periodontia by using the bruxChecker and T-Scan. Clinical attachment loss (CAL) and mobility of teeth are examined and periodontal bone volume loss (PBVL) is evaluated by CT examination. Further correlation between of change of occlusal grinding pattern and CAL of teeth are evaluated for patients following orthodontic treatment.

**Results:** Results show that group grinding patterns (cannier - premolar- molar) were more frequently found in patients with periodontitis, whereas more cannier dominant grinding patterns in healthy periodontia. Significant CAL and PBVL are found on teeth with both of wear facet and grinding facet on brux-Checker comparing to teeth with no signs of these. Increased CAL, PBVL and mobility are also detected in molars with mediotrusive grinding occlusion pattern by either BruxChecker or T-Scan. Patients who following orthodontic treatment change cannier dominant grinding pattern and maintain stable CAL and mobility of teeth in 10 years after orthodontic treatment.

**Conclusion:** Tooth loading in mediotrusive movement pattern may contribute to acceleration of breakdown of periodontal tissue. Beside aesthetic approach, detecting occlusal trauma and establishing functional occlusion are important for orthodontic treatment of periodontal disease.

## P0386

### Dentin tubules oblitative capacity of two toothpastes: in vitro SEM and EDX analysis

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**Aim:** Evaluate the obliteration of dentinal tubules after using two toothpastes using scanning electron microscopy (SEM) and Xray spectroscopy by energy dispersive (EDX)

**Material and Methods:** Five extracted human third molars were collected and stored in formalin solution. Five dentin discs were obtained (1 mm). Each dentin disc was sectioned into four quarters and stored in artificial saliva. All samples were etched (acid citric 6%/2 min) and distributed into four groups each one containing five samples and different treatments: G1 without treatment; G2 brushed with artificial saliva; G3 brushed with OralB® ProExpert; G4 brushed with Sensodyne® Repair&Protect™. The G2, G3 and G4 surface were brushed twice daily/30 s/14 days. Samples from each group were SEM and EDX examined. Tubule occlusion was quantified by two independent blind examiners and evaluated on a scale of increasing obliteration from 1 to 6. Statistical analysis was performed using Kruskal-Wallis and Mann-Whitney test (CI 95%)

**Results:** G1 showed the lowest occlusion rate ( $1.6 \pm 0.548$ ) and the G4 had the highest ( $4.8 \pm 1.095$ ). G2 and G3 showed, respectively,  $\pm 3.42 \pm 1.414$  and  $1.304$ . Comparison between groups showed statistically significant differences ( $p < 0.05$ ) between G1 G2 ( $p = 0.016$ ), G1 G4 ( $p = 0.007$ ) and G2 G4 ( $p = 0.042$ ). According to the EDX analysis, Ca and P were the main elements detected on the samples surface, with the highest incidence in G3 and G4

**Conclusion:** Both toothpastes tested demonstrated ability to promote obliteration of the dentin, with Sensodyne Repair & Protect™ revealing a more consistent pattern of tubular occlusion

## P0387

### Assessment of periostin levels in serum and gingival crevicular fluid of patients with periodontal disease

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**Aim:** Periostin, a secreted adhesion molecule essential for periodontal tissue integrity, is highly expressed in the periodontal ligament and plays a critical role in tooth and bone development. The purpose of this study was to investigate periostin levels in the gingival crevicular fluid (GCF) and serum of patients with periodontal disease and compare them with those of healthy individuals.

**Material and Methods:** Eighty individuals were enrolled in the study. Individuals were divided into three groups following clinical and radiographic examinations: the periodontal-healthy group ( $n = 20$ ), gingivitis group ( $n = 30$ ), and chronic periodontitis group ( $n = 30$ ). GCF and serum samples were collected and periostin levels were determined using the enzyme-linked immunosorbent assay.

**Results:** The total amount and concentration of periostin decreased in the GCF with the progression and severity of the disease from healthy control to gingivitis and to chronic periodontitis groups and differed significantly ( $p < 0.05$ ). However, there was no significant difference in serum periostin concentration within all groups ( $p > 0.05$ ). When all the clinical groups were examined together, periostin concentration negatively correlated with CAL and GI; moreover, total periostin positively correlated with periostin concentration and CAL ( $p < 0.05$ ).

**Conclusion:** GCF periostin levels decreased proportionally with the progression and severity of periodontal disease, and negatively correlated with the clinical parameters. Within the limits of the study, periostin level in the GCF can be considered as a reliable marker in the evaluation of periodontal disease susceptibility and activity.

## P0388

### Aggressive periodontitis: a diagnostic dilemma?

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**Aim:** The clinical diagnosis of Aggressive Periodontitis (AgP) can often be a diagnostic dilemma, with patients presenting with overlapping features of Chronic Periodontitis (CP). Whether AgP is a separate disease or a rapidly progressing form of CP in certain genetically susceptible patients has been discussed. Moreover, whether the inappropriate diagnosis of AgP over CP impacts the management and outcomes for successful treatment has been debated. The use of adjunctive systemic antibiotics to supplement treatment has shown to have a positive impact in patients with AgP. However, we question whether patients who do not meet the strict criteria of AgP should be treated initially without antibiotics; focussing instead on modifying risk factors. This article presents a case series of patients diagnosed with AgP outlining their clinical and radiological features, and appropriateness of the diagnoses and treatment plans discussed amongst different Restorative clinicians.

**Material and Methods:** 10 patients seen on Consultant clinics within a teaching Hospital were diagnosed with AgP and treatment planned for periodontal treatment based on the aetiology of the condition.

**Results:** The diagnosis of AgP can be challenging to define, with variations in diagnosis and management strategies seen amongst different clinicians within our department.

**Conclusion:** The diagnosis and management of AgP is influenced by multiple factors. Although most clinicians felt that localised AgP was a separate clinical entity, the distinction between generalised CP and AgP was not always easy to differentiate. The decision to manage AgP cases with adjunctive antibiotics should be made on an individual case-by-case basis.

## P0389

### Systemic inflammatory markers in periodontitis

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**Aim:** To evaluate the systemic levels of inflammatory markers, specifically HMGB-1 and S100 A12, in periodontally healthy individuals and chronic periodontitis patients.

**Material and Methods:** 18 systemically healthy persons, 10 periodontally healthy individuals and 8 chronic periodontitis patients, were recruited as part of an ongoing observational study. Peripheral blood samples were collected from each participant by venipuncture. Blood samples were collected twice from each participant, at two different time points 1–2 weeks apart. Samples were processed to prepare serum, and aliquoted and stored at  $-80^{\circ}\text{C}$ . Aliquoted serum samples were analysed for HMGB-1 and S100A12 levels using commercially available ELISA kits following the manufacturer's instructions.

**Results:** Statistical analysis of the preliminary data showed that there was no statistically significant difference in the levels of S100A12 and HMGB-1 within groups at different time points. The mean HMGB-1 and S100A12 levels in the periodontally healthy group were 2.40 ng/ml and 101 ng/ml respectively. In the chronic periodontitis group the mean levels of HMGB-1 and S100A12 were 2.95 ng/ml and 146 ng/ml. Although the levels of both inflammatory markers were higher in the chronic periodontitis group, they were not statistically significantly different from the levels in the periodontally healthy group ( $p = 0.263$  for HMGB-1 and  $p = 0.086$  for S100A12).

**Conclusion:** Within the limits of this pilot investigation, the systemic levels of HMGB-1 and S100A12 did not differ significantly between periodontally healthy individuals and chronic periodontitis patients.

## P0390

### The histologic comparison of bone with peripheral giant cell lesion and native bone for dental implant placement: a case report

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**Aim:** Peripheral giant cell granuloma (PGCG) is a reactive lesion that occurs on the gingiva or alveolar mucosa and contains numerous giant cells. Different local causal factors have been associated with this type of lesion. The aim of this case was to compare the bone specimen with PGCG lesion and native bone. The samples of each were taken intraoperatively and compared histopathologically.

**Material and Methods:** The case report deals with a 51 year old woman, who complained of a slowly expanding swelling, teeth mobility, mastication, and phonation problems. The lesion was localized on the attached gingiva from the mandibular lateral incisor to the right canine and it was removed by surgically. Related teeth with lesion were extracted due to severe mobility and possibility of recurrence of lesion. Lesion was examined histopathologically. During implantation a bone sample was collected and sent for histological examination.

**Results:** An excisional biopsy of the mass resulted in the diagnosis of peripheral giant cell granuloma. The histopathology of PGCG reveals large number of multinucleated giant cell in vascularized fibrocellular fibroma. There were the histopathologic similarities between bone sample with lesion and native bone sample.

**Conclusion:** The diagnosis of PGCG was confirmed by histological examination, and no relapse has been recorded after 12 months of follow-up.

**P0391****Oral anticoagulation therapy: clinical controlled study and evaluation of bleeding on probing**

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**Aim:** To study the possible relationship between plaque index, probing depth, INR and Acenocumarol dose with clinical signs of BOP in a sample of anticoagulated patients. To analyze oral hygiene habits and attitude towards bleeding in these patients.

**Material and Methods:** An observational controlled clinical study was developed in the Hospital La Ribera (Valencia, Spain) with 44 anticoagulated patients (Sintrom®) and a homogenized control group of 44 non-anticoagulated patients. A survey on oral hygiene habits and attitude towards bleeding was performed and the main periodontal parameters were recorded. Descriptive, bivariate and multiple regression statistical analysis of the data was done.

**Results:** Probing depth was the parameter with greater correlation with BOP ( $p < 0.001$ ), followed by plaque index ( $p < 0.002$ ). However, there was no relationship between Acenocumarol dose or INR with BOP. The average BOP was higher in the control group than in the anticoagulated group ( $p < 0.001$ ). Oral hygiene habits and attitude towards bleeding differed significantly between groups.

**Conclusion:** We have not found an explanation to justify that BOP was higher in the control group. What seems clear is that with the same plaque index and probing depth, anticoagulated patients did not bleed more than non-anticoagulated patients. Lack of knowledge in health and oral hygiene habits were observed in these patients.

**P0392****Periodontal disease in children – case report**

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Warsaw/Poland

**Aim:** Presentation of two generally healthy children – one suffering from localized aggressive periodontitis, the other one from generalized aggressive periodontitis.

**Material and Methods:** Two patients aged 13 and 14 years old who revealed no systemic diseases despite precise general examinations.

**Results:** Both patients followed periodontal and surgical treatment. Periodontitis in children is a challenge concerning therapy. The treatment must be planned carefully as it may include many extractions and prosthetics, which are not as obvious as in adults.

**Conclusion:** Aggressive periodontitis occurs in young healthy adults whose periodontal tissues destruction is inadequate in comparison to their oral hygiene. The etiology consists mainly of genetic and immunological factors which usually are clinically undetectable. Periodontal disease in children (especially in deciduous dentition) must be differentiated between aggressive periodontitis and manifestation of a systemic disease. The diagnosis must be based on a very broad general examination not to overlook any general disease as well as to exclude contraindications for periodontal treatment. Occurrence of periodontitis in children is very rare and its nature is more severe in comparison to adult

patients. That is why it must be followed by appropriate treatment, however the prognosis is hard to predict.

**P0393****Higher income levels and household assets are related to better periodontal outcomes up to a certain threshold**

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Amsterdam/Netherlands

**Aim:** To explore the shape of the relationship between income and two periodontal health outcomes in Brazil, probing depth and attachment loss.

**Material and Methods:** Individual level data from the Brazilian National Oral Health Survey in 2010 (SBBrazil 2010) were obtained for 9779 subjects, aged 35–44 years, from 170 municipalities. Multistage sampling was designed to be representative of the whole country and weights were used in analysis. Relations between per capita income and periodontal health were smoothed using Lowess technique (bandwidth 0.35), in order to assess the relationship between per capita household income and assets with periodontal health.

**Results:** Prevalence of adults with at least one tooth with  $>5$  mm of loss of attachment was 7.2% (CI95%: 7.1–7.3) and the prevalence of pocket depth  $>5$  mm was 6.5% (CI95%: 6.4–6.6). Mean per capita income per month was US\$326. The relationship between both periodontal health outcomes and per capita household income was curvilinear, showing a clear threshold of no relationship for income levels higher than US\$1000 per month. For individuals in households with an income of up to US\$1000 per month, better periodontal outcomes were positively correlated with higher income levels. Among the 2.5% of individuals with earnings higher than the threshold, education and the number of household assets had no association with periodontal outcomes.

**Conclusion:** The relation of oral health with per capita household income and assets demonstrated a clear and strong threshold.

**P0394****Detection and quantification of periopathogens with real-time PCR in 344 chronic periodontitis**

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Nantes/France

**Aim:** Real-time PCR has been shown to be a sensitive, rapid method for the detection and quantification of individual microbial species. The objective of this study was to identify the bacterial load of the different bacterial complex: red complex, orange complex and *Aggregatibacter actinomycetemcomitans* (Aa) in 344 patients from university hospital of Nantes

**Material and Methods:** The population was composed of 344 patients consulting for chronic periodontitis, 119 men and 225 women, (age: 36 to 51) confirmed by clinical and radiological examination, and having undergone no antibiotherapy and no periodontal treatment in the last three months. Four active sites with pockets at least 5 mm deep were chosen in each patient. Samples were pooled for each patient and taken for analysis with real-time PCR in a specialized molecular laboratory (Carpegen® GmbH, Münster, Germany).

**Results:** The detection threshold was  $10^2$  bacteria for real-time PCR analysis. The SAS software 9.3 was used to classify the results and calculate the means and standard deviations. Red complex was found in 70.6% of the patients, orange complex in 48.5% and Aa in 14.2%. We get very similar results between women and men for each complex but not for the Aa., with 21% for the men and 10.7% for women.

**Conclusion:** The prevalence of the red complex is more important in our study, and for Aa, but for the orange complex we are very close than the other study. These differences may be due to the difference of the populations studied, but it can be affect the treatment for the patient.

## P0395

### Bio-tissues monitoring by laser speckle technologies in dentistry

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**Aim:** To prove the high efficiency of laser-optical diagnostics of periodontal diseases on the basis of a digital speckle-photo experimentally and clinically.

**Material and Methods:** Luikov Heat and Mass Transfer Institute, National Academy of Sciences of Belarus has developed new method of lazer-optical diagnostics based on digital version of micro-PIV and Speckle Technologies for dentistry. The present study included 376 adult patients with periodontal diseases (gingivitis, periodontitis, gingival recession and periodontal atrophy), 30 adult patients with defects of hard tissues of the teeth, having dentures, and 318 adult patients with malocclusion.

**Results:** The results are indicative of that by means of new method of lazer-optical diagnostics on the basis of a digital speckle-photo possible early revealing the pathological processes in periodontal tissues. Sensitivity and high information of lazer-optical diagnostics provided an opportunity to evaluate differentiated initial preclinical stage of the inflammatory process in all topographic zones of the gums, which determined the timely assignment of corrective therapy. Qualitative and quantitative analysis was performed to define and reveal the zones of maximum voltage concentration on teeth surfaces that gives the most exact feature an biomechanical behaviours teeth. The relation between the stress-strain condition in the system «orthodontic appliance – hard tissues of tooth», capillary pressure and intensity of periodontal microcirculation was established, thus allowing to individualize the treatment.

**Conclusion:** Speckle technologies are effective tool for bio-tissues monitoring, providing 2D maps of sub-skin blood microcirculation in vivo in real-time operation mode and comprehensive stress distribution in hard tissues under loading.

## P0396

### Integration of supplementary periodontal education in a comprehensive diabetes education program

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Hannover/Germany

**Aim:** The aim of this study was to evaluate the effect of supplementary periodontal education including information about

the relationship between diabetes and periodontitis and instructions for oral hygiene procedures within a comprehensive diabetes education program.

**Material and Methods:** 144 patients with diabetes were divided in two groups (test group: TG, control group: CG) and asked to complete a questionnaire. Thereafter, both groups received the same information brochure about the relationship between periodontitis and diabetes. A supplementary periodontal education within a comprehensive diabetes education program was performed for subjects of the TG. Both groups were asked to answer a second questionnaire after 2 years.

**Results:** In both groups significantly more subjects were informed about the mutual influence between diabetes and periodontitis after two years (McNemar-test,  $p > 0.0001$ ). Subjects of the TG ( $n = 87$ ; 44 female, 43 male; mean age  $61.2 \pm 13.52$ ) were significantly better informed about periodontal diseases (McNemar-test,  $p = 0.034$ ), spent more time in brushing their teeth (Chi-square-test  $p = 0.023$ ), used more utilities for oral hygiene (Chi-square-test  $p = 0.009$ ) and changed their tooth-brushes more often (Chi-square-test  $p = 0.0016$ ) than subjects of the CG ( $n = 57$ ; 43 female, 14 male; mean age  $54.73 \pm 10.57$ ). The majority of all patients considered supplementary periodontal education as an important part of diabetes counselling.

**Conclusion:** The supplementary periodontal education was shown to increase the awareness of oral hygiene procedures and the knowledge about the relationship between diabetes and periodontitis and should be integrated in diabetes education programs.

## P0397

### Development of a new device and classification for the clinical evaluation of gingival biotype

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**Aim:** A new device, consisting of 3-colored tip probes (white/green/blue) allows the clinician to distinguish gingival biotype on a 4-point scale on the base of color transparency (thin/medium/thick/very thick). This study aims to evaluate the clinical reliability of the new device and to compare its accuracy and reproducibility with those of visual assessment and probing, and the intra-and inter-operators' agreement for all the techniques.

**Material and Methods:** 153 systemically healthy non-dental-related students ( $\geq 18$  years) were included. At baseline and after 42 days the clinical parameters were recorded on the 6 upper front teeth: Visual-Gingival-BioType (VGBT) and Gingival-Transparency-Score (GTS) as thin/thick. The new device, 3-colored tip probes, was used for assessing Gingival-BioType-Probe-score (GBTP) on a 0–3 scale. VGBT and GBTP were scored by two independent examiners while another one scored GTS. Cohen's Kappa coefficient of agreement for intra- and inter-operator comparison for VGBT, and between VGBT and GTS; Bland-Altman's plots for comparing GBTP (intra-and inter-); estimating of AUROC for comparing GBTP and GTS were performed.

**Results:** VGBT showed limited agreement between and within operators ( $K_{max} = 0.41; 0.39$ ) and with GTS ( $K_{max} = 0.41$ ). GTS had a good intra-operator agreement ( $K_{max} = 0.60$ ). GBTP showed a good agreement between operators and a fair intra-operator agreement. GBTP showed a generally fair/good agreement with GTS (min/max:AUROC = 0.63/0.86 and 0.52/0.76 for the two operators respectively).

**Conclusion:** VGBT proved to be insufficiently reproducible. Currently GTS is the most common technique for gingival biotype examination: although sufficiently reliable, its dichotomy reduces variability of results. Based on these data the GBTP is adequately reproducible. The GBTP probe and the 4-point classification could provide to the clinician more detailed information on the gingival biotype.

## P0398

### Perceived Stress is associated with more severe periodontal disease

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**Aim:** Psychosocial factors, especially depression, perceived stress and Locus-Of-Control (LOC), supposedly impact the course of periodontal disease. We aimed at exploring the association between these characteristics and clinical variables in patients suffering from periodontitis.

**Material and Methods:** 79 patients (mean age = 46.19 years; SD = 12.35) suffering from periodontitis were recruited from the Department of Periodontology of a University Hospital. Initial clinical examination included recording the Number of Standing Teeth (NST), Plaque Control Record. Patients completed Beck Depression Inventory (BDI) and Cohen Perceived Stress Scale (PSS). After dental prophylaxis, Bleeding On Probing (BOP), Probing Pocket Depth, mean Clinical Attachment Loss (CAL) and the percentage of sites with CAL  $\geq$  5 mm (CAL5) were recorded. CAL5 was considered as a relevant composite index of periodontitis severity and extent.

**Results:** No periodontal index was correlated with BDI. NST was positively correlated with internal LOC ( $r = 0.25$ ;  $p = 0.028$ ). BOP was negatively correlated with PSS ( $r = -0.23$ ;  $p = 0.043$ ). After controlling for age, tobacco consumption and mean CAL, PSS was positively associated with CAL5 ( $p = 0.010$ ;  $\eta^2 = 0.087$  for effect size; adjusted global  $R^2 = 0.815$ ). Examining the distribution of CAL5 per PSS quartiles showed a threshold effect for the highest quartile ( $p = 0.035$ ;  $\eta^2 = 0.059$ ).

**Conclusion:** The association between depression and periodontitis should be questioned. Findings confirm that perceived stress, especially for the most stressed individuals, is associated with more severe periodontitis, underlying the interest of a psychological evaluation and eventual support for patients presenting as particularly stressed. Stress could hide some inflammatory signs. For these patients, dental hygiene habits reinforcement could rely on an internal LOC.

## P0399

### Prevalence and severity of gingivitis in three South American cities

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**Aim:** To investigate prevalence and severity of gingivitis in representative adults of three south american cities.

**Material and Methods:** 18 adults and older patients (1650) in Porto Alegre, Brazil; Tucumán, Argentina; Santiago, Chile were examined for Löe-Sillness Gingival Index (GI) and Visible Plaque (VP). A structured questionnaire comprised questions including demographic, habits and knowledge related to oral health. The sampling procedure comprised 4 stages: city; tract census; blocks and individual within the age group. The examinations were performed in mobile dental units by an examiner for each participating city, with kappa-coefficients above 0.7 for intra and inter-examiner. Mann-Whitney test was used to determine significances in the GI between genders and age groups, and the data among study cities were compared using the Kruskal-Wallis.

**Results:** The mean age of the sample was 41.9 and, was approximated to the Census data of each city. The overall average GI was 1.29; only 4.4% of subjects showed mean GI  $< 0.50$ ; most (95.6%) were  $\geq 0.50$ , with 66.2%  $> 1.0$ ; and the 33.8% of subjects had  $\geq 50\%$  of periodontal sites with bleeding (GI = 2). There was a significant correlation ( $p < 0.001$ ) between the PI and GI. The Argentine females showed higher GI ( $p < 0.005$ ) than the males; Chilean adults showed a significantly higher GI (GI = 1.7) than the Argentine (GI = 1.0) and Brazilian (GI = 1.1) ( $p < 0.001$ ), and Argentine adults showed the lowest prevalence of Gingivitis (90%).

**Conclusion:** The prevalence and severity of gingivitis is high in the three cities of south America, so it is urgent to strengthen the promotion measures and prevention of this disease.

## P0400

### Hidradenitis suppurativa and periodontal diseases

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**Aim:** Hidradenitis suppurativa (HS) or Verneuil's disease is a not well known chronic inflammatory disease of skin tissue. The pathogenesis of HS remains unknown though probably multifactorial.

Periodontal diseases (PD) are a group of inflammatory diseases from infectious origin but other factors are important in the development of these diseases promoting tissue damage and can lead to the loss of teeth.

Although their primary etiology seems different, it would appear that a number of etiopathogenic similarities could link HS and PD as certain genetic polymorphisms, environmental factors and immuno-pathological mechanisms. In fact, those factors lead to a dysregulation of the inflammatory response and a change in the particular periodontal flora.

**Material and Methods:** A pilot study is proposed in collaboration with dermatologists from the University Hospital Center of Reims (CHU de Reims). Twelve patients with HS are recruited by the dermatology unit depending on the severity of their lesions by using the Hurley classification. In the periodontology unit of Reims Hospital, a periodontal check-up with clinical periodontal indices (bleeding on probing, probing depth, clinical attachment loss) and a targeted X-ray examination are realised on those patients compared to twelve healthy patients.

**Results:** The initial findings show that patient with HS have clinical periodontal indices in favor of a gingival inflammation that, for five of the twelve observed patient are amplified during the acute HS phase.

**Conclusion:** The pilot study shows a possible interrelationship between PD and HS.

The purpose of this work could be beneficial for patients in their care and especially in monitoring in periodontology.

Topic: Periodontal medicine

## P0401

### Evaluation of in vitro anti-proliferative effect of resveratrol on herediter gingival fibromatosis and juvenil hyaline fibromatosis

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**Aim:** The objective of this study was to determine the effect of resveratrol on the proliferation of gingival fibroblasts derived from patients with herediter gingival fibromatosis (HGF), juvenile hyaline fibromatosis (JHF) and healthy subjects

**Material and Methods:** Gingival fibroblasts harvested from HGF, JHF patients and healthy subjects were cultured. Fibroblast cells were incubated with different concentrations of resveratrol. Cell proliferation was assessed by MTT assay and real time cell analysis system xcelligence impedance method. Fibroblast cells were monitored every 30 min for a period of up to 72 h by the xCELLigence system.

**Results:** The impedance-based method was found to be applicable for the determination of the cell proliferation of HGFs, JHF and healthy gingival fibroblasts. The comparison of this method with MTT determinations showed a comparable results. Resveratrol in doses used in this study did not show cytotoxicity neither fibromatosis nor health fibroblast cells. Within doses using in this study, 100  $\mu$ mol resveratrol had revealed best anti-proliferative effect both on HGF and JHF cells.

**Conclusion:** This in vitro study revealed that Resveratrol has an anti-proliferative effects on HGF and JHF cells while this effect is not observed in normal gingival fibroblasts. Additional molecular studies are necessary to explain anti-proliferatif effect of resveratrol on the gingival fibromatosis cells. This antioxidant may be a useful alternative or supporting therapy agent for gingival hyperplasia, in the future.

## P0402

### Gingival changes during pregnancy with and without high risk for preterm birth: a prospective clinical trial

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**Aim:** To investigate gingival changes during pregnancy in women with and without high risk for preterm birth.

**Material and Methods:** A prospective case-control study was conducted in 89 pregnant women with periodontally healthy gums. Group 1 consisted of 40 subjects showing high risk for preterm birth, while group 2 involved 49 subjects with a normal course of pregnancy. The control group was formed by 50 non-pregnant women not conducting hormonal contraception. Clinical parameters and microbiological changes were monitored during pregnancy and 2–4 weeks after parturition. Finally the variables were compared within and between the different groups.

**Results:** In subgingival samples of pregnant woman with preterm birth tendency significantly higher concentrations of *A. actinomycetemcomitans* ( $>10^4$ ), *P. gingivalis*, *T.forsythia*,

*P.intermedia* and *F.nucleatum* ( $>10^5$ ) were found compared to the control group ( $p < 0.05$ ). Also clinical variables like Plaque-score (PI, Silness & Løe, group 1  $0.72 \pm 0.06$ , group 2  $0.63 \pm 0.05$ , group 3  $0.36 \pm 0.06$ ,  $p < 0.05$ ), Gingiva-Index (GI, Løe and Silness,  $0.68 \pm 0.06$ , group 2  $0.49 \pm 0.04$ , group 3  $0.48 \pm 0.05$ ,  $p < 0.05$ ) and periodontal pocket depths (group 1  $3.01 \pm 0.62$ , group 2  $1.37 \pm 0.41$ , group 3  $0.54 \pm 0.55$ ,  $p < 0.05$ ) were significantly higher in group 1 compared to the control group.

**Conclusion:** Due to a higher plaque level, gingival swelling and bleeding and amount of periodontal pathogens, pregnant women with high risk for preterm birth seem to be more susceptible for gingival inflammation.

## P0403

### 1.25 (OH)<sub>2</sub> Vitamin D insufficiency is associated with Periodontitis in type 1 Diabetes

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**Aim:** It is well recognized that Periodontitis is a complication of Diabetes Mellitus, through changes in the innate immune system. To investigate this further the aims of this study were to investigate the association of glycaemic control, Vitamin D status and salivary antimicrobial peptides (AMPs) with periodontitis in patients with type 1 Diabetes Mellitus (T1DM).

**Material and Methods:** 59 patients with T1DM were recruited from the University Hospital of Cantabria between 2009 and 2011. Full dental and periodontal examination was carried out. Clinical and biochemical data were collected, including HbA1c, 25 (OH) Vitamin D and 1.25 (OH)<sub>2</sub> Vitamin D, saliva samples were analysed for  $\beta$ -defensins and LL-37 cathelicidin by ELISA. Periodontitis status was dichotomized into those with moderate–severe Periodontitis (Page & Eke 2007) versus the remainder of subjects.

**Results:** Of the 59 T1DM, 76.3% (45) presented with moderate to severe Periodontitis. The average HbA1c of the last 3 years was 7.8% (SD;1.09). The AMPs were 0.18 ng/ml for LL-37 Cathelicidin and 49.4 pg/ml for  $\beta_2$  Defensin. There was a significant negative relationship between Periodontitis and 1.25 (OH)<sub>2</sub> Vitamin D ( $p = 0.022$ ) but not 25 (OH) Vitamin D.

**Conclusion:** This study is one of a growing number of studies that show that Vitamin D insufficiency is associated with risk of Periodontitis. However, this is the first study where these observations have been shown in patients with T1DM. The data suggests that 1.25 (OH)<sub>2</sub> Vitamin D may be more diagnostically useful for this purpose than the more traditionally used 25 (OH) Vitamin D.

## P0404

### Relationship between periodontitis and metabolic syndrome

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**Aim:** The aims of these study were: to assess whether the diagnostic of chronic periodontitis may identify patients with meta-

bolic syndrome and to verify the effect of periodontal therapy on the components used for the diagnostic of metabolic syndrome

**Material and Methods:** In study 1, 33 patients with chronic periodontitis and 36 controls, without diagnostic of metabolic syndrome were examined. The patients were evaluated clinically and laboratory to verify possible association between the presence of periodontitis and diagnose of metabolic syndrome. The clinical parameters used were: visible plaque index (VPI), gingival index (GI), bleeding on probing (BOP), probing pocket depth (PPD) and clinical attachment loss (CAL). Serum levels of C-reactive protein (CRP), fasting glucose, cholesterol and triglycerides were analyzed. Weight, height, waist circumference, body mass Index (BMI) and blood pressure were also assessed. In study 2, patients with chronic periodontitis received periodontal therapy and 90 days after treatment were reevaluated to new clinical assessment. The data of weight, height, waist circumference, BMI, blood pressure and serum assessments were repeated and compared to day 0

**Results:** In study 1, the serum glucose level and the number of items of the metabolic syndrome present were statistically higher in the test group as compared to the control group. In study 2, the levels of glucose, cholesterol, LDL, and number of items in the metabolic syndrome present significantly reduced and HDL increased significantly after non-surgical therapy

**Conclusion:** Chronic periodontitis diagnostic increases the chance of diagnostic of metabolic syndrome and periodontal treatment was effective in improving some components of metabolic syndrome.

## P0405

### Internists, gynecologists, cardiologists and family physicians: knowledge, opinions, and behaviors regarding periodontal disease and its systemic implications

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Jerusalem/Israel

**Aim:** The aim of the study was to evaluate the knowledge, opinions, and behaviors of physicians in the field of internal medicine, gynecology, cardiology and family medicine regarding periodontal disease and its systemic implications.

**Material and Methods:** A three part questionnaire was: (1) anonymous personal questions, (2) questions regarding general periodontal knowledge and its systemic implications, and (3) multiple choice questions. The questionnaire was distributed to internists, gynecologists, cardiologists and family physicians.

**Results:** 118 questionnaires were reviewed. The overall general knowledge of physicians regarding periodontitis was modest with an average of 29% correct answers. The majority of the respondents (58%) agreed that there is a need for further periodontal knowledge in the field of medicine. Cardiologists answered correctly when asked about the cause of periodontal disease (100% vs. 60% in the other residencies). Internists and cardiologists knew the main implications of periodontal disease (90% correct answers) and the gynecologists exceeded (93% correct answers) in knowing what a periodontist is. Gynecologists and family physicians had better oral hygiene habits compared to internists and cardiologists. Interestingly, when comparing the knowledge of systemic implications of periodontal disease to

oral hygiene habits, there was no difference according to residency.

Although 46% of the subjects had a personal experience with a periodontist, it did not change the subjects' knowledge regarding periodontology and its systemic influences.

**Conclusion:** The study indicates a gap in the training of physicians with regard to the knowledge in the field of periodontology. This information compel us to reach our colleagues and help them learn about our profession.

## P0406

### Development of a systemic inflammation model of Porphyromonas gingivalis-infected periodontitis in high-fat diet fed rats

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**Aim:** The aim of the present study was to develop a systemic inflammation model of Porphyromonas gingivalis (P.g)-infected periodontitis in rats with high-fat diet induced dyslipidemia.

**Material and Methods:** Male rats aged 8 weeks were fed a high-fat diet for 12 weeks. Eight weeks prior to the end of the experimental period,  $10^9$  CFU of P.g -slurry was topically applied around the silk suture ligated molar teeth to induce experimental periodontitis in the experimental group. Control animals were ligated using the same protocol and slurry without P.g was applied. Histological analysis of gingival tissue stained with H&E and measurement of the amount of bone resorption in micro-CT were performed to estimate the experimental periodontitis. Serum CRP and AST levels and the concentration of endotoxins in blood plasma were measured to evaluate the presence of systemic inflammation. All experimental procedures were approved by the Animal Care Committee of Nippon Dental University.

**Results:** In the P.g infection group, significantly increased alveolar bone resorption and inflammatory cell infiltration into sub-epithelial connective tissue were observed. A significant rise in the CRP level and the slight upward trend in AST were seen in the P.g infection group. However, the concentrations of endotoxin in all rats were lower than the detection threshold value. There were no significant differences between the two groups in serum lipid profiles.

**Conclusion:** P.g-infected experimental periodontitis caused systemic inflammation characterized by a rise in serum CRP levels in high-fat diet fed rats.

## P0407

### Effect of scaling and root planing on improvement of glycemic control in periodontitis patients with type-2 diabetes mellitus

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Dharan/Nepal

**Aim:** The aim of this study was to evaluate the clinical and laboratory changes 3 months after full mouth scaling and root planing in periodontitis patients with type 2 diabetes mellitus (T2DM).

**Material and Methods:** Forty-seven T2DM subjects with moderate to severe periodontitis were randomly divided into two groups. Treatment group, 25 subjects, received full-mouth scaling and root planing; control group, 22 subjects, received no treatment. At baseline and at the end of three months, glycated hemoglobin (HbA1c) values, fasting glucose, and clinical parameters like plaque index (PI), gingival index (GI), probing pocket depth (PPD), and clinical attachment level (CAL) were recorded in all the patients. Following SRP, the patients were enrolled in a monthly interval maintenance program for 3 months.

**Results:** A statistically significant effect could be demonstrated for PI, GI, PPD, and CAL for the treatment group. HbA1c levels in the treatment group decreased significantly whereas the control group showed a slight but insignificant increase for these parameters.

**Conclusion:** The results of this study showed that non-surgical periodontal treatment is associated with improved glycemic control in T2DM patients and could be undertaken along with the standard measures for the diabetic patient care.

## P0408

### Association of periodontitis with glycemic levels in type 2 diabetics (T2DM) and nondiabetics – a cross-sectional study in Indian population

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Patna/India

**Aim:** The aim of the study was to investigate the relationship between periodontitis with glycemic and metabolic levels in Type 2 diabetics and nondiabetics.

**Material and Methods:** Diabetic and nondiabetic subjects suffering from periodontitis in the age group of 35–80 years were recruited for this case-control study (n = 350). Periodontal examination included probing depth, clinical attachment loss gingival recession and bleeding on probing. Blood analysis was carried out for fasting glucose, glycosylated haemoglobin (HbA1c) metabolic levels (lipid cholesterol and triglycerides) and BMI assessed for obesity. Diabetics were classified as HbA1c >7%. Other demographic variables recorded were age, sex, smoking.

**Results:** Multi-variable analysis did not reveal any significant association between diabetes and periodontitis, however the study revealed that uncontrolled glycemic levels have a significant association with the severity of periodontitis. Proportionate odds model showed that a 1.0 unit increase of HbA1c was found to increase the likelihood of periodontitis by 1.34 times. Smoking, high lipid levels were also found to be associated with increased severity of periodontitis. Non obese subjects were found to be 0.44 times less likely to develop periodontitis.

**Conclusion:** Its not the mere presence of diabetes but uncontrolled HbA1c levels or poorly controlled diabetic levels increase the severity of periodontitis. A well controlled diabetic will not have any added higher risk of developing periodontitis and the associating severity of periodontitis when compared to the non-diabetic.

## P0409

### A cross sectional study of the associations between periodontitis and carotid arterial calcifications in an elderly population

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**Aim:** To study if the presence of carotid arterial calcifications diagnosed on panoramic radiographs is associated with periodontitis in an elderly population.

**Material and Methods:** Study individuals were randomly selected from the Swedish civil registration database representing the aging population (60–96 years) in Karlskrona, Sweden. Bleeding on probing (BOP) and the deepest probing measurement at each tooth were registered. The proportions of teeth with a probing depth  $\geq 5$  mm and the proportion of teeth with bleeding on probing were calculated. Analog panoramic radiographs were taken and the proportion of sites with a distance  $\geq 5$  mm between the alveolar bone level and the cement-enamel junction (CEJ) were assessed. A diagnosis of periodontitis was declared if, a distance between the alveolar bone level and the CEJ  $\geq 5$  mm could be identified from the panoramic radiographs at >10% of sites, probing depth of  $\geq 5$  mm at one tooth or more, and with BOP at >20% of teeth.

**Results:** Readable radiographs were obtained from 504 individuals. A total of 18.8% of these individuals were assessed with a diagnosis of periodontitis. A positive finding suggesting carotid calcification was identified in 36.1%. In the older age group (78–93 years) data analysis demonstrated that individuals with periodontitis had a higher prevalence of carotid calcifications, (Pearson  $\chi^2$ : 6.5,  $p < 0.01$ ), and with a likelihood of 2.1 (95% CI: 1.2, 3.7,  $p < 0.01$ ).

**Conclusion:** An association between periodontitis and carotid calcifications was found in the older age group.

## P0410

### Efficacy of a topical sialogogue containing 1% malic acid (Xeros Dentaïd Spray®) in patients with benzodiazepine-induced dry mouth

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**Aim:** To evaluate the clinical efficacy of a topical sialogogue spray containing 1% malic acid on patients affected by dry mouth caused by benzodiazepines.

**Material and Methods:** This research took the form of a double-blind, randomized clinical trial. 61 participants with benzodiazepine-induced dry mouth were divided into two groups: for the first “intervention group” (31 subjects) a topical sialogogue spray (malic acid 1%, Xeros Dentaïd Spray®, Dentaïd, Barcelona, Spain) was applied, while for the second “control group” (29 subjects), a placebo spray was applied; for both groups the sprays were applied on demand during two weeks. The Dry Mouth Questionnaire (DMQ) was used to evaluate dry mouth levels before and after product/placebo application. Unstimulated and stimulated salivary flows rates, before and after application, were measured.

**Results:** DMQ scores increased significantly (improvement of dry mouth) ( $p < 0.05$ ) after 1% malic acid application, whereas DMQ scores did not increase significantly after placebo application ( $p > 0.05$ ). After 2 weeks of 1% malic acid application, unstimulated and stimulated salivary flows rates increased significantly ( $p < 0.05$ ). After placebo application, unstimulated and stimulated salivary flows rates did not increase significantly ( $p > 0.05$ ).

**Conclusion:** A sialogogue containing 1% malic acid improved benzodiazepine-induced dry mouth and increased unstimulated and stimulated salivary flows rates.

## P0411

### Is there an efficient method for fighting oral malodor?

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**Aim:** To test an effectiveness of treatment regime consisting of Meridol HALITOSIS system, and to compare it to a standard oral hygiene.

**Material and Methods:** 30 participants of both sexes were randomly assigned to two groups: Group A: Performing regular oral hygiene. Group B: Using Meridol HALITOSIS system. After 2 weeks of treatment and 1 week wash-out phase the groups were switched (crossed-over). The study was conducted according to a special protocol and at each appointment Gingival Index, Bleeding On Probing, Plaque Index and tongue coating were assessed, the mouth air was examined for the presence of Volatile Sulphur Compounds.

**Results:** There was no significant difference between the age of patients in both groups ( $p = 0.393$ ). There were statistically significant differences observed for both groups: VSC<sub>total</sub> was lower in the Meridol HALITOSIS group (30 min after usage of oral hygiene products) on day 0 ( $p = 0.016$ ), day 14 ( $p = 0.006$ ), day 35 ( $p = 0.04$ ). H<sub>2</sub>S was lower in the Meridol HALITOSIS group on day 0 (30 min after usage of oral hygiene products) ( $p = 0.002$ ), day 14 ( $p = 0.007$ ) and for Bleeding On Probing on day 14 ( $p = 0.049$ ) and day 35 ( $p = 0.045$ ). There was no statistically significant difference for tongue coating, Plaque Index and Gingival Index between groups A and B ( $p \geq 0.05$ ) at any day.

**Conclusion:** A multidisciplinary approach remains the method of choice to come to the right diagnosis and treatment of halitosis. The results showed that the Meridol HALITOSIS system significantly reduced the concentration of VSCs measured by gas chromatography in healthy patients.

## P0412

### Subgingival periodontal pathogens profile in a group of Romanian chronic kidney disease patients

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**Aim:** The aim of our study was to assess the subgingival profile of 9 periodontal pathogens (Aggregatibacter actinomycetemcomitans, Porphyromonas gingivalis (Pg), Treponema denticola (Td), Tannerella forsythia (Tf); Prevotella intermedia (Pi), Peptostreptococcus micros (Pm), Fusobacterium nucleatum (Fn);

Eubacterium nodatum (En) and Capnocytophaga gingivalis (Cg) in a group of Romanian chronic kidney disease (CKD) patients by means of a commercially available real time PCR and to analyze the association with renal and periodontal clinical parameters.

**Material and Methods:** The study population included 70 consecutive adult CKD patients recruited from the Internal Medicine – Nephrology Department of Fundeni Clinical Institute. Periodontal parameters (periodontal pocket depth, clinical attachment loss, bleeding on probing and plaque index) were assessed and subgingival biofilm samples were collected from the deepest periodontal pocket of each quadrant and were pooled in one transporting unit. Clinical data about kidney disease was drawn from the medical file of the patients.

**Results:** In our study, prevalence of periodontal disease was 48.5% (34 patients). There was a statistical significant correlation between periodontal disease and presence ( $>10^5$  copies) of 3 pathogens: T. forsythensis ( $p = 0.018$ ), T. denticola ( $p = 0.041$ ) and P. micros ( $p = 0.044$ ). Additionally, P. gingivalis and T. denticola correlated with median clinical attachment loss ( $p = 0.04$  respectively  $p = 0.02$ ) and T. denticola correlated also with low serum albumin ( $p = 0.03$ ). None of the analyzed pathogens correlated with estimated glomerular filtration rate.

**Conclusion:** Within the limits of this study, CKD is not significantly associated with a particular subgingival periodontal pathogens profile in periodontitis patients.

## P0413

### Association between periodontal infection and development of type 2 diabetes – results of a longitudinal study

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**Aim:** To investigate whether periodontal infection is associated with the development of type 2 diabetes.

**Material and Methods:** The subjects were inhabitants of the city of Oulu (in Finland) who were born in 1935. The subjects ( $n = 395$ ) underwent a clinical baseline examination in 1991–1992 and follow-ups in 1998 and 2007. The subjects were categorized into four categories according to their periodontal condition in the baseline examination: subjects without deepened periodontal pockets, subjects with at least one tooth with deepened periodontal pockets of pocket depth of 4–5 mm, subjects with at least one tooth with periodontal pockets of pocket depth of 6 mm or more, and edentulous subjects. The diagnostic criteria for diabetes were the following: glucose measurements from capillary plasma after a standard oral glucose tolerance test  $\geq 11.1$  mmol/l and fasting plasma glucose  $\geq 7.0$  mmol/l. Confounding variables included gender, BMI, physical activity, dietary habits, family history of diabetes and number of teeth.

**Results:** During the follow-up period, 81 out of 395 non-diabetic subjects developed diabetes. Periodontal pockets of pocket depth of 4–5 and 6 mm or more and edentulousness associated with the development of diabetes as follows: OR 1.6, 95% CI 0.7–3.6, OR 2.0, 95% CI 0.9–4.5 and OR 1.2, 95% CI 0.4–3.0 compared to periodontally healthy subjects, respectively.

**Conclusion:** The findings support the conception that infectious periodontal disease is associated with the development of type 2 diabetes. The nature of the association is unclear and additional research is still needed.

## P0414

### Gestational diabetes mellitus, gingival inflammation and inflammatory cytokines in biofluids

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**Aim:** Gestational diabetes mellitus (GDM) is defined as varying glucose intolerance with first onset in pregnancy. Approximately 4–10% of all pregnant women have GDM and it is associated with significantly increased risks of maternal and infant morbidity such as preeclampsia, preterm birth, and macrosomia. The aim of this study was to evaluate possible associations between gestational diabetes mellitus and gingival inflammation.

**Material and Methods:** Serum and gingival crevicular fluid (GCF) samples were collected, full-mouth recordings of plaque index (PI), bleeding on probing (BOP) and probing depth (PD) were performed in 96 females with GDM (cases) and 65 non-diabetic pregnant females (controls). Age, smoking status, pre-pregnancy body mass index, pregnancy outcomes and other indices were recorded. Serum, GCF interleukin (IL)-10, IL-33 and tumour necrosis factor (TNF)- $\alpha$  levels were determined. Kruskal–Wallis, Bonferroni-corrected Mann–Whitney *U* tests were used to analyse the data.

**Results:** The control group was younger ( $p < 0.0001$ ) and gingival inflammation was less prevalent ( $p = 0.031$ ) than the GDM group. PI, BOP scores, and PD were significantly higher in the GDM group than the controls ( $p = 0.005$ ,  $p = 0.003$ , and  $p = 0.049$ , respectively). Serum TNF- $\alpha$  levels were significantly higher in cases than controls ( $p = 0.001$ ). GCF IL-10 concentration and total amount were significantly higher in the GDM group than the control group ( $p = 0.004$  and  $p < 0.0001$ , respectively).

**Conclusion:** Inflammatory response seems to be more pronounced in women with GDM. The observed increase in both local and systemic levels of inflammatory cytokines may suggest an interaction between GDM and gingival inflammation.

## P0415

### Periodontal disease and its association with angiographically verified coronary artery disease – a pilot study

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**Aim:** To investigate the association of chronic and aggressive periodontitis with the severity of coronary artery disease in hospitalized patients.

**Material and Methods:** Subjects were recruited from hospitalized patients at the University Hospital Centre Zagreb that had to undergo coronary angiography due to their primary illness. Thorough clinical examination included: number of teeth, body mass index (BMI), smoking status, approximal plaque index (API), bleeding on probing (BOP), periodontal probing depth (PD), gingival recession (GR), clinical attachment loss (CAL) and general quality of life assessment (SF-36). Data were analyzed using Kruskal–Wallis and Pearson's Chi-Square test.

**Results:** From 66 patients that were examined so far, 47 (71.2%) were hospitalized for acute coronary syndrome (ACS), 15 (22.7%) had stable coronary artery disease (CAD) and only 4 (6.1%) had no significant CAD. Stable CAD had the highest PD ( $3.96 \pm 1.09$ ) and CAL ( $4.58 \pm 1.43$ ) values, whereas ACS group had PD ( $3.71 \pm 0.81$ ) and CAL ( $4.19 \pm 1.03$ ), with no significance ( $p > 0.05$ ). Out of 66 patients in total, 46 (69.7%) were diagnosed with periodontitis. Chronic periodontitis was the most common finding, with 76.5% in ACS group and 56.5% in patients with stable CAD ( $p > 0.05$ ). Only 16 (24.2%) out of 66 patients were never-smokers. General quality of life assessment showed lowest quality of life in stable CAD group for both mental health ( $p \leq 0.032$ ) and energy vitality ( $p \leq 0.022$ ).

**Conclusion:** Due to the low number of patients examined so far, we couldn't establish a positive association of periodontitis and angiographically verified CAD. However, 2/3 of patients had periodontitis and as such pose a risk for CAD development.

## P0416

### Periodontal situation and microbiological findings of hemodialysis patients with or without diabetes mellitus – a clinical cohort study

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**Aim:** Aim of this clinical study was to evaluate the periodontal situation and periodontal microbiological findings of hemodialysis patients (HD) with or without diabetes mellitus.

**Material and Methods:** 159 Hemodialysis patients were included and divided according to pre-existing diabetes status: diabetes mellitus (DM,  $n = 66$ ,  $70.5 \pm 10.2$  years,  $m = 43$ ) or no DM (nDM  $n = 93$ ,  $66.7 \pm 13.0$  years,  $m = 59$ ). Dental examination included dental findings (DMF-T) and periodontal situation (pocket probing depth [PPD], clinical attachment loss [CAL]). Periodontal condition (PPD and/or CAL) was classified into healthy/mild, moderate or severe periodontitis. Subgingival biofilm samples were taken from deepest pockets and pooled. Microbiological analysis of periodontal pathogens was carried out using PCR. Statistical analysis: *t*-Test and Wilcoxon-Test; level of significance:  $\alpha = 5\%$ .

**Results:** 30 HD-patients were toothless (DM = 13, nDM = 17). The mean DMF-T showed no statistically significant difference between DM- ( $20.4 \pm 6.0$ ) and nDM-patients ( $21.2 \pm 5.4$ ;  $p = 0.44$ ); especially with higher number of missing teeth in nDM (M-T: DM =  $10.8 \pm 7.8$ , nDM =  $12.8 \pm 8.6$ ;  $p = 0.18$ ). 96% of DM- and 97% of nDM-patients have moderate to severe periodontitis (moderate: DM = 19, nDM = 32; severe: DM = 32, nDM = 42;  $p > 0.05$ ). Microbiological analysis showed higher prevalence of periodontal bacteria in nDM-patients; *Fusobacterium nucleatum* (DM: 96%, nDM: 98%), *Parvimonas micros* (DM: 67%, nDM: 73%) and *Tannerella forsythia* (DM: 50%, nDM: 62%) were the most frequent bacteria. Only for *Porphyromonas gingivalis* (DM: 25%, nDM: 47%), *Parvimonas micros* and *Eubacterium nucleatum* (DM: 0%, nDM: 10%) a statistical difference was determined ( $p < 0.05$ ).

**Conclusion:** HD-patients showed an inadequate periodontal health independently of pre-existing diabetes status. Furthermore, periodontal pathogens were seen more frequently in nDM-HD-patients.

## P0417

### Periodontal situation in patients with chronic bowel disease – a clinical monocentric cohort study

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**Aim:** The aim of this clinical study was to evaluate the periodontal situation of patients with chronic bowel disease (CBD) compared to healthy control subjects (HC).

**Material and Methods:** 59 CBD-patients with the diagnosis of Morbus Crohn or Colitis ulcerosa (49.8 ± 12.1 years, f = 25) and 59 HC (51.3 ± 12.0 years, f = 25) were included in this study. HC were set up considering age, gender and smoking habits. In the CBD group, duration, severity and activity of CBD were recorded. Dental examination included: dental findings (DMF-T) and evaluation of periodontal situation (pocket probing depth [PPD], clinical attachment loss [CAL]). Periodontal condition (PPD and/or CAL) was classified into healthy/mild, moderate or severe periodontitis. Statistical analysis: *t*-Test and paired rank-Test; level of significance:  $\alpha = 5\%$ .

**Results:** The mean DMF-T was significantly different between CBD and HC (CBD: 20.1 ± 5.9, HC: 16.1 ± 6.8;  $p < 0.01$ ); with CBD-patients showing a mean of 2.5 teeth less than HC (M-T: CBD = 7.7 ± 5.2, HC = 4.2 ± 4.5;  $p < 0.01$ ). Furthermore, values of PBI (CBD: 1.3 ± 0.8 HC: 0.3 ± 0.4) and CAL (CBD: 3.3 ± 1.3 HC: 2.3 ± 1.8) were significantly higher for CBD patients ( $p < 0.01$ ). PPD was not significantly different (CBD: 2.4 ± 0.5, HC: 2.4 ± 0.8;  $p = 0.8$ ). 80% of patients with CBD and 79% of HC had moderate to severe periodontitis (moderate: CBD = 25, HC = 32; severe: CBD = 22, HC = 15;  $p = 0.44$ ). Differences between Morbus Crohn and Colitis ulcerosa could not be observed ( $p > 0.05$ ).

**Conclusion:** The majority of CBD-patients showed moderate to severe periodontitis, as well as HC. The difference in CAL was significant but without clinical impact. Noticeable is the increased number of missing teeth in CBD.

## P0418

### Mitochondrial dysfunction in gingival overgrowth induced by cyclosporine and nifedipine

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**Aim:** Cyclosporin A (CsA) and Nifedipine (N) – induced gingival overgrowth (GO) is an adverse drug reaction which is still incompletely explained. Previous studies have described morphological changes in the mitochondrion. So, our purpose is to evaluate if mitochondrial dysfunction is involved in the pathogenesis of GO.

**Material and Methods:** 30 Wistar rats were distributed in 3 groups of 10. During 6 weeks, each group received daily intraperitoneal injections of: – CsA group (30 mg/kg; Sandimmun®). – N group (1 mg/kg; Adalat®). – Control group (saline solution). At the end of the experimental period, all animals were anaesthetized, and samples of gingiva and jaw were obtained for the following double-blind analyses: Histomorphometrical analyses (optical microscopy), mitochondrial ultrastructure analyses (electron microscopy) and biochemical determinations:

new collagen detection, citrate syntase, lipid peroxidation and ATP levels.

**Results:** The histomorphometric analysis confirms the enlargement. The area and perimeter of mitochondrion were longer for CsA, and the mechanisms of fusion and fission of mitochondrial dynamic were reduced in both test groups. We found a reduction in the synthesis of new collagen for CsA and N. The levels of citrate sintasa, lipid peroxidation and ATP showed an alteration in the mitochondrial function and increase of the oxidative stress.

**Conclusion:** Our results indicate that mitochondrial dysfunction and oxidative stress could be involved in the physiopathological changes induced by CsA and N in the gingiva of rats.

## P0419

### Periodontal situation in patients with rheumatoid arthritis in dependence of immunosuppressive therapy – a clinical monocentric cohort study

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**Aim:** This clinical study aimed to evaluate the periodontal situation of patients with rheumatoid arthritis (RA) compared to healthy control (HC). Furthermore, influence of immunosuppressive therapy and severity/activity of RA (DAS28) were determined.

**Material and Methods:** 168 RA-patients (ACR criteria) with various immunosuppressive medication (58.4 ± 8.0 years, f = 137, mean disease duration: 8.0 ± 6.2 years) and 168 HC-patients (56.8 ± 6.8 years, f = 102) were included and divided in seven medication-subgroups (min n = 17). The control group (HC) was set up considering age, gender and smoking habits. Dental examination included dental findings (DMF-T) and evaluation of periodontal situation (pocket probing depth [PPD], clinical attachment loss [CAL]). Periodontal condition (PPD and/or CAL) was classified into healthy/mild, moderate or severe periodontitis. Statistical analysis: Trend-Test as well as Wilcoxon-Test; level of significance:  $\alpha = 5\%$ .

**Results:** The mean DMF-T in RA (19.3 ± 3.9) was significantly higher as in HC (16.9 ± 4.5), especially due to number of missing teeth (M-T: RA = 6.0 ± 4.1, HC = 3.1 ± 2.4;  $p < 0.05$ ). RA-patients showed significantly higher mean PPD (RA: 3.0 ± 0.9, C: 2.3 ± 0.9) and number of PPD between 3 and 6 mm (RA: 61%, C: 37%) compared to HC-patients ( $p < 0.05$ ); for CAL no statistical difference could be determined (RA: 2.4 ± 1.6, C: 2.5 ± 0.9). 98% of RA- and 82% of HC-patients have moderate to severe periodontitis (moderate: RA = 74, HC = 102; severe: RA = 90, HC = 36;  $p < 0.05$ ). For RA-patients, no association between immunosuppressive therapy and severity/activity of rheumatoid arthritis (DAS28) and severity of periodontitis was detected ( $p > 0.05$ ).

**Conclusion:** The periodontal situation of RA-patients is worse than that of HC. Influence of immunosuppressive medication and RA-activity (DAS28) on periodontal health could not be observed.

## P0420

### Periodontal and metabolic parameters in Chilean type 2 diabetic individuals. A Cross-sectional study

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**Aim:** The present study determine whether the clinical periodontal status correlate with metabolic and inflammatory parameters of type 2 diabetic (T2D) individuals.

**Material and Methods:** Thirty patients with T2D (<5 years of diagnosis of diabetes), of both genders aged between (18 and 65) living in the Southern/central area of Santiago, Chile were enrolled. Anthropometric, metabolic and inflammatory variables included Body Mass Index (BMI), fasting blood glucose, glycosylated hemoglobin (HbA1c), insulin, insulin resistance (HOMA-IR) and ultrasensitive C-Reactive Protein (usCRP) were performed. Periodontal evaluation involved a panoramic digital radiography and measurements of Clinical Attachment Level (CAL), probing depth (PD), gingival level (GL) and average of bleeding on probing (BOP). Chi square and linear correlation test were used for determining the statistical significance of associations

**Results:** Mean BMI, HB1Ac and HOMA-IR were 31.5, 7.22 and 6.06 respectively. usPCR ranged from 0.17 to 13.9. Mean periodontal parameters were BOP: 39.3, CAL: 2.8, PD: 2.8 and GL: 0.1. BOP was significantly correlated with BMI and HOMA-IR and was higher in patients with elevated usCRP >3 mg/l ( $p < 0.05$ ). A positive correlation was also found between GL and evolution time of T2D.

**Conclusion:** Patients with recent diagnosis of T2D have increased levels of CRP, insulin and HOMA-IR, findings that correlate with BOP. The correlation between increased levels of CRP (>3) and BOP deserve further studies in order to characterize plausible biological mechanisms that may help explain this association.

## P0421

### A possible approach to the etiopathogenic role of Periodontitis on Rheumatoid Arthritis onset – a literature review

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**Aim:** The current hypotheses of Rheumatoid Arthritis (RA) pathogenesis, suggest that individuals with appropriate genetic background, develop ACPA (antibodies to citrullinated-peptide antigens) under the action of oral bacteria (*Porphyromonas gingivalis*-Pg) and smoking habits, still within an asymptomatic pre-clinical stage. The aim of this poster is to review the evidence for an etiopathogenetic role of Periodontitis, namely the related microbiological flora, on immune tolerance breakdown and subsequent RA onset.

**Material and Methods:** A search strategy of the literature was performed in PubMed using the following associations of keywords (Periodontitis AND oral bacteria AND Rheumatoid arthritis pathogenesis) OR (Periodontitis AND Citrullinated peptides AND Rheumatoid arthritis pathogenesis) including all article types on Humans, published in the last 5 years. A manual search was additionally performed.

**Results:** Pg is the only bacterium known to express a peptidyl-arginine-deiminase-enzyme. This enzyme is responsible for citrullination, suggesting a potential impact on RA onset and progression. Levels of *Fusobacterium nucleatum*-Fn, also appear to be significantly higher in patients with RA and ACPA-positive RA patients. Antibodies to uncitrullinated versions of RA associated autoantigens may occur before the development of ACPA and, in periodontitis, uncitrullinated peptides may break tolerance. Literature suggests that there are two stages of ACPA development: appearance of antibodies against arginine peptides and development of antibodies against citrullinated peptides.

**Conclusion:** The association between Periodontitis and RA onset needs to be evaluated in further clinical studies, with larger sample sizes and wider microbiological scope. Since no studies are available on the emergence of autoantibodies in Periodontitis at a pre-RA state, further investigation is warranted.

## P0422

### Periodontal health condition in patients with dementia and Alzheimer's disease

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**Aim:** The aim of this study was to evaluate the periodontal health status in individuals with and without dementia and Alzheimer's disease (AD).

**Material and Methods:** A total of 50 individuals with Alzheimer's disease (AD) and 50 cognitively normal (ND) adult individuals, were assessed for periodontal health status. Individuals were ranging in age from 29 to 90 years. All individuals were non-smokers. Number of teeth, Approximal Plaque Index (API), O'Leary Plaque Index (PI), probing depth (PD), clinical attachment level (CAL) and percentage of bleeding sites (BOP) were evaluated.

**Results:** All the evaluated periodontal parameters were higher in individuals with AD than that in ND individuals. There were significant differences in mean number of teeth, API and BOP between all the groups.

**Conclusion:** Individuals with dementia and Alzheimer's disease have poor oral health. Knowledge of oral and periodontal status of patients should have the great importance for public health and family education.

## P0423

### The effect of nonsurgical periodontal therapy on salivary and blood glucose levels in diabetic patients with chronic periodontitis

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**Aim:** This study aimed to evaluate the effect of nonsurgical periodontal treatment on glucose levels in blood and saliva of type II Diabetes Mellitus (DM) patients with chronic periodontitis and to investigate the correlation between these values.

**Material and Methods:** 42 patients with type II Diabetes Mellitus and moderate to severe chronic periodontitis were subjected to the routine clinical periodontal examination including

probing pocket depth (PPD), clinical attachment level (CAL) and bleeding on probing (BOP) measurements. The patients' venous blood and unstimulated saliva samples were collected and the glucose level was measured in all samples. Four weeks after completion of nonsurgical periodontal therapy (scaling and root planing) the same clinical and para-clinical measurements were repeated. Statistical analysis was performed by Pearson's correlation coefficient and paired samples *t*-test.

**Results:** In follow up examination, the clinical parameters were significantly improved and the glucose level in both samples showed a significant reduction compared to baseline values. ( $p < 0.01$ ). There was a high intra patient correlation between the glucose level in blood and saliva in either of the tests performed before or after treatment ( $r = 0.959$ ,  $p < 0.0001$ ).

**Conclusion:** The results suggested that saliva sample may be used for monitoring blood glucose level in known DM cases as well as for DM screening in a dental office. Moreover, the reduction of blood and salivary glucose after periodontal treatment underscores its importance in control of diabetes and it might decrease the detrimental effects of elevated salivary glucose.

## P0424

### Sleep disorders and gingival inflammation: a cross-sectional study

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**Aim:** Sleep disorders (SD), particularly sleep deprivation, might alter the immune system and induce systemic inflammation. Recent epidemiological evidence supports an association between periodontal disease and SD. The aim of this cross-sectional epidemiological study was to assess the oral status (amount of plaque, calculus, gingival inflammation, and masticatory function) in subjects with SD compared to subjects without SD.

**Material and Methods:** The study population consisted in a French cohort of subjects who underwent medical and oral examinations between 2012 and 2013 at the Centre d'Investigations Préventives et Cliniques (IPC) of Paris. The presence of SD was assessed by a medical questionnaire. Logistic regression was used to explore the association between SD and oral conditions.

**Results:** Over a total of 42,539 subjects, 15,636 (36.8%) reported to regularly have SD. Compared to subjects without SD, subjects with SD were older (mean age 45.7 vs. 46.8 year;  $p < 0.0001$ ), prevalently female (38.1% vs. 52.7%;  $p < 0.0001$ ), and with higher BMI (25.3 vs. 25.6;  $p < 0.0001$ ). Moreover, SD subjects displayed significantly higher amount of dental plaque [Adjusted Odds Ratio (AOR) (95%CI): 1.19 (1.06–1.34)], higher amount of gingivitis [AOR: 1.22 (1.13–1.32)], and lower masticatory function [AOR: 1.45 (1.33–1.58)]. A negative correlation was found between the hours of sleep and the presence of gingivitis ( $p = 0.001$ ).

**Conclusion:** The presence of SD is associated with an increased risk of gingival inflammation.

## P0425

### Gingival inflammation in patients treated by continuous positive airway pressure for obstructive sleep apnea: a population-based case-control study

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**Aim:** Recent epidemiological evidence suggests that patients with obstructive sleep apnea (OSA) may have an increased risk of developing periodontal disease. Little is known about the oral status (amount of plaque, calculus, gingival inflammation, and masticatory function) of OSA patients treated by continuous positive airway pressure (CPAP). The aim of this population-based case-control study was to compare the oral status between CPAP users and control subjects.

**Material and Methods:** The study population was retrieved from a French cohort of subjects who underwent medical and oral examinations between 2012 and 2013 at the Centre d'Investigations Préventives et Cliniques (IPC) of Paris. Cases were selected if they reported to be treated by CPAP; controls were age-, gender-, BMI-matched based on a 1:2 ratio.

**Results:** Over a total of 31,442 subjects, 470 (1.5%) CPAP users [mean age (SD): 58.5 year (11.1); 73.2% males] were compared to 940 controls. CPAP users reported significantly higher prevalence of cardiovascular diseases (13.9% vs. 8.5%;  $p = 0.003$ ), hypertension (39.8% vs. 23.5%;  $p = 0.0001$ ), diabetes (14.4% vs. 8.8%;  $p = 0.002$ ), and sleep disorders (60.2% vs. 35.7%;  $p = 0.0001$ ) compared to controls. No significant group-difference was noted for the amount of dental plaque, calculus, gingival inflammation and masticatory function.

**Conclusion:** OSA patients treated by CPAP have an oral status that is comparable to age-, gender-, BMI-matched controls in terms of levels of gingival inflammation, amount of plaque, and masticatory function.

## P0426

### Immunological aspects in patients with type 2 diabetes mellitus and periodontal disease

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**Aim:** In adults with type 2 Diabetes Mellitus (DM) in comparison to non-diabetic patients, the Periodontal Disease (PD) appears with a higher incidence. The present research study aimed at evaluating the correlations between PD and DM from an immunological perspective.

**Material and Methods:** The individual chart made for the 17 patients included in the study group recorded: detailed anamnesis of type 2 DM, dental and periodontal status and radiographic exam (Ortopantomography). Each patient underwent biological explorations from the venous blood which determined: HbA<sub>1c</sub>, IL-6, TNF $\alpha$ , 25 HO vitamin D levels and IL-1 from the gingival mucous scraper.

**Results:** The determination of 25OH vitamin D revealed: vitamin D deficiency ( $<10 \mu\text{g/l}$ ) in 5.89% cases and vitamin D insufficiency ( $10\text{--}19 \mu\text{g/l}$ ) = 35.29%. Great fluctuations of vitamin D in type 2 DM patients were also found in pro-inflammatory cytokine levels. IL-6 determining had normal values

(<7 pg/ml) in 94.12% cases and 5.88% had higher values >7 pg/ml. 11.76% of patients had normal values of TNF $\alpha$  ( $\leq$ 8.1 pg/ml) and 88.24% presented values >8.1 pg/ml. IL-1 genotype analysis situated the patients in all 4 classes of genotypes. Regarding the glycemic balance, 5.88% of patients had normal values of HbA $_{1c}$  (<6%), 64.71% between 6–8% and 29.41% >8%.

**Conclusion:** Type 2 diabetic patients present great fluctuations of 25HO vitamin D levels, fluctuations observed in the pro-inflammatory cytokine levels. The risk established by identifying IL-1 genotype shows a uniform distribution of the patients in all 4 risk classes.

## P0427

### The relationship between systemic and periodontal inflammation in sickle cell disease

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**Aim:** Sickle cell disease (SCD) is a chronic inflammatory disease in which vaso-occlusive crisis and endothelial dysfunction are present. The aim of this study was to investigate the relationship between periodontal and systemic inflammation in children with SCD.

**Material and Methods:** Forty-three children with SCD and 43 healthy children were included in the study. Physical, dental and periodontal statuses were examined, and blood, saliva and dental plaque samples were taken. Levels of pro-inflammatory, pro-thrombotic, endothelial dysfunction and oxidative stress mediators in serum and saliva were evaluated by microarray. The presence of *Streptococcus mutans*, *Lactobacillus* and *Candida* species, *Prophyromonas gingivalis*, *Prevotella intermedia* and *Fusobacterium nucleatum* were investigated in tongue coating and plaque samples by culture techniques.

**Results:** The periodontal and microbiological findings of the groups were similar. The majority of the subjects in both groups had gingivitis. In SCD group, significantly higher serum high sensitive C-reactive protein (Hs-CRP), interleukin (IL)-6, IL-8, tumor necrosis factor (TNF)- $\alpha$ , total oxidant status (TOS), nitric oxide (NO), E-Selectin and salivary IL-6, IL-8 and TNF- $\alpha$  levels were observed whereas serum and salivary total antioxidant status (TAS) levels significantly decreased in comparison with the controls ( $p < 0.05$ ). There were positive correlations between serum and salivary IL-6 ( $r = 0.303$ ,  $p = 0.048$ ) and serum IL-6 levels and salivary NO ( $r = 0.412$ ,  $p = 0.006$ ). Serum tPA levels correlated with salivary TOS ( $r = 0.372$ ,  $p = 0.014$ ) and NO ( $r = 0.340$ ,  $p = 0.026$ ).

**Conclusion:** Salivary cytokine levels were increased in SCD patients as were serum cytokine levels. Although, observed oral health status and microflora were similar in both groups, increased levels of local pro-inflammatory cytokines were determined in the patients with SCD.

## P0428

### Local and general problems in patients with oral lichen planus

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**Aim:** Lichen planus is a chronic inflammatory disease that frequently involves the oral mucosa. The aim of this study was the evaluation of oral and general status in patients with oral lichen planus (OLP).

**Material and Methods:** 30 patients with OLP underwent clinical examination at the Periodontology Department of Wrocław Medical University. Their general health, subjective complaints and oral status were appraised following an intraoral examination and the evaluation of a questionnaire.

**Results:** Of the 30 OLP patients (mean age 60.3) 24 were women and 6 were men. The mean duration of symptoms was 2.9 years. The most common clinical presentation was the reticular OLP type. The patients had multiple oral sites of involvement, mainly in the buccal mucosa, tongue or attached gingiva. The mean activity measured by the scoring by Escudier was 1.0. Associated skin and nail involvement was found in 8 and 23 cases. Additional conditions included hypertension (12), gastritis (8), hypothyroidism (4) and osteoporosis (3). As many as 28 patients suffered from local ailments (mainly oral dryness and burning sensation). The medium visual pain analog scale score was 4.7. In 24 cases prosthetic restorations were present (mostly partial removable dentures – 16). Patients also complained about problems in keeping proper oral hygiene (60%) and in wearing dentures (33%).

**Conclusion:** The clinical manifestation and extent of OLP can vary. It has an impact on the quality of life due to local problems like pain, discomfort, oral dryness, eating/speech difficulties and lack of proper hygiene.

## P0429

### Involvement of PLAP-1/Asporin in diet-induced obesity

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**Aim:** Periodontal disease has been suggested to be associated with metabolic syndrome, especially following obesity. However, detailed molecular mechanisms between these diseases have not been fully defined yet. Recently we found that PLAP-1 (Periodontal ligament-associated protein-1)/Asporin, an extracellular matrix protein that is predominantly expressed in periodontal ligament (PDL), is also expressed in white adipose tissues. This finding prompted us to investigate possible involvement of PLAP-1/Asporin in diet-induced obesity animal models utilizing PLAP-1 deficient mice.

**Material and Methods:** We performed real-time PCR for detecting the expression of PLAP-1 in various tissues of C57BL6 wild-type (WT) mice. Then, 5-week-old WT and PLAP-1 knock-out (PLAP-1 KO) mice were fed with either a normal chow (NCD) or a high-fat diet (HFD) for 4 months. While HFD feeding, we measured weight gain, and carried out glucose tolerance and insulin tolerance tests to assess the development of diet-induced metabolic syndrome and obesity in

HFD-fed WT and PLAP-1 KO mice. We also analyzed alveolar bone resorption of those mice by micro-computed tomography ( $\mu$ CT).

**Results:** We confirmed constitutive expression of PLAP-1 mRNA in white adipose tissues and the expression was increased by HFD feeding in WT mice. Compared with WT mice, PLAP-1 KO mice showed the improvement in overweight, the impairment of glucose tolerance and insulin resistance which were induced by HFD. Furthermore, PLAP-1 KO mice were also protected against HFD-induced alveolar bone resorption.

**Conclusion:** PLAP-1 is an important contributor to HFD-induced obesity and metabolic syndrome probably through the adipose tissue homeostasis and development.

## P0430

### The effect of physical activity on glycemic level and periodontal parameters in type 2 diabetes mellitus patients

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Istanbul/Turkey

**Aim:** To evaluate the effect of the degree of physical activity (PA) on glycemic levels and periodontal parameters in type 2 diabetes mellitus (T2DM) patients.

**Material and Methods:** International Physical Activity Questionnaire (IPAQ) short form was distributed to 160 T2DM patients. The levels of PA were determined as low (<600 MET-min/week), moderate (600–3000 MET-min/week) and high (>3000 MET-min/week). Periodontal parameters including plaque index, gingival index, probing depth, bleeding on probing, clinical attachment level, and missing teeth were recorded. Recent ( $\leq$ 48 h) blood test results of the patients, including fasting plasma glucose (FPG), glycosylated hemoglobin (HbA1c), high sensitive C-reactive protein, creatinine, total cholesterol, triglyceride, high density lipoprotein, and low density lipoprotein were registered.

**Results:** The mean MET-min/week of all patients was  $1350.05 \pm 2821.86$ . Of the patients, 49.4% had low and 50.6% had moderate/high PA. The mean HbA1c level of the patients with low PA was significantly ( $p = 0.047$ ) higher than that of the patients with moderate/high PA ( $7.68 \pm 1.73$  and  $7.19 \pm 1.68$ , respectively). Moreover, the mean FPG level of the patients with low PA was also higher ( $p = 0.020$ ) than the patients with moderate/high PA ( $161.23 \pm 61.13$  and  $138.44 \pm 44.60$ , respectively). There were no significant differences in periodontal parameters between the patients with low and moderate/high PA.

**Conclusion:** Moderate/high PA had a positive effect on HbA1c and FPG levels. However, within the limits of this study, there was no difference in clinical periodontal parameters at different levels of PA.

## P0431

### Genotypic diversity and potential pathogenicity of supragingival Prevotella strains isolated from cystic fibrosis patients

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**Aim:** The aims of the study were to investigate the production of virulence factors (beta-lactamase, haemolysis and capsule), to determine the antibiotic susceptibility and the genotypic characteristics of Prevotella species from dental plaque of cystic fibrosis (CF) patients.

**Material and Methods:** Supragingival biofilm of seven CF stable patients was collected and immediately placed into the anaerobic cabinet. A PCR reaction was carried out to amplify the 16S rRNA gene and Prevotella species were selected to the study, with a total of 16 different species of Prevotella. Nitrocefin solution was used to identify if Prevotella isolates were capable to produce  $\beta$ -lactamases. The presence of capsules was observed using a microscope and the haemolysis activity analysed using Supplemented Brucella Blood Agar (SBBA). E-tests<sup>®</sup> were used to test the antimicrobial susceptibility to 12 different antibiotics. Genotypic characteristics intra and inter-species were analysed using Pulsed Field Gel Electrophoresis (PFGE) method.

**Results:** As a result, more than 50% of Prevotella species from dental plaque of CF patients were capable to produce beta-lactamases and haemolysis and approximately 40% of them presented capsules. Furthermore, the isolates were resistant to the antibiotics clindamycin, metronidazole, tetracycline, and tobramycin. The study found closely related genotypic characteristics among Prevotella species, using PFGE method.

**Conclusion:** In conclusion, Prevotella species from dental plaque of CF patients were capable to produce virulence factors and also presented antibiotic resistance. Additionally, some isolates presented genotypic similarities in an intra-species analysis.

## P0432

### Dental aerosols – a culprit behind skin infections

M. Mehta

Uttar Pradesh/India

**Aim:** To establish a positive link between aerosols produced during dental procedures and skin infections.

**Material and Methods:** A cross sectional study was conducted on 60 dental personnel (post graduate students and auxiliaries) working in the ITS DENTAL COLLEGE, GHAZIABAD, INDIA. Selected subjects were divided into 3 groups GROUP A:- 20 dental personnel performing oral prophylaxis using ultrasonic scalers. GROUP B:- 20 dental personnel using aerotor handpieces for endodontic procedures. GROUP C:- 20 dental personnel performing manual scaling and root planing. In all the groups sterile cotton swab were used to take samples before and after completion of procedure from the exposed facial skin surfaces (i.e. area under the eyes and forehead) and unexposed facial skin surfaces (tip of the nose and chin) of the dental personnel and streaked on blood agar plates. After this laboratory analysis was conducted to quantify the bacteria and identify the specific bacterial species involved.

**Results:** Colony count was significantly higher in Group A ( $7.38 \pm 6.4$ ) as compared to Group B ( $4.3 \pm 4.4$ ) and Group C ( $0.000 \pm 0.000$ ). Percentage of colony count was highest in Group A. Among all the sites evaluated forehead was most affected.

**Conclusion:** Within the limits of our study, it was found that a potential association between dental aerosols and skin infections among clinicians exists, forehead being the most affected site.

## P0433

### Periodontal therapy improves biomarkers of endothelial dysfunction

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Amsterdam/Netherlands

**Aim:** To assess the effect of periodontal therapy on two biomarkers of endothelial dysfunction and other markers of systemic inflammation.

**Material and Methods:** A group of moderate-to-severe periodontitis patients ( $n = 71$ ) received non-surgical periodontal therapy. A sub-group ( $n = 38$ ) was randomly assigned to systemic antibiotic administration. Blood samples were collected at baseline, and 3-, 6-, and 12-months after completion of periodontal therapy. Levels of the biomarkers of endothelial dysfunction, sE-selectin and sP-selectin, were assessed by ELISA. CRP, fibrinogen, leukocyte and neutrophil counts, and ESR were assessed in a hospital-based biochemistry laboratory.

**Results:** sE-selectin levels were significantly reduced at 3 and 6 months post-therapy ( $24.51$  and  $23.56$  ng/ml) compared to baseline ( $26.68$  ng/ml,  $p < 0.05$ ). sP-selectin levels were lower at 12 months ( $40.28$  ng/ml) compared to 6 month ( $45.72$  ng/ml,  $p = 0.004$ ) and baseline ( $44.67$  ng/ml,  $p = 0.061$ ). Fibrinogen showed a sustained reduction at 3, 6, and 12 months post-therapy ( $2.98$ ,  $2.94$ ,  $2.95$  g/l, respectively) compared to baseline ( $3.08$  g/l,  $p < 0.05$ ). CRP, leukocyte and neutrophil counts, and ESR showed a similar trend of reduced values post-therapy, without reaching statistical significance. Remarkably, changes in the endothelial biomarkers correlated poorly with clinical improvement in periodontal parameters and were not influenced by antibiotic treatment or smoking status of the patients.

**Conclusion:** After periodontal therapy, the levels of the biomarkers of endothelial dysfunction were reduced in this group of systemically healthy patients, indicating an improvement in vascular function. These results corroborate the clinical improvements of vascular function reported in the literature after periodontal therapy.

## P0434

### A comparison of the analgesic effects of novafen and ibuprofen in relieving pains caused by periodontal surgeries

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Tabriz/Iran

**Aim:** Aim of this research is to compare anti pain effect of novafen and ibuprofen in relieving of pain after periodontal surgery.

**Material and Methods:** In a clinical training control random study, 30 patients of candidates of full mouth periodontal opera-

tion in the form of two groups consisting of 30 areas (each patient from two areas) were studied. The patients of both groups were the same in terms type of surgery. After operation, group one received the capsule of novafen (35 mg acetaminophen, 200 mg ibuprofen and 40 mg caffeine). The second group received ibuprofen 400 mg after operation. The drugs were chosen from the same pharmaceutical firm and the patients consumed the prescribed drugs. The levels of pain were studied after 30 min, 1 h, 3 h after operation (by using VAS) and after 1, 2 and 3 days by using VRS.

**Results:** The patients were the same in terms of type of operation ( $p = 0.09$ ). Level of variable VAS in minute 30 was significantly less in the group novafen, but in hour 1 and 3 had no significant difference ( $p = 0.321$ ,  $p = 0.547$  and  $p = 0.001$  respectively). But the level of VRS was less in the first, second and third days in the novafen group ( $p = 0.001$ ,  $p = 0.001$ ,  $p = 0.021$ ).

**Conclusion:** According to the result of this study, it can be concluded that novafen can act effectively after periodontal operation and reduce the patient pain. By this explanation that this control of pain is similar to ibuprofen in the first hours and it is better than ibuprofen in days 1 and 3.

## P0435

### Periodontal situation, microbiological findings and aMMP-8 of patients before and after liver transplantation – clinical cohort study

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**Aim:** This clinical study was implemented to evaluate the periodontal situation, microbiological findings and aMMP-8 level in patients before and after liver transplantation (LTx).

**Material and Methods:** 110 patients were included and subdivided into two groups: before (preLTx:  $n = 35$ , aged  $54.9 \pm 8.5$  years, male = 18) and after LTx (postLTx:  $n = 75$ , aged  $56.7 \pm 12.3$  years, male = 48). In all patients the caries incidence (DMF-T) and the periodontal parameters pocket probing depth (PPD) and clinical attachment loss (CAL) were assessed. The periodontal condition (PPD and/or CAL) was classified into healthy/mild, moderate or severe periodontitis. Samples of gingival crevicular fluid (GCF) were taken from the deepest sites to detect periodontal pathogens (PCR) and aMMP-8 level (ELISA). Swabs from oral mucosa were investigated concerning candida species. Statistical analysis: *t*-Test, Mann-Whitney-*U*-Test, Chi-Square-Test; level of significance:  $\alpha = 5\%$ .

**Results:** The mean DMF-T showed no statistically significant difference between preLTx- ( $23.6 \pm 4.8$ ) and postLTx-patients ( $23.3 \pm 6.2$ ;  $p = 0.74$ ). 72% of preLTx- and 67% of postLTx-patients have moderate to severe periodontitis (moderate: preLTx = 16, postLTx = 38; severe: preLTx = 9, postLTx = 12;  $p = 0.3$ ). There was no significant difference in composition of periodontal pathogens or occurrence of candida species ( $p > 0.05$ ). *Fusobacterium nucleatum* (preLTx: 90%, postLTx: 98%) and *Tannerella forsythia* (preLTx: 32%, postLTx: 34%), as well as *Candida albicans* (preLTx: 86%, postLTx: 81%) and *Candida glabrata* (preLTx: 33%, postLTx: 19%) were the most frequent bacterial and candida findings. The mean aMMP-8 level was lower in postLTx ( $17.8 \pm 12.5$  ng/ml) than in preLTx ( $20.3 \pm 10.8$  ng/ml;  $p = 0.69$ ).

**Conclusion:** Pre- and post-LTx-patients showed inadequate periodontal conditions. Furthermore, periodontal and microbiological findings were comparable, while the aMMP-8 was lower under immunosuppression in postLTx-patients.

## P0436

### Effect of receptor genetic polymorphisms on periodontitis and systemic diseases of Chinese women

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**Aim:** FcγRIIB is the Fc receptor for immunoglobulin G, PPARγ is the peroxisome proliferator activated receptor. In previous studies, we found the association between FcγRIIB polymorphisms, periodontitis and adverse pregnancy outcomes, between PPARγ polymorphisms and periodontitis in Japanese pregnant women. In addition, PPARγ polymorphisms were associated with low bone mineral density (BMD), the level of inflammatory cytokines and body mass index (BMI) in Japanese postmenopausal women has been reported. Meanwhile, periodontitis has been suggested to be a risk for adverse pregnancy outcomes and low BMD and BMI has been reported. But these results have not been established in Chinese women by now. We want to investigate if there is an association between receptor genetic polymorphisms, periodontitis and systemic diseases of Chinese women and the mechanism between them.

**Material and Methods:** We collect clinical periodontal parameters, and obstetrical and orthopedics data from Chinese women to ensure if there is a relationship between them, and use Enzyme linked immuno-sorbent assay (ELISA) to determine the level of cytokines, DNA sequencer and Fluorescence Activating Cell sorter (FACS) to determine if receptor genetic polymorphisms affect the expression of receptor on cells.

**Results:** There is a significant association between clinical periodontal parameters and adverse pregnancy outcomes in Chinese pregnant women ( $p < 0.05$ ).

**Conclusion:** Periodontitis was associated with adverse pregnancy outcomes in Chinese pregnant women. But further studies need to be continued.

## P0437

### The effect of Vitamin D supplementation on the periodontal health of pregnant females

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**Aim:** To determine the effect of oral vitamin D supplementation on the periodontal health of pregnant women residing in a rural district of Pakistan.

**Material and Methods:** A community based double blind block randomized placebo controlled clinical trial was conducted in Pakistan. Pregnant females ( $n = 85$ ) at 12 weeks of gestation were inducted. Women with known high level of Vitamin D were excluded. Serum samples and periodontal parameters such as attachment level (CAL) and probing depth (PPD) were recorded. Intervention group was supplied with daily oral dose of 4000 IU of Vitamin D for 6 months. Controls received pla-

cebo for the same duration. The outcome was change in the periodontal parameters i.e. BOP, PPD and CAL. The study was registered at the clinicaltrials.gov (ref# NCT01422122).

**Results:** The mean vitamin D levels were  $12.9 \pm 6.3$  and  $12.7 \pm 5.3$  ng/ml in intervention and placebo respectively. No subjects in the either group had sufficient vitamin D levels at baseline. The pocket depth (PPD) and attachment loss (CAL) did improve in the vitamin D group but the difference remained statistically insignificant. The vitamin D level in the intervention group improved but was not enough to reach a sufficient plasma level for this micronutrient. The placebo group showed a decline in their vitamin D level at the endpoint.

**Conclusion:** Supplementation of 4000 IU/day to vitamin D deficient pregnant females was not enough to improve their Vitamin D levels. There was no significant difference in CAL and PPD of subjects treated with or without vitamin D during pregnancy.

## P0438

### Reinfection prevention after full mouth decontamination (FMDC) in diabetes patients

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**Aim:** To evaluate the change of clinical, serological and immunological parameters after full mouth disinfection, including amoxicillin and metronidazole medication (i.e. FMDC) followed by frequent, professional supportive periodontal reinfection prevention.

**Material and Methods:** After IRB approval and written informed consent, 15 hospitalized type 2 diabetes patients (DMCP) were treated for their systemic condition (cf. NCT01848379). 15 periodontitis patients served as controls (CP). All individuals followed a therapeutic periodontal regimen and monitoring of 16 visits. 15 systemically/orally healthy subjects served as controls (C) for clinical/immunological parameters. Monitoring of the patient cohorts was performed at baseline (BL), +2 weeks (W), after FMDC (except periodontal parameters, FloridaProbe™), +24W and after the completion of all supportive visits (SE).

**Results:** Median(m) clinical attachment level (mCAL) was gained and periodontal probing depth (mPPD) reduced between BL and +24W ( $p < 0.01$ , ANOVA) as well as +24 and SE ( $p < 0.06$ ), in both cohorts. BL bleeding on probing (mBOP) at 90% for DMCP and CP, abolished completely over the time of the study ( $p < 0.001$ ). Median c-reactive protein was reduced by factor 2.8–0.7 for CP and 2.5 for DMCP. The glycosylated hemoglobin (mHbA<sub>1C</sub>) was  $\leq 5.8\%$  at all visits for CP and C, dropped from 11.2% to 7.5% over time for DMCP ( $p < 0.01$ ). The body-mass-index (mBMI), 25.5 for C and in between 24.5 and 24.1 for CP, was lowered for DMCP by 2.0–3.0 kg/m<sup>2</sup> from BL to SE ( $p < 0.05$ ).

**Conclusion:** Based on the data reported, synergistic medical and dental patient cares are strongly suggested, to relieve patients from periodontal and endocrinological burdens.

## P0439

### Association between preterm birth and/or low birth weight and maternal periodontal disease: a case–control study in Brazil

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**Aim:** The aim of this hospital based case–control study was to evaluate the association between preterm birth and/or low birth weight (PTB/LBW) and clinical parameters of maternal periodontal disease.

**Material and Methods:** Postpartum women who gave birth to a newborn PTB/LBW (test group), and postpartum women who had babies at full term with normal weight (control group) were included. Data were collected through medical records, interview, and clinical examination. Bivariate analysis was performed to assess the proportion PTB/LBW in the independent variables and multiple logistic regression analysis was performed to assess the association between adverse perinatal outcomes and independent variables.

**Results:** The sample consisted of 140 cases and 276 controls. The presence of generalized periodontitis was not associated to any adverse pregnancy outcomes. The PTB/LBW was significantly associated with income between 1.5 and 2.9 and  $\geq 3$  minimum wage [OR = 1.84 (1.09–3.09), OR = 1.89 (1.07–3.35), respectively], inadequate number of prenatal visits [OR = 0.26 (0.13–0.50)], history of PTB/LBW [OR = 2.16 (1.27–3.65)], systemic disease [OR = 1.70 (0.88–3.29)], cesarean delivery [OR = 1.83 (1.20–2.77)] and pre-eclampsia [OR = 5.26 (2.43–11.4)]. Among postpartum women, preterm birth was significantly associated with higher income status, increased age, previous history of PTB/LBW. In addition, previous history of systemic disease was significantly associated with PTB/LBW.

**Conclusion:** In conclusion, we found no significant relationship between preterm birth and/or low birth weight and maternal periodontal disease.

## P0440

### Association of periodontal parameters and $\gamma$ -glutamyl transpeptidase in Japanese adults

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**Aim:** Periodontitis has a reported influence on liver lipid metabolism independently of alcohol ingestion. A study with office employees in Tokyo showed a significant association of periodontitis with serum  $\gamma$ -glutamyltransferase (GGT). The aim of our study was to evaluate the association between periodontal parameters and serum GGT in Japanese adults lived in Sado Island (Niigata prefecture, Japan).

**Material and Methods:** Japanese adults living on the island who visited Sado General Hospital were invited to the Project in Sado for Total Health (PROST). Among 2275 participants, blood test data were obtained from 1464, and of these participants, 118 had periodontal records dated before the blood tests. Ten patients involved in periodontal maintenance phase before the study were excluded. The final participants consisted of 48 males and 59 females aged 41–85 years (mean age 71.8 years).

Probing pocket depth (PPD) was measured on each mesial point per tooth. The definition criterion for periodontitis was having more than one tooth with PPD  $\geq 5$  mm. The levels of serum GGT, ALT and AST were measured. Participants were divided into two groups by the median of GGT.

**Results:** A significant association was found between GGT and periodontitis by a multiple regression analysis adjusted for age, sex and alcohol drinking. No significant difference in ALT or AST was found between participants with periodontitis and healthy controls.

**Conclusion:** There was a significant association between GGT and periodontitis in Japanese adults. An analysis with a larger number of participants should be undertaken in future.

## P0441

### The impact of hemodialysis or peritoneal dialysis on oral health status in end-stage renal disease patients

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**Aim:** To compare oral health status in chronic kidney disease population undergoing hemodialysis (HD) or peritoneal dialysis (PD).

**Material and Methods:** Demographic data, clinical information, visual plaque index, number of decayed, missing and filled teeth, clinical attachment level, bleeding on probing as well as unstimulated and stimulated–saliva flow rate and pH were evaluated in patients undergoing HD or PD with or without previous history of HD therapy [PD or PD(HD) groups].

**Results:** Age and gender did not differ among the three groups. PD patients with previous HD history [PD(HD)] were longer on dialysis therapy than HD and PD groups ( $p < 0.001$ ). No differences were observed among the three groups concerning blood levels for creatinine and urea, chronic disease etiology and literacy. HD patients smoked more when compared to PD patients with or without previous history of HD ( $p = 0.007$ ). The number of decayed and filled teeth did not differ among the three groups, however HD patients presented more teeth than the other two groups ( $p = 0.001$ ). Additionally, visual plaque index and clinical attachment level were higher in HD patients when compared to either PD or PD(HD) groups ( $p = 0.030$ ,  $p = 0.002$ ). No differences were observed in unstimulated and stimulated–saliva flow rate and pH among the three groups.

**Conclusion:** In comparison to PD patients with or without previous history of HD, HD patients presented poorer oral hygiene and higher rates of periodontal disease, independently of the time on dialysis.

## P0442

### The effect of macrophage erythroblast attacher (MAEA) gene polymorphism on the relationships between periodontitis and bone mineral density in postmenopausal Japanese women

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**Aim:** Macrophage erythroblast attacher (MAEA) mediates the attachment of erythroblasts to macrophage and plays an important role in the development of mature macrophages. MAEA also contributes to nuclear architecture and cells division events in erythroblasts and macrophages. Polymorphisms in MAEA gene have been reported to associate with type II diabetes in East Asians. The aim of this study was to investigate possible associations between MAEA gene polymorphism, bone mineral density (BMD) and/or periodontitis in postmenopausal Japanese women.

**Material and Methods:** The final sample in this study comprised 345 postmenopausal Japanese women who lived in Yokogoshi area, Niigata City. Probing pocket depth (PPD) and clinical attachment levels (CAL) were measured per tooth. Genomic DNA was extracted from peripheral blood. SNP of MAEA (rs6815464) was analyzed with TaqMan method. BMD of total femur bone head was assessed using dual-energy X-ray absorptiometry.

**Results:** No significant difference in age, number of teeth, body mass index (BMI) or BMD was found between the genotypes. The mean CAL was significantly different between the G allele carrier group and the non-carrier group ( $p = 0.026$ ). After controlled with age as a covariate, positive correlations were found between mean CAL and BMD levels ( $p = 0.014$ ) in the G carrier group, and between mean PD and BMI ( $p = 0.044$ ) in the G non-carrier group.

**Conclusion:** The MAEA gene polymorphism was independently associated with periodontitis, but not with BMI or BMD in postmenopausal Japanese women. Periodontitis was correlated with BMD in the G allele carriers and with BMI in the G allele non-carriers.

## P0443

### Interrelationship between metabolic syndrome and periodontal health condition: a prospective cohort study

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**Aim:** Several cross-sectional studies have shown that periodontal disease coexists with metabolic syndrome. We examined the interrelationship between metabolic syndrome and periodontal condition for each gender, with metabolic syndrome being worse periodontal condition, and periodontal condition negatively affecting metabolic syndrome in a cohort study.

**Material and Methods:** We analyzed longitudinal data with 5 years follow-up in the two cohort groups, (1) 547 males (mean age 43.2 years) and 182 females (mean age 44.2 years)

who had shallow probing depths (PDs, the lowest tertile of mean PD) at baseline; (2) 665 males (mean age 41.7 years) and 276 females (mean age 43.6 years) who had no metabolic component at baseline.

**Results:** Logistic regression analysis showed that, in the group with shallow PD, males with metabolic syndrome at baseline was significantly more likely to have severe PD, defined by the highest tertile of mean PD, at 5 years later than those who had no metabolic component (odds ratio 3.0; 95% confidence intervals: 1.3–7.1). Periodontal condition at baseline was not associated with incidences of having at least one metabolic component at 5 years later in males. Females did not have any relationship between metabolic component and periodontal condition.

**Conclusion:** This study suggests that metabolic syndrome is possible to be worse periodontal condition in males, but in females. On the other hand, we did not observe the opposite relationship in both males and females.

## P0444

### Periodontal disease parameters in patients with coronary heart disease with emphasis on disease severity

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**Aim:** Periodontal medicine is a branch that for many years has been focusing on relationship between periodontal disease and systemic conditions such as cardiovascular diseases, diabetes, preterm birth, rheumatoid arthritis, lung disease, stroke, and so on. Majority of these investigations fail to classify the periodontal disease in a uniform way. The aim of this investigation was to determine specifically periodontal disease parameters for each level of the disease severity, namely: early, moderate and severe periodontitis and compare the results in two subsets of examinees – healthy and patients suffering from coronary heart disease (CHD).

**Material and Methods:** 320 patients of both genders were examined, aged 25–75 years, 160 in each group. All of them were non-smokers and did not suffer from diabetes or any other systemic disease. All teeth were examined for the following parameters: full mouth plaque score (FMPS), full mouth bleeding score (FMBS), clinical attachment loss (CAL), furcation involvement, and presence of periodontal abscess(es).

**Results:** Patients suffering from CHD had greater FMPS and FMBS; they had a lower chance of having  $CAL \leq 2$  mm, and more frequently had  $CAL \geq 5$  mm. They also suffered more frequently from periodontal abscesses and furcation involvement. Finally, the severity of periodontal disease correlated significantly with total cholesterol levels.

**Conclusion:** There are differences between prevalence of certain degrees of periodontal disease in patients with and without CHD. Registration of mere presence or absence of periodontal disease is insufficient; the most severe forms are more likely to occur in patients with CHD.

## P0445

Dr

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**Aim:** To evaluate prevalence of periodontal disease in a cross sectional survey of diabetes mellitus (DM) subjects (types 1 and 2) and correlate with duration of DM and presence of other systemic conditions.

**Material and Methods:** 107 consecutive adult diabetes mellitus patients (types I and II) were recruited from Endocrinology outpatient Clinic of the University Teaching Hospital Maiduguri. All individuals who consented to this study were examined for periodontal status using numbers of mobile teeth, Community Periodontal Index (CPI) and Oral Hygiene Index- Simplified (OHI-S). Other parameters recorded were bio data, smoking, presence of other systemic conditions and fasting blood glucose. Epi-Info statistical software package was used.

**Results:** Of the 107 patients (47 males and 60 females) included in the study, 90.7% of the subjects were diagnosed with T2DM. Their ages ranged from 20 to over 70 years. Only a fifth had secondary education and over 60% of the subjects had DM for 5 years and less. 60% used toothbrush/paste with same brushing once daily. Nearly all (97.2%) did not smoke. 54.2% had hypertension as an associated systemic condition. Only 38.3% had good oral hygiene. Majority (45%) had CPI 2 (calculus deposits) while only 17% had periodontitis (CPI 3 OR 4). 63.5% of subjects had abnormal fasting blood glucose levels (>7 mmol/l). There was no association between periodontal disease status and duration of diabetes and categories of fasting blood glucose.

**Conclusion:** This data indicates a minor predisposition of diabetic patients to periodontitis. However use of a larger sample size is recommended.

## P0446

### Effect of systemic antibiotics as adjunct to basic periodontal therapy on markers of metabolic syndrome: a 12-month follow-up study

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**Aim:** To investigate the effects of systemic antibiotics (AB) as adjunct to basic periodontal therapy (BPT) on parameters of Metabolic Syndrome (MetS)

**Material and Methods:** 110 systemically healthy chronic periodontitis patients were randomly assigned to BPT (n = 56, control) or BPT + AB (n = 54, test). The following parameters of MetS were measured at baseline, 3, 6 and 12 months after intervention: waist circumference (WC), systolic (SBP) and diastolic (DBP) blood pressure, triglycerides (TR), glucose (GL), HDL cholesterol. On the basis of these parameters, diagnosis of MetS was also assessed. ANOVA for repeated measures with treatment allocation as fixed factor was used for statistical analyses.

**Results:** Both test and control, irrespective of AB, showed significant reduction in SBP [from 138.9 mm/Hg to 133.5, 130.8 and 133.5 (test) and from 134.8 to 132.6, 132.2 and 132.1 (control) (p = 0.004, p < 0.001 and p = 0.041)] and in TR [from

1.59 mmol/l to 1.23, 1.13, and 1.28 (test) and from 1.71 to 1.17, 1.27 and 1.35 (control) (p < 0.001, p < 0.001 and p = 0.018)]. Reductions for the other MetS parameters were not observed, again irrespective of AB. 30 patients (27.2%) were retrospectively diagnosed with MetS. After treatment this proportion changed to 14.5% (month 3, p = 0.007), 17.3% (month 6, p = 0.017) and 21.8% (month 12, p = 0.383).

**Conclusion:** After BPT+/-AB, patients show decreased levels for two out of five parameters of MetS. AB do not show adjunctive effects for these parameters. In a sizeable proportion of patients with MetS, periodontal therapy could reverse this condition.

## P0447

### Periodontal treatment in patients with chronic kidney disease

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**Aim:** The aim of this pilot study was to evaluate the effect of periodontal treatment on renal function, metabolic markers (triglycerides, total cholesterol, albumin) and asymmetric dimethylarginine (ADMA) in pre dialysis chronic kidney disease patients presenting chronic periodontitis.

**Material and Methods:** Twenty-six stages 2/4 CKD patients with severe chronic periodontitis were studied. Periodontal clinical parameters included plaque index (PI), bleeding on probing (BOP), probing pocket depth (PPD) and probing attachment level (PAL). Estimated glomerular filtration rate (eGFR), triglycerides, total cholesterol, albumin and ADMA levels were evaluated at baseline, 90 and 180 days after periodontal therapy. Estimated GFR was evaluated by the MDRD equation.

**Results:** All periodontal clinical parameters significantly improved (p < 0.05) 180 days after periodontal therapy. There was a significant improvement on the median values (interquartile range) of eGFR from 36.2 (27.3) ml/min/1.73 m<sup>2</sup> on baseline to 37.8 (36.2) ml/min/1.73 m<sup>2</sup> on day 90, and to 39.3 (27.8) ml/min/1.73 m<sup>2</sup> (p < 0.05) on day 180. ADMA levels significantly reduced 180 days after periodontal treatment. No significant differences were observed at the median values of metabolic markers comparing baseline and 180 days after periodontal treatment.

**Conclusion:** eGFR improved 6 months after periodontal treatment, while ADMA levels significantly reduced in this period of time. These data point to a link of kidney disease with endothelium dysfunction and periodontitis, suggesting that periodontal treatment may be beneficial to the course of CKD.

## P0448

### Periodontal changes in children and young adults patients with type 1 diabetes

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**Aim:** The aim of the study is to highlight possible correlations between periodontal status, diabetic clinical parameters and immunohistochemical aspects characterizing patients diagnosed with type 1 diabetes (T1D).

**Material and Methods:** This study was conducted on 62 children and young adult patients aged 5–29 years, divided in control (periodontal diagnostic without T1D diagnostic) and test groups (periodontal and T1D diagnostic). It was performed clinical periodontal examination (the PD- probing depth, plaque index Silness and Loe- PI), and a periodontal diagnostic was established – gingivitis/aggressive periodontitis. For the diabetic patients, it was noted the HbA1c values, age of diabetes, the diabetes onset. An immunohistochemical gingival study for certain biomarkers was performed also. Statistically significant differences between groups ( $p < 0.05$ ) and correlations between clinical periodontal, diabetes status and expression of biomarkers were investigated.

**Results:** Significant differences were found between the IP values on test groups of children and adults but there were no significant differences between IP on test and control groups of adults or between IP on test and control groups of children. It was not found a statistically significant correlation between HbA1c and severity of periodontal diagnostic in children group but found a direct correlation between HbA1c and statistically significant in periodontal diagnostic in adults group. It was found also a correlation between the expression of biomarkers in gingiva of diabetic patients with and the periodontal diagnostic.

**Conclusion:** The results show a possible correlation between periodontal changes, diabetic status and gingival expression of certain biomarkers.

## P0449

### Porphyromonas gingivalis modulates Ox-LDL and TNF- $\alpha$ pre-treated endothelial cell death

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**Aim:** Infection of endothelial cells by periodontal pathogens is suspected to worsen atherosclerosis. In this study, we investigate the specific effects of *Porphyromonas gingivalis* (Pg) and its lipopolysaccharide (Pg-LPS) on endothelial cell apoptosis in a pro-atheromatous context.

**Material and Methods:** Human umbilical vein endothelial cells (HUVEC) were pre-treated with Ox-LDL (30  $\mu\text{g/ml}$ ) or TNF- $\alpha$  (40 ng/ml) during 24 h and infected with Pg or stimulated by Pg-LPS or *Escherichia coli* LPS for 24 h. Levels of cell necrosis and apoptosis were evaluated using Annexin-V-fluorescein/propidium iodide staining for flow-cytometry. Expression of apoptosis related genes, Caspase-1, -3, Bcl 2 and Bax was evaluated by RT-qPCR.

**Results:** Pg, Pg-LPS, Ox-LDL and TNF- $\alpha$  decreased HUVEC viability after 24 h. Pg-induced cell death was higher in pre-treated cells (>20%). For Pg infection or Ox-LDL pre-treatment, cell death was predominantly due to necrosis while cell death was mainly due to apoptosis in Pg infected Ox-LDL pre-treated HUVEC. In TNF- $\alpha$  pre-treated cells, no changes were observed after Pg infection regarding the ratio necrosis/apoptosis. Apoptosis gene-related expression was amplified by infection in pre-treated cells compared to infection alone (10-folds). Pg-LPS stimulation effects on necrosis/apoptosis ratios and apoptosis related gene expression were similar to observed Pg infection effects. Interestingly, *Escherichia coli* LPS, did not invert necrosis/apoptosis ratio in pre-treated HUVEC.

**Conclusion:** This study confirmed the potential deleterious effect of Pg on vessel walls. Furthermore, our data showed that

Pg could selectively modify and amplify the pro-atheromatous effect of Ox-LDL and TNF- $\alpha$  highlighting a novel aspect of atherosclerosis worsening related to Pg infection.

## P0450

### Are obstetricians and dentists knowledgeable regarding associations between periodontal health and pregnancy outcome?

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**Aim:** As hormonal variations occur throughout pregnancy and have been associated with gingival inflammation, whilst periodontal disease itself may lead to adverse pregnancy outcomes, diagnosis and referral for treatment at early pregnancy stages or before conceiving are recommended. We aim to determine the disparity between contemporary evidence and the practice behaviours of dentists and obstetricians.

**Material and Methods:** 1000 dentists and 306 Obstetricians at Victoria, Australia, were randomly selected and received questionnaires assessing their knowledge and how that translates to practice behaviour.

**Results:** Replies were received mostly from experienced dentists, 83% of practicing >10 years. 29% of responders were female. 30% of participants were educated about the association between oral and systemic health during their dental studies. While 95% of dentists report current literature affects their practice, most consider it being affected to a low extent. Although 54% of dentists suggest alternative treatment plans for pregnant patients, only 6% consider the effect of systemic health on oral and periodontal health as part of their practice. Most dentists are aware of potential effect of periodontal bacteria on gingival health during pregnancy (66%) and some (43%) on pregnancy outcome. Those figures dropped dramatically for obstetricians, all of which believe being able to identify periodontal disease themselves, and report rarely referring their patients for periodontal treatment.

**Conclusion:** As early treatment of periodontal disease might affect both periodontal health and pregnancy outcome, dentists and especially obstetricians must be educated regarding. This should be emphasized along various stages of their professional career.

## P0451

### Periodontal assessment of chronic oral anticoagulation population

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**Aim:** Evaluate periodontal alteration and biochemical determinations related to bone remineralization in a population of patients on chronic oral anticoagulant (Warfarin and Acenocumarol) treatment.

**Material and Methods:** We evaluated 147 patients treated with oral anticoagulants, 80 patients with mean age  $71.46 \pm 2.59$  years were selected. 52% women. Divided into 2 cohort:

Group A n = 36 medicated  $\leq 1$  year Group B n = 44 > 1 year. Clinical evaluation was performed, including: PD >3 mm with manual probe, plaque index and gingival index BOP. Analytically biochemical parameters of bone remodeling (calcium and phosphorus serum), formation (alkaline phosphatase and bone isoenzyme), serum osteocalcin and resorption parameters (acid phosphatase AP and beta-crosslaps in plasma) were evaluated. The control and intensity of oral anticoagulation was assessed by INR. Data were analyzed with SPSS 10.0, descriptive statistics and nonparametric Kruskal–Wallis statistical analytical with significance at  $p < 0.05$ .

**Results:** Gingivitis with BOP was observed in over 90% of groups although in Group B is lower, what could be related to levels of AP. PD >3 mm showed moderate to mild chronic periodontitis with similar results in both groups, local differences observed between molar-premolar teeth with greater loss in this area compared to anterior teeth. Of all the analytical parameters were relevant osteocalcin, which showed deep-maintained decline levels, total and tartrate-resistant AP and beta-crosslaps ( $p < 0.005$ ).

**Conclusion:** The studied population has a degree of mild to moderate periodontitis, more severe in patients with longer treatment, although the most frequent abnormality is gingivitis. Analytically can find obvious alteration of bone metabolism with reflection in the periodontium and contribute to the indicated clinical findings.

## P0452

### Clinical and microbiological effects of electrostimulation in xerostomia

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**Aim:** Xerostomia is a common symptom in adult population associated with hard and soft tissue changes and oral disturbances. Medical therapy to improve salivary gland secretory function has shown variable results. Electrostimulation of salivary glands has previously shown promising results. We aimed to evaluate the clinical and microbiological changes of salivary gland using electrostimulation, applying the Saliwell-Crown® in xerostomic patients.

**Material and Methods:** A longitudinal, open-label study of 10 patients was conducted at the UANL Periodontics Program Clinic, using the Saliwell-Crown®. Outcomes were to compare: (1) Xerostomy symptoms using a symptomatology survey and the modified Schirmer's sialometry; (2) Colony forming units (CFU) changes using rinse samples for *Candida* spp, *Streptococcus mutans*, and *Lactobacillus* spp, at baseline and 4 weeks of continuous stimulation. A Student *T*-test was used for analysis.

**Results:** Nine patients had Sjögren syndrome and one drug-induced xerostomia. The survey mean improved from 5.2 to 4.5, without statistical significance. Sialometry scores improved significantly at 3 min, without stimulation from 8.3 to 15.9 mm ( $p = 0.02$ ), and with stimulation from 24.1 to 26.2 ( $p = 0.03$ ). The mean CFU change for *Candida*-spp 203.6–167.90 ( $p = 0.29$ ), *Streptococcus mutans* from 568.11 to 350.03 ( $p = 0.88$ ), and for *Lactobacillus*-spp. from 781.82 to 407.93 ( $p = 0.33$ ).

**Conclusion:** Electrostimulation using the Saliwell-Crown® significantly increased the salivary flow rate at 4 weeks follow-up

in xerostomic patients. No significant changes were observed regarding the symptomatology survey and the CFU of *Candida*-spp, *Streptococcus mutans*, and *Lactobacillus*-spp. Further larger and controlled clinical trials are necessary to confirm our findings.

## P0453

### Successful reduction of periodontal inflammation is correlated with improved markers of presymptomatic arterial dysfunction

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**Aim:** This prospective clinical trial evaluated the effects of non-surgical periodontal treatment on cardiovascular surrogate parameters like pulse wave velocity (PWV), augmentation (Aix), systolic and diastolic blood pressure and central blood pressure. The aim was to describe the association between reduction of periodontal inflammation and measures of arterial structure and function that are subclinical indicators of atherosclerotic vascular disease.

**Material and Methods:** A total of 100 subjects suffering from severe periodontitis received full-mouth scaling and the adjunctive oral administration of amoxicillin (500 mg) and metronidazole (400 mg) 3× daily for 7 days followed by supportive periodontal care in 3 months intervals. PWV, Aix, central and peripheral blood pressure were recorded using an oscillometric device (Arteriograph) at baseline, 6 and 12 months after completion of the antiinfective periodontal therapy.

**Results:** 12 months after completion of the antiinfective periodontal therapy the observed reduction of bleeding on probing correlated significantly with a decrease of the cardiovascular parameters like PWV and Aix. Successful periodontal therapy reduced PWV values to a meter per second from 8.3 to 7.4 m/s. If it was not possible to eliminate or control the periodontal inflammation the pulse wave velocity stays the same or it decrease. By contrast recorded peripheral blood pressure values did not change during the course.

**Conclusion:** Reduction of periodontal inflammation (bleeding on probing) is associated with improved markers of presymptomatic arterial dysfunction. As both disease entities are very prevalent among the general population an intensified collaboration between general medicine and dentistry may be advised.

## P0454

### Detection of periodontal pathogens in tooth brushing-induced bacteremia by culture and molecular techniques

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**Aim:** This cross-sectional study was aimed to compare the prevalence and quantity of periodontal pathogens in tooth brushing-induced bacteremia using three culture techniques [direct anaerobic culturing (DAC), hemo-culture (BACTEC), and lysis-centrifugation (LC)] and a non-culture dependent method [quantitative polymerase chain reaction (qPCR)].

**Material and Methods:** Blood samples were collected from thirty six subjects (17 periodontally healthy individuals, 10 with gingivitis and 9 with moderate-severe periodontitis) at baseline and 2 min after tooth brushing. Each sample was analysed by four techniques: DAC, BACTEC, LC for detection and quantification of bacterial isolates and qPCR for detecting *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans*. Descriptive statistics, ANOVA and Chi-squared test were used for data analysis.

**Results:** Neither BACTEC nor qPCR detected any type of bacteria in the blood samples. Only LC (2.7%) and DAC (8.3%) detected bacteremia, but not in the same patients. *Fusobacterium nucleatum* was the bacteria most frequently detected.

**Conclusion:** The present results demonstrate that presence of periodontal pathogens in blood samples after toothbrushing is very low. The disparity of the obtained results when using different detection methods highlights the need of properly validated methods in bacteremia studies.

## P0455

### Detection and quantification of *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans* in bacteremia after interproximal tooth brushing

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**Aim:** This cross-sectional study was aimed to compare the prevalence and quantity of *Porphyromonas gingivalis* and *Aggregatibacter actinomycetemcomitans* in bacteremia induced by interproximal toothbrushes in chronic periodontitis and periodontally healthy patients using either a direct anaerobic culturing (DAC) or a non-culture dependent molecular method quantitative polymerase chain reaction (qPCR).

**Material and Methods:** Blood samples were collected from 30 periodontally healthy individuals and 30 with moderate-severe chronic periodontitis at baseline and 1 min after the use of inter-proximal toothbrushes (professionally-administered). Each sample was analysed by DAC and qPCR. DAC was used for the detection and quantification of bacterial anaerobic isolates, and qPCR was directed to *P. gingivalis* and *A. actinomycetemcomitans*. Descriptive analyses were performed.

**Results:** Neither *P. gingivalis* nor *A. actinomycetemcomitans* were detected in blood samples with any technique (DAC or qPCR). DAC detected *Fusobacterium nucleatum* (in one periodontitis patient at baseline) and non-identified bacteria [10 at baseline (8 periodontitis and 2 healthy patients) and 6 after brushing (3 periodontitis and 3 periodontally healthy)]. Only 3 patients had positive bacteremia at baseline and after interproximal brushing.

**Conclusion:** DAC and qPCR failed to detect *P. gingivalis* or *A. actinomycetemcomitans* in blood samples after interproximal toothbrushing.

## P0456

### Oxidative stress and activation of the inflammasome in patients with acute myocardial infarction and periodontitis

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**Aim:** Some factors have been described related to impaired inflammatory response in periodontitis. Oxidative stress is defined as a persistent imbalance between the production of highly reactive molecular species and anti-oxidant defenses. Inflammasome is a multi protein complex that regulates the recognition of aggression.  $IL-\beta$  is a final product indicating an activation of inflammasome. Cardiovascular disease (CVD) is due to atherosclerosis that has been related with an inflammation of artery wall. Both periodontitis and CVD, have been related in epidemiological studies, but the question is to know, if they shared the same pathogenic mechanism. The aim was to study both aspect in patients suffering CVD and periodontitis.

**Material and Methods:** This is an observational study with 2 groups of patients: Group A with acute myocardial infarction (n = 154) and B without (n = 107). Both are divided into 2 subgroups: With and without Periodontitis (P). Lipid peroxidation was determined by determining the levels of malondialdehyde,  $IL-\beta$  was analyzed by commercial ELISA kit.

**Results:** The highest levels of hidroperoxides and  $IL-\beta$ , mainly in CVD patients, both with and without P were found. In patients without CVD but with P, high values were also found.  $IL-\beta$ : test with P (102.29); test with no PD (97.32); control with P (61.99); control with no P (5.50). Hidroperoxides: test with P (180.71); test with no P (16.43); control with P (37.08); control with no P (12.25).

**Conclusion:** Both Cardiovascular disease and Periodontitis, may result in highest levels of lipid peroxidation and  $IL-\beta$ .

## P0457

### Mucin-containing artificial saliva increase the pro-inflammatory capacity of human gingiva fibroblasts

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**Aim:** Artificial saliva can relieve xerostomia symptom including inflammation of the oral mucosa in patients with reduced salivary flow. We have recently reported that whole saliva can cause a strong inflammatory response in oral fibroblasts indicated by the release of cytokines and chemokines. It is, however, unclear how oral fibroblasts react when exposed to artificial saliva.

**Material and Methods:** Here we examined the response of gingiva and periodontal ligament fibroblasts exposed to four available commercial preparations of artificial saliva: Orthana AS, Saliva Natura, Aldiamed, and Glandosane. A panel of inflammatory genes including interleukin-6 (IL-6), IL-8, and intercellular adhesion molecule (ICAM-1) were measured by expression and immune analysis. Sterile human whole saliva served as a control.

**Results:** We show herein that oral fibroblast being exposed to Orthana AS, a preparation containing mucins, exhibited increased expression of IL-6, IL-8 and ICAM-1. Also mucins

isolated from porcine salivary glands caused the increased IL-6, IL-8 and ICAM-1 expression in oral fibroblasts. The oral epithelial cell line HSC-2, however, showed a neglectable response to Orthana AS.

**Conclusion:** These results demonstrate that artificial saliva containing mucins can provoke a pro-inflammatory response in human oral fibroblasts. We currently determine the underlying molecular mechanisms, particularly focusing on the role of mucins.

## P0458

### Periodontal bacteria in human carotid atherothrombosis as a potential trigger for intraplaque hemorrhage

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**Aim:** To study the biological relationship between carotid intraplaque hemorrhage and periodontal disease. Intraplaque hemorrhage are more susceptible to rupture and prone to clinical complications as stroke.

**Material and Methods:** This study included 41 consecutive patients with symptomatic or asymptomatic carotid stenosis, admitted for endarterectomy surgical procedure. Carotid samples were collected and markers of neutrophil activation were quantified in conditioned medium (myeloperoxidase or MPO, cell-free DNA, and DNA-MPO complexes). A complete clinical and microbiological periodontal examination was performed. To investigate the presence of DNA from periodontal bacteria in atheromatous plaque, polymerase chain reaction analysis using specific primers for *Porphyromonas gingivalis* (Pg), *Tannerella forsythia* (Tf), *Prevotella intermedia* (Pi) and *Aggregatibacter actinomycetemcomitans* (Aa) was used

**Results:** There was an association between neutrophil activation and intraplaque hemorrhage, reflected by the release of MPO and MPO-DNA complexes. No significant results were found for cell-free DNA. Presence of DNA from periodontitis-associated bacteria was found in 32/41 atheromatous plaque samples. More specifically, DNA from Pg, Tf, Pi, Aa was respectively found in 46%, 24%, 34% and 68% of the samples. Hemoglobin levels were higher in conditioned media for carotid samples where the bacteria were found, but it was not significant.

**Conclusion:** This study confirms the close relationship between intraplaque hemorrhage and neutrophil activation. It also confirms the presence of periodontal bacteria DNA in carotid atheromatous plaque that may contribute to this activation.

## P0459

### Detection of serum advanced oxidation protein products (AOPPs) in different periodontal health status in systemically healthy subjects and a 3 month assessment of the effect of scaling and root planing on AOPPs and glycemic levels in uncontrolled type 2 diabetes mellitus subjects with chronic periodontitis

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**Aim:** To measure the levels of serum advanced oxidation protein products (AOPPs) as markers of oxidant mediated protein damage in healthy, chronic gingivitis and chronic periodontitis subjects (CP). To perform a three month assessment of the efficacy of scaling and root planing (SRP) on AOPPs and glycemic control in uncontrolled type 2 diabetes mellitus (DM) subjects with CP.

**Material and Methods:** The initial segment of the study involved the analysis of serum AOPPs levels in healthy controls, chronic gingivitis and CP subjects (n = 105). The latter part of the study involved subjects diagnosed with uncontrolled type 2 DM with CP (n = 19). 2 ml blood sample were collected from all subjects to determine the difference in the levels of AOPPs in various periodontal conditions using spectrophotometry. SRP was done for type 2 DM subjects. Blood samples were collected after 3 months to determine AOPP. Fasting (FBS), post prandial (PPBS) blood sugar and HbA1c levels were estimated at 3 months following SRP. Post hoc, ANOVA and Paired "t" tests was done. The results were averaged as mean  $\pm$  standard deviation

**Results:** AOPPs levels in healthy, gingivitis and CP were  $172.11 \pm 84.79 \mu\text{mol/l}$ ,  $193.59 \pm 73.60 \mu\text{mol/l}$  and  $273.40 \pm 64.29 \mu\text{mol/l}$  respectively. In type 2 DM subjects 3 months following SRP there was a reduction in AOPP, mean FBS, PPBS and HbA1c levels from a baseline value of  $342.13 \pm 47.17 \mu\text{mol/l}$  to  $190.99 \pm 49.08 \mu\text{mol/l}$ ,  $202.78 \pm 71.74 \text{ mg/dl}$  to  $147.68 \pm 44.46 \text{ mg/dl}$ ,  $305.21 \pm 78.03 \text{ mg/dl}$  to  $185.57 \pm 62.35 \text{ mg/dl}$  and  $10.18 \pm 1.75\%$  to  $7.67 \pm 1.22\%$  respectively. The difference was found to be statistically significant.

**Conclusion:** AOPPs have significance in periodontal medicine owing to highly complex periodontal microenvironment.

## P0460

### Periodontal status of renal transplant recipients with different immunosuppressive drug regimens

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**Aim:** Immunosuppressive drugs used to prevent organ rejection after renal transplantation have different effects on the periodontium. This study aimed to evaluate periodontal status and DMF index of patients with renal transplantation treated by CsA, sirolimus or tacrolimus.

**Material and Methods:** 63 renal transplant recipients and 22 healthy patients were recruited. DMF index and patients' full mouth periodontal parameters were recorded at six sites of each tooth. Groups were compared with t test.

**Results:** Results revealed that all transplant recipients had higher Plaque and gingival indices than healthy patients ( $p < 0.001$ ). No significant differences were observed for missing or decayed tooth numbers. The number of filled teeth was higher in healthy patients ( $p < 0.05$ ).

**Conclusion:** Although probing depths were similar between test and control groups, oral hygiene levels of transplant recipients is worse than controls. These results could be related to the host response modulating effects of immunosuppressive drugs.

## P0461

### Porphyromonas gingivalis infection exacerbates features of Alzheimer's disease in transgenic mice

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**Aim:** Recently, associations between periodontitis and Alzheimer's disease (AD) have been demonstrated. Bacterial infections might contribute to the onset and progression of AD; however, evidence for causative relationship is sparse. In this study, we used a transgenic mouse model of AD to investigate whether *P. gingivalis* infection modulates the pathological features of this neurodegenerative disease. We also investigated the molecular mechanism by which *P. gingivalis* infection exacerbates the disease in an in vitro study.

**Material and Methods:** *P. gingivalis* was inoculated intraorally in J20 mice for 5 weeks. The mice were subjected to passive avoidance tests and novel objection tests. Immunohistochemical analysis was performed to examine brain amyloid  $\beta$  ( $A\beta$ ) deposition. The levels of IL-1 $\beta$  and TNF- $\alpha$  in brain samples were measured to evaluate inflammation in the brain. Levels of lipopolysaccharide (LPS) in serum and the brain were measured by The Limulus Amebocyte Lysate assay. The ability of *P. gingivalis* LPS to induce IL-1 $\beta$  and TNF- $\alpha$  production was also examined in microglia cell cultures.

**Results:** Cognitive functions were significantly impaired in *P. gingivalis*-inoculated mice.  $A\beta$  deposition in the hippocampus and cortex was significantly greater in inoculated J20 mice than in control J20 mice. Brain levels of IL-1 $\beta$  and TNF- $\alpha$  were higher in inoculated mice than in control mice. Levels of LPS were increased in serum and the brain from *P. gingivalis*-inoculated mice. LPS strongly enhanced IL-1 $\beta$  and TNF- $\alpha$  production in microglial cells primed with  $A\beta$ .

**Conclusion:** The results suggest that *P. gingivalis* infection exacerbates brain amyloid deposition and triggers brain inflammation, leading to enhanced cognitive impairment.

## P0462

### Total oxidant status and antioxidant capacity in serum and gingival crevicular fluid and periodontal state in patients with obesity

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**Aim:** Oxidative stress is one of the main pathophysiological mechanisms in many systemic conditions and diseases, e.g. obesity

and periodontitis. Measurement of total oxidant status (TOS) and total antioxidant capacity (TAOC) in serum and gingival crevicular fluid (GCF) can provide a practical approach to elucidate the systemic and local interaction in obesity and periodontal disease. The aim of this study was to analyze the effect of obesity on serum and GCF TOS and TAOC and periodontal state in young obese individuals and to compare the findings with age and sex matched lean controls.

**Material and Methods:** A total of 40 females (20 obese and 20 lean) included in the study. Periodontal status of all participants was determined by clinical periodontal indices. Anthropometric measurements; height, weight, body mass index (BMI), and waist-to-hip ratio (WHR) were determined. After overnight fasting, blood and GCF samplings were performed and serum and GCF TOS and TAOC levels were measured.

**Results:** No significant differences were found between groups in PD, CAL and PI ( $p > 0.05$ ), while GI were higher in the obese group ( $p < 0.05$ ). BMI, WHR, Glucose-120, fasting insulin, insulin-120, and HDL were significantly higher in obese group ( $p < 0.05$ ). Serum TAOC was significantly lower in obese group ( $p = 0.032$ ) while no significant differences was found in TOS ( $p = 0.074$ ). GCF TAOC was significantly lower while GCF TOS was significantly higher in the obese group.

**Conclusion:** The generation of oxidative stress by an underlying obesity may be a pathophysiological way to elucidate the higher susceptibility to periodontitis in obese individuals.

## P0463

### The relationship between the severity of periodontal lesions, the intensity of the systemic inflammatory reaction and the development of atherosclerotic lesions in patients with periodontitis

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**Aim:** To evaluate the severity of periodontal lesions and the intensity of the patients' systemic inflammatory response measured with cytokines IL-1, IL-6, IL-8, TNF $\alpha$  concentrations. Also to compare the degree of progression of atherosclerosis in its clinically asymptomatic period in the study and control groups.

**Material and Methods:** Study group consisted of 47 people with previously untreated periodontitis, and control group of 50 people without periodontitis. In both groups, the carotid artery intima-media thickness, the values of the ankle-brachial pressure index, determining the frequency of occurrence of the arterial wall calcification, were measured. In study group extensive periodontal examination was performed. To assess the risk of bacteremia, dependent on the severity and extent of periodontal lesions, PIRI index was determined.

**Results:** The progression of clinically asymptomatic atherosclerotic lesions was significantly higher in periodontal patients. It was shown in increased carotid artery intima-media thickness, more frequent occurrence of pathological calcifications of the aorta wall as well as significantly lower values of the ankle-brachial index. In patients with periodontitis a positive correlation between the severity of the disease and the concentrations of cytokines was found (PIRI/IL-1 correlation:  $R = 0.4892$ ;  $p = 0.0005$ , PIRI/IL-6:  $R = 0.1249$ ;  $p = 0.4029$ , PIRI/IL-8:  $R = 0.4439$ ;  $p = 0.0018$ . Correlation between PIRI and the cumulative average level of cytokines:  $R = 0.95$ ;  $p = 0.0001$ ).

**Conclusion:** The study confirms that there is strong relationship between the severity of periodontitis, the intensity of the inflammatory reaction, and development of atherosclerotic lesions in periodontal patients.

## P0464

### Can periopathogens play a role in cardiovascular diseases?

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Wroclaw/Poland

**Aim:** There are data suggesting the presence of a correlation between periodontitis and several systemic diseases. Periodontitis is associated with an increased level of biomarkers of endothelial dysfunction and dyslipidemia. *Porphyromonas gingivalis*, a major etiological agent in chronic periodontitis, is thought to induce and enhance general inflammatory processes, including in the cardiovascular system. The aim of the study was to examine whether the DNA of *Porphyromonas gingivalis* can be found in the tissues of the cardiovascular system.

**Material and Methods:** Seventy-six patients were enrolled in the study (30 patients with heart valve dysfunction, 31 with carotid artery stenosis and 15 patients with ascending aortic aneurysm). Tissue samples that were harvested during cardiac and vascular surgery operations were examined. All patients underwent a periodontal examination. To evaluate the periodontal status of the patients, the following clinical parameters were recorded: the pocket depth, bleeding on probing (BOP) and apical plaque index (API). The presence of *P. gingivalis* in the specimens harvested from heart valves, aneurysms, atherosclerotic plaques from carotid arteries and periodontal pockets were analyzed using a single-step PCR method.

**Results:** The DNA of *P. gingivalis* was found in 15 of 76 (19.7%) samples taken from valves and vessels and in 40 of 76 (52.6%) samples from periodontal pockets.

**Conclusion:** This study suggests that *P. gingivalis* is able to colonize the cardiovascular system, but its role in the pathogenesis of cardiovascular disorders needs to be further examined.

## P0465

### Evaluation of the effects of secondary hemodialysis therapy on periodontal tissues

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Iasi/Romania

**Aim:** The purpose of this study was to examine the effect of secondary HPT on the periodontium of patients on hemodialysis.

**Material and Methods:** The experimental group consisted of 35 patients with secondary HPT, with chronic renal failure treated by hemodialysis (B group). A control group (C group) was formed from 35 healthy subjects. Blood samples were taken from the group, and the active intact parathormone was assayed. Also a clinical and X-ray periodontal examination was performed.

**Results:** Demographically, both groups were similar with no statistical difference. PI was also similar and GI was slightly greater in the C group. PD in the B group was identical to that of the C group. Likewise, CAL in the B group did not differ from CAL in the C group.

**Conclusion:** From this study it can be concluded that secondary HPT does not influence the periodontal status but hyperparathyroidism has an appreciable effect on periodontal indices and radiographic bone height.

## P0466

### Changes in the subgingival microbiome due to palatal expansion

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Graz/Austria

**Aim:** Orthodontic appliances are suspected to shift the oral biofilm composition. Next generation sequencing studies shed new light on the onset of periodontal disease. The aim of this study was to assess the influence of tooth borne palatal expansion on the subgingival microbiome.

**Material and Methods:** Children aged 8–10 years wore tooth borne palatal expanders for 4 months (CA, n = 16). A control group (CO, n = 16) was untreated. Subgingival biofilm was sampled at 3 points in time: at baseline (T1), after 3 weeks of a standardized oral hygiene (T2), and 4 months later (T3), the day, the appliances of the cases were removed. Paper points were therefore inserted for 20 s into the subgingival sulcus. Bacterial DNA was analyzed with 454-pyrosequencing targeting the V1–V3 hypervariable regions of the 16S rRNA gene. Pyrosequencing data was then processed with QIIME 1.8.0. Statistical data analysis was performed with R 3.1.2.

**Results:** Rarefaction curves show a loss of diversity of the CAs at T3. Significantly lower Shannon diversity indices at T3 (CA) prove these results. In PCoA a clustering of the T3 (CA) is found. CO samples are evenly distributed. Statistical analyses on genus level show a difference in *Fusobacteria* (p = 0.022), *Leptotrichia* (p = 0.001), *Veillonella* (p = 0.002) and *Capnocytophaga* (p = 0.042) species.

**Conclusion:** Wearing palatal expanders for 4 months leads to a loss of diversity in the subgingival microbiome of children. Seeing this as a marker for disease, we suggest long-term studies to monitor further microbiome behavior after removal of the appliance.

## P0467

### The possible connection between periodontal status and infertility among men

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**Aim:** Poor periodontal status may have a connection between various systemic diseases. It is unknown whether chronic periodontitis, which is a frequent disease in adults, is associated with pathospermias. The aim of the study was to examine the potential relationship of periodontal conditions with sperm parameters.

**Material and Methods:** The male partners of the infertile couples presented at the Andrology Outpatient Clinic in the Department of Obstetrics and Gynecology, University of Szeged between January 2011 and July 2013 went through dental examinations. The patients were systemically healthy, those with varicocele, testicular microlithiasis, hypogonadism, genetic

disorders and with azoospermia were excluded. Socio-demographic data were collected and data regarding dental/periodontal and andrological examination, and sperm analysis were completed. Periodontal disease was diagnosed as having BOP (bleeding on probing) at  $\geq 50\%$  of the teeth, and having at least one PD (probing depth)  $\geq 4$  mm. The following statistical methods were used to check the hypothesis: Mann–Whitney *U*-test,  $\chi^2$ -test, Spearman rank correlations.

**Results:** Data of 95 patients (age 35.1 years, 23.9–52.1) were analyzed. In the study group 32 men (33.7%) had normozoospermia, 15 (15.8%) cryptozoospermia, 27 (28.4%) asthenozoospermia and 36 (37.9%) oligozoospermia. Chronic periodontitis was diagnosed in 48 (50.5%) cases. There was no detectable connection between poor periodontal status and pathozoospermia. The frequency of pathozoospermia was 62.5% in patients with periodontal disease and 70.2% with healthy periodontium; there was no significant connection ( $p = 0.516$ ) between periodontal status and any kind of pathozoospermia.

**Conclusion:** In this study no connection between periodontal status and pathozoospermia could be detected.

## P0468

### Correlations between the periodontal modifications and lipid peroxidation in periodontal disease patients

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Iasi/Romania

**Aim:** Our study was centred on the comparative research of enzymatic and non-enzymatic oxidative status mediators in the crevicular fluid on chronic and aggressive periodontitis patients, compared to periodontal healthy subjects.

**Material and Methods:** The study was conducted on 42 patients. They were divided in 3 study groups: chronic periodontitis subjects, aggressive periodontitis patients and periodontal healthy subjects. On marginal periodontitis patients, associated or not with systemic diseases, we initially collected gingival crevicular fluid and saliva samples and we evaluated the following enzymatic stress markers for all the three groups of subjects: superoxide dismutase, glutathione peroxidase, malondialdehyde, using the gingival crevicular fluid (GCF) as biologic material.

**Results:** The statistical analysis for the malondialdehyde in the control group, aggressive periodontitis group and chronic periodontitis group shows significant differences between the groups. SOD values in the gingival crevicular fluid were low in the periodontitis groups compared to the control group. Despite the strong correlation between the glutathione peroxidase values in the three groups, we did not observe any significant differences between the GPx values in the aggressive periodontitis, chronic periodontitis and control groups.

**Conclusion:** The present study revealed significant statistic differences between most of the oxidative stress parameters analysed in the GCF, specially in the aggressive periodontitis group, less in the chronic periodontitis group compared to the control group.

## P0469

### Influence of the mandibular flexure on the periodontal status of the first molar

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**Aim:** The mandibular flexure is a functional elastic deformation that occurs during forced opening and propulsion of the mouth. This deflection has less known effects on the bone. Our study measured the mandibular flexure at the maximum mouth opening and propulsion and searched for bone modifications on the first molar related to this phenomenon.

**Material and Methods:** Measurements were performed on 25 volunteers, students of School of Dental Medicine Iasi, with natural dental arches and healthy periodontal status. The impressions taken at maximum opening and propulsion were 2D scanned (BENQ SCANNER 5550). Each impression image was saved as Joint Photographic Experts Group (JPEG) and processed using Adobe Photoshop CS2 software. To determine the changes in the mandibular width there was used UT-HSCSA ImageTool 3.0 software. There were performed densitometric analyses to evaluate bone density and radiographic measurements for the alveolar bone level on the first mandibular molar.

**Results:** The changes in mandibular width ranged from 120 to 1500  $\mu\text{m}$  for maximum opening and between 320 and 920  $\mu\text{m}$  for maximum propulsion. We observed an association between low bone density for the first molar and, respectively, the maximum opening and propulsion. Of the patients with lower bone densities, 55% presented greater values for the maximum opening and 15% presented greater values for propulsion.

**Conclusion:** The mandibular arch width decreases during mouth maximum opening and propulsion. Based on these evidence we suppose that a lower bone density associated with a higher mandibular flexure may reduce the alveolar bone level for the mandibular first molars.

## P0470

### Periodontitis and self-reported medical conditions in dental patients in a Teaching Hospital in Nigeria

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Lagos/Nigeria

**Aim:** To determine the prevalence of self-reported medical conditions and their relationship with the severity of periodontitis among dental patients in a teaching hospital in Lagos, Nigeria.

**Material and Methods:** A total of 108 dental records of periodontal full care patients  $\geq 18$  years old, diagnosed with chronic periodontitis who were seen by final year dental students for 3 years were analyzed. Data retrieved were age, gender, smoking status and self-reported medical conditions. Periodontitis was classified as localized or generalized, and as mild, moderate and severe. Oral hygiene status, affected teeth, and tooth loss were recorded. Descriptive statistics, *t*-test, and chi-square were used in data analyses.  $p \leq 0.05$  were statistically significant.

**Results:** Males represented 61.1%, mean age was  $57.6 \pm 13.2$  years. About 47% of the study sample had at least one self-reported medical condition. Hypertension was the most frequent condition (34.3%), diabetes (16.7%), and combined

hypertension/diabetes (9.3%). Smokers constituted 6.5%. About 50% had localized periodontitis. Patients with self-reported medical conditions were significantly older than those without these conditions [ $63.5 \pm 9.8$  vs.  $52.3 \pm 1.6$  years respectively] ( $p < 0.000$ ). Oral hygiene status was good in only 10.2% of the patients. Periodontitis was severe in 35.8%, moderate in 35.8% and mild in 28.3%. Severity of periodontitis was not significantly associated with self-reported medical conditions ( $p > 0.05$ ).

**Conclusion:** The dental patients had a relatively high prevalence of self-reported medical conditions, which were not significantly associated with severe periodontitis. Older dental patients had a higher prevalence of self-reported medical conditions. Hence, they should be screened for these medical conditions.

## P0471

### Periodontitis and retinal microcirculation in the Atherosclerosis Risk in Communities (ARIC) study

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**Aim:** The aim of this study is to explore if periodontitis is associated with alterations of the retinal microcirculation, a predictive marker of cardiovascular events.

**Material and Methods:** We conducted a cross-sectional analysis of the ARIC cohort, a population-based study of 457 subjects aged 45 years and more from four U.S communities. Periodontitis was determined by using the CDC/AAP definition and was categorized as healthy/gingivitis, moderate and severe periodontitis. Retinal arteriolar and venular diameters were measured by computer-assisted methods, and summarized as central retinal arteriolar/venular equivalents (CRAE/CRVE). Multivariable linear regression models were used to estimate the independent relationships between CRAE, CRVE and periodontal status.

**Results:** No significant association was found between CRAE and periodontal status. However, CRVE and severe periodontitis were positively and significantly associated. Mean CRVE ( $\pm$ standard deviation) was  $187.0 \pm 17.1 \mu\text{m}$  in the health-gingivitis group, and respectively  $188.6 \pm 16.3 \mu\text{m}$  and  $191.7 \pm 16.8 \mu\text{m}$  the in moderate and severe periodontitis groups ( $p$  for trend  $< 0.05$ ), after adjustment for a propensity score based on confounders. Results were consistent when analyses were restricted to participants with diabetes mellitus.

**Conclusion:** Severe periodontitis is associated with larger retinal venular diameter. Further studies are needed to explore the impact of T2D on the association between periodontitis and retinal microcirculation.

## P0472

### The association between obstructive sleep apnea and periodontitis; a case-control study

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**Aim:** Obstructive sleep apnea (OSA) is characterized by recurrent collapse of upper airway during sleep. A higher prevalence

of periodontal disease has been reported in patients with OSA. Although the mechanism of OSA and periodontitis on systemic inflammation is unclear, the effects on proinflammatory and anti-inflammatory cytokine levels have been clarified. The aim of this study was to evaluate the association between OSA and periodontitis.

**Material and Methods:** 83 subjects with OSA and 80 systemically healthy subjects were included in this study. Clinical periodontal measurements were recorded and gingival crevicular fluid (GCF) samples were collected. Periodontal health status was evaluated by gingival index (GI), plaque index (PI), clinical attachment level (CAL) and probing pocket depth (PPD). GCF levels of high-sensitive C-reactive protein (hs-CRP), interleukin-1 beta (IL-1 $\beta$ ) and tumor necrosis factor alpha (TNF- $\alpha$ ) and serum hs-CRP levels were analyzed with an enzyme-linked immunosorbent assay method.

**Results:** All the clinical parameters and GCF IL-1 $\beta$  concentrations were significantly higher in patients with OSA than healthy controls ( $p < 0.001$ ). There was no significant difference in GCF TNF- $\alpha$  and hs-CRP levels between the groups ( $p > 0.05$ ). The prevalence of periodontitis in patients with OSA was 96%, and severe periodontitis prevalence was higher in OSA group.

**Conclusion:** Our study suggests that OSA may be associated with periodontitis. However, there is still a need for randomized clinical trials.

## P0473

### Dental and periodontal status in Turkish diabetic patients

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**Aim:** Periodontal infections are considered as the sixth complication of diabetes mellitus. The aims of this study were to evaluate Turkish diabetic patients' dental and periodontal conditions, demographic characteristics, dental care access and health education needs.

**Material and Methods:** 121 diabetic patients (43 M/78 F) with a mean age of  $49.8 \pm 13.3$  were enrolled in this study. To determine oral hygiene habits, patients were asked to complete self-administered questionnaires at baseline. Full-mouth periodontal/dental examinations were performed.

**Results:** 68.0% of diabetic patients were found to be visiting the dentist irregularly and seeking for dental care only when in pain. 74.6% of patients had not been informed about the risks of having periodontal disease by their endocrinologist. The mean number of decayed, missing, filled teeth index (DMFT) was  $12.09 \pm 7.09$ . No gender differences were observed regarding periodontal status. Mean A1c levels was  $7.68 \pm 1.76\%$ . Diabetics with A1c level higher than 7.0% had increased pocket probing depths and clinical attachment loss ( $p = 0.039$  and  $p = 0.005$ , respectively). Decreased numbers of missing teeth and not an increase in probing pocket depth were found in diabetics who knew their last measured A1c level. Higher prevalence of missing teeth (80%) and plaque index (80%) were observed in diabetics with comorbidities ( $p = 0.026$  and  $p = 0.029$ , respectively). Patients with higher education had significantly decreased periodontal disease levels. Smokers had significantly worse oral hygiene than the non-smokers.

**Conclusion:** The results indicate that diabetics with inadequate glycemic control may be susceptible to periodontitis. Diabetics

should be informed about periodontal risks and their oral conditions should be improved.

## P0474

### Prevalence of diabetes patients within an dental hygienist private practice population

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**Aim:** The aim of this study was to assess the prevalence of diabetes mellitus (DM) patients among a population of newly registered patients to a Dental-Hygienists (DH) practice. This with the ultimate goal to establish whether there is a need for increased awareness by DH concerning patients with DM.

**Material and Methods:** In retrospect a cohort of newly registered patient in the DH-practice over a 3-year period (2011–2013) including all clients  $\geq 18$  years were examined. Data regarding demographics, route of registering, self-reported DM (from health-questionnaires), smoking status and the Dutch Periodontal Screening Index (DPSI) were gathered from case-records-files.

**Results:** From a total of 926 registered-clients 742 met the inclusion criteria. Age-range 18–87 years (mean: 46), males: 42%, females: 58%. In this cohort 53% had been referred by their dentist and 32% visited the DH at own initiative. In addition 26% was smoker and on average one third of the clients had a DPSI-score 4 ( $\geq 1$  pocket of 6 mm and bleeding-upon-probing) in one or more pre-molar sextants. In total 13 patients (1.8%) reported with DM. From these 3 were smokers and 9 patients had been referred by a dentist while 4 patients visited the DH at own initiative. Half of the DM-clients (N = 7) were assessed with at least one sextant with a DPSI score of 4.

**Conclusion:** As assessed retrospectively  $< 2\%$  self-reported diabetes in a cohort of newly registered clients over a 3 year period in a DH-practice in the Netherlands. Given a national prevalence of DM of 7.5% (IDF), DM does not appear to be a reason for visiting the DH with periodontal problems.

## P0475

### Periodontal status in patients with rheumatoid arthritis: an epidemiological study. Preliminary results

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**Aim:** Rheumatoid arthritis (RA) and periodontitis (P) are chronic inflammatory disorders characterized by a deregulation of the host inflammatory response. Aim of this study was to assess the prevalence and severity of periodontitis in patients with RA.

**Material and Methods:** Medical records of patients affected by RA from the outpatient rheumatology clinic of the University Hospital of Pisa were screened for inclusion and subjects were invited to participate. Included subjects underwent a full-mouth periodontal examination including probing depth, gingival reces-

sion, plaque index, bleeding on probing. RA disease activity was scored with DAS28. Serum analyses investigated levels of rheumatoid factor, anti-citrullinated protein antibodies, C-reactive protein and erythrocyte sedimentation rate. Information concerning smoking, body mass index (BMI) and RA medical therapy was also collected.

**Results:** 112 RA medical records were screened, 32 subjects refused to participate and 6 were edentulous. 74 subjects were finally included (63 females and 21 males). Over 51% of the sample, representing 38 subjects, had periodontitis, distributed as 29%, 8% and 14.5% of mild, moderate and severe periodontitis, respectively. No significant differences in DAS28, BMI and serological tests were observed between P and periodontitis free (PF) subjects. Interestingly, 70% of the PF-RA population, against 43.7% of the P-RA population, was constituted of non-smokers. Furthermore, 75% of the PF-RA patients, against 50% of the P-RA patients, were on treatment with biological medicines.

**Conclusion:** The prevalence of severe periodontitis was higher than expected from epidemiological data in RA free subjects. Non-smokers and subjects on biological RA therapy are associated with less prevalence of periodontitis.

## P0476

### Curcumin ameliorates alveolar bone destruction by inhibiting RANKL-induced osteoclastogenesis

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**Aim:** We tried to investigate the therapeutic effects of curcumin (CCM) for periodontal disease. In this study, CCM was used in a rat model of periodontal disease induced by ligature placed around the maxilla second molars of each animal.

**Material and Methods:** Curcumin has been used as a dietary spice and a traditional medicine. Its wide range of biological activities, including antioxidant, anti-microbial, anti-inflammatory has been documented exponentially over recent years. Male S-D rats were divided into three groups: (1) animals without ligature placement receiving administration of empty vehicle (2) animals with ligature receiving administration of empty vehicle; (3) animals with ligature receiving administration with oral CCM (50 mg/kg/day). The animals were sacrificed after 3, 7, 10, 14 days after induction of periodontal disease. An in vitro assay was also employed to test the inhibitory effects of CCM on osteoclastogenesis.

**Results:** Micro-CT analyses of alveolar bone level demonstrated that CCM-treated animals presented less alveolar bone destruction, compared to those animals with ligature, with empty vehicle treatment. CCM administration significantly reduced myeloperoxidase (MPO) activity in gingival tissue around ligature-operated molars. In addition, CCM also reduced the growth of periodontopathogens *P. gingivalis* and *A. actinomycetemcomitans* in a dose-dependent manner. Corresponding to such results obtained from in vivo experiments, CCM also suppressed in vitro osteoclast differentiation in the presence of RANKL in osteoclast precursor cells, along with the down-regulation of the expression of RANKL-induced osteoclast related genes.

**Conclusion:** CCM may suppress the alveolar bone resorption by inhibiting RANKL-mediated osteoclastogenesis elicited during the course of experimental periodontitis in rats.

## P0477

### Association between the periodontal pockets depth and proinflammatory Th-17 family cytokines production in patients with severe and moderate periodontitis

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**Aim:** Chronic periodontitis is associated with activation of the immune system, which can lead to systemic implications affecting development of cardiovascular diseases, Alzheimer disease, rheumatoid arthritis etc. The aim of the study was to characterize cytokine levels of the highly pro-inflammatory Th17 family and their association with severity of periodontitis measured by the periodontal pockets depth.

**Material and Methods:** Patients with gingivitis and periodontitis were recruited and trained dentists measured pockets depth in 6 points per each tooth. The blood sample was obtained for the Th17 family cytokine analysis using Luminex<sup>®</sup> xMAP<sup>®</sup> technology (fluorescent-coded magnetic beads immunoassay), including IL-17F; IFN $\gamma$ ; IL-10; CCL20; IL-17A; IL-1B; IL-33; IL-23; IL-6; IL-17E; TNF $\alpha$ .

**Results:** Plasma levels of several cytokines including IL-17F, IL-17A and IL-17E as well as IL-33, TNF $\alpha$  and IFN $\gamma$  were increased in periodontal patients (n = 16) when compared to controls (n = 9). Interestingly, a significant correlations were observed between periodontal pocket depth and levels of following cytokines IL-33 (R = 0.36); IL-23 (R = 0.32); IL-17E (R = 0.38); TNF $\alpha$  (R = 0.36); IL-17F (R = 0.38) and IL-17A (R = 0.28). Moreover, patients with severe periodontitis (mean pocket depth 4.6  $\pm$  0.3 mm) indicated significantly increased cytokine production compared with the patients with moderate periodontitis (mean pocket depth 2.5  $\pm$  0.3 mm) and healthy individuals (mean pockets depth 1.4  $\pm$  0.4 mm).

**Conclusion:** In investigated patients severity of periodontitis was associated with increased production of plasma Th17-family proinflammatory cytokines. Systemic activation of the immune system in periodontal patients with significant production of the proinflammatory cytokines may provide a link between periodontitis and systemic diseases.

## P0478

### Periodontal health of Polish population after acute coronary syndrome

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**Aim:** The aim was to evaluate the periodontal health of Polish population after acute coronary syndrome (ACS), as well as prevalence of some common risk factors for periodontitis and ACS.

**Material and Methods:** The study group comprised 350 participants, aged 25–69 years (mean age 55.9  $\pm$  7.5), from three big Polish cities: Warsaw, Szczecin and Wrocław. A thorough periodontal examination was performed within 72 h from the ACS episode, including plaque index, bleeding on probing, pocket depth (PD) and clinical attachment loss (CAL), as well as

Community Periodontal Index (CPI). Potential risk factors included education level, tobacco smoking and obesity. The results were subjected to statistical analysis, using Spearman correlation test and ANOVA.

**Results:** The examination revealed poor periodontal health of the studied population. CPI score = 4 was stated in 46% of the patients. 13% were toothless. Mean plaque index was 78.2%, bleeding on probing 43.7%. Mean PD amounted to 2.8 mm, mean CAL 4.0 mm. Median number of points with PD  $\geq$  4 mm was 9. Poor periodontal health coexisted with other risk factors: lower education level, tobacco smoking and obesity. 57% were smoking, and only 2.9% of women and 7.1% of men exhibited normal WHR values. 88.2% of women and 54.0% of men presented abdominal obesity. The periodontal indices correlated well with education, smoking and waist-to-hip ratio.

**Conclusion:** Periodontal status of Polish patients after ACS is highly unsatisfactory. The prevalence of common risk factors for ACS and periodontitis is high, signaling a need for health promotion, especially among the patients with lower education.

Topic: Periodontal plastic surgery

## P0479

### The effects of ozone therapy on early healing period in free connective tissue grafts: a randomized placebo-controlled clinical trial

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**Aim:** The aim of this study was to evaluate the effects of ozone therapy (OT) on early healing of free connective tissue graft (FCTG) placed for gingival augmentation by laser Doppler flowmetry (LDF).

**Material and Methods:** Thirty patients who had inadequate or no attached gingiva in the lower incisor region, were included in the study. Patients were assigned to one of the study groups; test group: FCTG + OT; control group: FCTG alone. Ozone was applied on FCTG placed in the recipient site immediately after surgery, at 1 and 3 days post surgery. Blood perfusion in the recipient site was measured by LDF on day of surgery and at 1, 2, 3, 6, 8, 10 and 13 days.

**Results:** Intragroup analysis showed that blood perfusion unit statistically increased in the first week in both test and control groups (p < 0.001). However, increase in blood perfusion units in the test group was significantly higher than that in the control group. Significant differences in blood perfusion units between the two groups were monitored for all recall days.

**Conclusion:** Within the limitation of the present study, we suggest that ozone therapy enhanced blood perfusion units. This increase should be cautiously interpreted together with clinical parameters, life quality and post operative pain assessments to clarify its effect on wound healing.

**P0480****Treatment of isolated gingival recession defects using acentric double pedicle graft: a case series**

N. Abolfazli, F. Saleh Saber

Tabriz/Iran

**Aim:** A Numerous periodontal plastic surgery procedures introduced to treat gingival recession defects, each showing a variable degree of success. The aim of present study is to introduce acentric double pedicle graft, a simplified and predictable procedure to treat isolated gingival recession defects.

**Material and Methods:** With some modifications in incision line location and orientation, pedicle flap sizes and shape, and the suturing line place in mid buccal area, this procedure tries to resolve the weak point of traditional double papilla graft technique. 18 teeth in 14 patients with miller's class I and II gingival recession were treated with this approach. Vertical recession depth (VRD), Horizontal recession depth (HRD), keratinized tissue width (KTW), clinical attachment level (CAL), and clinical probing depth (CPD) were measured preoperatively and 6 months post surgery. Descriptive statistics were expressed as mean  $\pm$  SD. A paired *t* test was applied to assess the statistical significance between baseline and 6 month followup.

**Results:** At the 6 month examination all quantitative parameters except CPD showed statistically significant improvements from baseline values. Complete root coverage occurred in 82% of defects and 94% of root surface, on average, was covered with grafted tissue.

**Conclusion:** Acentric double pedicle graft seems to be an effective, less invasive and predictable approach in treatment of isolated miller's class I and II gingival recession.

**P0481****A comparative study of the results of root coverage with double pedicle flap with connective tissue graft or platelet rich in growth factor**

F. Saleh Saber, N. Abolfazli

Tabriz/Iran

**Aim:** The objective of this study was to compare the results of double pedicle flap + platelet rich in growth factor (DPF + PRGF) and DPF+ connective tissue graft (DPF + CTG) in the treatment of Miller's Class I and II recession defects.

**Material and Methods:** Thirty Miller's Class I and II recession defects in 15 patients were treated with double pedicle flap + connective tissue graft or platelet rich in growth factor. Vertical recession depth (VRD), Horizontal recession depth (HRD), keratinized tissue width (KTW), clinical attachment level (CAL), and clinical probing depth (CPD) were measured preoperatively, 1, 3 and 6 months post surgery. Descriptive statistics were expressed as mean  $\pm$  SD. Repeated measures analysis of variance was used for examination of differences regarding PD, CAL, and TKT. The Wilcoxon test was used to detect differences between groups and the Friedman test to detect differences within group regarding WKT, RH, and RW.

**Results:** After 6 months a significant decrease in VRD was observed in DPF + PRGF ( $3.33 \pm 0.30$  mm) and DPF + CTG ( $4.5 \pm 0.28$  mm) treated sites. There was also a significant

increase in KTW ( $0.83 \pm 0.23$  mm vs.  $2.08 \pm 0.14$  mm in DPF + PRGF and DPF + CTG sites, respectively). The gain in CAL was  $3.54 \pm 0.38$  mm and  $4.45 \pm 0.30$  mm in DPF + PRGF and DPF + CTG group, respectively. There were significant differences between the treatments for VRD, CAL, and KTW at the end of study.

**Conclusion:** The DPF + CTG procedure seems to provide better long-term results than the DPF + PRGF in obtaining root coverage, increasing the KTW and CAL gain.

**P0482****Connective tissue graft and the envelope technique without suture for root coverage: a case series**C. Monteagudo<sup>1</sup>, K. López Gazcon<sup>2</sup>, R. Martinez<sup>2</sup><sup>1</sup>Mexico D.F./Mexico, <sup>2</sup>Mexico City/Mexico

**Aim:** During the past few decades gingival recession (GR) treatment has been considered a topic of interest as a mucogingival therapy. The search of clinical solutions in the management of GR has led advance in the periodontal plastic surgical techniques increasing predictability of root coverage (RC). Therefore, the aim of this study is to show clinical outcomes of (RC) by connective tissue graft (CTG) and a envelope technique modification (ETM) without suture and another adhesive components.

**Material and Methods:** Nine nonsmokers patients with single and multiple Miller Class I GR were selected and treated by CTG in a ETM. Probing depth, bleeding on probing, gingival recession, clinical attachment level, keratinized tissue width and dental sensitivity were measured. The CTG was harvested and placed by minimal surgical trauma over single or multiple areas of recession and placed softly in the supraperiosteal envelope. Firm fixation of the CTG over areas of recession was provided without suture by the pressure and the length of the CTG, then a dress was placed over the surgical site.

**Results:** Clinical results 3–12 months postoperatively were favorable. Patients reported low morbidity and high satisfaction with esthetic appearance for the procedure. The treatment provided statistically significant gains in RC. The percentage of coverage was 88.9%. A significance level of 0.5 was adopted for all statistical comparisons.

**Conclusion:** RC with CTG and ETM produced an effective clinical results up to 12 months. CTG stability without suture and ETM may be a predictable alternative approach as a minimally invasive periodontal plastic surgery technique.

**P0483****Exposure of impacted canine with tunnel technique**

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**Aim:** Crescini (1994) described "tunnel technique" for surgical exposure of impacted canine associated with retained deciduous. After extraction of the primary teeth, the empty bony socket can be used as "tunnel" to guide the impacted canine along an eruption pathway that simulates the physiologic one. At the completion of therapy, there is adequate amount of periodontal tissue around the tooth.

**Material and Methods:** Case report A 17 years old female was referred from the Orthodontist for the exposure of buccally

impacted canine. She presented with retained upper right deciduous lateral incisor and canine. The gingival tissue is of thin type. Both deciduous teeth were extracted during the time of surgery. After that a full-thickness mucoperiosteal flap was raised. The sockets of the extracted deciduous teeth formed a tunnel that was used for the traction. The wire chain fastened to the cusp of the permanent canine passed through the empty socket reaching the centre of the alveolar ridge. Then, the flap was repositioned and sutured into its original site with interrupted silk sutures. The tooth subsequently erupted like a physiologic eruption.

**Results:** In patient with thin gingival biotype, there is a risk of gingiva recession and uneven margin. This procedure preserved the keratinized gingiva and produce good gingival aesthetic. In this case report, the tooth erupted into the oral cavity mimicking a physiologic eruption. There is no change in the level of mucogingival junction.

**Conclusion:** Tunnel technique can be used for infraosseous impacted canine associated with the presence of the corresponding primary teeth.

## P0484

### Coverage of multiple gingival recessions using the tunnel technique and Mucoderm collagen membrane

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Zabrze/Poland

**Aim:** The aim of this study was to evaluate the clinical efficacy of application to cover multiple gingival recession (Miller's class I and II) using xenograft material.

**Material and Methods:** Fourteen patients aged between 18 and 60 years came to the Periodontal Disease and Mucous Membrane Outpatient Clinic in Zabrze seeking for doctor's recommendations. After an intraoral examination, 59 gingival recessions (Miller's class I and II) were found on the buccal surfaces of teeth of those patients. Clinical evaluation of the severity of gingival recession was performed on the first visit using a calibrated Williams probe. Clinical parameters: RD, RW HKT, CAL, PD, RA, CEJ-MGJ were recorded. Coverage of gingival recessions was made using the tunnel technique and xenograft material. After 3 and 6 months clinical parameters were evaluated and the mean percentage of coverage of the surface of the tooth root -% ARC and percentage of total coverage of gingival recession-CRC%.

**Results:** Statistically significant differences were found for the all clinical parameters between baseline values and the results after 3 and 6 months. Mean ARC was 91% and CRC was 69% at the follow-up visits after 3 and 6 months.

**Conclusion:** Statistically significant improvements were recorded in all clinical parameters at follow-up visits. The values of ARC and CRC after 3, 6 months were satisfying and persistent. Covering of gingival recession with the use of matrix Mucoderm could be also an effective method and an alternative to autogenous tissue grafts.

## P0485

### The periodontal surgery of impacted teeth at the orthodontist service. About 500 teeth treated in 5 years

J. Dersot

Paris/France

**Aim:** Describe a surgical decision tree adapted to different impacted teeth, mainly canines, in order to facilitate the orthodontic movement and optimize the periodontal conditions at the end of the orthodontic treatment.

**Material and Methods:** In a periodontal private practice, from 2010 to 2014, 511 impacted teeth have been exposed for orthodontic purpose including mainly maxillary canines (75.84%), maxillary central incisors (6.33%), mandibular canine (5.94%) and second mandibular premolar (4.15%). Sex ratio: M = 34.17% – F = 45.56%. Periodontal pocket depth (PPD) and keratinized gingival height (KGH) have been evaluated around all teeth.

**Results:** 111 teeth were still in orthodontic treatment, so the result were evaluated on 400. Only 10 teeth never moved (2.5%). All the teeth, aligned in the arches, presented a healthy periodontium with a PPD under 4 mm and a mean gingival height of 2.4 mm. Finally, a surgical decision-tree is proposed depending of the position of the tooth (labial, lingual, superficial, deep).

**Conclusion:** Good relationships between periodontists and orthodontists are mandatory to succeed in orthodontically positioning impacted teeth with a healthy periodontium.

## P0486

### Connective tissue graft versus acellular dermal matrix – 1 year follow-up, a case report

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Rijeka/Croatia

**Aim:** Surgical techniques based on a coronally advanced flap with tissue/material interposed between the flap and the root surface are used to treat single and multiple gingival recession defects. The most common surgical technique ("gold standard") is coronally advanced flap and a connective tissue graft harvested from palate (CAF + CTG). In order to eliminate the second surgical site (palate), several materials have been proposed and introduced, such as acellular dermal matrix (CAF + ADM).

**Material and Methods:** Case report: Recession defects on lower premolars of a healthy patient (27 years old) were treated by the same operator using different surgical techniques: CAF + CTG on the right, and CAF + ADM (Mucoderm®; Botis Dental GmbH, Berlin, Germany) on the left side of the mandible. Clinical results were evaluated 6 months and one year after the surgical procedures.

**Results:** Both surgical procedures provided satisfactory clinical result in terms of complete root coverage in one year follow-up period. In the distal cervical area of the tooth 45 recession defect remained due to the absence of the adjacent tooth and the distal papilla.

**Conclusion:** Both surgical procedures may be recommended for the treatment of gingival recession defects since they both provide good clinical and aesthetic results in one year follow-up period.

**P0487****Root coverage procedures and their outcomes using connective tissue grafts in the anterior sextants**

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**Aim:** Connective tissue grafts which are used in combination with coronally advanced flaps are the gold standard in root coverage procedures. This four case series presents the role of root coverage procedures and their outcomes, using connective tissue grafts with coronally advanced flap or the tunnelling technique to treat Miller's classification I–III defects in anterior teeth.

**Material and Methods:** Four patients aged 18–46 years old with gingival recession (Miller's class I–III) affecting the maxillary or mandibular incisors were selected for this case series. The patients' chief concerns included the associated poor aesthetics, possible future tooth loss, difficulty with self-performed oral hygiene and tooth hypersensitivity. The root coverage procedures included connective tissue grafts harvested from the palate used in combination with either a coronally advanced flap or the tunnelling technique. The primary outcome evaluated was the percentage root coverage. Secondary outcomes included the gain in keratinised tissue, increased gingival thickness, the reduction in root hypersensitivity, facilitation in self-performed plaque control (where applicable) and patient satisfaction.

**Results:** A total of 7 recessions with depths of 3–6 mm were treated. Three months after surgery the mean percentage root coverage achieved was  $48.92 \pm 41.68\%$  and ranged from 0% to 100%. All cases resulted in increased thickness of gingivae. Aesthetic concerns were also addressed. There was also a reduction or elimination in tooth hypersensitivity reported by patients.

**Conclusion:** Connective tissue grafts used in combination with different flaps can successfully address the recession-related concerns of our patients.

**P0488****Platelet-rich fibrin in the treatment of multiple gingival recessions**

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**Aim:** The main objective of this study was to evaluate the clinical effectiveness of platelet-rich fibrin (PRF) in combination with coronally advanced flap (CAF) in the treatment of multiple gingival recessions.

**Material and Methods:** Twenty patients with multiple gingival recession defects (Miller I, II) participated in this split-mouth trial. Sixty defects received either CAF + PRF (test) or CAF with subepithelial connective tissue graft (SCTG) (control). Gingival recession depth (RD), gingival recession width (RW), keratinized tissue width (KTW), recession area (RA), probing depth (PD), clinical attachment level (CAL) and gingival thickness (GT) were evaluated at baseline and 6 months. Additionally post-surgery patient satisfaction and pain status were measured by comparing visual analogue scale (VAS) scores.

**Results:** Percentage of root coverage in test group was 82.7% and in control group was 84.2% ( $p > 0.05$ ). Percentage of com-

plete root coverage of the test and control groups was 62.7% and 67.3%, respectively ( $p > 0.05$ ). KTW and GT were increased in both groups from baseline to 6 months ( $p < 0.001$ ), but there was no statistically significant difference between treatment groups ( $p > 0.05$ ). Use of a PRF membrane in gingival recession treatment decreased subjective patient discomfort compared to CTG-treated gingival recessions.

**Conclusion:** Within the limits of the present study, it can be concluded that localized gingival recessions could be successfully treated with CAF + PRF as well as CAF + SCTG. PRF might be suggested as an alternative to SCTG for the treatment of localized gingival recessions.

**P0489****Tunnel technique with connective tissue graft versus coronally advanced flap with enamel matrix derivative for root coverage: a RCT using 3D digital measuring methods. Two-year results**

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**Aim:** The aim of this randomized clinical trial (RCT) was to introduce 3D digital measuring methods for evaluating the outcomes after surgical root coverage (RC) and to assess the clinical performance of the tunnel technique with subepithelial connective tissue graft (TUN) versus the coronally advanced flap (CAF) with enamel matrix derivative in the treatment of shallow localized gingival recession defects.

**Material and Methods:** Twenty-four patients contributed a total of 46 Miller class I or II recessions for scientific evaluation. Clinical outcomes were evaluated at 24 months. Precise study models gained at baseline and follow-up examinations were optically scanned and virtually superimposed for digital evaluation of clinical outcome measures including percentage of RC and complete root coverage (CRC).

**Results:** At 24 months, RC was 93.78% for TUN-treated and 66.96% for CAF-treated defects. CRC was observed in 53.4% (TUN) and 13.4% (CAF) of the cases.

**Conclusion:** TUN resulted in significantly better clinical outcomes compared to CAF. The new measuring method provided high accuracy and unforeseen precision in the evaluation of treatment outcomes after surgical root coverage.

**P0490****The effects of enamel matrix derivative with porcine acellular dermal matrix in the treatment of gingival recession defects. A comparative experimental study in dogs**

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**Aim:** To compare the healing patterns after various root coverage treatments and to evaluate the effects of enamel matrix derivative (EMD) with porcine acellular dermal matrix (PADM) on gingival recession defects in dogs.

**Material and Methods:** Gingival recession defects (5 mm wide and 7 mm deep) were surgically created on the labial side of bilateral maxillary canines in 8 dogs. After 8 weeks of plaque accumulation, the 16 chronic defects were randomly assigned to one of the following treatments: Coronally advanced flap (CAF), CAF with PADM (CAF/PADM), CAF with EMD (CAF/EMD) and CAF with EMD and PADM (CAF/EMD/PADM). The animals were sacrificed 10 weeks after surgery for histologic evaluation.

**Results:** In all groups, root coverage was obtained to a varying degree. PADM was well incorporated in gingival connective tissue in the CAF/PADM and in the CAF/EMD/PADM groups. The gingival height above the cemento-enamel junction in the CAF/EMD/PADM group ( $1.61 \pm 0.86$  mm) was significantly greater than in the CAF group ( $0.22 \pm 0.45$  mm;  $p < 0.05$ ). The height of newly formed bone was significantly greater in the CAF/EMD/PADM group ( $1.49 \pm 0.93$  mm) than in the CAF group ( $0.08 \pm 0.17$  mm;  $p < 0.05$ ). New cementum formation with periodontal ligament-like tissue was predominantly found in the CAF/EMD and CAF/EMD/PADM groups. The CAF/EMD/PADM group showed the greatest amount of new cementum among the groups examined.

**Conclusion:** Within the limitations of the present study, it can be concluded that CAF/EMD/PADM treatment effectively promoted periodontal regeneration in gingival recession defects in dogs.

## P0491

### Crown lengthening for restorative reasons: a systematic review

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<sup>1</sup>Lossiemouth/United Kingdom, <sup>2</sup>Thessaloniki/Greece, <sup>3</sup>Columbus/United States of America

**Aim:** To assess the efficacy of surgical crown lengthening employed for restorative reasons and to analyze the associated periodontal outcomes.

**Material and Methods:** A systematic electronic search, along with a hand search, of articles relevant to surgical crown lengthening was conducted including results up to May 2014, utilizing optimized search strategies. Articles reporting at least baseline and post-operative measurements of periodontal indices, probing depth (PD), attachment loss/level (AL), and alterations of periodontal tissues, were selected. Independent reviewers made independent searches and assessment of the studies, and disagreements were resolved by discussion.

**Results:** According to the eligibility criteria for qualitative assessment, four clinical studies (three controlled clinical trials, one case series) and one animal study were included in the review. Almost invariably, apically positioned flaps with or without osseous resection were used. The healing process extends beyond 3 months and tissue rebound should be expected; rebound is likely associated with periodontal biotype. The reformed biologic width seems to be shorter compared to baseline, based on two studies. Attachment loss is always expected post-surgically. The published studies lack information on patient-centered outcomes.

**Conclusion:** The present systematic review concludes that the surgically achieved crown length may decrease over time due to possible coronal displacement of free gingival margin. It is unclear whether the healing process extends beyond 6-months, the time period to which all selected studies were limited. Addi-

tional studies with extended observation period and inclusion of patient-centered outcomes are required to better determine the outcomes of surgical crown lengthening for restorative reasons.

## P0492

### Pre-implants development-site and soft tissues management in a case of a complex maxillo-facial upper reconstruction

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Milano/Italy

**Aim:** To emphasize the role of the periodontist in the soft tissues management after 3D reconstructive surgery in a complex case.

**Material and Methods:** The patient lost several teeth for periodontal problems. We place first and second provisional on the residual teeth, fulfilling apical repositioning flaps on them. Then, two bilateral sinus-lift procedures and 3D alveolar crest reconstructions were carried out (Prof. R. Brusati – Milan). After 5 months, we perform a gingival traslation from palatal to buccal (partial thickness flaps), removing the bone-block screws. We extract the tooth 1.1, achieving on the edentulous 2.1 site a roll-flap combined with the use of a resorbable porcine collagen matrix. We place implants through a guided flap-less immediate loading procedures, finishing the case in three prosthetic sextants, using zirconium implant abutments and full monolithic zirconium crowns.

**Results:** The maxillofacial surgery was necessary to solve the case. The gingival traslation before of the implants placement permits to gain cheratinized tissue, replacing the right position of the muco-gingival line and fornix depht. Roll-flap technique on the 2.1 site combined with the use of a resorbable porcine collagen matrix increased the width of the tissues from buccal to palatal, and so the esthetic of the final prosthetic result. The guided surgery permits easily the placement of six implants in the choosen sites, through a minimally invasive flap-less and immediate loading procedures.

**Conclusion:** After a maxillo-facial reconstruction, the importance of a correct soft tissues management around implants and natural teeth can be really fundamental, such as an interdisciplinary approach in complex cases.

## P0493

### Gingival margin stability after mucogingival plastic surgery. The effect of manual versus powered toothbrushing: a randomized clinical trial

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**Aim:** To evaluate the role of powered versus manual toothbrushing in terms of gingival margin stability after mucogingival plastic surgery.

**Material and Methods:** Sixty healthy patients with at least a single Miller Class I or II gingival recession underwent surgical root coverage procedure. Soft-bristle manual and powered toothbrushes were given to participants randomly assigned to control and test group, respectively. Full-mouth Plaque Score

(FMPS), Full-mouth Bleeding Score (FMBS), Probing Pocket Depth (PPD) and Recession Depth (REC) were recorded 1, 3 and 6 months after completion of surgical procedure. Longitudinal analyses were performed using linear random-intercept models to take into account within-subject correlations over time. Temporal trend differences across treatments by including treatment-time interaction terms were then tested using a global Wald test.

**Results:** The use of a powered toothbrush resulted in a greater reduction of recorded periodontal clinical indexes over time, compared to a manual device: p-values for interaction terms were 0.045 for FMPS, 0.01 for FMBS and 0.03 for PPD. At the end of follow-up Complete Root Coverage (CRC) was 67% in the control and 83% in the test group ( $p = 0.14$ ). The frequency of Partial Root Coverage (PRC) changed over time from 0% to 33% in the control group and from 7% to 17% in the test group ( $p = 0.003$ ).

**Conclusion:** Powered toothbrush was related to a lower periodontal inflammation and higher gingival margin stability, promoting a better wound healing after root coverage procedures comparing to manual toothbrush.

## P0494

### Relative composition of connective and fatty/glandular tissue in various subepithelial connective tissue graft donor sites of the hard palate

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**Aim:** The hard palatal mucosa is a regular donor site for subepithelial connective tissue grafts (SCTG), but their composition might vary due to donor site and harvesting technique. The present study assessed the histological composition of the hard palatal mucosa and of SCTG harvested by different techniques in different donor sites.

**Material and Methods:** Samples of the hard palatal mucosa of 10 fresh human cadaver heads were harvested in the anterior and posterior lateral palate in an area close and distant to the teeth. The thickness of the mucosa and the proportion of epithelium, connective tissue, fatty/glandular tissue, and vascular tissue were assessed for the entire mucosa and for digitally marked grafts [SCTG gained by split-flap preparation (SCTG-SF) and as de-epithelialized gingival graft (DGG)].

**Results:** The thickness of the hard palatal mucosa ranged from 2.35 to 6.89 mm. The main parameters (proportion of connective and fatty/glandular tissue) presented no significant differences between different donor sites (anterior versus posterior lateral palate, close versus distant to the teeth;  $p > 0.145$ ). Independent of the donor site, DGG contained a significantly higher proportion of connective tissue and a significantly lower proportion of fatty/glandular tissue than SCTG-SF ( $p < 0.041$ ). Both, thickness and histological composition, presented a high inter-individual variability.

**Conclusion:** Thus far, differences of the histological composition of SCTG in dependence of the harvesting technique have been described based only on clinical experience. To the best of our knowledge, the present study describes for the first time non-significant differences due to donor site, but significant differences due to harvesting technique.

## P0495

### Hereditary gingival fibromatosis: clinical management and in vitro study – a case report

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**Aim:** Hereditary gingival fibromatosis is an inherited autosomal dominant trait with an incidence of 1:350,000. The gingival overgrowth is due to excessive production of collagen in the gingival corium.

**Material and Methods:** Case report: A case of a 10-year-old female is reported who presented a generalized severe gingival overgrowth, involving the maxillary and mandibular arches. The enlarged gingival tissues completely covered the crowns of some teeth, delaying physiologic eruption, and interfering with speech and mastication. Histologically, the tissues showed an excess of collagen in the corium. Vessels presented widened walls and inflammatory cells included lymphocytes and plasma cells with Russell bodies. A maxillary-quadrant flap surgery and gingivectomy were performed to remove excess gingiva, and orthodontic treatment was undertaken to help tooth eruption. Samples of gingival tissues were fixed and paraffin-embedded for further histological studies. Gingival fibroblasts were collected and seeded at early passages for an in vitro primary cells characterization.

**Results:** Surgical intervention is the current treatment of hereditary gingival fibromatosis, but the patient has to deal with the risk of recurrence. The pathogenesis is believed to be an imbalance between extracellular matrix assembly and degradation, involving transforming growth factor- $\beta$  and matrix metalloproteinases and/or an alteration of gingival fibroblasts. No specific pathological process has been yet identified.

**Conclusion:** Once the correlations between gene mutations, histology, and anatomical situation are clear, they can be applied to clinical application. A better understanding of molecular pathways will provide methods for disease diagnosis, prognosis and targets for disease prevention and treatment.

## P0496

### Partly epithelialized free gingival graft (PE-FGG) versus free gingival graft (FGG) in the treatment of Miller Class II–III: esthetic evaluation using RES score

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**Aim:** Free gingival graft (FGG) is frequently chosen for the treatment of recessions in mandible. Mandibular anterior teeth are the most affected teeth and major causes of the recession are lack of keratinized tissue, high frena attachments and shallow vestibular depth. However, free grafts frequently result in a poor aesthetic appearance due to unsatisfactory chromatic, texture, tissue integration and apical disalignment of alveolar mucosa. This is related at least in part to graft thickness and apicocoronal extent, necessary for its survival. The apical extent of the epithelialized FGG is probably responsible for the apical disalignment of the mucogingival junction (MGJ). Therefore, partly epithelialized free gingival graft (PE-FGG), with an apical de-epithelialized portion designed to overcome some of the

aesthetic problems associated with the conventional FGG. The aim of this study is to compare the RES score of the PE-FGG and conventional FGG in Miller class II and III recessions.

**Material and Methods:** 24 patients with Miller II and III recessions at mandibular anterior teeth were chosen. Twelve mandibular anterior teeth were chosen for FGG procedure and fourteen mandibular anterior teeth in 12 patients were chosen for PE-FGG procedure. All patients were periodontally healthy women.

**Results:** All patients completed the study and attended all recall visits. The mean RES score of the FGG and PE-FGG groups were  $5.14 \pm 0.66$  and  $6.42 \pm 0.64$  respectively. PE-FGG gave a better score than FGG but full root coverage was not achieved.

**Conclusion:** The application of the PE-FGG resulted in excellent alignment of the MGJ and appreciable aesthetic outcomes.

## P0497

### Interdisciplinary treatment: the key to success

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**Aim:** The aesthetic dental it's placed at the top of Maslow's pyramid, which indicates the hierarchy of needs of people, from a motivational point of view. For Maslow, the needs of the people are of three types: a biological, other growth and other self-actualization. In this case we had to go through several disciplines, such as orthodontics, periodontics, implant and restorative over 2 years of treatment and obtaining very good results.

**Material and Methods:** Male 45 years, non-smoker with good hygiene, we chose to correct his Class II div.II bite order to improve their mobility in 12, 11, 21 and 22 teeth with orthodontic treatment with fixed appliances multibrackets. After year and a half of treatment will carry out temporary aesthetic composite reconstructions in 12, 11, 21, 22, and we put implants in teeth 36 and 46. After 2 years due to orthodontic treatment a periodontal regeneration was observed; It is when we place connective tissue grafts in the teeth 12 and 21. Finally we ended with bleaching treatment and aesthetic composite reconstructions in 12, 11, 21, 22, 32, 31, 41, 42 and tooth crowns alumina 43, 44, 45 and put crowns on implants 36 and 46.

**Results:** At the beginning of the treatment the periodontal defects from cemento-enamel junction (CEJ) to sulcus where: 12 (8 mm), 11 (1 mm) and 21 (9 mm); after 2 years due to orthodontic treatment a periodontal regeneration was observed, and the periodontal defects were: 12 (2 mm), 11 (0 mm) and 21 (1 mm).

**Conclusion:** In this case thanks to the use of different techniques, whether expectations were met. Using interdisciplinary collaboration we obtain better results.

## P0498

### Root coverage with modified tunnel technique and connective tissue graft: a series of cases

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**Aim:** Different methods for coverage of gingival recessions using pedicle flaps and/or connective tissue grafts have been

reported. Limited data are available for treatment of multiple recessions and those with Miller class III. The aim of this case series is to identify the success of the modified tunnel technique with connective tissue graft used to achieve root coverage of Miller class III gingival recession.

**Material and Methods:** This is series of 3 cases with gingival recession. All of these patients with Miller class III recession defects on the mandibular incisors referred to the clinic for treatment of esthetic concern and root sensitivity. Initial periodontal therapy was completed. In surgery briefly, sulcular incisions performed including the vestibular surfaces of teeth 31 and 41 and a tunnel connecting these incisions prepared. The connective tissue graft harvested from the palate and inserted through the tunnel, the flap positioned coronally and sutured. Clinical parameters including recession depth, width of keratinized gingiva, probing depth and % of root coverage were recorded at baseline and six months.

**Results:** No complication was observed in the surgical sites post operatively. At the end of 6 months partial root coverage and favorable esthetic results were achieved.

**Conclusion:** Modified tunnel technique with connective tissue graft is a safe method, which can achieve successful results in the treatment of Miller class III gingival recessions.

## P0499

### Dimensional changes of free gingival grafts to increase the width of attached gingiva and its effects on gingival margin: a case series

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**Aim:** This observational case series aimed to evaluate the effect of graft dimensions on gingival margin in patients with minimum attached gingiva.

**Material and Methods:** Free gingival grafts were placed in the lower anterior vestibular region of 20 patients with <1.0 mm of attached gingiva. Measurements were recorded from the cemento-enamel junction to the free gingival margin, base of the gingival sulcus and mucogingival junction on the facial of selected teeth. The gingival and plaque indices were also recorded. A total of 20 grafts were performed. All measurements were repeated 1, 3 and 6 months after surgery. Graft dimensions were determined on digital photographs taken at the time of surgery, post-op 10th day, post-op 1st, 3rd and 6th months by a software. Photographs were standardized by 1/1 ratio and taken perpendicular to the site with a standardized 10 mm-Williams probe as a reference.

**Results:** The width of the attached gingiva increased significantly at grafted sites. Neither sites demonstrated further attachment loss. An average of 25% of graft shrinkage was observed at post-operative 6th month.

**Conclusion:** Increased width of attached keratinised gingiva resulted with varying degrees of root coverage and improved gingival health. Tissue thickness may be related to the dimensional changes both in the horizontal and vertical directions.

## P0500

### Esthetic crown lengthening: treatment outcomes in delayed passive eruption

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**Aim:** The aim of this observational clinical trial was to evaluate the clinical (alterations in periodontal soft tissues) and patient outcomes (satisfaction) after surgical treatment of delayed passive eruption (DPE).

**Material and Methods:** Twenty-two individuals diagnosed with DPE (type 1B) received treatment of the maxillary anterior teeth by gingivectomy and osseous reduction, and were followed-up for 7, 15, 30, 90 and 180 days after surgery. The following parameters were analyzed: crown length, gingival length, probing depth, bleeding on probing and the following distances: gingival margin to cemento-enamel junction (CEJ); CEJ to alveolar bone crest (ABC). Subjects completed surveys to evaluate satisfaction with outcomes. The data were submitted to repeated measures ANOVA and Pearson's correlation test with significance level of 5%.

**Results:** At 6 months, there was an overall  $1.2 \pm 0.6$  mm increase in crown length ( $p < 0.0001$ ) and  $0.6 \pm 1$  mm decrease in gingival width ( $p < 0.008$ ) from baseline. Central incisors exhibited the greatest increase in crown length ( $1.7 \pm 0.6$  mm), compared to lateral incisors ( $1.1 \pm 0.7$  mm) and canines ( $1.0 \pm 0.6$  mm). Similarly, central incisors had the greatest decrease in gingival width ( $1.1 \pm 1$  mm), compared to lateral incisors ( $0.6 \pm 0.7$  mm) and canines ( $0.2 \pm 1$  mm). 23% of patients were satisfied with smile before Sx and 95% of patients were satisfied with their smile after surgery and would likely choose to undergo the procedure again.

**Conclusion:** DPE appears to impact central incisors more than other maxillary anterior teeth. Surgical treatment of DPE results in high level of patient satisfaction as well as predictable and stable outcomes.

## P0501

### Surgical versus non-surgical interventions for papilla reconstruction: report of two cases

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**Aim:** The so-called "pink aesthetic" has become the main challenge with prosthetic restorations in the anterior area and various techniques for soft tissues remodelling have been defined. This report presents surgical and non-surgical interventions for reconstruction of papillary tissue.

**Material and Methods:** Case 1: A 30-year old female patient needing renewal of porcelain crowns in the upper anterior site was referred to periodontics clinic due to the loss of papillary tissue. Following non-surgical periodontal therapy, crown-lengthening surgery was performed, provisional crowns were prepared to guide gingival tissue during the post-operative healing period. Provisional crowns were adjusted twice in 2 months. When soft tissue reconstruction was satisfactory, a new bridge was constructed. Case 2: A 60-year old female patient complained from tooth mobility and gingival bleeding in the upper

anterior site. Following non-surgical periodontal therapy, left central incisor was extracted due to severe alveolar bone resorption. The extracted tooth's root was shortened, adjusted and stabilized in the extraction socket with composite resin. Shortening of the root was repeated every three weeks for two months. When the desired gingival contours were achieved, an adhesive bridge was constructed.

**Results:** Both patients were placed in the maintenance programme and 6–12-month follow-ups revealed satisfactory aesthetic outcomes. Reasonable soft tissue aesthetics with papilla reconstruction was achieved with surgical as well as non-surgical interventions in these cases.

**Conclusion:** Surgical or non-surgical approach can be chosen for papilla reconstruction in unaesthetic open embrasures in the anterior arch. Severity of periodontal tissue loss, patient's expectations and treatment cost should be considered.

## P0502

### The modified coronally advanced tunnel (MCAT) with accelerated osteogenic orthodontics (AOO) in author's modification – case report

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**Aim:** Treatment of severe occlusion disorders can lead to gingival recessions and root resorption. To avoid the complications and teeth extraction AAO was introduced. Modification of standard AAO is presented.

**Material and Methods:** Case Report: 22 years old patient with orthodontic diagnosis of dental and skeletal class II, compression of both arches, severe crowdings in the lower arch (–14 mm) and moderate in the upper arch. Treatment sequence: orthodontic appliance in the upper arch (SmartClip brackets, MBT, slot 018); plastic microsurgery of vestibulum; orthodontic appliance in the lower arch; piezocision with MCAT technique – authors' modification: piezocision lines were distant and not aligned to the incisions of the mucosa. After AAO, for 3 months, frequent orthodontic activations were performed. All teeth except one lower incisor were aligned. Low-friction brackets helped to expand both dental arches. 6 months after AAO, the second piezocision was considered and control CBCT was analyzed.

**Results:** After profile and smile assessment, nonextraction treatment method was suggested which comprised of the expansion of both arches, supported by cortical piezocision as AAO, followed by class II correction.

**Conclusion:** The authors' modification of the piezocision led to fast healing. The AAO along with MCAT allowed for the safe bidirectional expansion of the lower arch in the adult patient after end of growth. Combining these two methods helps avoiding the formation of gingival recessions. The CBCT, made 6 months after AAO, revealed the distinct growth of the bone tissue in the frontal direction.

## P0503

### Clinical evaluation of the combined surgical/restorative treatment of gingival recession-type defects with different restorative materials

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**Aim:** The aim of this study was to evaluate the treatment of multiple gingival recessions associated with non-carious cervical lesions (NCCL) by a coronally advanced flap in combination with a subepithelial connective tissue graft on restored root surfaces.

**Material and Methods:** Eighteen systemically healthy subjects, who were positive for the presence of three cervical lesions associated with gingival recessions in three different adjacent teeth were enrolled in the study. The NCCL were each restored prior to surgery by using one of three different materials: composite resin (group 1), resin modified glass ionomer cement (group 2) or giomer (group 3). The subepithelial connective tissue graft combined with the coronally positioned flap was performed. Clinical measurements, including plaque index (PI), bleeding on probing (BOP), gingival recession height (GRH), probing depth (PD), cervical lesion height (CLH), clinical attachment level gain (CALG), keratinized tissue height (KTH), keratinized tissue thickness (KTT), percentage of root coverage (RC), and percentage of restored root coverage (RRC) were recorded at baseline and at 3 and 6 months postoperatively.

**Results:** Inter-group differences were not statistically significant for PI, BOP, PD, RR, CALG, KTH, or KTT ( $p > 0.05$ ) among the groups at any time. At 6 months, the mean RC were  $84.3 \pm 15.8\%$  for group 1,  $81.5 \pm 16.3\%$  for group 2 and  $77.1 \pm 16.1\%$  for group 3 ( $p > 0.05$ ).

**Conclusion:** The combined surgical/restorative approach could provide soft tissue coverage without damage to periodontal tissues. Giomer may be less effective compared with the other restorative materials for treatment of gingival recession associated with NCCL.

## P0504

### Surgical treatment of gingival hyperplasia of frontal region

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**Aim:** This case presentation will show a clinical case with proliferative changes of the maxillary frontal region surgically treated.

**Material and Methods:** Patient ZM, age 43, teacher, required clinical treatment of an obvious gingival enlargement presented in the gingiva of tooth 11. A modified surgical treatment was planned for the removal of this hyperplasia. Modified Widman flap surgery was carried out, with mechanical debridement of the hard periodontal structures and the soft wall of the enlargement was excised from the internal aspect in order to preserve the attached gingiva height. In order to avoid gingival postoperative recession, a preventive superior lip frenectomy was simultaneously undertaken.

**Results:** After the postoperative course, the anatomical gingival morphology is restored and subsequent gingival recession due to

absence of the underlying alveolar bone was avoided. The aesthetic effect is achieved, which was the main reason of the patients concern due to her profession.

**Conclusion:** Surgical periodontal treatment can be modified depending on the inflammatory changes.

## P0505

### Peripheral odontogenic fibroma: a case report

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**Aim:** The peripheral odontogenic fibroma is a rare benign odontogenic neoplasm of the oral soft tissue. According to WHO classification it is containing varying amounts of odontogenic epithelium in mature fibrous estroma. It is usually located in the gingiva or alveolar mucosa.

**Material and Methods:** A 38 years old woman referred to our clinic because of swelling in the maxillary and mandibular gingiva, complaint of bleeding, bad breath and pain. In the patient's orthopantomograph, the expansion was seen in periodontal space of all teeth. Especially posterior side, swelling was measured approximately 1 cm diameter. Surface features of gingiva were edematous, swollen surface, zone by zone pedicellate or sessile and erythematous. Patient had a poor oral hygiene. Firstly, curettage procedure was applied. Then, an excisional biopsy was performed under local anesthesia and root surface was scaled and planed.

**Results:** Histologically, cellular proliferation of fibroblast-like spindle cells with scattered islands and strands of odontogenic epithelium was seen. Also, calcifications manifested in the collagenized stroma. By these findings, the patient was diagnosed as "Peripheral Odontogenic Fibroma." The lesion was removed from all regions. But the recurrent lesion was again located in the maxillary attached gingiva of the central and lateral incisors approximately one month after treatment. The lesion was again excised and gingivoplasty was again performed.

**Conclusion:** The lesion is similar to many oral lesions. The clinical and radiological examinations may not be enough for differential diagnosis, so histological evaluation should be performed. The treatment is a simple excision. However it has high recurrent tendency. Therefore, patients should be checked at regular intervals.

## P0506

### The comparison of clinical and aesthetic parameters after connective tissue graft placement in combination with coronally advanced flap or with coronally advanced flap with vertical incisions in treatment of Miller class I and II recessions: a split-mouth study

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**Aim:** The aim of the study was the comparison of clinical and aesthetic parameters after connective tissue graft (CTG) placement in combination with modified coronally advanced flap

(MCAF) or with coronally advanced flap with vertical incisions (CAF) in treatment of Miller class I and II recessions.

**Material and Methods:** Twenty patients with 99 recessions were treated in split - mouth study model. The MCAF was used on the right side, while on a left side the CAF was applied. The both procedures were performed with additional CTG placement. The following parameters were evaluated before and one year post - op: GR, RW (recession with), PD, CAL, KT, GT (gingival thickness), PW (papilla width), PH (papilla height), PI and BOP. Moreover Root Coverage Esthetic Score (RES) was assessed one year after treatment.

**Results:** The mean root coverage on the MCAF side was 90.52% 1 year post-op, whereas on the CAF side 91.77%, respectively. Complete root coverage (CRC) was achieved in 78.43% gingival defects treated with MCAF and 83.33% defects treated with CAF. The average RES after the MCAF was  $7.98 \pm 1.88$  and  $8.37 \pm 1.81$  after the CAF. There was no significant difference in the CRC and RES value or its variables between the two techniques.

**Conclusion:** Within the limits of the study it can be concluded that either MCAF with CTG and CAF with CTG allow to obtain satisfactory and comparable root coverage as well as aesthetic outcome what comes out of lack of negative vertical incisions influence on soft tissue appearance.

## P0507

### A novel titanium prepared platelet rich fibrin or subepithelial connective tissue graft for treatment of multiple gingival recessions

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**Aim:** In our previous studies, we developed a novel platelet-rich product that we called titanium-prepared platelet-rich fibrin (T-PRF). T-PRF is based on the hypothesis that titanium may be more effective at activating platelets than the silica activators used with glass tubes in Chouckroun's platelet-rich fibrin. There has been no study to date comparing the effectiveness and predictability of T-PRF with that of the gold standard subepithelial connective tissue graft (CTG) for root coverage. The purpose of this randomized clinical trial was to compare these different autogenous graft materials (T-PRF and CTG) for the treatment of Miller Class I/II multiple adjacent gingival recessions.

**Material and Methods:** A total of 46 Miller Class I/II gingival recessions represented that exposed root surfaces showed abrasion defects, were randomly treated T-PRF (23 teeth) or CTG (23 teeth) with a coronally repositioned flap. Toothbrushing trauma is the causative factor for the development of the recessions. The brushing techniques were altered. Clinical measurements were recorded at baseline, 1, 3 and 6 months postoperatively. VAS and Wound Healing Index were also recorded postoperatively.

**Results:** After 6 months, in T-PRF, CTG groups, the mean gain of clinical attachment were  $2.39 \pm 1.08$  mm and  $1.89 \pm 1.36$  mm, the mean root coverage were 93.39% and 85.95%, completely root coverage were 78.26% (18 out of 23 recessions) and 56.52% (13 out of 23 recessions), respectively.

**Conclusion:** Within the limits of this study, the results demonstrated that T-PRF membrane is safe and effective in a treatment of Miller Class I/II gingival recession defects. T-PRF may present an alternative to CTG.

## P0508

### Preliminary research on use of semiconductor laser in gingivectomy and gingivoplasty

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**Aim:** Lasers have become a necessary instrument in cosmetic dentistry. This study was to compare the clinical outcomes as a result of using semiconductor laser, high frequency electric knife, or conventional surgery in the management of soft tissue mucogingival problems by means of gingivectomy and gingivoplasty.

**Material and Methods:** 88 teeth in 20 patients who needed to receive gingivectomy and gingivoplasty were involved in the present study. The patients were randomly divided into 3 groups. Group A (8 patients, 28 teeth): gingivectomy and gingivoplasty were carried out by semiconductor laser; Group B (6 patients, 30 teeth): gingivectomy and gingivoplasty were carried out by high frequency electric knife; Group C (6 patients, 30 teeth): gingivectomy and gingivoplasty were carried out by conventional scalpel. Following surgery, the postoperative pain, wound healing time, and infections was used as the early parameters for evaluating the primary effects of different surgical instruments used for gingivectomy and gingivoplasty. The vertical height between the midpoint of gum edges in labial side and incisal of the tooth (marked as H) was examined in 1-, 3-, and 6-month follow-up, which was used as the major parameter for evaluating long-term clinical outcomes.

**Results:** With regard to all the tested parameters in our 1-year follow-up, there is no statistically significant between 3 groups. H value fluctuation was within 0–0.5 mm.

**Conclusion:** The postoperative pain, wound healing time, infection, and the gum position change display no relationship with the surgical instruments used in gingivectomy and gingivoplasty. Semiconductor laser may be a new surgical tool for gingivectomy and gingivoplasty.

## P0509

### Connective tissue graft versus PRF membrane: an aesthetic comparison of the results of treatment of bilateral symmetrical gingival recession defects

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**Aim:** Synergistic effect between tissue and vascular support is an important success criterion at gingival recession treatment. The aim objective of this case report was to evaluate the aesthetic satisfaction of patient and clinical results of two different treatment methods.

**Material and Methods:** The bilateral symmetrical Miller Class II gingival recessions were randomly treated platelet rich fibrin (PRF) or connective tissue graft (CTG) with a coronally repositioned flap (CRF). The healing period was uneventful. The clinical periodontal parameters and VAS scale that reflect the patient's aesthetic satisfaction were recorded at baseline, 3 and 6 months postoperatively.

**Results:** Complete root coverage was achieved at the CTG side, while there was 1 mm exposed root surface at PRF side at the end of 6 months. The aesthetic VAS scores were improved at the end of third and sixth months according to baseline. The

aesthetic VAS scores for PRF side were approximately similar with those of CTG side.

**Conclusion:** Although CTG + CRF technique was known as gold standart for treatment of gingival recession defects, similar aesthetic and clinical outcomes might be achieved with PRF + CRF technique too. Additionally, this new technique has some advantages such as decreased postop morbidity and obtaining the desired amount of PRF.

## P0510

### Treatment of gingival recessions with adequate matrix volume of platelet-rich fibrin

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**Aim:** Use of a graft under a coronally advanced flap (CAF) has given the best results for treatment of gingival recessions (GR) and Platelet rich fibrin (PRF) membrane with CAF for treatment can be successful only if the matrix volume of PRF is adequate.

**Material and Methods:** Case report: Three healty patients between 35 and 45 years old, suffering from GR and hipersensitivity problems referred to our clinic. There were approximately 3 mm Miller Class I GR on incisor and pre-molar teeth. Oral hygiene instructions were given and nonsurgical periodontal therapy including scaling and root planing was applied. Plaque and gingival index scores, recession depth (RD) and width (RW), keratinized tissue thickness (KTT) were recorded on baseline and 1, 3, 6 months after surgery. CAF combination with four layers of PRF membranes providing core material homogeneity used during mucogingival surgery. After the operation patients' pain levels were assessed in the first 7 days with visual analog scale (VAS).

**Results:** There was significant decrease in RD and RW, also a significant increase in KTT 6 months after surgery in all patients.

**Conclusion:** Conversely present root coverage rates were higher than previous mucogingival studies which used CAF with platelet concentrate grafts for treatment of GR. Reason for the differences can be using inadequate PRF membrane layer. Use of adequate volume and correct positioned PRF with CAF increase the success of treatment. Furthermore this tecnique can also be used as an alternative to connective tissue grafts in terms of patient satisfaction due to less post-operative pain.

## P0511

### Vestibular incision subperiosteal tunnel access associated with subepithelial connective tissue graft

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**Aim:** Gingival recession may be treated using a variety of therapeutic options with varying degrees of success depending on the initial presentation and treatment approach. The limitations of current techniques include scar formation at the recipient site resulting from surface incisions.

**Material and Methods:** The VISTA approach begins with a vestibular access incision mesial to the recession defects being treated. Through this incision a subperiosteal tunnel is created,

exposing the facial osseous plate and root dehiscences. The tunnel is extended at least one or two teeth beyond the teeth requiring root coverage to mobilize gingival margins and facilitate coronal repositioning. The mucogingival complex is advanced coronally and stabilized with the coronally anchored suturing technique. Patients were prescribed analgesics as required and were advised to use chlorhexidine mouth rinse daily for 3 weeks. All the patients were provided regular periodontal maintenance for 6 months.

**Results:** Mean gingival tissue thickness and keratinized tissue width increased significantly. Tissue at the site appeared healthy, with no visible signs of inflammation. This case series describe cases of Miller class I, II and III defects. Despite that complete root coverage wasn't achieved in class III cases, creeping attachment increased attached gingiva width and stopped progressive gingival recession.

**Conclusion:** The need to simultaneously address multiple recession defects is very difficult with the current procedures. VISTA technique appears to improve biotype, successfully treat multiple recession defects, with no scar formation, avoiding some of the potential complications of intrasulcular tunneling techniques.

## P0512

### The modified tunnel double papilla technique: a novel technique for root coverage. Clinical case presentation

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**Aim:** The purpose of this clinical presentation is to propose a modified novel technique using connective tissue graft, combined with tunnel and double papilla techniques. This modification was chosen to be named as modified tunnel double papilla technique.

**Material and Methods:** 14 recessions, Miller class: I (5 cases), II (7 cases) and III (2 cases), with 2–7 mm depth, in 11 patients were treated with this technique, all in the mandible (incisors and canine) with a follow up of at least 6 months and up to 1.5 year.

**Results:** Complete root coverage (100%) was achieved in 9/14 recessions (64%). Partial root coverage (70–85% of recession extent) was achieved in 4/14 recessions (28%). In 2/14 recessions root coverage achieved was 40% in one case and 66% in the other. In one case although full coverage was obtained a complication occurred, fenestration defect, at 1 month and was repaired later on with a new procedure of the same type. In another case Cl. III recession, partial root coverage was obtained at first and five months later another surgery of the same type was done and almost compete root coverage was achieved.

**Conclusion:** These results suggest that this technique is a predictable technique, treating shallow and deep recessions, enable to obtain good root coverage in the anterior mandible with satisfactory esthetic results.

## P0513

### Gingival fibroma related with palatal artery: case report

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**Aim:** Increase in size of gingiva is a common feature of gingival disease. Accepted current terminology for this condition is gingival enlargement or gingival overgrowth. Fibroma is a neoplastic enlargement. The gingival fibromas arise from the gingival connective tissue or from the periodontal ligament. They are slow growing, spherical tumors that tend to be firm and nodular but may be soft and vascular.

**Material and Methods:** Case report: 30 year- old-female patient with gingival fibroma which was localized palatal region related with palatal artery was referred our clinic. Under local anesthesia palatal artery was dissected and sutured. Then gingival fibroma was excised and gas iodoform was placed to exposed bone and prosthetic plate was applied. Prosthetic plate and sutures were removed after 7 days and postoperative healing was uneventfully.

**Results:** Fibromas are usually pedunculated. Hard fibromas of the gingiva are rare, most of the lesions diagnosed clinically as “fibromas” are inflammatory enlargements.

**Conclusion:** Fibromas are benign tumor of the gingiva and after excision recurrence is rare.

## P0514

### Comparing with the use of concentrated growth factor membrane and subepithelial connective tissue grafts in treatment of multiple gingival recession

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**Aim:** This study was designed to compare of clinical effectiveness Concentrated Growth Factor (CGF) membrane with coronally advanced flap (CAF) procedure's and subepithelial connective tissue graft (SCTG) with CAF in treatment of multiple Miller class I gingival recessions.

**Material and Methods:** Nine patients with multiple gingival recessions areas enrolled in this split mouth study. 9 patients and 50 recession defects were treated. Bilaterally gingival recessions in same patients were randomly treated with either CAF + SCTG (control) or CAF + CGF (test). Plaque and gingival index scores, recession depth, keratinized tissue width (KTW) and localization of the mucogingival junction were recorded on baseline, 1, 3, 6 months and probing depth, clinical attachment level (CAL), keratinized tissue thickness (KTT) were recorded on baseline, 3rd and 6th months. Root coverage was calculated 1st, 3rd and 6th months. Recordings of Healing index (HI) were performed in the 1st, 2nd, 3rd week post-surgically. The patients postoperative pain were assessed for the first 7 days using a horizontal scale (VAS).

**Results:** When compared to baseline, 6 months measurements, there was statistically significant decrease in CAL and increase KTT in test and control groups. Control groups were found more effective to increase KTW and root coverage than test groups. There was no significant difference 1st, 2nd, 3rd week HI scores. VAS scores for first 7 days for control groups were statistically significant higher than test groups.

**Conclusion:** It can be concluded that SCTG + CAF technique is more effective than CGF + CAF procedure for root coverage. At multiple recession defects, CGF + CAF may be preferred because of decreasing patient's post-operative pain.

## P0515

### The comparison of clinical and aesthetic parameters after coverage of Miller class I and II recessions with coronally advanced flap or with coronally advanced flap with vertical incisions: a split-mouth study

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**Aim:** The aim of the study was to compare clinical and aesthetic parameters after treatment of Miller class I and II recessions with modified coronally advanced flap (MCAF) or with coronally advanced flap with vertical incisions (CAF).

**Material and Methods:** Seventeen patients with 77 recessions were treated in split – mouth study model. The MCAF was used on the right side, while on the left side the CAF was applied. No additional grafts were used. The following parameters were evaluated before and one year post – op: GR (gingival recession), RW (recession width), PD, CAL, KT, GT (gingival thickness), PW (papilla width), PH (papilla height), PI and BOP. Moreover Root Coverage Esthetic Score (RES) was assessed 1 year after treatment.

**Results:** One year post-op, the mean root coverage on the MCAF side was 74.77%, whereas on the CAF side 83% respectively. Complete root coverage (CRC) was achieved in 60.52% gingival defects treated with MCAF and 69.23% defects treated with CAF. The average RES after the MCAF was 7.07 and 7.79 after the CAF. There was no significant differences in the CRC and RES values between the two techniques.

**Conclusion:** Within the limits of the study it can be concluded that either MCAF or CAF technique allows to obtain satisfactory and comparable root coverage as well as aesthetic outcome. Vertical incisions do not decrease aesthetics.

## P0516

### Assessment of the effect of corticotomy-assisted orthodontic treatment on periodontal tissue of patients with malocclusion. A case series

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**Aim:** The aim of the study was to assess the effect of corticotomy-assisted orthodontic treatment on clinical parameters of soft tissue status in patients with malocclusion.

**Material and Methods:** The study included 14 generally healthy adult individuals with malocclusion, who underwent corticotomy-assisted orthodontic treatment. During corticotomy only buccal cortical plate was cut with use of Piezosurgery device. Clinical examination was performed prior to the cortic-

otomy procedure, then 1, 6, 9 and 12 months after the procedure. The following parameters were assessed: FMPI, FMBOP, PPD, CAL, GR, RW (recession width), PW (papilla width), PH (papilla height), KT, BS (bone sounding) and biotype.

**Results:** There was a statistically significant reduction in PPD, CAL, PH, PW and BS after treatment. Statistically significant changes were also noted in relation to biotype, which thickness significantly increased after treatment. No statistically significant differences were observed in GR, RW and KT.

**Conclusion:** Corticotomy-assisted orthodontic treatment doesn't jeopardize periodontal clinical status. As the currently available literature lacks detailed studies on periodontal changes following the procedure, there is a need to continue study on bigger number of cases and longer follow-up time in order to get to know post-treatment periodontal tissue changes and stability.

## P0517

### Comparative clinical assessment of multiple coverage of gingival recessions using the tunnel method with allogenic biostatic transplant from fascia lata and autogenic connective tissue

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**Aim:** The aim of the paper was to assess the effectiveness of covering Miller's multiple gingival recessions type 1 and 2 with the usage of fascia lata and the transplant of CTG after 3 and 6 months.

**Material and Methods:** There were 24 people examined. All of them had multiple gingival recessions using the tunnel method. The patients were divided into two groups. In the testing group human fascia lata allograft was used and in control group CTG was used. Altogether, gingival recessions were used; 36 in the testing group and 36 in the control group. The clinical assessment was made at baseline, 3 and 6 months after surgery. The following clinical parameters were assessed: RD, RW, PD CAL, HKT and gingival recession's class of Miller classification. In both groups were estimated: %ARC the average percentage of gingival recession's coverage, %CRC the percentage indicator of gingival recession's coverage.

**Results:** After 6 months %ARC in the control group was  $94.44 \pm 0.11$  and in the testing group  $96.48 \pm 0.09$ , %CRC in the control group was  $90.74 \pm 0.18$  in the examined  $96.30 \pm 0.09$ , this difference was not statistically crucial. There was no statistically crucial difference between the groups as far as other clinical parameters after 6 months are concerned, apart from HKT indicator.

**Conclusion:** The usage of fascia lata in the presented research gave similar clinical effect in the usage of connective tissue graft in covering Miller's multiple gingival recessions type 1 and 2.

## P0518

### Minimally invasive treatment of maxillary anterior gingival recession defects by modification of pinhole surgical technique

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Bangalore/India

**Aim:** The aim of this presentation is to introduce to the clinicians a modification of pinhole surgical technique with orthodontic buttons and suturing.

**Material and Methods:** 10 sites from two patients having Millers Class I, II or combination of class I and II recession defects<sup>19</sup> in the maxillary arch were selected. The modification of Pin Hole Surgical Tehnique was carried out. The sutures were used to suspend the central area of the flaps on the buttons and to accomplish a precise adaptation of the buccal flap on the convexity of the underlying crown surface and stabilize every surgical papilla.<sup>5</sup> The clinical re-evaluation was done 6 months after surgical reconstruction.

**Results:** A total of 10 recessions were treated. At 6 months follow up examination 77.7% of root coverage was seen and 70% of sites showed complete root coverage.

**Conclusion:** Pinhole Surgical technique based on only a single incision 2–3 mm for access in the alveolar mucosa, with no releasing incision, suturing and sharp dissections has been tried.<sup>19</sup> The lack of suturing may compromise the anchorage which is critical during the first two weeks of wound healing.<sup>5</sup> There is a need for a minimally invasive and predictable procedure for recession coverage in MRTD. The current presentation describes a new minimally invasive technique i.e.; Modification of Pin Hole Surgical technique for treatment of Miller's Class I and II MRTDs with a clinically satisfactory and predictable outcome.

## P0519

### Platelet rich fibrin in the treatment of multiple gingival recessions: case series

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**Aim:** Platelet rich fibrin (PRF) is second generation platelet concentrate among soft tissue substitutes, which promotes wound healing and tissue maturation due to its autogenous nature without a donor surgical site. The aim of this case series was to demonstrate the root coverage achieved by PRF with coronally advanced flap (CAF).

**Material and Methods:** This case series presents the treatment of multiple gingival recessions using PRF in combination with CAF. Three systemically healthy non-smoker patients with Miller Class I recession defects on adjacent teeth in esthetic areas of the mouth were treated. Intra-oral photographs were taken and recession depth (RD), recession width (RW), keratinized tissue height (KTH), probing depth (PD), clinical attachment level (CAL) were measured at baseline, 3 months and 1 year after surgery. A total of 26 recessions were treated. The mean number of baseline and postoperative measurements were as follows, RD  $1.73 \pm 1.19$  mm and  $0.22 \pm 0.26$  mm, RW  $2.13 \pm 1.15$  mm and  $0.49 \pm 0.64$  mm, KTH  $4.67 \pm 1.37$  mm and  $4.27 \pm 0.79$  mm, PD  $2.56 \pm 0.74$  mm and

1.94 ± 0.55 mm, CAL 3.70 ± 1.10 mm and 1.79 ± 0.68 mm, respectively. The mean percentage of root coverage was 87.89% and complete root coverage was achieved in 18 out of 25 teeth.

**Results:** The clinical outcomes of this case series are in accordance with the previous results on the single root coverage with PRF.

**Conclusion:** The results show that PRF in combination with CAF is an effective technique in root coverage.

## P0520

### Diode laser-assisted gingivectomy of peripheral giant cell granuloma: a 16-month follow-up

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**Aim:** Peripheral giant cell granuloma (PGCG) is a benign inflammatory hyperplastic lesion of unknown etiology that occurs in the gingiva or alveolar ridge. It normally manifests as a soft tissue nodule, purplish-red in color, consisting of multinucleated giant cells in a background of mononuclear stromal cells and extravasated red blood cells. In this article diagnosis histopathological features and treatment of the case of peripheral giant cell granuloma are presented.

**Material and Methods:** The patient 54 years old man whose chief complaint was painless swelling in the anterior mandibular region was referred to the Department of Periodontology, Faculty of Dentistry, Selçuk University. Intraoral examination revealed a swelling that was red, firm, and sessile, with a smooth surface texture. Lesion was observed in the anterior mandibular gingiva. Intra-oral, peri-apical radiograph revealed no pathological findings. Medical consultation revealed that the patient had no systemic disease. The first phase of treatment that included oral hygiene instructions was initiated. Scaling and root planing were performed, and then gingivectomy procedure was used to removal of the gingival enlargement. Gingivectomy surgery procedure was performed with diode laser (940 nm, 5W, pulsed mode, 400 µm optic-fiber size). At the time of the surgery, gingival biopsies were obtained and fixed in neutral buffered 10% formaldehyde solution.

**Results:** The diagnosis of peripheral giant cell granuloma was confirmed with histopathological examination. No intra- and post-operative complications were seen. The patient attended regular follow-up.

**Conclusion:** Adequate surgical procedure, oral care and regular dental visits are important for recurrence of peripheral giant cell granuloma.

## P0521

### Coverage of gingival recession after the orthodontic treatment

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**Aim:** After fixed orthodontic treatment a Miller class II gingival recession appeared on tooth 35. A thin biotype of the gingiva and probably inadequate orthodontic treatment have contributed to the loss of the attached gingiva on tooth 35 and to the emergence of the gingival recession.

**Material and Methods:** The patient came to the Department of Periodontology, Dental Polyclinic Zagreb, because of the gingival recession on tooth 35. She was unsatisfied with the result of orthodontic treatment and was interested in possibilities of cosmetic correction of the gingival recession. Periodontal indices were measured and proper oral hygiene instructions were explained to the patient. Prior to surgery, removal of supragingival soft plaque was performed. We opted for the two-stage surgery. In the first stage, a free gingival graft was positioned to increase the amount of attached gingiva, and then 4 months later in the second stage a coronally advanced flap with connective tissue graft was performed to cover the gingival recession on tooth 35. Aggravating factor was the bone defect at the site of tooth 34 extracted for orthodontic reasons.

**Results:** Twelve months post-surgically we observed an adequate width of the attached gingiva, measuring 5 mm after the treatment, and the gingival recession was completely covered.

**Conclusion:** The two-stage treatment of the gingival recession, including free gingival graft in the first, and coronally advanced flap with connective tissue graft in the second stage, proved to be a reliable and a predictable procedure which resolved all the aesthetic and functional problems of the patient in presented case.

## P0522

### Clinical evolution of collagen matrix to enhance the width of keratinized tissue around dental implants

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**Aim:** The most problem of using dental implants is the lack of keratinized gingiva. The lack of keratinized mucosa around dental implants increase plaque accumulation, tissue inflammation (peri-implantitis or peri-implant mucositis) and gingival recessions due to tissue loss. In this case we aimed to increase keratinized gingiva around dental implants with using collagen matrix grafts and to compare them with free gingival grafts.

**Material and Methods:** Randomize patients that have implant with minimal keratinized tissue (<2 mm) were included in the study. We used mucoderm (Botiss) at 12 implants and mucograft (Geistlich) at 12 implants and free gingival grafts in 12 implants. Clinical measurements (width of keratinized mucosa, gingiva index, plaque index, probing depth) were taken pre-operatively and post-operative 1, 3 and 6 months after surgery.

**Results:** At 6 month in all groups results showed reducing in plaque index, gingival index and increasing tissue gain. While gains in gingival thickness and keratinized tissue, no significant change for closing recessions on implant surface and probing depth. Also collagen membrane has shown easy handling properties with a significant reduction in surgery time and patient morbidity.

**Conclusion:** Collagen matrix grafts might be used to increase tissue thickness and generate keratinized tissue around dental implants. They are also effective as free gingival grafts mucosa without the need for procuring a graft from the palate with collagen matrix grafts if there is a small amount of keratinized tissue. If there isn't any keratinized tissue using free gingival grafts have more effective results.

## P0523

### Treatment of multiple and unitary recession with coronal or laterally repositioned flaps and Emdogain®

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**Aim:** The aim of this work was to treat patients with hypersensitivity and gingival recession with coronal or laterally repositioned flaps, depending on whether recession was multiple or unitary, to increase the amount of gum inserted lengthways.

**Material and Methods:** Ten patients participated (one with recession in all 4 quadrants, 3 with recession in quadrants 2, 3, and 4, and 6 with unitary recession), without pathologies contraindicating treatment, who underwent radicular coverage with coronal or laterally repositioned flaps together with an enamel matrix derivative (Emdogain®). All patients were treated in a single surgical session for each tooth/quadrant, always preceded by periodontal stabilization. All surgery employed resorbable sutures and patients were recalled for check-ups after 1 week, 15 days, 1 and 6 months following surgery, when the area or tooth treated was monitored in photographs and by probing, taking the cemento-enamel junction as a reference point for measuring gum quantity. After surgery all patients were prescribed 1 g of amoxicillin every 8 h for a week, cold applied locally, and 600 mg ibuprofen.

**Results:** Following the healing period, radicular coverage was achieved as a result of surgery, augmenting the amount of gum insertion (length and apparent width), correcting aesthetic defects, and resolving the initial hypersensitivity.

**Conclusion:** The use of enamel matrix derivative in coronal or laterally repositioned flaps could be a good option for the plastic periodontal surgery.

## P0524

### Different depigmentation techniques compared: two case reports

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**Aim:** Melanin pigmentation is a major concern of individuals with a high smile line. The most used depigmentation techniques are scalpel surgery, lasers, electrosurgery and bur abrasion.

**Material and Methods:** Two female patients with melanin pigmentation are presented. The patients who had high smile line were concerned about the appearance of their smile. They were treated with bur abrasion depigmentation technique on the right maxillary regions and the left mandibular regions. Left maxillary regions were treated with electrosurgery, while on the right mandibular regions, laser surgery was performed. Periodontal dressing was covered on all sites and no analgesics was prescribed. None of the patients needed analgesics and wound healing was uneventful. Patients' Visual Analog Scale (VAS) score was under "3" in all regions, with the highest score on the electrosurgery zone. No recurrence was reported 6 months after the operations.

**Results:** Bur and the laser techniques are both noninvasive and simple. Electrosurgery is more invasive and the connective tissue is revealed more easily because of the difficulty to control the deepness of the effect. Usage of periodontal packs helps preventing pain and discomfort after surgery, thus VAS evaluation might be misleading. One of the patients had more pain and discomfort on the electrosurgery zone; indicating that electrosurgery is more invasive.

**Conclusion:** Different techniques may be preferred in pigmentation cases. Bur abrasion is a simple technique and laser surgery is a non-invasive and effective method. Preservation of the healthy tissues without re-pigmentation is required for successful therapy.

## P0525

### Treatment of a patient with unilateral cleft lip and palate with free gingival graft

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**Aim:** Children with cleft lip and palate (CLP) are at high risk for development of periodontal diseases. Poor oral hygiene was frequently seen. After surgical approaches scar formation and tissue tension occurs on the upper lip and thus it may be difficult to maintain esthetic and oral hygiene procedures in the anterior maxillary region. An adequate width of keratinized gingiva is important for gingival health. Free gingival graft (FGG) is a simple, predictable technique for increasing attached gingiva and vestibular depth.

**Material and Methods:** A 15 year-old male patient with unilateral CLP referred to the clinic complaining from gingival bleeding and swelling before orthodontic treatment. In clinical examination shallow vestibul, buccal mucosal tension, absence of attached gingiva was seen in the maxillary anterior region. After the completion of phase 1 periodontal therapy, FGG was performed to facilitate the movement of the upper lip, to enhance the oral hygiene practices and to create attached gingiva. Two FGG surgery was applied in two different interventions for the solution of mucogingival problems in the patient.

**Results:** In the literature, there is limited knowledge about management of mucogingival problems with FGG in CLP patient. FGG can use for vestibuloplasty and increasing/creating attached gingiva so it can be applied for the patients with tissue tension (due to scar formation) and mucogingival problems.

**Conclusion:** For CLP patients with mucogingival problem in the maxillary region, FGG is one of the effective procedures for creating attached gingiva and increasing vestibular depth. In this case, the optimal mucogingival condition was provided before orthodontic treatment.

## P0526

### Aesthetic treatment of gingival fenestration in attached gingiva

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**Aim:** Gingival fenestration is a rare clinical entity in which the overlying gingiva is denuded and the root is exposed to the oral cavity. Gingival fenestration defects may create problems regard-

ing root caries, plaque control, root hypersensitivity, and esthetics.

**Material and Methods:** This case reports a 34-year old male patient who was referred to the authors' department with a chief complaint of esthetic problem and sensitivity. Clinical examination showed gingival fenestrations and caries localized on the labial vestibule of the mandibular left and right central incisors. The defects were treated with a connective tissue graft taken from the hard palate after excavation of root caries. Healing was uneventful. Six months follow up results showed complete coverage of the gingival fenestration defects.

**Results:** There have been various surgical procedures that have been documented for fenestration treatment. In this case connective tissue graft was preferred. Connective tissue grafts covered with pedicle flaps has some benefits over other procedures such as increased blood supply and color match compared to free gingival grafts, and increased tissue thickness compared to pedicle flaps.

**Conclusion:** According to the results obtained in this case, connective tissue grafts can be applied successfully in treatment of gingival fenestrations.

## P0527

### Use of the partially epithelialised free gingival graft technique in management of gingival recession: a case series

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**Aim:** Gingival recession is the apical migration of the gingival margin relative to the cemento-enamel junction, which can lead to sensitivity and poor aesthetics. The free gingival graft aims to increase width and thickness of keratinized tissue. Completeness of root coverage is unpredictable, particularly in defects with Miller's classification 2 and above. A further surgical procedure, often a coronally advanced flap +/- connective tissue graft, may be required to achieve root coverage. Other disadvantages include poor colour and texture match to the recipient site and misalignment of the mucogingival junction. Cortellini (2012) described a partially epithelialized free gingival graft technique (PE-FGG), which aims to improve outcomes via increased root coverage potential and better appearance of the grafted tissue relative to the adjacent recipient site.

**Material and Methods:** This case series presents management of single gingival recession defects using the PE-FGG technique within the Restorative Department of the Leeds Dental Institute. Following initial non-surgical periodontal therapy, the PE-FGG technique was used in management of localised recession defects. The surgical technique is described and outcomes are presented.

**Results:** Excellent outcomes have been reported following the use of the PE-FGG for localised and multiple recession defects. Whilst complete root coverage was not demonstrated in these cases, the PE-FGG technique achieved results which were satisfactory in terms of the small size of the residual defect, comfort and aesthetics, and where no further surgical procedures were required.

**Conclusion:** The cases presented demonstrate good aesthetic outcomes and improved root coverage following the use of the PE-FGG technique.

## P0528

### Preparation of the periodontal tissue before the orthodontic treatment

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**Aim:** In recent years, an increasing number of adult patients present for treatment of the teeth and jaw anomalies on the one hand, and complications of periodontal tissues after orthodontic treatment on the other one. Complications occur as single or multiple recessions, dehiscences and fenestrations. The aim of the study was to develop an algorithm for the training of periodontal tissues before orthodontic treatment in adult patients.

**Material and Methods:** We examined 133 patients, who were on orthodontic treatment for 2–5 years. 2 groups have been created: control – without preliminary preparation of the periodontium (n=67) and experimental – with preliminary preparation (n=66). Average age – 41.5 and 34.3 respectively. Statistical data were collected regarding the initial status of periodontal tissues in patients before starting orthodontic treatment and at the end. As an example, presents a clinical case of preparation of the periodontium before orthodontic treatment.

**Results:** Attached gingiva: Control group – a decrease of attached gingiva on average, 0.85 mm. The experimental group – increased level of attached gingiva on 2.12 mm. Recession: Control group: Before – most recessions belonged to the class 2–15 (22.4%) After to the class 3–21 (31.3%) The experimental group:

Before – most recessions belonged to the class 1–36 (54.5%)  
After to the class 1–6 (9.09%)

**Conclusion:** In the presence of a thin gums, narrow zone of attached gingival, small vestibule of the oral cavity, the volume of the soft tissues must be increased before the beginning of the orthodontic treatment.

## P0529

### Coronally advanced flap plus porcine collagen matrix for the treatment of gingival recessions: a randomized clinical trial

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**Aim:** To evaluate the clinical outcomes following the treatment of single gingival recessions with coronally advanced flap technique (CAF) when compared to the association of CAF and a porcine collagen matrix graft (CAF + CM).

**Material and Methods:** For this randomized controlled clinical trial, 40 patients showing single Miller Class I/II gingival recession (depth  $\geq 2$  mm), located at upper canines or premolars, were included. The patients were randomly assigned to receive either CAF or CAF + CM. The primary outcome was gingival recession reduction (Rec Red).

**Results:** After 6 months, the observed root coverage was 77.2% for the CAF + CM group and 72.1% for the CAF group

( $p > 0.05$ ). No statistically significant difference was observed between the two groups regarding Rec Red. Complete root coverage (CRC) was found in 40% of the cases in the CAF + CM group and in 35% of the sites treated with CAF alone. Keratinized tissue thickness (KTT) was 0.29 mm higher in CAF + CM group ( $p < 0.05$ ).

**Conclusion:** Within the limits of the present study, it was concluded that both approaches could provide a significant gingival recession reduction after 6 months, with no significant differences between the treatments. However, the association of CAF with CM may provide an additional gain in keratinized tissue thickness.

## P0530

### Magnification and microsurgical instruments in laterally moved, coronally advanced flap for Miller Class III isolated recession defects. A randomized controlled clinical trial

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**Aim:** The aim of this study is to evaluate the laterally moved coronally advanced flap (LMCAF) technique in which magnified vision was used in conjunction with microsurgical instruments (LMCAF-M) and to compare the results with conventional LMCAF technique (LMCAF-C) for clinical and patient related outcomes in the treatment of Miller Class III isolated recession-type defects.

**Material and Methods:** Fifty patients with 50 isolated Miller Class III gingival recession defects located at upper and lower incisors and canines were treated with LMCAF-M and LMCAF-C technique. Outcome parameters (complete root coverage-CRC and mean root coverage-MRC) were assessed 6 months postoperatively. Postoperative morbidity and aesthetic results were evaluated by means of an analog visual scale.

**Results:** Twenty-three of the 25 defects in LMCAF-M (92.0%) and 17 of the 25 defects (68.0%) in LMCAF-C group exhibited CRC ( $p < 0.007$ ); MRC scores were 90.48% for the LMCAF-C group and 97.64% for the LMCAF-M group ( $p < 0.04$ ). There was a significant difference of VAS-P measurements between two groups in the first post-operative week ( $p < 0.0001$ ). Patient satisfaction with aesthetics was better in LMCAF-M group when compared with LMCAF-C group ( $p < 0.032$ ).

**Conclusion:** The present study indicates that even though LMCAF can be performed with traditional approach, performing this procedure using a loupe and microsurgical instruments offers definite advantages in terms of better CRC and MRC; decreased post-operative morbidity, and increased acceptance by the patients.

## P0531

### A survey of patients' perception towards grafting materials typically used in periodontology

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**Aim:** A variety of grafts from multiple sources are available for surgical applications. As the body of evidence grows for

materials' suitability from a biological perspective, patient reported preferences remain largely unconsidered in the literature. Grafting materials in use include; autogenous, allograft, xenograft and alloplast. The aim of this prospective pilot survey was to determine patient preferences for, and perceived barriers to, various grafting materials used in periodontology.

**Material and Methods:** A questionnaire was designed and distributed to a random sample of patients attending Dundee Dental Hospital. Each patient received a brief explanation of grafting and asked a series of standardised questions.

**Results:** Fifty-five patients participated, with an average age of 48 years, 26 were male. Fifteen percent of participants declined an animal derived grafting material stating religious and animal welfare concerns their main barrier to acceptance. Of the remaining 85%, 6% would only accept bovine grafting material but objected to equine or porcine. Twenty-two percent of patients declined cadaveric derived materials, in comparison to autogenous and synthetic grafting materials where only 7% and 4% respectively declined these. When asked to rank grafting materials in preferred order, 18% had no preference. Cadaveric derived materials were perceived least acceptable, with 65% of participants ranking this as one of their final two options whilst an autogenous source was most desirable (44%).

**Conclusion:** This survey suggests that patients have a more positive perception of autogenous bone grafts compared to allograft and xenograft. This was a small sample group and further investigation is required.

## P0532

### Clinical comparison between a porcine collagen matrix and free gingival graft for augmentation of keratinized gingiva and for improvement of the inflammatory gingival status

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**Aim:** To compare the ability to increase the keratinized tissue (KT) surface and to improve the local conditions for preventing the inflammation of a 3D porcine collagen matrix with free gingival graft (FGG), at 3 months after surgical placement.

**Material and Methods:** Rectangular mucosal fenestrations were surgically created in 25 patients with insufficient zones of KT (<2 mm) and were randomly grafted either with rectangular patches of xenogeneic collagen matrix (Geistlich Mucograft<sup>®</sup>; Geistlich Pharma, Wolhusen, Switzerland) (test) or with FGG (control). The primary variable was the change of the area of the grafted site ( $\Delta$ GA) from surgery to 3 months. Secondary parameters included gingival recession, pocket depth, KT width, overall plaque index and bleeding on probing (BOP). Wilcoxon and Mann-Whitney *U* tests were used for the intra-group and for inter-group analysis, respectively.

**Results:** 13 patients (22 teeth in total) were included in the test group, and 11 patients (20 teeth) in the control group. Healing occurred uneventful. At 3 months, both treatments resulted in significant contractions of the grafts and in significant differences between the final grafted areas ( $\Delta$ test  $72.30 \pm 27.81 \text{ mm}^2$  vs.  $\Delta$ control  $28.19 \pm 14.80 \text{ mm}^2$ ,  $p < 0.0001$ ), significant increases of KT (both  $p < 0.001$ ) and significant  $\Delta$ KT favorizing the control group ( $p < 0.0001$ ). BOP deteriorated signifi-

cantly in the test group ( $p < 0.005$ ), with the test group significantly deteriorating when compared with the control ( $p < 0.005$ ).

**Conclusion:** While both treatments resulted in significant shrinking of grafted areas and increases of KT width, the FGG seems to better fulfill the goal of KT augmentation. However, no surgical method seemed to have a positive effect on the overall inflammatory gingival status.

## P0533

### Multiple coronally advanced flap: frontal approach.

#### A case report at 4 years

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**Aim:** Gingival recession are common diseases in adult population (Serino et al 2004). They are seldom localised at buccal surface in high hygienic standard population (Loe et al 1992). When time passes by, recessions get worse and worse (Agudio 2009) and are often associated with hyper-sensibility (Rees & Addy 2002), non carious cervical lesions (Pini Prato et al 2010) and root cavities (Bignozzi et al 2003). This paper was meant to describe a simple and highly predictable surgical technique for the treatment of frontal multiple recession defects (Zucchelli & De Sanctis 2007). Results are presented at 4 years.

**Material and Methods:** A 35 years old man, Asa 1, Hysterical psychologic profile (House 1950) presented Miller Class1 multiple recession on upper anterior teeth. Inter-proximal clinical attachment was conserved -RT 1-(Cairo et al. 2011). The entire technique is well documented step by step, from first incision to half-full-half thickness incisions. From surgical papilla creation to final suture.

**Results:** Multiple recessions have been entirely solved. Complete root coverage was obtained and maintained. The patient reported no hypersensitivity during 4 years after surgery. No graft was harvested and applied, no vertical incision had to be performed so as no scars resulted. Aesthetic results are totally accomplished.

**Conclusion:** The presented microsurgical technique (Zucchelli & De Sanctis 2007) without the need of any graft or vertical incisions demonstrated simplicity and predictability. Medium terms results (4 years) are discussed.

## P0534

### Evaluation of free gingival grafts placed on periosteum and alveolar bone

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**Aim:** The aim of this study is to find out dimensional changes and post-operative clinical results of free gingival grafts placed on periosteum and alveolar bone in patients with minimum attached gingiva.

**Material and Methods:** Free gingival grafts (FGG) were placed in the lower anterior vestibular region of 16 patients with <1.0 mm attached gingiva. FGGs were placed on periosteum in 8 patients and placed on alveolar bone in other 8 patients. The gingival and plaque indices were also recorded. All measurements were repeated 1, 3 and 6 months after surgery. Graft

dimensions were determined on digital photographs taken at the time of surgery and post-op 6th months by a software. Photographs were standardized by 1/1 ratio and taken perpendicular to the site with a standardized 10 mm Williams probe as a reference.

**Results:** Varying degrees of graft shrinkage was observed at post-operative 6th month. Graft shrinkage ratios varied between 32% and 43%. Shrinkage was observed in all transferred grafts. All grafts healed well, there were no graft necrosis or no other healing complications.

**Conclusion:** Increased width of attached keratinized gingiva resulted with improved gingival health. Both of grafting techniques were found successful. Tissue thickness may be related to the dimensional changes both in the horizontal and vertical dimensions.

## P0535

### Management of physiological gingival hyperpigmentation by Nd:YAG laser

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**Aim:** Gingival hyperpigmentation is mostly caused by the physiologic deposition of melanin by melanocytes. Although melanin pigmentation is not a medical problem, complaints about “non-esthetic appearance” is common. There are a lot of techniques to remove hyperpigmentation of gingiva perform with laser or scalpel.

**Material and Methods:** This case report presents the treatment of a 26-years old female patient who was conscious about her dark gums requested for treatment. Gingival hyperpigmentation was removed using Nd:YAG laser with the following irradiation parameters: 320 µm optic fiber; 3W; 100 mj; 30 Hz; emission mode, pulsed and contact mode. The patient was evaluated for pain, wound healing and melanin repigmentation at 1 week, 1 month and 6 month. No discomfort pain, or bleeding complication were observed intraoperatively or 1 week postoperatively. Ablated wounds healed almost completely within 1 week.

**Results:** Achieved results were satisfactory for patients and the operator. Nd:YAG laser is an atraumatic and simple method for treating gingival hyperpigmentation.

**Conclusion:** This result suggests that Nd:YAG laser as an atraumatic, effective and simple method for treating gingival hyperpigmentation where esthetics is a concern and is desired by the patient.

## P0536

### Biometrical analysis of the root coverage

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**Aim:** In order to quantify the root coverage percentage after a periodontal plastic surgery we need to evaluate: the recession depth, the clinical insertion level, the whole root coverage frequency and the root coverage mean percentage. From these four parameters, only the insertion can be measured in a strictly clinical way. Some mistakes can occur when measuring the root cov-

erage by a periodontal probe, e.g., the probing accuracy and the anatomical location of the amelo-cemental junction limit. Even though with these discrepancies, the clinical measurements are still considered as the “gold standard” to evaluate the mean percentage of the root coverage in the recessions. The aim is to compare the root coverage amount that can be obtained by different mucogingival surgery techniques.

**Material and Methods:** A number of cases of mucogingival surgery are presented for the treatment of multiple recessions. Bilaminar techniques are performed with the use of connective tissue grafts from palate. To quantify the root coverage need photographs obtained of start and end of treatment, that will be compared. To calibrate the yardstick in both photographs we use plaster models of the patient.

**Results:** A biometrical analysis system has recently been developed for the diagnosis and planning based in photography. That system uses plaster models to standardise the measurements, which allows to compare and to unify the results of the root coverage techniques.

**Conclusion:** The biometrical analysis allows a better accuracy of the real root coverage percentage we obtained, eliminating some of the mistakes of the previous techniques.

## P0537

### Porcine xenograft to treat peri-implant fenestration defect

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**Aim:** Even though osseointegration is predictably achieved with contemporary oral implants, soft tissue aesthetic outcomes require meticulous planning to achieve successful results. Dehiscence and fenestrations in peri-implant mucosa have been reported and may occur due to thin biotype, quantity, quality and position of peri-implant bone and position of the implant. A case study using porcine xenograft to correct a fenestration defect is reported.

**Material and Methods:** A 23 year old male patient with orofacial trauma following assault presented with unrestorable root fracture for teeth 11, 12, 22 (extracted) and labial displacement for 21. An implant-based fixed prosthodontic solution was undertaken and implants were placed at sites 12 and 22 with particulate bovine xenograft augmentation. Following a four month healing period, the peri-implant labial mucosa developed fenestration on 22 implant coronally owing to a loose healing abutment. This defect was treated surgically with porcine xenograft material and a coronally advanced flap. An unremarkable healing was noted with complete resolution of the fenestration and an increased width and thickness of keratinised mucosa around the 22 implant on review at 3 months.

**Results:** The evidence of different approaches (including a connective tissue graft (CTG), CTG with envelope, coronally advanced flap (CAF) with sub epithelial CTG, pediculated CTG, free gingival graft and acellular dermal matrix with CAF) to surgically correct soft tissue peri-implant facial defects in the maxillary anterior region is scarce. Well controlled clinical trials are required.

**Conclusion:** The use of porcine xenograft offers a viable solution to address fenestration defect around implants.

## P0538

### The use of a porcine xenograft to treat multiple adjacent recession defects

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**Aim:** Recession defects may be implicated in periodontal pathologies, aesthetic issues and dentine hypersensitivity. Partial or full root coverage may be sought via autograft or allograft use. However, contemporary xenografts have been licensed for use in similar situations.

**Material and Methods:** A non-smoking, fit, 32 year old female presented with sensitivity and aesthetic concerns. All quadrants exhibited Miller I and/or II defects. Following a detailed consultation, the patient consented to surgery. This involved three sided partial thickness mucogingival flaps, reduction of the buccal root surface at the point of maximum bulbosity, placement of enamel matrix proteins (Emdogain) and placement of porcine collagen xenograft material (Mucograft). The graft was sutured securely into place and was covered via advancement of the flap. Non-resorbing sutures were left in place for 6 weeks and the patient was asked to rinse with chlorhexidine gluconate for 3 weeks followed by her normal oral hygiene regime. Reviews took place at 2 weeks, 6 weeks and 6 months.

**Results:** Recession defects may cause a multitude of clinical issues. Surgery may effectively treat such defects but carry certain risks. Of particular significance is the requirement of a donor site in autografts and patient acceptance of cadaveric material in allografts. Xenografts address the former and appear more accepted than the later. Such materials require placement in demanding situations to gain widespread acceptance as a viable substitute.

**Conclusion:** Porcine xenografts may be used to successfully cover multiple adjacent recession defects thus avoiding multiple donor sites along with improved acceptability over allografts.

## P0539

### Post-extraction socket seal surgery with an epithelized connective tissue graft using a subpapillar tunneling procedure

J.M. Stein, C. Hammächer

*Aachen/Germany*

**Aim:** Ridge preservation in the aesthetic area is still a challenging procedure. The aim of the present case series was to introduce a new technique for post-extraction socket seal surgery using an epithelized connective tissue graft and socket filling with a xenogeneic biomaterial.

**Material and Methods:** Thirteen patients, aged 29–59 years, requiring extraction of 16 maxillary anterior teeth were recruited. After tooth extraction the sockets were filled with a deproteinized xenogenic biomaterial and the buccal gingiva and interdental papillae were undermined and augmented with an epithelized soft tissue graft using a tunnelling procedure. Thereby, the epithelized part was used to close the orifice of the alveolar socket. In all sites, the horizontal and vertical dimensions of the alveolar ridge were evaluated directly after extraction and 5 months later before implant placement.

**Results:** No intra-operative or post-operative complications occurred. In three grafted sites after one week an incomplete integration with fibrinoid healing of the graft had been recorded. However, after 6 weeks complete integration of all grafts had been detected. Five months post-operative, the mean reduction of the horizontal width of the alveolar ridge was  $-0.5$  mm, while the height of the mesial and distal papillae were reduced by  $-0.2$  mm and  $-0.4$  mm, respectively. The buccal gingival margin of the alveolar ridge showed a vertical gain of  $0.5$  mm.

**Conclusion:** The presented technique seems appropriate for preservation of the alveolar ridge in esthetically relevant area.

## P0540

### Digital smile design on treatment of altered passive eruption. Case report

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**Aim:** At this present time aesthetic canons are becoming highly important at all levels including dentistry. Nowadays, the population not only claims for a healthy mouth, without biological or functional problems, but also for an attractive smile.

**Material and Methods:** A patient came to the clinic mainly concerned about her dental aesthetics. Short and mismatched crowns were easily appreciated, and after an appropriate clinical and radiographic valuation, Altered Passive Eruption was diagnosed. A multidisciplinary treatment plan was developed and planned with the Digital Smile Design's help. Using computer software (PowerPoint or Keynote) a new harmonic smile, which reach the functional, aesthetic and emotional needs of the patient, was designed. The mock-up created was used as a guideline for surgical crown lengthening. After six months of healing period aesthetic lithium disilicate ceramic crowns were made.

**Results:** Any complications were assessed during the postoperative phase. Since the surgical day, provisional crowns were placed and only exceeded once. The patient underwent a successful oral hygiene. Finally the aesthetic expectancies from the patient were achieved thanks to a surgical and prosthodontic multidisciplinary treatment.

**Conclusion:** The Digital Smile Design aims to help in the creation of a fluid channel of communication among dentist, technician and patient, achieving a significant higher acceptance of proposed treatments. The planning guide by aesthetic concept has been quickly spread mainly due to its simplicity as it requires no equipment, special software or additional investments.

## P0541

### The partially submerged epithelialized connective tissue graft (E-CTG): a novel surgical technique for the treatment of Miller Class III. Single gingival recessions in lower incisors

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Budapest/Hungary

**Aim:** The aim of this retrospective case series was to clinically evaluate the treatment of Miller-Class III single recessions in

lower incisors utilising the envelope technique combined with a partially submerged epithelialized connective tissue graft (E-CTG).

**Material and Methods:** Seven subjects exhibiting singular Miller-Class III recessions were treated using the envelope technique combined with a partially submerged E-CTG. An envelope flap was prepared (Ratzke et al. 1985). Subsequently a connective tissue graft was harvested from the maxillary tuberosity by distal wedge preparation (Robinson 1966) or from the palate by the single incision technique (Hürzeler and Weng 1999). During harvestment, an epithelial collar was maintained individually tailored to each recession defect. The harvested E-CTG was inserted and fixed in the envelope, with the epithelial collar left unsubmerged (Stimmelmayer et al. 2011). Sling sutures were applied to ensure wound closure and graft stability. Following parameters were assessed at baseline and 12 months postoperatively: recession depth, percent of root coverage, width of keratinized tissues.

**Results:** Adverse events, graft necrosis did not occur in any of the cases. At 12 months, root coverage averaged  $2.83 \pm 1.06$  mm; percent of root coverage was 89%. Increase in keratinized tissue width averaged  $2.55 \pm 0.88$  mm. Postoperative complaints were minimal.

**Conclusion:** (1) Treatment of lower incisors exhibiting Miller-Class III singular recessions using the envelope technique combined with PSE-CTG may result in substantial root coverage, (2) The applied surgical technique represents a predictable treatment approach with low patient morbidity, resulting in favourable esthetic outcomes and tissue blending.

## P0542

### Treatment of multiple gingival recessions with two different approaches

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Istanbul/Turkey

**Aim:** The aim of this controlled study was to evaluate the clinical effectiveness of tunnel technique (TUN) in combination with acellular dermal matrix graft (ADM) on defect coverage, esthetics and patient satisfaction compared to coronally positioned flap (CAF) + ADM for the treatment of Miller Class I multiple gingival recessions.

**Material and Methods:** A total of 20 patients (13 females and 7 males) with 58 Miller Class I multiple recessions  $\geq 3$  mm were included and divided into TUN + ADM and CAF + ADM groups. At baseline and 12 months after the surgery, plaque index (PI), gingival index (GI), bleeding on probing (BoP), probing depth (PD), clinical attachment level (CAL), recession height (RH), keratinized tissue height (KT), gingival thickness (GT), and mean defect coverage were evaluated. Patient satisfaction and root coverage esthetic scores (RES) were also assessed.

**Results:** Baseline RH in TUN + ADM and CAF + ADM groups was  $3.23 \pm 0.28$  mm and  $3.30 \pm 0.35$  mm, respectively. Intragroup comparisons revealed statistically significant differences at 12 months for all parameters except PD ( $p < 0.05$ ). Mean defect coverage was 75.72% (RH reduction:  $2.45 \pm 0.20$  mm) in TUN + ADM group, and 93.81% (RH reduction:  $3.10 \pm 0.57$  mm) in CAF + ADM group. Intergroup differences were found to be significant for RH reduction, KT increase, mean defect coverage, and RES ( $p < 0.05$ ).

**Conclusion:** Both techniques were effective in root coverage of multiple recession defects, however better esthetic results and

clinical improvements were achieved with CAF and ADM combination.

## P0543

### Laser-assisted versus conventional frenectomy of upper lip

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**Aim:** Periodontal reconstructive surgical procedures seek to correct mucogingival defects, including gingival recession. Predictable and optimal coverage of exposed root surfaces is, therefore, an important goal in periodontal plastic surgery. The frenulum exerts a pull upon the tissue and can lead to the continuation of the lesion. Various techniques have been used to dissect the labial frenulum and deepen the vestibule.

**Material and Methods:** In 15 clinical cases we compared the use of Nd:YAG and Er:YAG laser with conventional surgical frenectomy on correcting frenulum pull. Young patients aged 6–14 years were referred from the orthodontic department due to a short frenulum of the upper lip and/or gingival recessions on first upper incisors. After a complete periodontal examination, we performed a frenectomy of the upper lip along with the fibrotomy in the case of diastema between first upper incisors. Five patients were treated with the Nd:YAG laser (5 W, 40 Hz, SP, 300 mm), another five with the Er:YAG laser (80 mJ/p, 40 Hz, SP, 400 mm) while the last five were treated with conventional blade surgery.

**Results:** Healing was uneventful in all five Er:YAG laser treated patients and resulted in a firm keratinized-like mucosa after 1 week. Thermally altered wound after Nd:YAG treatment was healed completely after 2 weeks without any post-operative complications. In patients who received conventional surgical treatment sutures were removed after 1 week, and the wound healed completely after another 2 weeks.

**Conclusion:** Laser-assisted frenectomy of upper lip might represent a useful alternative to conventional surgical frenectomy.

## P0544

### Laser-assisted fenestration of un-erupted single rooted permanent teeth

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**Aim:** Un-erupted incisors or canines may manifest as benign cysts that appear on the mucosa of a tooth shortly before its eruption. The majority erupt and disappear on their own. If they hurt, bleed or are infected, they may require surgical treatment to expose the tooth and drain the content.

**Material and Methods:** Here we present three clinical cases: a child with an un-erupted permanent maxillary central left incisor, a child with un-erupted maxillary left canine and a child with un-erupted malformed maxillary right incisors and canine. The overlying firm keratinized mucosa in all three children was ablated with an Er:YAG laser (60–90 mJ/pulse, 30 Hz, SP, 400 mm), haemostasis of the wound was achieved by Nd:YAG laser (5 W, 50 Hz, LP). The procedure did not require any sutures; there was no haemorrhage, swelling, infection or post-operative pain.

**Results:** Healing was uneventful in all three laser treated patients and after one week resulted in a firm keratinized mucosa surrounding the crowns of, now partially exposed, teeth. Thermally altered wound after Nd:YAG modification was healed completely after 2 weeks without any post-operative complications. Fixed orthodontic appliance was able to attach to exposed crown immediately after laser-assisted surgical fenestration.

**Conclusion:** The treatment of un-erupted single rooted teeth with described technique facilitates the cooperation of paediatric patients and makes the treatment more predictable, faster and safe.

## P0545

### Comparison of two root coverage techniques in the treatment of gingival recession. Results of a randomized controlled, parallel-group study

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**Aim:** Different treatment modalities have been described for root coverage in gingival recession cases. The aim of the present study is to analyze the outcomes of two root coverage techniques.

**Material and Methods:** 40 patients with single recession defects were treated with either semilunar coronally positioned flap (SCPF) or envelope connective tissue graft (ECTG). At baseline and 6 months follow-up, in addition to patient based outcome variables including postsurgical morbidity (PM) and aesthetic scores, clinical parameters of plaque index (PI), gingival index (GI), vertical recession (VR), horizontal recession (HR), keratinized tissue width (KTW), tissue thickness (TT) and attachment level (AL) were measured.

**Results:** At baseline, all clinical parameters were similar in SCPF and ECTG groups ( $p > 0.05$ ). Both groups demonstrated significant improvements in clinical parameters ( $p < 0.05$ ). 6 months after surgery, the only intergroup difference was observed in KTW, TT and PM values (Higher at ECTG) ( $p < 0.05$ ).

**Conclusion:** SCPF and ECTG can be preferred for the coverage recession defects with esthetic outcomes. While more benefit can be achieved with ECTG in terms of TT and KTW, SCPF has the advantage of less postsurgical morbidity.

## P0546

### Enhancement of the papilla aesthetics adjacent to an edentulous ridge by soft tissue grafting before placement of anterior single implant

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**Aim:** Various surgical techniques target achieving adequate keratinized tissue around dental implants. The aim of this report is to present the case involving improvement of the papilla using connective tissue graft procedure before implant placement.

**Material and Methods:** A 27 year-old girl with single upper incisor loss that had been previously rehabilitated with a block bone autograft, was referred before implant placement. In her

clinical examination, horizontal and vertical dimensions of the edentulous area were adequate for aesthetic implant placement and restoration. However, distal papilla was 3 mm below the adjacent cemento-enamel junction and an area of inadequate bone volume with deficient interproximal papillae and ridge soft tissue was present. Resulting defect was surgically restored by modified connective tissue graft procedure. Three months after, dental implant was placed and then an emergence profile-contoured provisional crown was fabricated. After achievement of the satisfactory soft tissue contours, case was finalized with a porcelain restoration.

**Results:** Clinical follow-up of the patient demonstrated an implant supported final crown with satisfactory soft tissue aesthetics and enhancement of the height of papilla.

**Conclusion:** The modified connective tissue graft procedure may be a useful option to enhance peri-implant aesthetics and to establish desired periimplant soft tissue contours.

## P0547

### The Early Wound Healing Score: a novel approach to evaluate early wound healing characteristics following treatment of multiple Miller Class I–II recessions

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**Aim:** Root coverage and changes in soft tissue dimensions following surgical treatment of multiple gingival recessions can be evaluated quantitatively by means of pre- and postoperative clinical measurements. Our aim was to introduce a novel quantitative evaluation methodology of early wound healing characteristics following treatment of multiple Miller-Class I, II recessions using the modified coronally advanced tunnel (MCAT) technique either with a bioresorbable collagen matrix (Mucograft®) or subepithelial connective tissue graft (SCTG).

**Material and Methods:** Twenty-two subjects exhibiting bilateral multiple Miller-Class I, II recessions were treated in a split mouth design using the MCAT with either Mucograft® (test) or a SCTG (control). Quantitative evaluation of early wound healing events was performed by the newly introduced Early Wound Healing Score (EWS). Differences in EWS values were analysed in relation to postoperative root coverage and gain of keratinised tissues 12 months after surgery.

**Results:** Different early wound healing characteristics were observed, EWS values were lower at test sites when compared to control. (Day 3:  $3.86 \pm 1.61$  vs.  $4.68 \pm 1.46$ ; Day 7:  $2.09 \pm 1.27$  vs.  $2.73 \pm 1.64$ ; Day 10:  $0.59 \pm 0.67$  vs.  $1.41 \pm 1.18$ ; Day14:  $0.82 \pm 0.66$  vs.  $1.09 \pm 0.97$ , Day28:  $0.04 \pm 0.21$  vs.  $0.14 \pm 0.35$ ). Nevertheless, these differences did not correlate with final treatment outcomes, as both treatment modalities resulted in substantial mean root coverage and gain of keratinised tissues.

**Conclusion:** Based on early wound healing observations, it can be concluded, that (1) treatment with CAMT + Mucograft® resulted in moderate tissue reactions compared to CAMT + SCTG (2) Mucograft® may represent a valuable alternative to SCTG, resulting in uneventful wound healing and lower patient morbidity.

## P0548

### Implant therapy and reconstruction of lost hard- and soft tissues in the atrophic mandible to create and maintain periimplant tissue health: a case report

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Budapest/Hungary

**Aim:** This case report presents a multidisciplinary approach for implant placement and reconstruction of lost hard- and soft tissues in the atrophic mandible resulting in favourable clinical outcomes.

**Material and Methods:** A 59 year old female patient with good general health and chronic periodontitis was treated. At baseline bilateral advanced horizontoververtical ridge defects were present originating from previously lost subperiosteal implants. Following initial periodontal therapy vertical segment osteotomy was performed with alveolar nerve transposition on the right side of the mandible. On the left side horizontal guided bone regeneration using autogenous bone particles and a bovine derived xenograft (Bio-Oss, Wolhusen, Switzerland) combined with an nPTFE membrane (Cytoplast, Osteogenics, Lubbock, USA) was carried out. After 6 months of healing dental implants (Astra Tech; Densply Implants, Mannheim, Germany) were inserted. 2 months after implant placement bilateral vestibuloplasty was performed combined with free gingival grafts. Following another 2 months healing abutments were connected and fixed partial dentures were delivered.

**Results:** Advanced alveolar defects were successfully reconstructed on both sides of the mandible. All implants were successfully osseointegrated. Optimal periimplant soft tissue conditions were established by increasing the vestibular fold and the amount of periimplant keratinized tissues. Thus, cleansibility and optimal function of the final prosthetic restorations could be achieved.

**Conclusion:** Implant therapy of edentulous sites originating from horizontoververtical defects requires reestablishment of previously lost bone, periimplant keratinized tissues and masticatory function. This can be achieved by a stepwise periodontal-surgical-prosthetic approach, which may result in periimplant tissue stability and successful long-term treatment outcomes.

## P0549

### Alveolar corticotomy using Piezzo surgery: a case report

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**Aim:** Alveolar corticotomy around the teeth roots reduces treatment duration and risk of related complications such as root resorption of orthodontic treatment of adult patients. Piezzo surgery enables selective, controlled bone surgery and atraumatic approach. In this case report, alveolar corticotomy using piezzo surgery and orthodontic treatment is presented.

**Material and Methods:** 32 year old female patient presented to Orthodontic Clinic with bimaxillary protrusion. Orthodontic treatment using fixed appliances combined with selective alveolar corticotomy was planned. Under local anesthesia, full thickness

flaps were raised both in maxillary and mandibular anterior teeth. Using piezzo surgery corticotomy was performed mesial-distal and apical bone around the roots. Xenogenic bone grafts were applied to corticotomy sites and collagen membranes were applied covering the roots.

**Results:** Uneventful soft tissue healing was observed postoperatively. Following orthodontic teeth movements were accelerated without any related complications. The orthodontic treatment was finished within 12 months. The patient was well-satisfied with the treatment outcomes and treatment duration.

**Conclusion:** Selective alveolar corticotomy shortened the orthodontic treatment with faster teeth movement and no complications were observed. Use of piezzo device for corticotomy surgery provided easier access to difficult sites on the palatal side, atraumatic approach and increased tactile sense.

## P0550

### Free connective tissue autograft versus platelet rich fibrin membrane for root coverage: a randomized controlled clinical study

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**Aim:** The aim of this randomized controlled trial was to assess the clinical performance of Coronally Advanced Flap with Connective Tissue Graft versus Coronally Advanced Flap with Platelet Rich Fibrin in the treatment of Millers class I and class II facial recession defects.

**Material and Methods:** The efficacy of Platelet Rich Fibrin with Coronally Advanced Flap surgical technique (Group II) was compared with Connective Tissue Graft with Coronally Advanced Flap technique (Group I). In this study, 18 patients were randomly selected based on concrete inclusion and omission criteria and arbitrarily allocated to both the groups. The patients were studied in pre-operative and two months post-operative conditions. Digital images were taken both pre-operatively and post-operatively and were analyzed utilizing Matlab Software (predicated on the principles of pixel photography) and Material plus 4.2 image analyzer (predicated on linear image quantifications).

**Results:** There was a significant decrease ( $p$ -value 0.000,  $p < 0.01$ ) in recession height in Group I when compared to width ( $p$ -value .101,  $p < 0.05$ ). In Group II there was less consequential decrease in both recession height and width.

**Conclusion:** This controlled randomized clinical trial for the treatment of millers Class I and II gingival recessions indicated that coronally advanced flap with connective tissue graft was more effective than coronally advanced flap with Platelet Rich Fibrin.

## P0551

### Evaluation of free gingival graft (FGG) used in combination with coronally advanced flap (CAF) with FGG alone for root coverage: 5 years follow up of 55 cases

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**Aim:** The aim of this study was to compare Free gingival graft (FGG) used in combination with coronally advanced flap (CAF) with FGG alone for root coverage.

**Material and Methods:** 55 cases with bilateral Miller Class I/II gingival recession were treated with FGG + CAF (Test group) or FGG (Control group). Recession depth (RD), width of keratinized gingiva (WKG) were recorded at baseline, 5 years post treatment.

**Results:** RD was  $5.25 \pm 1.8$  mm in FGG + CAF group and  $4.80 \pm 1.4$  mm in FGG group at baseline,  $2.69 \pm 0.25$  and  $2.75 \pm 0.65$  at 6 months and  $0.50 \pm 0.38$ ,  $1.95 \pm 0.35$  5 years respectively. WKT was  $1.85 \pm 0.35$  mm in the FGG + CAF group and  $1.44 \pm 0.89$  mm in the FGG group at baseline,  $4.46 \pm 0.75$  and  $4.25 \pm 0.4$  at 6 months,  $5.70 \pm 0.3$  and  $4.65 \pm 0.35$  5 years respectively; the differences between two groups was statistically significant

**Conclusion:** FGG + CAF seem more effective treatment for gingival recessions than FGG alone. One of the main etiologic factors could be Creeping Attachment

## P0552

### Labial frenectomy with Nd: Yag laser and conventional surgery: a comparative study

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**Aim:** The aim was to compare pre-, trans-, and postsurgical clinical parameters of labial frenectomies performed with conventional surgery and Nd:Yag laser.

**Material and Methods:** The study was conducted on 40 patients. The first 20 patients was treated with a surgical method of frenectomy (experimental group 1). On the second group of 20 patients the frenectomy was conducted with Nd: Yag laser (experimental group 2). All data about the patients were recorded in special clinical records which included indications for frenectomy, location of the frenulum, the size of the frenulum, level of pre operative anxiety, the course of the surgery, recovery of the patient, individual sense of discomfort, as well as post surgical complications, if there are any. The healing of the surgical wound was evaluated on the 3th, 7th and 14th day after the intervention.

**Results:** All patients treated with the laser did not require suture ( $p < 0.001$ ), there was no bleeding during the procedure ( $p < 0.001$ ) less time was needed for the intervention ( $p < 0.001$ ). There were no statistically significant differences in terms of preoperative anxiety, pain during the intervention, postoperative discomfort and complications.

The clinical recovery of surgical wound was statistically significantly better after classical scalpel technique and on 14th day

was fully completed in 100% of these patients compared to 30% in patients treated with laser ( $p < 0.001$ )

**Conclusion:** Nd:Yag laser may be an efficient and satisfactory option for frenectomy in term of avoiding the need of suturing, reduction of surgical time and reduction of trans operative bleeding.

## P0553

### Biometric analysis for plastic periodontal procedures

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**Aim:** To evaluate a biometric analysis based on photographs as an objective tool in the diagnosis, planning and communication with the patient and other professionals, in root coverage procedures.

**Material and Methods:** Two cases of root coverage are presented. Both have received all hygiene and prophylaxis measures required before surgery. A biometric analysis on initial and follow-up photographs was applied. Measurements were calibrated with those recorded on a plaster cast of the same arch treated (Coachman & Calamita QDT 2012). According to the method to predetermine a root coverage proposed by Zucchelli et al (Zucchelli jop 2006) to calculate the position of the future gingival margin. This information can be visually presented to the patient, as an estimate of the possible outcome of the intervention. It can also be used to communicate to other professionals the need for pre-surgical restorative treatment. Using follow up photographs the results achieved can also be biometrically evaluated. Comparisons allow to objectively quantify the root coverage obtained, and residual recession against those predetermined.

**Results:** In both cases treated the biometric analysis was applied to diagnose, plan and evaluate the root coverage procedure. This protocol allowed reliable extrapolation of the measurements estimated on the initial photographs to the actual case.

**Conclusion:** This protocol allowed reliable extrapolation of the measurements estimated on the initial photographs to the actual case. This approach may become a powerful tool for analysis and evaluation in plastic periodontal procedures.

## P0554

### Treatment of gingival recession before orthodontic therapy: a case report

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**Aim:** Gingival recession is a condition that is seen at a large portion of the young and adult population, and negatively affects the aesthetic. Orthodontic tooth movement may lead to gingival recession. For this reason before orthodontic treatment periodontal health should be optimum. The aim of this case report is to describe a case where a subepithelial connective tissue graft with laterally positioned flap was performed, in the treatment of deep gingival recession before orthodontic treatment.

**Material and Methods:** A 21-year-old female, systemically healthy patient with Miller class II gingival recession was referred to our clinic by her orthodontist before orthodontic treatment.

After clinical and radiographic examination, initial periodontal treatment was performed. Connective tissue graft and laterally sliding flap technique were performed to provide root coverage and to increase the attached gingiva width. The clinical measurements were made at baseline, after 1, 6 and 12 months.

**Results:** Root coverage was provided and keratinized tissue gain was achieved after 12 months follow up. Orthodontic treatment is currently being carried out without any problems.

**Conclusion:** Root coverage was provided and keratinized tissue gain was achieved after 12 months follow up. Orthodontic treatment is currently being carried out without any problems.

## P0555

### Laterally moved, coronally advanced flap with apical resection. A combined surgical approach: a case report

R. Aghazada, F. Dominici, E. Bozbay, A. Pilloni

Rome/Italy

**Aim:** The purpose of this case report was to evaluate the laterally moved, coronally advanced flap combined with apical resection surgery on premolar tooth with vestibular bone defect.

**Material and Methods:** In this case report, a 55-years-old female patient, with good general health, searched for assistance complaining of esthetic dissatisfaction and food impaction. On clinical and radiographical examination it was found apical lesion in root apex site in tooth #14 and the presence of a gingival recession in tooth #14 and #15 classified as Müller class I. Previously to the surgery, the patient received basic periodontal therapy. Endodontic treatment of tooth #14 was performed prior to the surgery. Due to the extent of root surface exposed and the lack of attached gingiva in the buccal area, surgical procedure was planned to the laterally moved, coronally advanced flap and apical resection in order to avoid two surgeries aimed on preserving keratinized soft tissue.

**Results:** The root of teeth 14 and 15 were completely covered with soft tissue. The keratinized tissue was observed stable after 1 year follow-up. The radiographical result showed that there was not any lesion in apical root area and esthetical and food impaction problems were resolved.

**Conclusion:** The combined surgery approach as laterally moved, coronally advanced flap with apical resection can be performed in the same period with acceptable results.

Correction added on 3 July 2015, after first online publication. The primary author's order list F. Dominici, E. Bozbay, A. Pilloni has been changed to R. Aghazada, F. Dominici, E. Bozbay, A. Pilloni

## P0556

### Cryotherapy for treatment of physiologic gingival pigmentation with dimethyl-ether-propane: a case report

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Monterrey/Mexico

**Aim:** Gingival pigmentation can be either exogenous or endogenous. The most common type is physiologic pigmentation

produced by excessive deposits of melanin. The procedures suggested for its treatment include: gingivectomy, free gingival graft, ADM, electrosurgery, laser and cryosurgery. Cryotherapy consists of tissue destruction by application of coolant mixtures. Dimethyl-ether-propane (DMEP) has been recently marketed in aerosol form, which is easy to administer and store. This product reaches  $-57^{\circ}\text{C}$  in its applicator swab through evaporation.

**Material and Methods:** A 38-year-old woman in good health presented to the Department of Periodontology, at the UANL, with complaint of "brown gums." At intraoral analysis, pigmentation was observed on buccal gingiva in both arches. Prior to procedure, topic anesthesia was administered to minimize discomfort. DMEP was sprayed on a cotton swab and rolled gently over pigmented areas, maintaining each freezing zone for 5 s. Patient was examined at 2 weeks and 90% depigmentation of previously affected surfaces was observed. Papillary pigmentation persisted due to difficult access with cotton swab. The postoperative period was uneventful and depigmented gingiva healed at 2 weeks. Complete keratinization took place in 3–4 weeks after treatment, without recurrence of pigmentation.

**Results:** Cryosurgery with DMEP is a technique used in dermatological practice. In this case it was used for depigmentation of the gingiva. Its advantages are: no need of anesthetic infiltration, sutures, or dressing.

**Conclusion:** Cryotherapy is an economic and safe procedure, minimally invasive with no post-operative bleeding or scarring, which makes it superior to scalpel, laser, and other conventional procedures.

## P0557

### Treatment of multiple gingival recession defects with a new collagen membrane

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**Aim:** To evaluate clinically the healing of multiple Miller class I, II and III gingival recessions after treatment with the modified coronally advanced tunnel (MCAT) in conjunction with a new collagen membrane (CM) of porcine origin.

**Material and Methods:** Twelve patients (9 female, mean age  $37.08 \pm 8.2$  years) presenting at least 2 adjacent Miller Class I, II or III gingival recessions, of a depth of at least 2 mm, were consecutively treated with MCAT in conjunction with a new CM of porcine origine (Mucoderm<sup>®</sup>; Botiss Dental, Berlin, Germany). The following parameters were evaluated at baseline and at 6 months after surgery: gingival recession depth (GR-D) and width (GR-W), width of attached gingiva (AG), probing pocket depths (PD) and clinical attachment level (CAL). The primary outcome variable was root coverage (RC).

**Results:** Healing was uneventful in all cases. Membrane exposure, exfoliation, postoperative pain, bleeding complications or inflammatory reactions related to the used biomaterial were not observed in any of the cases. Statistically significant clinical improvements ( $p < 0.05$ ), evidenced by GR-D reduction (from  $3.52 \pm 0.33$  at baseline to  $0.81 \pm 0.74$  mm at 6 months) and high percentages of RC of up to 100% (mean RC 72.24%) were recorded. A slight increase in the mean AG values (from  $2.46 \pm 1.13$  mm to  $2.65 \pm 1.02$  mm) was measured, while the mean PD values remained unchanged ( $1.69 \pm 0.89$  mm at baseline,  $1.66 \pm 0.59$  mm at 6 months).

**Conclusion:** The use of MCAT in conjunction with a CM may lead to significant root coverage of multiple adjacent Miller I, II or III recessions.

## P0558

### Piezocision™ for orthodontic treatments – a clinical randomized controlled trial

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**Aim:** This randomized controlled trial aims at evaluating the benefit and clinical outcomes of Piezocision™, a minimally invasive approach of corticotomy used in orthodontic treatments.

**Material and Methods:** Twenty-four adult patients presenting overcrowdings and consulting for orthodontic treatment were included. Twelve patients were randomly allocated in a control group, treated with classic orthodontics and in a test group subjected to a piezo-assisted orthodontic technique. The Piezocision™ was performed one week after the placement of the orthodontic appliance. Small vertical incisions and osteotomies using a piezoelectric instrument were performed between each tooth needing a mobilization. Grafting material and suture were not used. All patients were followed every 2 weeks by the orthodontist until treatment completion. Arches were changed only if they were no longer active. The overall timing for the orthodontic treatment was calculated and periodontal parameters (PPD and recessions) were evaluated at baseline and at the end of the orthodontic treatment.

**Results:** At baseline, crowding level, PPD, bleeding index and plaque index were homogen between the 2 groups. Treatment time was significantly reduced of 40% in the Piezocision™ group compared to the control group. In both group, periodontal parameters were no significantly different at baseline and treatment completion. Scars were found in 50% of patients in Piezocision™ group.

**Conclusion:** In these conditions, the Piezocision™ technique seems to be effective to accelerate orthodontic tooth movement. Gingival recessions were not observed. The risk of remaining scars might limit the indications for Piezocision™ in presence of high smile line.

## P0559

### Managing isolated lower incisor gingival recession using connective tissue grafts (CTG) with different surgical techniques

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 London/United Kingdom

**Aim:** Compare two different root coverage procedures that may help address the patients aesthetic needs by giving root coverage and reducing sensitivity.

**Material and Methods:** Patient A: 33-year-old female, complained of sensitivity from the LR1 (41). Observed Miller's Class II marginal tissue recession. After non-surgical therapy a coronally advanced flap (CAF) with CTG was completed for 41 recession defect. Patient B: 26-year-old female, also complained of sensitivity from the LL1 (31). Observed Miller's Class II marginal tissue recession defect. Following non-surgical therapy an envelope flap/pouch surgical technique, with CTG was used to address the 31 recession site.

**Results:** Patient A: Complete root coverage was achieved and the patient no longer experienced sensitivity following treatment. Patient B: Clinical measurements show >90% of root coverage achieved and the patient no longer experienced sensitivity.

**Conclusion:** Both bi-laminar techniques were effective in addressing the patient's complaints and in achieving near full coverage of single-tooth recession defects. A more favourable gingival anatomy was created following both root coverage procedures. These addressed the patient's aesthetic demands and enabled the patients to better maintain an optimal level of oral hygiene in these sites. These cases also highlight advantages and disadvantages of using different root coverage techniques to treat Miller's Class II recession defects.

## P0560

### Innovative closed crown lengthening with micro invasive laser

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**Aim:** Many patients desire esthetic crown length procedures. Traditional methodologies include flap access with ostectomy/plasty as a key ingredient for gingival margin placement. Clinicians have devised closed techniques to satisfy esthetic end points utilizing mechanical devices with rotary hand pieces however, with inconsistency. Erbium dental lasers can afford clinicians the ability to manipulate gingiva and bone with minimally invasive techniques.

**Material and Methods:** Case Report: Case selection is critical in determining closed versus open flap procedures. Factors to be considered are gingival margin to lip line, height/width proportions of clinical crowns, cemento-enamel junction exposure, adequate attached gingivae, and anatomical thickness of the dento-alveolar structures. The micro invasive laser protocol includes gingiva re-contouring and sculpting of the papillary area. Initial osseous levels are altered to biologic width utilizing specific Erbium settings. This is followed by mini flap access utilizing magnification and adjunctive manual and ultrasonic devices re-contouring osseous levels without troughing.

**Results:** A limitation of closed flap osseous procedures has been lack of access resulting in troughing of bone architecture and eventual violation of biological width. Erbium laser manipulation allows for both gingival and osseous height changes with minimal invasion of tissues. Precision can be obtained due to small diameter of the Erbium firing tips. Final steps rely on utilizing innovative manual and ultrasonic instrumentation to ensure appropriate parabolic contours. Magnification is a key for access.

**Conclusion:** Managing crown lengthening cases with manual, ultrasonic and especially Erbium lasers results in minimal invasive procedures with satisfactory esthetic results.

## P0561

### Periodontal concerns associated with the orthodontic and surgical management of impacted teeth: a series of cases

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Casablanca/Morocco

**Aim:** Impaction of anterior teeth is a common situation in the orthodontic practice. The choice of the appropriate treatment represents a real challenge and involves an orthodontic and surgical collaboration. Anterior teeth have several important functions in the dental arch, which justifies an accurate treatment for the impacted ones. Now, 3D imaging are a great help in revealing very precise informations about the intimate anatomic relationship between the tooth and its adjacent structures.

**Material and Methods:** The purpose of this work is to illustrate through four complex cases our treatment approach.

**Results:** Case 1: A 14 years old girl with an impacted and crown dilacerated incisor. Case 2: A 19 years old girl with an ankylosed and partially impacted incisor, an alveolar corticotomies was indicated. Case 3: A 21 years old girl with high palatal-impacted canines. Case 4: Complex impacted of 11, 12 and 13 in 20 years old boy. In all cases needed a full fixed orthodontic therapy in coordination with an oral surgery to expose and ligate the impacted teeth.

**Conclusion:** The success of these therapies was reached by placing correctly the teeth in the arch while preserving their periodontal integrity except for the last case where we noticed a periodontal lysis.

## P0562

### Periodontal plastic surgery with fraenectomy and deepening of vestibule at lower anterior teeth

M. Alshammeri

London/United Kingdom

**Aim:** This procedure was carried out to prevent further gingival recession and provide favourable tooth-cleaning environment for the lower anterior incisors.

**Material and Methods:** A 53 years old female was referred to Periodontal Clinic at Barts & The London Dental Institute regarding increasing gingival recession around the labial of the LR1. She complained of soreness from the buccal gingivae of the lower anterior incisors and difficulty in cleaning the area due to highly attached frenum.

**Results:** Following oral hygiene instructions and a round of non-surgical debridement, fraenectomy and deepening of the vestibule were performed. An incision separated the frenum from the base of interdental papillae and extended apically up to vestibular depth to completely separate it from alveolar mucosa. Any remnant of frenal tissue in the mid line and on the under surface of lip was excised. A vertical parallel incision was taken on the mesial side of LR2, 2–3 mm apical to marginal gingiva, up to vestibular depth. A horizontal incision, 1–2 mm apical to gingival sulcus in the attached gingiva, connected the coronal ends of the two vertical incisions. After wound stabilisation, the incised area was sutured to obtain haemostasis and primary closure. A healing zone of increased attached gingiva was clearly

visible with no loss of interdental papilla after two weeks and good plaque control.

**Conclusion:** Frenectomy and deepening of vestibule can prevent further gingival recession by eliminating the pathological frenum, increase band of attached gingivae along with maintaining an aesthetic outcome as well as improving patient's plaque control.

## P0563

### Clinical application of collagen tissue matrix and enamel matrix derivative in the treatment of multiple gingival recessions. A randomized controlled clinical trial

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**Aim:** The aim of the study was to evaluate and compare clinical outcomes of several surgical techniques for management of multiple adjacent gingival recession type defects (MAGR).

**Material and Methods:** 20 patients with a total of 99 MAGR displaying Miller's Class I or II were enrolled in this study. Recessions were randomly treated using the following treatment modalities: collagen tissue matrix graft (CM), enamel matrix derivative (EMD), and a connective tissue graft (CTG), combined with a modified coronally advanced tunnel technique (MCAT). Several parameters, such as gingival recession coverage (GRC), keratinized tissue width (KTW), keratinized tissue thickness (KTT), clinical attachment level (CAL) and probing depth (PD) were recorded at baseline and 6 months postoperatively. The objective assessment of esthetic outcomes was performed by means of root coverage esthetic score (RES).

**Results:** Healing was uneventful in all of the groups. 6 months following the surgery, all the groups have shown significant improvements in all of the clinical parameters when compared to baseline. No statistical significance was found between groups in terms of GRC, KTW, KTT, CAL, PD and RES.

**Conclusion:** A new porcine derived collagen matrix and enamel matrix derivative present a possible alternative to CTG for the treatment of MAGR when the MCAT technique is applied. These treatment modalities are associated with decreased surgical chair time and decreased postoperative patient morbidity.

## P0564

### The use of xenogenic collagen matrix and enamel matrix derivative with coronally advanced flap in the treatment of multiple adjacent Miller Class I and II gingival recession defects

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**Aim:** The aim of this study was to evaluate whether the use of xenogenic collagen matrix (CM) and enamel matrix derivative (EMD) in combination with coronally advanced flap (CAF) improves clinical results in the treatment of multiple gingival recession defects.

**Material and Methods:** Twenty patients with total of 118 multiple ( $\geq 2$ ) adjacent gingival ( $\geq 2$  mm) Miller Class I and II

recession on both sides of the maxilla were enrolled in the study. Recessions were randomly treated according to a split - mouth design by means of CAF + CM + EMD (test group) and CAF + EMD (control group). The following measurements were recorded at baseline, 3, 6 and 12 months: gingival recession depth (GRD), keratinized tissue width (KTW), gingival thickness (GT) – 3 mm apical to the gingival margin, probing pocket depth (PD) and clinical attachment level (CAL).

**Results:** According to the literature, the rate of successful outcome was similar to results from other studies where the same surgical technique was used. Statistically significant improvements were found in both groups for all measurements compared with the baseline. No statistically significant difference was demonstrated between two groups in terms of GRD, PD and CAL, but there were statistically greater increase in buccal keratinized tissue width and gingival thickness in the control CAF + CM + EMD group.

**Conclusion:** The results of this study indicate that the use of xenogenic collagen matrix provide greater increase of keratinized tissue width and gingival thickness, so is more effective than CAF + EMD alone in the treatment of multiple gingival Miller Class I and II recession defects.

## P0565

### Treatment of multiple adjacent gingival recessions with a modified coronally advanced flap in conjunction with either connective tissue graft or a collagen matrix. A randomized controlled clinical study

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**Aim:** To compare the efficacy of connective tissue graft (CTG) and a porcine collagen matrix (CMX) used in conjunction with a modified coronally advanced flap (CAF) for the treatment of multiple adjacent Miller Class I or II recession defects.

**Material and Methods:** In 13 patients with multiple buccal recessions Miller Class I or II, a total of 15 quadrants were treated with CAF + CMX (test treatment) and 15 quadrants with CAF + CTG (control). Clinical outcomes were evaluated at 6 and 12 months. An additional subgroup analysis was performed in 9 patients who were treated with both treatment modalities in a split-mouth design.

**Results:** A mean of 3.97 + 1.16 teeth were treated per quadrant. At 12 months, mean root coverage was significantly higher in the control sites than in the test sites (96.5 + 4.63 vs. 85.2 + 18.4,  $p = 0.0059$ ) and also Complete Root Coverage (86.8 + 17.9 vs. 67.6 + 25.6,  $p = 0.0304$ ). Both treatments resulted in significant improvements of recession depth and width, clinical attachment level, width of keratinized tissue and increased the number of sites with thick biotype at 6 and 12 months. Post-operative pain was statistically significantly less in the test sites. The subgroup analysis of the split-mouth patients yielded similar results. The overall patient satisfaction was similar for both treatment modalities.

**Conclusion:** Although mean root coverage and CRC was higher for CTG + CAF, the use of CMX appears to be a suitable alternative to CTG resulting in reduced patient morbidity.

**P0566****Treatment of gummy smile with esthetic crown lengthening or reverse vestibuloplasty: report of four cases**

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**Aim:** Excessive gingival display (gummy smile) is a frequent condition impairing esthetics. Altered passive eruption, vertical maxillary excess and hypermobility of the upper lip are the main causes of the gummy smile. The diagnosis of the problem determines the treatment type. The aim of this case report is to present two different treatments of gummy smile in four cases.

**Material and Methods:** Four female patients complaining about gummy smile were referred to our clinic. The etiology of the gummy smile was diagnosed as altered passive eruption for two patients and esthetic crown lengthening was performed with osseous resection to restore biological width. For the other patients, hypermobility of the upper lip was the etiology of the gummy smile. Reverse vestibuloplasty was performed by removing a strip of mucosa from the maxillary buccal vestibule and suturing the lip mucosa to the mucogingival line. This resulted in a narrower vestibule and restricted muscle tension, thereby resulting in stable lips and reduced gingival display during smiling.

**Results:** The patients were highly pleased and satisfied with the esthetic outcome. Desired crown lengths were obtained after esthetic crown lengthening surgery and the gingival line was stable at the follow up period. Minimum relapse was occurred 1 year after reverse vestibuloplasty operation as previously reported cases in the literature.

**Conclusion:** This report shows 4 cases for the treatment of gummy smile according to the etiology. Proper examination and correct diagnosis must be performed before deciding the treatment.

**P0567****Clinical and tomographic measurements of bone sounding and gingival thickness**

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Rio De Janeiro/Brazil

**Aim:** The aim of this study was to compare the clinical and tomographic measurements of bone sounding and gingival thickness in the anterior maxillary area.

**Material and Methods:** Fifteen female healthy patients (mean age  $26.8 \pm 8.1$  years of age), non smokers, were selected at the Health Center from Veiga de Almeida University. Six teeth were analyzed in each patient. The clinical periodontal measurements and cone beam computed tomography (CBCT) images measurements included (1) bone sounding, evaluate by the distance between gingival margin (GM) and bone crest (BC) and (2) gingival thickness (GT). GT and GM-BC were measured with an endodontic finger spreader. Tomographic images were acquired in a Prexion 3D (Yoshida) device and were specified as follows: Voxel size 0.1 mm; 90 kV; 4 mA; 360° spin; 37 s exposure. The measurements were made by a single calibrated radiologist using the Prexion 3D Viewer Software (Yoshida). Student *T* test was used to verify differences between CBCT and clinical values

**Results:** The mean clinical values GM-BC ranged between 3.5 mm ( $\pm 1.3$ ) and 4.8 mm ( $\pm 1.41$ ), while the corresponding values obtained with tomographic images were 3.5 ( $\pm 1.4$ ) and 4.3 mm ( $\pm 1.1$ ) ( $p > 0.05$ ). The mean GT was similar in the tomographic and clinical measurements.

**Conclusion:** In conclusion, CBCT accurately reflected the actual distance between gingival margin to bone crest and gingival thickness.

**P0568****Management of a single tooth recession defect in the aesthetic zone**G.P. Cherukara<sup>1</sup>, N.V. Pandya<sup>2</sup><sup>1</sup>Aberdeen/United Kingdom, <sup>2</sup>London/United Kingdom

**Aim:** Treatment of gingival recession tends to be a complex phenomenon. It is not always possible to get the best possible result with periodontal plastic surgery alone. Patients tend to be concerned when there are symptoms and or aesthetic issues. In this poster we present a case where in a single tooth gingival recession (Miller's Class 3) defect was corrected with a multidisciplinary restorative approach.

**Material and Methods:** A 33 years old patient with Amelogenesis Imperfecta presented with an Endo-Perio lesion and gingival recession at UL1, measuring 7 mm vertically and 7 mm wide. The Endo-Perio lesion was treated with non-surgical periodontal and conventional root canal treatments. The labial gingival recession (Miller's Class 3) at UL1 was previously treated with a Connective Tissue Graft resulting in partial coverage of the defect. The patient was unhappy with the result. Therefore a second procedure was done by raising a labial curvilinear flap at UL1. The root surface was conditioned with PrefGel and Emdogain (Straumann UK) was applied. After de-epithelialisation of the coronal tissues, the flap was coronally repositioned to cover the defect.

**Results:** At 3 months the flap shrunk to leave a small residual defect. The residual recession was subsequently masked with direct tooth coloured Composite Resin.

**Conclusion:** This case report demonstrates the role of multidisciplinary restorative management in the treatment of a complex marginal gingival recession defect.

**P0569****Comparison of coronally advanced flap with or without vertical releasing incisions combined with acellular dermal matrix graft performed in thin biotype multiple gingival recessions**C. Ahmedbeyli<sup>1</sup>, S. Dirikan İpci<sup>2</sup>, G. Cakar<sup>2</sup>, S. Yılmaz<sup>2</sup><sup>1</sup>Baku/Azerbaijan, <sup>2</sup>Istanbul/Turkey

**Aim:** The purpose of this randomized controlled clinical study was to compare the coronally advanced flap with (CAF) or without vertical incisions (mCAF) combined with acellular dermal matrix graft (ADM) in terms of complete root coverage (CRC), esthetics and patient satisfaction for the treatment of Miller Class I/II multiple recessions with gingival thickness  $< 0.8$  mm.

**Material and Methods:** Twenty-two patients with 55 Miller I/II multiple recessions  $\geq 3$  mm were included and divided into test (mCAF + ADM) and control (CAF + ADM) groups. At baseline and 12 months after surgery, probing depth, clinical attachment level, recession height (RH) and width, keratinized tissue height, gingival thickness (GT), mean root coverage (MRC) and CRC were evaluated. Patient satisfaction and root coverage esthetic score (RES) were also assessed.

**Results:** The mean baseline RH in mCAF + ADM and CAF + ADM groups were  $3.02 \pm 0.44$  mm and  $3.06 \pm 0.55$  mm, respectively. Intra-group comparisons revealed statistically significant differences at 12 months compared to baseline for all parameters ( $p < 0.05$ ). GT increased from  $0.69 \pm 0.11$  mm to  $1.35 \pm 0.14$  mm and  $0.71 \pm 0.09$  mm to  $1.30 \pm 0.14$  mm in test and control groups, respectively. MRC and CRC were 95.54%, 81.80%; 92.57%, 72.70%, in test and control groups, respectively. Inter-group differences were found to be statistically significant for patient satisfaction in favor of test group ( $p < 0.05$ ).

**Conclusion:** Both techniques combined with ADM were successful and can be used for the treatment of Miller Class I/II multiple recessions with thin tissue biotype. Superior results regarding esthetics and patients satisfaction were obtained with mCAF that is performed without vertical incisions.

## P0570

### Treatment of gingival recession in the anterior mandible using a combined epithelialized-subepithelial connective tissue graft and double lateral pedicle flap

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Frankfurt/Germany

**Aim:** Twenty-seven year old female patient arrived at our clinic with a buccal gingival recession at the tooth 41. Patient stated that the tooth is hypersensitive. Patient had recession miller class 3 that causes local chronic periodontitis, thin gingival type and toothbrush trauma.

**Material and Methods:** We decided to treat recession at 41 with combination of an epithelialized-subepithelial connective tissue graft and double lateral pedicle flap. The area of recession was identified and the graft bed was prepared with preparation of double lateral pedicle flap. Then the contaminated cementum was removed with curettes. Root was scaled and planed. After that, the root was smooth and glassy. The graft dimension was measured and the graft was harvested from the hard palate. The epithelialized part should not include any rugae because of unsatisfactory aesthetic. The graft was 1.7 mm thick. To suture we used Prolene 5.0 and Vicryl 6.0.

**Results:** As final outcome, the combined epithelialized-subepithelial connective tissue graft and double lateral pedicle flap showed a good aesthetic and functional result. The advantage of the combined epithelialized-subepithelial connective tissue graft compared with connective tissue graft only maybe the protection of the underlying connective tissue with an epithelialized layer.

**Conclusion:** This case shows that treatment of gingival recessions of miller class 3 affecting lower incisor with thin gingiva type without keratinized gingiva is safely possible. We advice in such cases a combined epithelialized-subepithelial connective tissue graft with double lateral pedicle flap.

## P0571

### Alternative uses of rotated palatal flap to correct mucogingival defects

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**Aim:** The use of rotated palatal flap has been described to correct different mucogingival defects when it's necessary to have extra soft tissue available to reconstruct a defect or to create esthetic tissues around a teeth or implant.

**Material and Methods:** Three patients with different mucogingival defects were treated in the Department of Periodontics and Implantology, Universidad Nacional Autónoma de México. The first one showed absence of keratinized tissue and Periimplantitis (zone of teeth 26) and was treated with full-thickness rotated palatal flap. The second one exhibited absence of interdental papilla and a split-thickness rotated palatal flap was performed. The last one was treated with split-thickness rotated palatal flap for horizontal soft tissue augmentation.

**Results:** Increased of keratinized tissue around the implant was achieved in the first case. In the second patient, vertical augmentation of the papilla was obtained as well as decrease of hypersensitivity. In the third one a considerable horizontal augmentation of soft tissue was accomplished.

**Conclusion:** The use of rotated palatal flap (full-thickness and Split thickness) is a predictable and reliable treatment in mucogingival defects due to horizontal and vertical soft tissue gain. It offers a higher volume of keratinized gingiva, and is vascularized by a pedicle graft donor site itself.

## P0572

### Stability of the gingival margin level of a esthetic crown lengthening procedure using a flapless approach

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**Aim:** Altered passive eruption is a development anomaly with aesthetic and periodontal implications. The aim of this study was to evaluate the effectiveness of a flapless crown lengthening technique in patients with altered passive eruption, as well as the stability of the gingival margin during a period of 6 months postoperatively.

**Material and Methods:** We selected 10 patients (2 men and 8 women), aged 15–35 years. These patients were clinically and radiographically diagnosed with altered passive eruption. The following parameters were assessed at baseline: gingival margin position (the distance from the stent to the gingival margin); cemento-enamel junction level (the distance from the gingival margin to the cemento-enamel junction); alveolar crest (the distance from the gingival margin to the alveolar crest). All patients were submitted to a crown lengthening procedure. After gingivectomy, osteotomy was performed using delicate chisels through the sulcus without raising a flap until a distance of 3 mm from the gingival margin to the alveolar crest was achieved. Gingival margin position was reevaluated at an interval of 1, 2, 3 and 6 months.

**Results:** Statistical analysis (Kruskal–Wallis test) showed that the gingival margin level did not change over time after surgery ( $p = 0.519$ ). At 6 months, a significant and stable improvement of crown length was observed when compared to the baseline ( $p < 0.0001$ ).

**Conclusion:** The proposed flapless crown lengthening technique was effective in the treatment of altered passive eruption, with predictable, stable and satisfactory cosmetic results.

## P0573

### Treatment of single and multiple Miller Class I and II recessions with the Modified Coronally Advanced Tunnel

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**Aim:** To evaluate clinically the healing of single and multiple Miller Class I and II gingival recessions treated with the Modified Coronally Advanced Tunnel technique (MCAT) and Sub-epithelial Connective Tissue Graft (SCTG).

**Material and Methods:** Ten healthy patients (9 women and 1 man) with a total of 30 Miller Class I and II gingival recessions were treated with MCAT in conjunction with SCTG. Three patients had 4 single recessions while the rest of 26 recessions were distributed in the rest of 7 patients. Post-surgically patients were given antibiotics ( $3 \times 500$  mg amoxicillin) for 7 days to prevent infection. No mechanical cleaning was performed at the surgical sites for 14 days following surgery. Patients were advised to use 0.12% chlorhexidine gluconate mouth rinse solution twice a day for two weeks. Sutures were removed at either 7 days (from the palatal donor site) or at 14 days (from the area of the treated recession) after surgery. Treatment outcomes were assessed at baseline and at 6 months postoperatively. The primary outcome variable was complete root coverage (CRC).

**Results:** No complications such as postoperative bleeding, allergic reactions, abscesses, or loss of SCTG were observed. At 6 months, substantial root coverage was obtained in all 30 defects. CRC was measured in 27 out of the 30 defects (90%). In the remaining 3 defects, CRC measured 70%, 85% and 90%, respectively. Mean root coverage was 98.17%.

**Conclusion:** Within their limits, the present results indicate that the described treatment approach may lead to predictable root coverage of single and multiple Miller Class I and II gingival recessions.

## P0574

### Analysis of vascularization and cellular tissue reaction to several porcine-based collagen membranes and matrices: human and animal studies

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**Aim:** Aim of the present study was to assess the vascularization and cellular tissue reaction to five different collagen based materials after their application either in human or animal tissue. The focus was on materials integration versus degradation,

transmembranous vascularization and the inflammatory cells involved in the cellular tissue reaction.

**Material and Methods:** The five different collagen materials were used for socket preservation, lateral augmentation and vestibuloplasty in humans. The same materials were histologically assessed in wild-type mice in a time period of 60 days. Biopsies of these materials have been excised, processed and investigated histologically with special focus on material stability, vascularization and induction of a multinucleated giant cell triggered foreign body reaction.

**Results:** The histological analysis showed distinct differences concerning the cellular reactions to the different collagen membranes depending on material specific characteristics and processing techniques. Cellular reactions consisting of either mononuclear cells (e.g. macrophages) and missing of a foreign-body-reaction or multinucleated giant cells triggered granulation tissue was observed for the materials in both species. These two different tissue reactions significantly influenced the materials stability and premature degradation.

**Conclusion:** Collagen based membranes serve in periodontology and implantology as versatile barriers, which separate different tissues and cells in the healing process. For clinical application of collagen membranes a detailed knowledge of the cells involved in the cellular tissue response to materials is of striking importance. These cells, either mononuclear or multinucleated giant cells can significantly decide over materials stability and integration. The latter two parameters have distinct influence on the clinical success.

## P0575

### Keratinized tissue around dental implants placed in jaws with excessive bone resorption and augmented with autogenous iliac graft

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Istanbul/Turkey

**Aim:** The aim of this series of cases is to document the changes in peri-implant soft tissue status/dimension following soft tissue augmentation around dental implants placed sites that were excessively resorbed and reconstructed by iliac grafts.

**Material and Methods:** 4 patients, with excessive bone resorption were treated with iliac crest bone reconstruction were further treated and followed for inadequate keratinized mucosa around their implants. Free gingival grafts were used to create a band of keratinized mucosa around 30 implants. Clinical measurements including probing depth (PD), bleeding on probing (BoP) and the width of keratinized mucosa (KTW) were recorded at baseline and 3 months after the surgery.

**Results:** Clinical measurements including probing depth (PD), bleeding on probing (BoP) and the width of keratinised attached mucosa (KTW) were recorded at baseline and 3 months after the surgery. The main keratinized tissue around the implants was 0 mm before the surgery and changed to  $2.4 \pm 0.28$  mm (0–5.5) at 3 months postoperatively. The probing depth around implants ranged between (1 and 3) with a mean of 1.1 mm.

**Conclusion:** Within the limits of this case series, it may be concluded that free gingival graft procedure is an effective method in creating keratinized mucosa around implants placed sites that were reconstructed by autogenous bone block grafts.

## P0576

### A facilitated approach for connective tissue graft harvesting using a novel periodontal instrument

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**Aim:** Connective tissue grafts (CTG) from palatal donor sites are considered the gold standard for soft tissue grafting. However, harvesting of CTG demands high operator skills and poses risk of injury to sensitive structures. A novel, specially designed periodontal knife helps facilitate the harvesting of the graft while at the same time increasing safety of the procedure.

**Material and Methods:** After performing a submarginal palatal single incision, the palatal flap is dissected from the underlying connective tissue using an ordinary scalpel. In order to circumscribe the dimensions of the graft, the periodontal knife can be used to perform incisions on the apical, the mesial, and the distal borders of the connective tissue donor site. The graft is harvested either by blunt or by sharp dissection from its base.

**Results:** The special design of this instrument facilitates harvesting of CTG and helps perform fairly accurate and safe undermining incisions. Further, this approach may decrease risk of injury to the neurovascular bundle i.e. palatine artery and potential perforation of the palatal flap.

**Conclusion:** The novel periodontal knife represents a viable alternative tool for the harvesting of CTG.

Topic: Periodontal regeneration

## P0577

### Effects of FGF-2 on the healing of surgical periodontal defects in early diabetic rats

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**Aim:** Metabolic changes occurring in diabetes may influence the reparative capacity of periodontal tissues. There is still a lack of preclinical investigation to validate the dynamic changes in the local environment and repair patterns during periodontal regeneration in diabetes. This study aimed to evaluate the effects of fibroblast growth factor (FGF) -2 on the healing of surgical periodontal defects in rats with streptozotocin-induced early diabetes.

**Material and Methods:** Wistar rats were assigned to streptozotocin-induced diabetes or non-diabetes group. Bilateral standardized periodontal defects (2 × 2 × 1.7 mm) were surgically created mesially of the maxillary first molars. Defects were treated with hydroxypropyl cellulose (HPC) or FGF-2 with HPC. After 2 or 4 weeks, defect fill was evaluated by micro-computed tomography. Histological and immunohistochemical analyses were performed.

**Results:** Compared to vehicle alone, FGF-2 treatment yielded significantly greater bone volume and trabecular thickness in diabetes group. Histologically, diabetes group displayed reduced new bone formation and significantly longer epithelial down-growth compared to non-diabetes group. In diabetes group, FGF-2 treatment increased PCNA-positive cells and new bone formation after 2 weeks and suppressed epithelial downgrowth,

but new cementum formation was minimal even after 4 weeks. In diabetes group, overexpression of vascular endothelial growth factor was evident in cells within connective tissue, and no significant enhancement was observed by FGF-2 treatment. FGF-2 increased the expression of  $\alpha$ -smooth muscle actin in diabetes group.

**Conclusion:** Treatment of periodontal defect in diabetic rats with the single application of FGF-2 provided beneficial effects primarily on new bone formation via increasing cell proliferation and regulating angiogenesis.

## P0578

### The effect of simvastatin gel in the treatment of intrabony defect in chronic periodontitis

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**Aim:** The study was conducted to evaluate the effect of simvastatin gel in the treatment of intrabony defect in chronic periodontitis.

**Material and Methods:** The study was designed as split mouth in ten patients. Open flap debridement was performed at affected sites to enable access to the defect. Simvastatin gel was delivered in ten sites and the other ten sites received placebo gel. Pocket depth, clinical attachment level, plaque index and gingival index were recorded at baseline, 3 and 6 months postsurgically. Radiographic evaluation of the intrabony defects was based on linear measurement of the osseous defect depth before surgery and at the end of the study. Standardized radiographic examination was performed using individually customized radiographic stent as well as parallel technique to obtain reproducible images. A line was drawn from cemento-enamel junction to the base of each defect parallel to the long axis of the defect related root.

**Results:** A significant decrease in pocket depth and gain in clinical attachment level was found in both groups at 6 months compared to baseline. The difference between the simvastatin sites and placebo sites was significant at the end of the study. The reduction in plaque index and gingival index was significant at the end of the study in all sites; with insignificant difference between simvastatin and placebo sites. The reduction in osseous defect depth was in favor of simvastatin sites.

**Conclusion:** Simvastatin gel has a potential role as a new treatment modality in periodontal regeneration.

## P0579

### Effects of self-assembling peptide nanofiber scaffold hydrogel on periodontal healing in rats

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**Aim:** Extracellular matrix (ECM) plays an important role in tissue healing. Self-assembling peptides, derived from essential amino acids, have similar biological properties to ECM and they can be used as 3-dimensional scaffolds. Although there have been reports on tissue healing using self-assembling peptides, information is limited regarding their effects on periodontal tissue healing. This study investigated the effects of self-assembling peptides on healing of surgical periodontal defects.

**Material and Methods:** Maxillary first molars of 6 week-old male Wistar rats were extracted and bilateral periodontal defects were surgically created mesially of the second molars after 4 weeks. A self-assembling peptide (TDM-711) was applied to defects in experimental group, a control gel was used in the negative control group, and defects in control group were left empty. Micro-CT evaluation was performed 2 and 4 weeks after surgery. Histological and immunohistochemical analyses were also performed.

**Results:** Bone volume fraction and trabecular number in the experimental group at 2 weeks were significantly greater than those in the control group. Histological observation demonstrated new bone formation in the defect of the experimental group at 4 weeks. Periodontal ligament-like collagen bundles ran perpendicular to the root into the new cementum-like layer whereas ligaments ran parallel to the root in other groups. Proportion of PCNA-positive cells above newly formed bone in the experimental group was significantly greater than that in the control groups at 2 weeks.

**Conclusion:** It is suggested that the application of the self-assembling peptide hydrogel is effective in the healing of periodontal tissue.

## P0580

### Extraction of tooth with periradicular lesion adjacent to or penetrating the maxillary sinus with simultaneous immediate alveolar ridge regeneration: results of 24 cases

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**Aim:** Debridement of periradicular lesions adjacent to or penetrating into the maxillary sinus (MS) is a challenging task. The study aim was to evaluate a novel surgical procedure of simultaneous lesion removal, sinus membrane (SM) elevation in case of penetration, socket reconstruction with guided bone regeneration (GBR) to promote healing of the sinus floor and alveolar ridge regeneration.

**Material and Methods:** 24 sequential patients with periradicular lesion adjacent to (17) or penetrating (7) the MS underwent tooth extraction and soft tissue debridement from the socket walls, followed by socket reconstruction and GBR. Penetrating lesions underwent simultaneous SM elevation while disconnecting surrounding oroantral bone dehiscence. After collagen membrane was placed underneath the sinus membrane (separating between MS and oral cavity) GBR was executed. Procedure essentials: (1) Tooth lesion extraction and removal from the socket with surgical curette. (2) Disconnecting and displacing the antral membrane and attached granulation tissue into the MS cavity creating SM space. (3) Collagen membrane placement underneath the SM (4) Debridement of attached soft tissue from within socket's walls with specialty drills (5) Socket walls reconstruction with a titanium foil and GBR.

**Results:** All 24 subjects healed uneventfully with satisfactory sinus floor reconstruction and alveolar ridge regeneration. Improved sinus membrane pathology nasal membrane healing were also noted.

**Conclusion:** By complete lesion removal from the socket and separating between MS and the residual alveolar ridge this novel surgical technique secures both alveolar ridge reconstruction and sinus floor regeneration, while promoting sinus and nasal health restoration.

## P0581

### Effectiveness of a novel prototype membrane loaded with BMP-7 for periodontal tissue engineering applications in vitro

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**Aim:** A novel prototype membrane was designed and fabricated with a graded structure (polycaprolactone- PCL, collagen-COL, nanohydroxyapatite- nHA) to ensure the periodontal regeneration. The aim of this study was to investigate the effectiveness of this multilayer membrane loaded with or without BMP-7 in vitro.

**Material and Methods:** MC3T3-E1 (mouse osteogenic) cells were cultured on the membrane in vitro. The layers of the membrane were consisted of PCL + COL, PCL + nHA and PCL + COL, respectively. Half of the membranes were prepared with BMP-7 to enable the comparison as to further effectiveness. The adhesion and proliferation of the cells to the membranes were evaluated by using scanning electron microscope (SEM) and MTT assay. Gene expressions of the osteogenic markers (ALP, COL-1, runx2, OCN, OPN) were also evaluated. Statistical analyses were found to be significant at  $p < 0.05$  level.

**Results:** SEM analysis revealed the attachment and extracellular matrix synthesis of the cells on PCL- COL layer. Proliferation score of the cells on the BMP-7-loaded membrane was found higher at 5, 7, 14 days compared to BMP-7-free membranes. The expression of COL-1 and runx2 was found to be two-fold at day 7. OCN and OPN levels were found three-fold higher on BMP-7-loaded membrane at day 21 when compared to the BMP-7-free membranes. Expression of ALP activity of cells indicated higher for the BMP-7 loaded membranes at days 7 and 14.

**Conclusion:** Within the limits of the study, multilayer GTR membrane consisting of nHA and collagen was found to be stimulating the osteoblast proliferation and addition of BMP-7 enhanced this effect.

## P0582

### Single flap approach versus double flap approach in the treatment of intraosseous periodontal defects with recombinant human platelet-derived growth factor-BB and beta-tricalcium phosphate: a randomized controlled trial

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**Aim:** To compare the clinical, radiographic, and patient-centered outcomes of a regenerative strategy based on recombinant human platelet-derived growth factor-BB (rhPDGF-BB, 0.3 mg/ml) and  $\beta$ -tricalcium phosphate ( $\beta$ -TCP) in the treatment of intraosseous periodontal defects accessed with the Single Flap Approach (SFA) versus double flap approach based on papilla preservation techniques (DFA).

**Material and Methods:** Fifteen and 13 defects were randomly assigned to access with SFA or DFA, respectively, and were grafted with rhPDGF-BB +  $\beta$ -TCP. The Early Wound Heal-

ing Index (EHI) was evaluated at 2 weeks post-surgery. Probing parameters were assessed before surgery and at 6 months post-surgery. Post-surgical pain ( $VAS_{\text{pain}}$ ) was self-reported using a visual analog scale.

**Results:** Twelve sites in the SFA group and 6 sites in the DFA group showed complete flap closure (i.e.,  $EHI = 1-3$ ). Both treatments resulted in significant 6-month CAL gain (SFA group:  $4.0 \pm 1.9$  mm; DFA group:  $3.2 \pm 1.4$  mm) and PPD reduction (SFA group:  $4.1 \pm 1.7$  mm; DFA group:  $3.6 \pm 1.1$  mm), with no significant increase in REC. No significant differences in 6-month changes of CAL, PPD, REC and radiographic linear defect fill were found between groups. Significantly lower  $VAS_{\text{pain}}$  was observed in SFA group compared to DFA group at day 1, day 2 and day 6. A significantly greater number of analgesics was assumed in the DFA group compared to the SFA group at day +1.

**Conclusion:** When combined with rhPDGF-BB and  $\beta$ -TCP, SFA results in better quality of early wound healing, lower pain and use of analgesics during the first postoperative days compared to DFA.

## P0583

### Bone healing results of two xenografts in rats

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**Aim:** The goal of this investigation was to observe long-term bone building outcomes from two xenografts of cranial bone defects in rats.

**Material and Methods:** Twenty-four circular parietal bone defects, which were of critical size, were created in the craniums of 12 rats divided into three groups. Gen Os was applied to defects in Group I (G1), Gel 40 to defects in Group II (GII), and no treatment to Group III (GIII). The rats were sacrificed 9 months after surgery and block sections including the defects were removed. Stained sections were examined under a microscope for histochemistry purposes. Bone healing scores were calculated using a semiquantitative method.

**Results:** The amount of bone formation in G1 was Grade 1 according to the bone healing measurement used. In the other two groups, no or minimal bone formation was observed. Bone measurements revealed that the amount of bone in G1 was significantly greater than in GII and GIII.

**Conclusion:** Within the limitations of the study, Gen Os appeared to be more effective in promoting bone building and therefore may be more suitable for treating bone defects.

## P0584

### Phenotypic difference of regionally distinct osteoblasts may affect bone regenerative capacity

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**Aim:** Previous studies suggest that genes associated with mineral density and bone mass are differentially expressed in distinct skeletal sites. The aim of this study was to test persistence in vitro of phenotypic differences in isolated adult rat osteoblasts derived from different sites.

**Material and Methods:** Osteoblastic cells from femurs and calvariae were harvested as matched pairs of cultures from 4 male rats. Cells were expanded extensively in medium supplemented with FGF-2, and maintained their osteoblastic phenotype as characterized by alkaline phosphatase (ALP) staining, osteopontin (OPN), osteocalcin (OCN) expression and mineralised bone nodules. The cells were collected and assessed for osteoblast-associated genes (Runx2, Bglap and Spp1) and transcription factors (Msx2, Irx5 and Tbx3) using quantitative RT-PCR.

**Results:** Our results demonstrated a number of phenotypic and functional differences between femoral and calvarial osteoblastic cells which persisted despite extensive culture in vitro. These include differences in Spp1, Runx2 and Bglap expression and osteopontin protein production. Despite increased Bglap expression in femoral cells, no differences were seen in osteocalcin production. The transcription factors Msx2 and Irx5 were consistently more highly expressed in calvarial cells, whereas Tbx3 expression was elevated in femoral cells. Femoral cells also showed markedly increased production of mineralised bone nodules.

**Conclusion:** The results demonstrated the persistence of potentially important phenotypic differences. This may suggest that the paraxial mesoderm-derived cells may proliferate more, but lateral plate mesoderm-derived cells may differentiate faster. This may affect bone regenerative capacity and regeneration when cells from different embryonic origin are grafted.

## P0585

### Histological study of created bone defect in diabetic rabbits treated with bone allograft mixed with mesenchymal stem cells

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**Aim:** To study the regeneration of bone defect created on the femoral condyle of diabetic rabbits using demineralized freeze-dried bone allograft (DFDBA) mixed with bone marrow mesenchymal stem cells (MSCs) and to compare it with DFDBA and recombinant human bone morphogenetic protein 2 (rhBMP-2).

**Material and Methods:** Of 30 alloxan induced diabetic rabbits were used for the study. A total of 60 defects were created, one in each femoral bone (5 mm in diameter, 10 mm in depth). Defects were randomly assigned to three groups: (i) DFDBA + MSCs, (ii) DFDBA + rhBMP-2, and (iii) Unfilled defect (control). Newly formed bone volume was assessed histologically at 4 and 8 weeks healing after retrieving the femoral condyles.

**Results:** At 4 weeks, the mean percentage of the newly formed bone volume (NFBV) for the negative control, the positive control and the test groups was 10.4, 17.1 and 20.5 respectively and it was 12.1, 34.5 and 40.3 at 8 weeks, with a significant difference between the negative control and the positive control groups (4 weeks,  $P < 0.01$ ; 8 weeks,  $P < 0.001$ ), also between the negative control and the test group (4 and 8 weeks,  $P < 0.001$ ). The difference between the positive control and the test groups was only statistically significant at 8 weeks ( $P < 0.05$ ).

**Conclusion:** Bone regeneration was observed in diabetic rabbits. The addition of MSCs to DFDBA has enhanced the bone regeneration compared to DFDBA combined with rhBMP-2.

**P0586****Alternative therapy for bone regeneration in periodontal disease with the use of a chitosan-hydroxyapatite hybrid composite**

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**Aim:** Introduction: Periodontal disease, chronic inflammatory pathology, where the immune response is decisive in the beginning and in the progression of the disease. It is characterised by the formation of periodontal bags, loss in level of insertion and bone defects. High cost materials exist for recovery of tissue but non-reusable. An alternative treatment is recommended, using chitosan-hydroxyapatite, which is bio-compatible, bio-active, relatively inexpensive, easy to use, and doesn't get contaminated because has function antibacterial.

**Material and Methods:** Clinical Case: A 60 year old male patient was diagnosed with severe, chronic, periodontal disease, located in dental organs #16 and #17. After asepsis the affected gum area was opened, with the root completely cleaned and scrapped. The chitosan-hydroxyapatite bio-material applied and sutured, the sutures removed at 14 days. The x-ray and photo process was completed at 8, 20, 90, and 120 days, with a report of morphological changes upon conclusion of study. The study was approved by the ethics committee of the University of Guadalajara with registration #CI-01613. Pre-Patent registration number MX/a/20014/002985.

**Results:** The combination of chitosan-hydroxyapatite, in its application and adherence to the tissue, and its continuation in the site, cause regeneration activity, may be being the activator of the extracellular by fibroblasts way and their angiogenesis, permitting bone regeneration.

**Conclusion:** The chitosan-hydroxyapatite application can be a good alternative for regeneration in cases of periodontal bone defects.

**P0587****Combined endo-paro lesion as a result of secondary occlusal trauma – a case report**

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**Aim:** The relationship between occlusal trauma and periodontal health has been a subject of considerable debate and investigation. The incorrect distribution of occlusal forces over the teeth may cause changes in the periodontal ligament, alveolar bone, cementum and dental pulp.

**Material and Methods:** Patient aged 38 years was sent to our clinic for periodontal treatment. Radiographic image showed incomplete upper dental arch, generalized horizontal bone loss due to periodontal disease and extensive localized vertical bone loss around tooth 45. Clinical examination revealed occlusal interference between teeth 14 and 45. Vitality test for tooth 45 was negative and grade II mobility was observed. After completion of occlusal adjustment, periodontal therapy and endodontic treatment of tooth 45, regenerative surgical procedure (Bio-Oss, Bio-Gide) was made. Control radiographs after 3 and 6 months showed significant amount of newly formed bone tissue and reduction of mobility of tooth 45.

**Results:** Excessive occlusal forces (traumatic occlusion) can increase damage to periodontal structures and also cause damage to other elements of the stomatognathic system such as pulpal tissues. Common signs and symptoms include bone loss, loss of connective tissue insertion, mobility, increased periodontal space, thickening of the lamina dura, pulp symptoms and pain.

**Conclusion:** Understanding the relationship between dental occlusion and periodontal status is necessary for correct diagnosis and for the establishment of restorative treatment in patients with periodontal disease.

**P0588****Extraction of a third mandibular molar to promote periodontal healing. 5-Years follow up**

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**Aim:** The surgical extraction may cause loss of bone, development of periodontal pocket on the distal root surface of second molar. The aim of this casereport presentation is to describe the extraction treatment approach to promote periodontal healing.

**Material and Methods:** A 26-years old woman is presented with a horizontal impacted left third mandibular molar, that required a surgical extractions and 37 with single periodontal pocket in depth of 6 mm. The concept of treatment had been recommended with a incision to reflect bucal and lingual flap. After the left third molar was removed, it was following deep scaling and root planing, with barrier resorable membrane and the xenogenic grafting material on the treatment of bone defect to second mandibular molar. The flap was replaced and sutured with the resorbable sutures, also to completely cover the barrier. The patient received systemic antibiotic.

**Results:** Probing pocket depth (PPD) before surgical treatment was 6 mm and 12, 24, 36, 48 and 60 months postoperatively is 0–2 mm. Radiographic feature on the panoramic oral radiograph: crestal radiolucency between the second and third molars, marginal bone level was assessed and expressed as a percentage of total root lenght, 50% before the surgery and 100% after the GTR surgery approach. The surgery treatment was without any complications.

**Conclusion:** The least traumatic treatment procedure of a patient to remove of impacted tooth is to reflect a flap, divide the tooth into the section, which are removed separately and on periodontal wound healing using of treatment modality of GTR in one stage surgery.

**P0589****The effect of low-level laser therapy on BMP/TGF- $\beta$ 1 expression and its receptors**

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**Aim:** The aim of this study was to determine the effect of low-level diode laser (LLLT) on genic expression of different biomarkers related with the growth and differentiation of osteoblasts, such as BMP-2, BMP-7, TGF- $\beta$ 1 and TGF- $\beta$  receptors (TGF- $\beta$  R1, TGF- $\beta$  R2; TGF- $\beta$  R3).

**Material and Methods:** MG-63 cell line was exposed to diode laser (ezLase) of 940 nm at 1–1.5 W/cm<sup>2</sup> and 3–4 J and the

genic expression of BMP-2, BMP-7, TGF- $\beta$ 1 and TGF- $\beta$  receptors (TGF- $\beta$  R1, TGF- $\beta$  R2; TGF- $\beta$  R3) was evaluated by quantitative RT-PCR.

**Results:** At 24 h, treatment with low-level diode laser increased the expression of BMP-2, TGF- $\beta$ 1, and the expression of TGF- $\beta$  receptors, TGF- $\beta$  R1, TGF- $\beta$  R2 and TGF- $\beta$  R3, as a function of the dose assayed ( $P < 0.001$ ). However, the expression of BMP-7 was not significantly affected by the treatment.

**Conclusion:** In conclusion, our results suggest a biostimulatory effect of LLLT on osteoblasts as a result of autocrine factors release in response to the irradiation. These factors have mitogenic effects and stimulate the cell differentiation and maturation, which may be clinically useful in the regeneration of bone tissue.

## P0590

### Regenerative therapy after systemic antimicrobial therapy for the intrabony defects

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**Aim:** The colonization of periodontal pathogens at sites treated by regenerative therapy may correlate with the intra-oral presence of pathogens before surgery (Rüdiger et al.). Ehmke et al. reported that regenerative therapy was followed by a negative effect by persistent subgingival infection of periodontal pathogens. So antimicrobial therapy to suppression or eradication of periodontal pathogens before regenerative therapy may be valuable. This case report describes the treatment of severe chronic periodontitis with regenerative therapy after antimicrobial therapy.

**Material and Methods:** The initial examination revealed deep probing depths at the incisors and molars in the maxilla and the mandible, with bleeding on probing. Patients received azithromycin before one-visit full mouth debridement (FMD). Within 2 months After FMD, EMD was applied. After surgery, a strict plaque control protocol was followed. Clinical parameters and intraoral radiographs were collected at baseline and 12 months after surgery. Plaque samples were taken from the most deep defect site at baseline and 12 months after surgery. P.g. and T.f. were detected by polymerase chain reaction.

**Results:** 12 months after periodontal surgery, clinical measurements at the affected sites revealed markedly improved PDs and CALs. Radiographs obtained 12 months after surgery showed marked fill of the bony defects.

**Conclusion:** This case report suggest that antimicrobial therapy to suppression or eradication of periodontal pathogens before regenerative therapy may be valuable. However there are need for controlled studies evaluating the clinical effects of antibiotic therapy before the regenerative therapy.

## P0591

### The regenerative potential of bone tissue in patients with severe generalized periodontitis

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**Aim:** To investigate the bone tissue regenerative potential (BTRP) in patients with severe generalized periodontitis (SGP) in area of periodontal defect.

**Material and Methods:** In 25 patients with SGP (basic group) and in 10 patients with healthy periodontium (control group) the jaw cancellous bone was investigated after taking during flap operation according MIST, MPPT (Cortellini P., Tonetti M., 2007, 2009), in control group – during extraction of vital intact teeth according to orthodontic, prosthodontic indications. Cloning of colony-forming fibroblast units (CFFU) of human jaws bone marrow was provided according to methodic of Fridenshtein O.Y. (1973) in modification of Astachova V.S. (1982).

**Results:** In 82% of cell cultures (in 27 from 33 cell cultures) of patients with SGP the growth of colonies was absent, the cloning effectiveness of CFFU = 0. Only in 6 occasions (18%) the growth of stromal fibroblasts was detected with cloning effectiveness of  $0.64 \pm 0.33$  (standard deviation of 1.86) among 105 nucleus-containing cells. Among 10 cell cultures in control group the growth of CFFU was detected in 20% but cloning effectiveness was significantly higher ( $P < 0.05$ ) forming  $11.2 \pm 7.1$  among 105 nucleus-containing cells (standard deviation of 15.9).

**Conclusion:** The BTRP in patients with SGP in area of periodontal defect was highly reduced, that is confirmed by rates of cloning effectiveness of CFFU that in 17.5 times less comparing to the same score in patients with healthy periodontium. Further development of optimized treatment approaches for stimulation of bone tissue regenerative potential in patients with SGP are among priorities.

## P0592

### The action of “Emdogain” (Straumann) on human osteogenous progenitor bone-marrow cells ex-vivo

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**Aim:** To investigate the direct action of “Emdogain” on osteogenous progenitor cells – colony-forming fibroblast units (CFFU) of human bone-marrow ex vivo and to evaluate its osteoinductive properties.

**Material and Methods:** Cloning of CFFU of human bone-marrow was provided according to methodic of Fridenshtein O.Y. (1973) in modification of Astachova V.S. (1982). The cancellous iliac bone was taken from healthy patients out of inflammatory and degenerative-dystrophic lesions. The four experimental series of CFFU cloning of human bone-marrow were provided: One group – with adding of etching gel “Pref-Gel”; two group – with adding of “Pref-Gel” with “Emdogain”; 3 – with adding of “Emdogain” only and 4 – without adding of any preparations (control). The action was evaluated according to cloning effectiveness of CFFU of human bone-marrow among 105 nucleus-containing cells. Nine experimental and six control colonies were cultivated.

**Results:** In 1 and 2 groups the growth of stromal fibroblasts wasn't detected. The effectiveness of CFFU cloning = 0. In 3 group in the mean 145 colonies of CFFU grew up with cloning effectiveness of  $15.10 \pm 0.95$ . In control group in the mean 120 colonies grew up. The cloning effectiveness was  $12.48 \pm 1.24$  among 105 nucleus-containing cells. Ad oculus the colonies from control and investigated groups weren't differ from each other.

**Conclusion:** “Pref-Gel” and combination of “Pref-gel” with “Emdogain” completely depress proliferation and differentiation of CFFU in human bone-marrow ex vivo. “Emdogain” on 20.8% in comparison with control group, enhances amount of

CFFU colonies in bone-marrow, increasing specific gravity of multilayer colonies, giving evidence about its osteoinductive properties.

## P0593

### Second attempt of guided tissue regeneration on previous successfully treated site

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**Aim:** Introduction Guided tissue regeneration (GTR) has been proven to promote attachment and regeneration of periodontal tissue. However, there is no report regarding the second attempt in GTR on the previous successful site with clinical attachment loss. Furthermore, information on prevention of periodontal attachment loss on previous GTR site is scarce in the literature.

**Material and Methods:** Case report A healthy 17 years old chinese boy had GTR performed with bovine bone particles (BioOss®) and bovine resorbable membrane (BioMend) on root-canal treated fused upper right lateral incisor and upper right canine (#12-#13). Probing depth on mid-palatal of #12-#13 was reduced to 4 mm and maintained for the next 4 years. But at the fifth year, probing depth was increased to 10 mm.

**Results:** Second attempt of GTR using the same material as before was carried out and successfully reduced the probing depth to 5 mm. Discussion The longest follow up of the guided tissue regeneration reported was more than 10 years. However, it is not known how to maintain successful sites with clinical attachment gain predictably. Patient-related factors and local factors which might affect the susceptibility of grafted periodontal tissue to breakdown; are therefore imperative for consideration in planning periodontal maintenance interval. Proper maintenance planning for GTR site is crucial to prevent relapse of disease.

**Conclusion:** It is possible to attempt GTR again on the previous successful grafted site. GTR did not increase tissue resistance against periodontal breakdown. Hence, proper maintenance planning for GTR site is important to prevent recidivism.

## P0594

### Central giant cell granuloma of the jaws – are enamel matrix proteins a new treatment option?

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**Aim:** Central giant cell granuloma of the jaws (CGCG) is a benign tumor which is characterized by destruction of alveolar bone and displacement of teeth or tooth germs. Although several non-surgical therapies have been proposed in the past, surgical resection of bone and involved teeth is still the method of choice in the treatment of CGCG. However, high recurrence rates indicate the need for a more effective treatment option.

**Material and Methods:** A 37-year-old female patient exhibited an osteolytic process at the interproximal space of teeth 14 and 15. Non-surgical periodontal therapy with systemic administration of amoxicillin was performed as pre-surgical treatment. During surgery, resection of defect-filling soft tissue, curettage of adjacent bone, scaling and root planning of involved root sur-

faces, and regenerative procedure with application of enamel matrix proteins (EMP) and bone replacement graft was conducted. CGCG was diagnosed by histopathologic analysis. Post-surgical radiographs demonstrated continuous bone fill. At the deepest site of the defect, pocket probing depth decreased from 15 mm before surgery to 6 mm 6 years post-surgery without development of gingival recession. Thus, a clinical attachment gain of 9 mm was achieved.

**Results:** RANK, RANKL and OPG play a decisive role in the pathogenesis of CGCG. Binding of RANKL to RANK induces the differentiation of osteoclast precursors to multinucleated giant cells (MNGC). As EMPs have been shown to down-regulate RANKL and to up-regulate OPG, they potentially inhibit the formation of MNGC.

**Conclusion:** EMPs could be considered as adjunct to surgical resection of CGCG.

## P0595

### Evaluation of regenerated furcations' outcome measurements

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**Aim:** Furcation defects' regeneration has been long discussed in the Periodontology field for decades. Investigators have been using biomaterials for that purpose, performing a periodontal surgery, with open flap. This periodontal regeneration is only possible to demonstrate histologically. On the other hand, clinically evaluation allows for checking improvement of some parameters without identifying with certainty the amount of tissue regeneration. The post-surgical evaluation has been done by different methods, such as x-ray alone, probing, or even surgical re-entry of the site. The objective of this revision is to compare methods of evaluation of regenerated furcation lesions, the advantages and disadvantages and ethical considerations.

**Material and Methods:** A search was performed in Medline to find articles of furcation defects' regeneration that included post-operative evaluation up to and including May 2013, using the key-words: "furcation", "regeneration", "assessment" and "post-surgical evaluation". Radiographic and clinical evaluations were both taken in consideration. Only articles published in English language were included for further review.

**Results:** The articles showed the following outcome measurements: Changes in horizontal furcation depth, with open assessment at re-entry or by horizontal probing attachment level; changes in vertical probing attachment level; changes in vertical probing depths; x-ray changes assessment.

**Conclusion:** The best way to assure the amount of regeneration is by open assessment re-entry, but ethical issues are strongly against it. It is possible to evaluate with other techniques, but with no assurance towards the volume gained, except with the help of recent 3D imagiology, which seems to be the best choice to complete vertical and horizontal probing measurements.

## P0596

### Effect of 15d-PGJ<sub>2</sub>-loaded nanoparticles on inflammation and bone regeneration in a rat cortical defect model

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**Aim:** To discuss the effect of 15-deoxy-delta-12,14-prostaglandin J<sub>2</sub>(15d-PGJ<sub>2</sub>) loaded in poly (D,L-lactide-co-glycolide) (PLGA) nanocapsules (15d-PGJ<sub>2</sub>-NC), locally applied in cortical defect, on the inflammatory response and the bone regeneration.

**Material and Methods:** The standardized transcortical defects were conducted on the femur of male Wistar rats. The saline, unloaded nanoparticles, 15d-PGJ<sub>2</sub> and 15d-PGJ<sub>2</sub>-NC were delivered locally. The expression of the interleukin-6(IL-6), interleukin-1beta (IL-1 $\beta$ ) and tumor necrosis factor-alpha (TNF- $\alpha$ ) in the surrounding soft tissue was analyzed by Western Blot and in the defect area by qRT-PCR. The mRNA expression of bone morphogenetic proteins-6(BMP-6), platelet-derived growth factor-B (PDGF-B) in the defect was examined by qRT-PCR. Masson's Trichrome staining and immunohistochemistry were respectively employed to reveal new bone formation and the EphrinB2 and osteoprotegerin (OPG) protein expression in the cortical defect area .

**Results:** 15d-PGJ<sub>2</sub>-NC appeared opalescent white and remained relatively stable in physico-chemical parameters or drug association efficiency .After the application of 15d-PGJ<sub>2</sub>-NC in the bone defect, the expression levels of IL-6, IL-1 $\beta$ , and TNF- $\alpha$  significantly decreased, compared with the control group (P<0.05), which was observed from both the qRT-PCR and Western Blot results. The qRT-PCR results also demonstrated that BMP-6 and PDGF-B mRNA expression up-regulated by 15d-PGJ<sub>2</sub>-NC. As the histomorphometry and immunohistochemistry results shown, new bone formation enhanced and the EphrinB2 and OPG protein expression increased in the cortical defect area in the 15d-PGJ<sub>2</sub>-NC-treated animals.

**Conclusion:** The stable 15d-PGJ<sub>2</sub>-NC complex had been successfully prepared. When locally administrated, it may attenuate the expression of IL-6, IL-1 $\beta$ , TNF- $\alpha$ , and increase new bone formation and the growth factors related to the bone regeneration in bone defect area.

## P0597

### Enamel matrix derivative (EMD) in the treatment of intrabony defects in diabetic patients: a clinical trial

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**Aim:** To evaluate the effect of an enamel matrix derivative (EMD) and open flap debridement (OFD) in the surgical treatment of intrabony defects in diabetic patients.

**Material and Methods:** A randomized, split-mouth clinical trial was conducted. Thirteen patients with controlled, Type 2 diabetes mellitus (T2DM) presenting without or two wall intrabony defects (width  $\geq$ 2 mm and depth  $\geq$ 4 mm) in at least

two hemiarches were included in this study. In each patient, one test site (EMD) and one control site (OFD) were considered. At baseline and at 6 months, probing pocket depth (PD), clinical attachment level (CAL) and gingival recession (GR) were recorded in all sites of every patient.

**Results:** Probing depth (PD) showed statistically significant difference between the test and control sites ( $p < 0.000$ ) after 6 months; the initial mean value was  $8.15 \pm 0.98$  mm and final  $3.00 \pm 0.57$  mm for the test group and  $7.53 \pm 0.96$  mm to  $4.69 \pm 0.63$  mm in the control group. As regards clinical attachment level (CAL), there was statistically significant difference between the groups ( $p < 0.000$ ); in the test group the initial mean was  $7.46 \pm 2.06$  mm and final  $4.15 \pm 1.62$  mm, and in the control group the means were  $8.38 \pm 1.75$  mm and  $6.76 \pm 1.23$  mm.

**Conclusion:** In view of the clinical findings, the use of EMD presented superior results to those of OFD in terms of PD reduction and CAL gain in patients with controlled DM type 2, in the period of 6 months.

## P0598

### Cranial bone repair in an experimental model treated with bisphosphonates. Histological study in rats

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**Aim:** The aim of this study is to evaluate, histologically, the cranial bone repair and remodeling after the systemic application of alendronate.

**Material and Methods:** Forty rats were randomly divided into four groups: Group C (control), Group AB (autogenous bone), Group B (bisphosphonates) e Group AB-B (autogenous bone + bisphosphonates). The animals from Group B and AB-B were given 3 systemic (intraperitoneal) applications of ALN, a dose of 50  $\mu$ g/kg weekly, for 4 weeks. Likewise, the animals from Group C and AB were given applications of physiologic saline in the same period. Afterwards, critical size defects of 5 mm were created in the calvaria of all animals. In groups C and B the defect was filled with blood clot. In groups AB and AB-B the defect was filled with AB. Histological analysis was performed after euthanasia (30 days after surgical procedure).

**Results:** Histologically, the healing of the animals from Group C and B, was predominantly characterized by dense connective tissue. In Group AB and AB-B, an amount of connective tissue with osteoblastic activity and compact bone neoformation was observed.

**Conclusion:** In conclusion, within the limits of this study, the systemic application of ALN, a dose of 50  $\mu$ g/kg, did not favor the cranial bone repair and remodeling.

**P0599****Use of hyaluronic acid to enhance augmentation after large periradicular cyst removal**

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**Aim:** Our aim was to evaluate the effects of hyaluronic acid on healing of the soft and hard tissues.

**Material and Methods:** A 30-year old male came to polyclinic complaining of the swelling in the region of lower incisors. Panoramic and intraoral radiographs have shown cyst-like formation in periapical region of lower incisors extending from the lower right canine to the lower left canine. Tooth 41 was extracted 15 years ago due to orthodontic treatment. Clinical examination has revealed discoloured tooth 31, pulp necrosis of 31, 32, 42 and movement of 42. Teeth 31, 32, 42 were endodontically treated and simultaneously splinted with Ribbond. Cyst was enucleated and root ends were resected. Bone defect was covered with hyaluronic acid gel and subsequently filled with mixture of spongy bovine bone substitute, hyaluronic acid gel and blood to enhance bony healing. Augmentation material was covered with resorbable collagen bilayer membrane, wound area was dressed with hyaluronic acid gel and 5.0 polypropylene sutures were placed. Periradicular soft tissue was submitted for histological evaluation.

**Results:** Excellent soft tissue healing was found during follow up period. Control CBCTs done after 3, 6 and 9 months have showed good bony healing with new bone formation.

**Conclusion:** Benefits of hyaluronic acid gel used in GTR/GBR are improved wound healing reducing the risk of infection, stabilization of bone granules as the viscous gel structure prevents subsequent displacement and formation of a protective barrier preventing penetration of connective tissue.

**P0600****Tooth-saving technologies in the treatment of intact molars with furcation defects of various degrees of severity in periodontitis**

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**Aim:** Aim of the research is investigation of efficacy of a new surgical approach to closure of furcation defects of multirrooted teeth in the II-III degree periodontitis.

**Material and Methods:** Depending on the method of surgery, 78 patients with II-III degrees of periodontitis were divided into 2 groups: I – basic (application of a new surgical approach to closure of furcation defects of multirrooted teeth with collagen blocks and prior removal of the pulp of intact molars), II – control group (traditional treatment). Diagnostics of generalized periodontitis was based on objective periodontal indices and orthopantomograms. Bacterioscopic investigation of biotope of furcation areas with the method of vital luminescent microscopy was conducted in patients of both groups; surface of the dentine and cement of furcation areas was investigated with scanning electron microscopy method (SEM) in removal of intact molars due to orthodontic and prosthodontic indications.

**Results:** According to SEM, formation of cracks through the cement and the dentine in molar roots and furcation openings,

was one of the main risk factors of endo-periodontal syndrome formation, requiring prior pulp removal of intact molars. Closure of furcation defects of multirrooted teeth with our technique (I group) reduced complications by 64.5% ( $p < 0.05$ ) in comparison with II group and enabled to save pulpless intact molars in 72.7% of cases, being confirmed by index, radiological and microbiological data.

**Conclusion:** Complex treatment of II-III degree periodontitis, implying prior pulp removal with further osteoplasty of furcation defects with collagen blocks according to our technique, is an effective tooth-saving technology.

**P0601****Inhibition of BMP-2-induced osteoblast differentiation by gingival fibroblasts in vitro**S. Kouris<sup>1</sup>, W. Turner<sup>2</sup>, F.J. Hughes<sup>2</sup><sup>1</sup>Athens/Greece, <sup>2</sup>London/United Kingdom

**Aim:** We have previously found that factors secreted by gingival fibroblasts may inhibit osteoblastic differentiation. The aim of the present study was to investigate possible mechanisms for this, and specifically to investigate the effects of gingival fibroblast conditioned medium on BMP-2 – induced osteoblastic differentiation.

**Material and Methods:** Cells from the multipotent murine fetal fibroblast C3H10T $\frac{1}{2}$  (10T1/2) line were treated with BMP-2, in the presence or absence of conditioned medium collected from cultured gingival fibroblasts. The BMP-inhibitor Noggin was used as a positive control treatment. Osteoblastic differentiation was determined by measurement of alkaline phosphatase (ALP) activity by pNPP colorimetric assay. RT-PCR was used to investigate differences in expression of possible genes responsible for ALP expression including noggin, chordin, Wnt3a, FGFR2 and Id1.

**Results:** BMP-2 increased ALP production by 10T1/2 cells in a dose-dependent manner, particularly when co-stimulated with Retinoic Acid. This effect was partially reversed by addition of Noggin to cultures. Treatment of cells with gingival fibroblast conditioned medium completely reversed the effects of BMP-stimulation. Conditioned medium alone had no effect on 10T1/2 cells in the absence of BMP-2. Gingival fibroblast conditioned medium also upregulated the expression of endogenous noggin gene expression.

**Conclusion:** Gingival fibroblasts may secrete factors that block BMP-2 mediated osteoblastic differentiation of undifferentiated mesenchymal cells. This inhibitory effect of gingival fibroblasts may be an important negative regulator of bone formation during periodontal regeneration.

**P0602****A combination use of human cultured periosteal sheet with platelet-rich fibrin enhance bone regeneration**

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**Aim:** Human cultured alveolar bone-derived periosteal (hCP) sheets as an osteogenic grafting material to the periodontal bone

regenerative therapy has been reported by researchers. It is also reported that platelet-rich fibrin (PRF) could have enhancement in the osteogenic potential to regenerative grafting materials. Hence, we analysed effects of the combination of PRF with hCP sheets.

**Material and Methods:** Periosteal segments (1 × 1 mm) obtained from patients were cultured for 2 weeks. The hCP sheets were harvested and placed on freshly prepared PRF and cultured for 2 weeks. The resulting hCP sheets and hCP-PRF complexes were subjected to SEM observation and histological examinations and  $\mu$ CT scanning. And also, these complexes were implanted into subcutaneous tissue or calvarial bone defects prepared in nude mice. At 4 weeks post-implantation, new bone formation, PCNA-positive cells and number of vessels were evaluated.

**Results:** In vitro, the cells migrated to surface and deep region of PRF. These cells expressed ALP and Osteopontin deposition. Mineral deposition was significantly increased in hCP + PRF complex (versus hCP). Animal studies revealed that PRF augmented collagen deposition by hCP cells in subcutaneous tissue. In the calvarial implantation, new bone was more actively formed by the complex (versus hCP). The PCNA-positive cells and vessels were increased in the site of implantation.

**Conclusion:** These results suggest that the osteogenic potential of hCP sheet is up regulated by PRF and the complex would be a promising grafting material for bone regeneration therapy.

## P0603

### Treatment of different types of bone defects with concentrated growth factor: three case reports

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**Aim:** Introduction: Various techniques have been attempted in the past to truly regenerate the lost bone structures. Owing to its stimulatory effect on angiogenesis and epithelialization, concentrated growth factor (CGF) is an excellent material for enhancing bone healing. The use of CGF may be a simple and effective method of improving the healing of bone defects. The purpose of these case series is to document the beneficial role of CGF in the healing of different bone defect areas.

**Material and Methods:** Case Reports: This report describes three female patients presented (1: with lateral cyst on teeth 22; 2: with periimplantitis on mandibular left first premolar area; 3: with furcation lesion on teeth 36). Mucoperiosteal full-thickness flaps were elevated to perform the surgical debridement of lesion areas in all patients. Then, minced CGF mixed with DFDB graft was applied to fill the defects. Recall radiographs of cases showed satisfactory healing of the bony defects.

**Results:** Discussion: The intended role of the minced CGF in the bone defects was to deliver the growth factors in the early phase of healing.

**Conclusion:** According to the results obtained in these case reports, the positive clinical impact of additional application of CGF with bone graft materials in treatment of bone defects is based on significant radiographic defect bone fill.

## P0604

### Oxytalan-positive peripheral ossifying fibromas express runt related transcription factor 2 (Runx-2), bone morphogenetic protein-2 (BMP-2), and cementum attachment protein (CAP). An immunohistochemical study

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**Aim:** To investigate the immunohistochemical expression of runt related transcription factor 2 (Runx-2), bone morphogenetic protein-2 (BMP-2), and cementum attachment protein (CAP) in oxytalan-positive POF, in order to establish the use of POF as an in vivo model for the study of the periodontal ligament.

**Material and Methods:** Thirty tumors that presented clinical and histologic features of peripheral ossifying fibroma (POF), as well as oxytalan fibers, were included in the study. Immunohistochemical expression of Runx-2, BMP-2 and CAP was evaluated by light microscopy.

**Results:** Runx-2, BMP-2 and CAP were abundantly expressed by POFs; twenty two of thirty tumors expressed positive staining for Runx-2, 26 tumors for BMP-2 and 25 tumors for CAP. The expression of Runx-2 was abundant in POFs where bone was histologically present ( $p = 0.04$ ) and of BMP-2 in POFs where dystrophic calcifications were present ( $p = 0.03$ ). Runx-2, BMP-2 and CAP were abundantly expressed by POFs; twenty two of thirty tumors expressed positive staining for Runx-2, 26 tumors for BMP-2 and 25 tumors for CAP. The expression of Runx-2 was abundant in POFs where bone was histologically present ( $p = 0.04$ ) and of BMP-2 in POFs where dystrophic calcifications were present ( $p = 0.03$ ).

**Conclusion:** It is suggested that oxytalan-positive POFs, purportedly originating from the periodontal ligament, express molecules that are specific to bone and cementum (Runx-2, BMP-2), or cementum only (CAP). Thus, the cell populations present in the lesion belong to the mineralized-tissue-forming cell lineages, the cementoblastic or osteoblastic lineage.

## P0605

### Purified-mesenchymal stem cells in human induced pluripotent stem cells derived neural crest cells

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**Aim:** In periodontal tissues, some mesenchymal stem cells (MSCs) were reported and expected as cell sources for regenerative medicine. Classically those MSCs have been selected by adherent culture, and retrospectively defined by self-renewal and analysis of mesenchymal differentiation. So actually they consist of MSCs and other cells. Our group reported MSCs specific markers (LNGFR, THY-1) in 2013. By this, we can isolate purified-MSCs (LNGFR<sup>+</sup>, THY-1<sup>+</sup> cells: LT cells) from periodontal tissues, and analyze prospectively. However it is difficult to apply those LT cells for regenerative medicine because of low population and technical dependence. Here we show efficient mass generation method of LT cells by inducing human induced pluripotent stem cells (iPS cells) into neural crest cells (NCCs).

**Material and Methods:** Human iPS cells were induced into NCCs by a previously described method. Induced NCCs were analyzed and sorted by flow cytometer. After LT cells sorting, we analyzed them in vitro.

**Results:** Human iPS-LT cells had potentials to form colonies, differentiate into mesenchymal and neural crest lineages in vitro. They also had potentials to migrate functionally.

**Conclusion:** Here we show the mass generation method of purified-MSCs. As known, periodontal tissues are developmentally from neural crest derived mesenchyme. This method reproduces the periodontal tissues' development. We hope this cell source will be useful for periodontal therapy in next generation.

## P0606

### Evaluation of periodontal ligament cell behaviour seeded into platelet rich plasma (PRP) loaded chitosan scaffolds: in vitro

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**Aim:** Platelet-rich plasma (PRP) used with various materials for periodontal regeneration treatments to provide sustained release of its rich growth factor content. The aim of the present study was to investigate the in vitro effect of platelet rich plasma loaded chitosan scaffolds on the cellular functions of periodontal ligament cells (PDL).

**Material and Methods:** PDL cells were seeded into 24 well-plates and cells were divided into four different experimental groups: (1) PRP-GEL group; PRP added to chitosan gel before freeze-drying to prepare scaffolds; (2) PRP-FD-GEL group; freeze-dried (FD) PRP added to chitosan gel before freeze-drying to prepare scaffolds; (3) CHITOSAN group; PRP embedded chitosan sponges added to wells; (4) PRP group; only PRP added to wells. Cell functions were assessed by scanning electron microscopy (SEM), MTT, von-Kossa staining and alkaline phosphatase activity at different time points.

**Results:** Cells seeded with only PRP (PRP group) exhibited greater levels of MTT at 3, 6, 9 and 12th days and ALP at 7 and 21th days compared with the chitosan groups. Mineral-like nodule formation was observed in all PRP added scaffold groups at day 7 and staining in PRP-GEL and PRP-FD-GEL groups was stronger compared to other groups. SEM images demonstrated that there was alteration on the porous structure of scaffolds and membrane structure of platelets were deteriorated, in PRP-GEL and PRP-FD-GEL groups. In CHITOSAN group, most of the platelets protected membran stability until twenty first day without any activation.

**Conclusion:** This study demonstrated that regenerative potential of platelet rich plasma wasn't enhanced when applied with chitosan scaffolds.

## P0607

### Comparison of autogenous periosteal pedicle graft as a barrier and bioresorbable collagen membrane in management of periodontal intrabony defects: a randomized controlled clinical trial

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**Aim:** Aim of this study was to evaluate the clinical and radiographic outcomes of autogenous periosteal pedicle graft (PPG) as a barrier compared to bioresorbable collagen membrane for treating periodontal intrabony defects.

**Material and Methods:** Twenty chronic periodontitis patients having matched contralateral intrabony defects participated in this randomized controlled clinical trial. Using split-mouth design, defects were randomly treated with either PPG (test group) or bioresorbable collagen membrane (Bioteck®, Arcugnano VI, Italy) (control group). Clinical parameters included; plaque index, gingival index, probing depth (PD) and clinical attachment level (CAL). Digital periapical radiographs and linear measurements were used to calculate bone defect area (BDA). Measurements were taken at the time of surgery and 6-months postoperatively. Statistical analysis was conducted using Wilcoxon's-Signed-Rank test.

**Results:** At 6 months both treatments resulted in statistically significant improvement in all clinical and radiographic parameters compared with baseline ( $p < 0.0001$ ). In PPG group, PD (mean  $\pm$  SD) was reduced from  $6.92 \pm 0.76$  mm to  $3.17 \pm 0.65$  mm, CAL (mean  $\pm$  SD) was improved from  $6.42 \pm 0.56$  mm to  $3.52 \pm 0.44$  mm, reduction in BDA (mean  $\pm$  SD) was  $3.94 \pm 4.09$  mm<sup>2</sup> and percentage reduction in BDA (mean  $\pm$  SD) was  $39.47 \pm 20.77\%$ . In collagen membrane group, PD (mean  $\pm$  SD) was reduced from  $6.82 \pm 1.1$  mm to  $3.15 \pm 0.67$  mm, CAL (mean  $\pm$  SD) was improved from  $6.15 \pm 0.98$  mm to  $3.6 \pm 0.57$  mm, reduction in BDA (mean  $\pm$  SD) was  $3.54 \pm 3.44$  mm<sup>2</sup> and percentage reduction in BDA (mean  $\pm$  SD) was  $34.55 \pm 26.88\%$ . Differences between groups were not statistically significant ( $p > 0.05$ ).

**Conclusion:** Within the limitations of this study, it can be concluded that both treatment modalities improved clinical and radiographic outcomes and were effective in management of intrabony defects.

## P0608

### The analysis of bone mineral density with concentrated growth factors (CGF) at rabbit tibia

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**Aim:** The latest innovation at regenerative periodontal therapy is the Concentrated Growth Factors (CGF) that is developed by Sacco in 2006. CGF is enhanced by centrifuging blood samples with a special device (Medifuge, Silfradent Srl, Italy) which resembles to PRP. However, CGF has a different centrifugation speed and time that it provides larger, denser and richer in growth factors containing fibrin matrix than PRP. The purpose of this study is to assess the wound healing on rabbit tibia by comparing CGF matrix, xenogenic bone graft, xenogenic bone graft + CGF matrix and normal bone healing.

**Material and Methods:** 4 bone defects were made on rabbit tibia, on each tibia 2 defects: control defect, CGF matrix filled defect, xenogenic bone graft filled defect, xenogenic bone graft + CGF filled defect. Different graft materials were used for observing bone regeneration at 1, 3 and 8 weeks. Also the normal bone density was calculated outside of defects. Specimens were subjected to bone mineral density (BMD) and bone mineral content (BMC) analysis with a peripheral dual x-ray absorptiometry densitometer.

**Results:** CGF matrix filled defects differed significantly to control group on each time samples. At 1st and 3rd week, xenogenic bone graft filled defect and xenogenic bone graft + CGF matrix filled defects were similar but at 8th week xenogenic bone graft + CGF matrix filled defect differed significantly from xenogenic bone graft filled defect.

**Conclusion:** CGF matrix can be used to fasten wound healing due to the high amount of growth factors it contain. Also, the CD34 positive cells that are inside of CGF should be searched extensively.

## P0609

### Treatment of infrabony defect in patient with aggressive periodontitis using anorganic bovine bone along with plasma rich in growth factors

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**Aim:** The aim of this case report was to show the regenerative therapy with anorganic bone along with plasma rich in growth factors of the infrabony defects caused by generalised aggressive periodontitis.

**Material and Methods:** A 27 year old female patient presented at the Department of periodontology complaining on severe tooth mobility 37 and 47. Generalised aggressive periodontitis was diagnosed by the clinical examination and radiographic evaluation. The mechanical therapy was performed and detailed instructions in oral hygiene were given. Chlorhexidine gluconate 0.2% solution and amoxicillin and metronidazole were prescribed. The teeth 37, 47 were extracted. The tooth 45 showed pocket probing depth 9 mm and infrabony vertical defect. Reevaluation after 8 weeks showed significantly reduced pocket probing depths except the tooth 45. Periodontal regenerative surgery with an anorganic bone along with plasma rich in growth factors was performed on the tooth 45. Chlorhexidine gluconate 0.2% solution and amoxicillin were prescribed. The sutures were removed after two weeks.

**Results:** Reevaluation after 6 months after surgery showed significantly reduced pocket probing depth at the tooth 45 and the healing of the infrabony defect was confirmed radiographically.

**Conclusion:** Aggressive periodontitis may cause severe infrabony defects of the adjacent tooth and tooth loss finally. In this case report we wanted to show how periodontal regenerative surgery with anorganic bone along with plasma rich in growth factors without use of the collagen membrane can improve healing of the infrabony defect.

## P0610

### NELL-1 and BMP-2 loaded chitosan-HA scaffolds periodontal regeneration: in vitro

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**Aim:** Using cells, growth factors and scaffolds, tissue engineering approaches may be used to develop new devices for regenerative periodontal treatments. Although various growth factors and scaffold were investigated, no predictable methods are established yet. NELL-1; a protein highly expressed in craniosynostosis patients, has been shown to promote osteoblastic differentiation in vitro and in vivo. 1- To investigate the effects of optimal dose NELL-1 on murine cementoblasts in comparison to BMP-2 and BMP-7. 2- To investigate the convenience of 1 ng/mL NELL-1 and NELL-1+ BMP-2 loaded scaffolds for periodontal tissue engineering.

**Material and Methods:** Gene expressions, proliferation and mineralization of cementoblasts were evaluated for NELL-1 dose-response experiments. The efficacy of NELL-1, BMP-2 and BMP-7 and possible synergic interactions were investigated. Chitosan-HA loaded with NELL-1, BMP-2 and NELL-1+BMP-2 combination were compared using MTT assay, qRT-PCR, western-blot and SEM images.

**Results:** 1 ng/mL NELL-1 was determined as the optimal dose. 1 ng NELL-1 and 1 ng/mL NELL-1+50 ng/mL BMP-2 found to be more potent inducing cementoblast differentiation. When growth factor loaded scaffolds were compared similar cell counts were observed. SEM images demonstrated faster cell spreading and matrix synthesis in 1 ng NELL-1+ 50 ng BMP-2 loaded scaffolds. Western-blot findings revealed increased ALP, OCN and collagen-1 protein levels supporting SEM findings.

**Conclusion:** The findings of this research shows NELL-1 is an important growth factor regulating cementoblast differentiation. The induction of differentiation-cementoblasts by NELL-1 applied alone or in combination with BMP-2 is noteworthy. NELL-1+BMP-2 loaded chitosan-HA might be suitable 3D construct for periodontal tissue engineering. (TUBITAK-SBAG-111S119)

## P0611

### The use of buccal fat pad free graft in regenerative treatment of peri-implantitis: a new and predictable technique

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**Aim:** To present a novel technique in the treatment of peri-implant lesion, utilizing free fat tissue graft from the buccal fat pad.

**Material and Methods:** Free fat tissue graft was harvested from the buccal fat pad in 8 patients, and used with bone substitutes to regenerate 17 peri-implant lesions. Mechanical debridement of the implants surface and the granulation tissue were made with /without Er; YAG Laser. Clinical parameters such, plaque index, bleeding in probing, pocket depth, gingival recession and the clinical attachment level were recorded as a

base line and during the follow up period. In addition radiological evaluation was made in the base line and the follow up period.

**Results:** The donor site of the free fat graft was healed without cosmetic disturbance in all the patients. 17 peri-implant lesions were followed up for 30 months. The bleeding in probing and the pocket depth were significantly improved, and the clinical attachment level was achieved and maintained during the follow up period due to the fibrous healing of the free fat graft. Satisfactory esthetic and functional outcomes of the treated implants were achieved and maintained.

**Conclusion:** The free fat graft heals by fibrosis. The resulted fibrotic tissue adheres strongly to the implant surface and withstand the recurrence of the peri-implant lesion, and provides stable and predictable outcomes.

## P0612

### Biostimulation with diode laser positively regulates cementoblasts functions, in vitro

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**Aim:** The aim of this study was to evaluate the effects of biostimulation of cementoblasts (OCCM.30) with diode laser (940 nm).

**Material and Methods:** A total of 40 root dentin slices were obtained from healthy 3. molar teeth and assigned to the following 2 groups: (1) control group; (2) Laser treated group. Dentin plates were placed to the cell culture inserts and OCCM.30 cells were seeded onto dentin plates. Cells were treated with biostimulation setting of diode laser (power: 0.3 W in continuous wave, 60 s/cm<sup>2</sup>). Proliferation and mineralized tissue associated gene's and BMPs mRNA expressions of cementoblasts were evaluated. Proliferation of cementoblasts was evaluated after laser application using real-time cell analyzer. Total RNA was isolated on day 3 and Bone sialoprotein (BSP), Osteocalcin (OCN), Type I collagen (COL I), osteoblastic transcription factor Runx2, Bone Morphogenetic Protein (BMP)-2, -4, -6 and 7 mRNA expressions were determined using quantitative-RT-PCR.

**Results:** In proliferation experiment, while there is no significant change till to 96 hrs, biostimulation of cementoblasts increased proliferation after 96 hrs when compared to control group. Statistically significant increase in OCN (5 fold), BSP and BMP-2, -6, -7 (2 fold) mRNA expressions were noted in the laser group when compared to untreated control group (P<0.05). No changes were observed for COL I, Runx2 and BMP-4 transcripts.

**Conclusion:** The results of this study demonstrated that biostimulation setting of diode laser modulates behavior of cementoblasts inducing mineralized tissue associated gene's mRNA expressions and these applications not only affect soft tissue but also positively regulate cells of mineralized tissues.

## P0613

### Application of full mouth disinfection combined with enamel matrix proteins in the treatment of chronic periodontitis

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**Aim:** The microorganisms that accumulate on the teeth seem to play the dominant role in the etiology of the periodontal disease. A standard treatment strategy for periodontal infections often consists of 4 consecutive sessions of scaling and root planing, without proper disinfection of the remaining intra-oral niches for periodontopathogens. This could theoretically lead to a reinfection of previously disinfected pockets by bacteria from an untreated region/niche. This study aimed to investigate, over an 6 months period, the clinical benefits of an one stage full-mouth disinfection (FMD) with enamel matrix proteins (EMP) usage in the control of severe periodontitis.

**Material and Methods:** Fifty patients with severe chronic periodontitis (CP) were randomly assigned to test and two control groups. The first control group (n=15) was scaled and root planed, per quadrant, at 2-week intervals and given standard oral hygiene instructions. The other control group (n=15) had FMD alone. In the test group (n=15) the FMD and EMP were used for the treatment of the CP. The plaque index, gingival index were recorded at baseline, first week, 1, 3 and 6 months afterwards. Probing depth, bleeding on probing, gingival recession, and clinical attachment level were recorded at baseline and at 6 months afterwards.

**Results:** All of the treatment modalities had a significant probing depth reduction and gain in attachment up to 6 months, and had significant improvements in other clinical parameters

**Conclusion:** The results of this study showed that all treatment groups provided statistically significant improvement on periodontal health while there were no differences between groups.

## P0614

### Novel 45S5 Bioglass<sup>®</sup>-derived glass-ceramic scaffolds: In vitro assessments of their role in bone regeneration

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**Aim:** Examine the biological properties of this novel Bioglass<sup>®</sup> matrix in relation to the response of osteoblast-like cells to these glass-ceramic scaffolds, and explore the impact of various characteristics of the material on the growth, differentiation and function of the aforementioned cells.

**Material and Methods:** Highly porous and interconnected three-dimensional (3D) Bioglass<sup>®</sup>-derived glass-ceramic scaffolds were fabricated. Variations in the material characteristics such as porosity, sintering and surface functionalisation were provided to examine their effect on cell function. Following cell culture preparation (MG63 osteoblast-like cells), preliminary quantitative and qualitative assessments were performed on discs/pellets to examine cell proliferation, morphology and attachment using AlamarBlue<sup>™</sup> assay and SEM respectively. The same assessments were then performed on 45S5 sintered Bioglass<sup>®</sup> scaffolds with two different porosities (45 and 60 ppi)

for a short period of 6 days. Finally, the function and characteristics of the MG63 osteoblast-like cells on the scaffolds were assessed long-term by the expression of the alkaline phosphatase (ALP) activity and the bone-associated protein, osteocalcin (OC) and microscopically for a period of 15 days.

**Results:** These novel Bioglass-derived glass-ceramic scaffolds were found to support osteoblast-like morphology and proliferation, the cells stained positively for alkaline phosphatase, and exhibited higher levels of osteocalcin protein expression than bovine-derived bone substitute control materials

**Conclusion:** The findings of this study indicate the promising role of these newly-fabricated Bioglass scaffolds in tissue engineering

## P0615

### Effects of EMPs on biological behaviors of human PDLs under hypoxia

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**Aim:** Enamel matrix proteins (EMPs) could promote the regeneration of periodontal tissues. However, hypoxia is a crucial microenvironment in periodontitis which may influence the process of healing/regeneration. The study was to investigate the effects of EMPs on cell behaviors and osteogenic differentiation of human periodontal ligament cells (PDLs) under hypoxic microenvironment in vitro.

**Material and Methods:** EMPs were extracted using the acetic acid method. Cobalt chloride (CoCl<sub>2</sub>) was to mimic hypoxia. Human PDLs were obtained and cultured in vitro. Cell attachment, cell spreading, cell proliferation, alkaline phosphatase (ALP) activity and mRNA expression of osteogenic markers were measured in the absence and in the presence of EMPs and CoCl<sub>2</sub>. The data were statistically analyzed with SPSS13.0 software package.

**Results:** CoCl<sub>2</sub> significantly inhibited the attachment, spreading and proliferation of human PDLs. CoCl<sub>2</sub> significantly inhibited ALP activity and down-regulated expressions of osteogenic markers such as runt-related transcription factor 2 (Runx2), alkaline phosphatase (ALP), osteocalcin (OCN), and collagen type I (Col-I), at the mRNA and protein levels in hPDLs. However, EMPs partly reversed this hypoxic inhibition of osteogenic differentiation.

**Conclusion:** EMPs could play a protective role in the impaired behaviors of human PDLs under hypoxia.

## P0616

### Effects of rhAm on osteogenic differentiation of PDLs under inflammatory microenvironment

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**Aim:** The study was to investigate the effects of recombinant human amelogenin (rhAm) on the osteogenic differentiation of human periodontal ligament cells (PDLs), and to explore the regulatory mechanisms of Wnt pathways in human PDLs treated with rhAm under inflammatory microenvironment in vitro.

**Material and Methods:** Human PDLs were isolated and characterized in vitro. The proliferation rate of PDLs under different concentration of *P.gingivalis* lipopolysaccharide (LPS) and rhAm was tested by MTT assay. The expression of osteogenic markers under different concentration of LPS and rhAm was investigated by real-time PCR and western blotting. Wnt signaling pathways were also detected. The data were statistically analyzed with SPSS13.0 software package.

**Results:** Immunocytochemical staining verified that the isolated cells were PDLs. 10ug/ml LPS inhibited the cell proliferation. The expression of osteogenic markers (ALP, Runx2, Collagen I, BMP2) were significantly decreased in 10 µg/ml LPS group and increased in 20µg/ml rhAm group. When PDLs were co-treated with LPS at the concentration of 10µg/ml and rhAm at the concentration of 20µg/ml, the expression of osteogenic markers were improved compared with LPS group. In addition, the mRNA expression of wnt1, LRP5/6, beta-catenin were decreased under inflammatory microenvironment, and increased when treated with rhAm.

**Conclusion:** rhAm could improve the osteogenic differentiation and that Wnt/beta-catenin signaling may play an important role in the osteogenic differentiation of human PDLs treated with rhAm under inflammatory microenvironment.

## P0617

### Clinical outcomes following combinations of periodontal regenerative therapy using a deproteinised bovine bone mineral, enamel matrix derivative with or without collagen membrane- 6 month prognosis

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**Aim:** To compare the clinical outcome in the treatment of periodontal intrabony defects using deproteinised bovine bone mineral (DBBM), enamel matrix derivative (EMD), with or without collagen membrane (CM).

**Material and Methods:** The study was approved by the Institutional Review Board of the Faculty of Dentistry, Niigata University. Sixteen informed consented patients with chronic periodontitis were enrolled. One defect per patient with probing depth ≥6 mm was randomly assigned to the treatment with either EMD + DBBM + CM (n =8) or EMD + DBBM (n = 8). At baseline and after 6 months, clinical parameters including gingival index (GI), probing depth (PD), gingival recession (GR), clinical attachment level (CAL), and bleeding on probing (BOP) and tooth mobility (MOB) were recorded. The primary outcome variables were the CAL and PD changes and the bone fill % measured by corn beam CT (CBCT) analyses.

**Results:** Significant decrease in PD, CAL gain, absence of BOP and increased bone fill were observed at six month after both regenerative combinations (p<0.05). The MOB did not show any significant changes in both groups. No significant differences were observed between two groups of regenerative combinations at six month.

**Conclusion:** Within the limitation of the study, combinations of periodontal regenerative therapy using EMD + DBBM + CM or EMD + DBBM for deep periodontal intrabony defects showed comparable clinical outcomes. However, further analyses assessing periodontal biotype, smoking status, types of defects and longer prognosis are needed and it's still on going.

**P0618****The effect of fibrin-binding oligopeptide derived from fibronectin on migration of periodontal ligament cells in an in vitro wound healing model**

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**Aim:** The aim of this study was to evaluate the effect of synthetic FN fragments containing an N-terminal fibrin-binding domain on migration of human PDL fibroblast cells in an in vitro wound healing model.

**Material and Methods:** Three types of synthetic oligopeptides, which included fibrin-binding domain of FN (FF1, 3 and 5), were allocated to the experimental groups. Recombinant oligopeptide (F20) including Type III 9–10 domains of FN was used as a positive control and a group treated with nothing was the negative control. Cell migration capacity was evaluated using anCell Migration Assembly kit.

**Results:** The migration rates and number of migrated cells increased in the test group and both control groups at each point in time. F20, which was used as a positive control in this study, showed a significantly increased cell migration rate as compared with the control group at 6 and 12 h, but not at 18 or 24 h. There were no significant differences among test groups or between the test and positive control (F20) ( $P < 0.05$ ). In examination of the number of migrated cells, there was no observable significance between the test and either control aside from the FF1 100 $\mu$ M, and FF5 100 $\mu$ M groups at 6 h and the FF1 50 $\mu$ M, and FF3 100 $\mu$ M groups at 12 h. There was no significant difference among the test groups ( $P < 0.05$ ).

**Conclusion:** Within the limits of this study, N-terminal fibrin-binding domain of FN promoted cell migration of PDL fibroblast cells.

**P0619****Periodontal tissue regeneration using bone marrow-derived mesenchymal stem cells and 3-D calcification-inducing complex**

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**Aim:** The aim of this study was to evaluate the kinetics of bone marrow-derived mesenchymal stem cells cultured in a FGF–collagen complex as a regenerative scaffold in vitro.

**Material and Methods:** Growth medium was prepared by adding FGF at a specified concentration (1–100 ng/ml) and collagen solution at 50% (v/v). Then mouse bone marrow-derived mesenchymal stem cells were added to the medium to obtain a density of  $6.0 \times 10^4$  cells/mL, and 0.5 mL of the cell suspension was seeded into each well of a 24-well plate. The plate was incubated for one hour in 5% CO<sub>2</sub> at 37°C until a gel is formed. After confirming gel formation, 0.5 mL of growth medium containing the specified concentration of FGF was added gently. The cells were cultured for 3 weeks.

**Results:** Bone marrow-derived mesenchymal stem cells showed good growth in the collagen gel culture. The effect of FGF in promoting cell growth is exhibited at the early stage of culture, and the ALP activity has already passed the peak when assayed at 14 days of culture at FGF concentrations of 10 ng/ml. The ALP activity showed in the presence of phosphophoryn in a dose-dependent manner at 14 days of culture. A marked difference in calcium content was not observed.

**Conclusion:** The present study sheds light on the development of an optimal biomaterial that forms the basis of calcified hard tissue formation, suggesting the feasibility of applying the 3-D collagen gel cell culture system for the construction of a scaffold that controls the amount of regenerating tissue.

**P0620****A novel MIS technique to obtain creeping attachment**

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**Aim:** Many studies of minimally invasive surgery (MIS) have reported slight gingival recession. However, there are very few reports on the detailed mechanism of creeping attachment after MIS. Based on twelve years observation and CBCT examination in a case with 2 mm facial creeping attachment, this video presentation shows a novel MIS technique to obtain creeping attachment.

**Material and Methods:** First case (12D: 2–3 wall defect with 4 mm depth). Second case (33M: 2–3 wall defect with 4 mm depth). Third case (47D: 2 wall defect with 6 mm depth). A crestal incision was made in the interdental papilla and connected to the intrasulcular incision. Autogeneous bone was harvested using the VISTA technique or from an adjacent site. After applying an enamel matrix derivative and the bone graft, a three-step suturing technique was performed: (1) a horizontal inter-cross mattress suture, (2) an interrupted suture (3) and a horizontal outer-cross mattress suture.

**Results:** First case: Probing pocket depth (PPD) reduction: 4 mm, clinical attachment level (CAL) gain: 4 mm, interdental creeping attachment: 2 mm. Second case: PPD reduction: 3 mm, CAL gain: 3 mm, interdental creeping attachment: 2 mm. Third case: PPD reduction: 4 mm, CAL gain: 4 mm, facial creeping attachment: 1 mm, increase of distal keratinized gingiva: 3 mm.

**Conclusion:** The novel MIS technique may help to achieve creeping attachment.

**P0621****Traditional or regenerative periodontal surgery? – A comparison of the published literature in two periodontal journals over time**

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**Aim:** Indications, decision making and procedures in periodontal surgery developed in the last decades. In this analysis the amount of publications with content regarding traditional or regenerative periodontal surgery was compared in the years

1982/1983 and 2012/2013 and within two periodontal journals.

**Material and Methods:** The search was carried out in the Journal of Periodontology (JP) and Journal of Clinical Periodontology (JCP). At least two authors screened the articles for their content and allocated them to one or several topics with respect to periodontal surgery. The distribution of articles with traditional or regenerative periodontal surgery was then compared between the journals and the respective time periods.

**Results:** In JP 208 articles were published in the years 1982/83 and 429 in the years 2012/13, respectively. The corresponding numbers for JCP were 118 and 321. Out of all studies published, articles with periodontal surgery content amounted to 14–18% for the first time period and 9–10% for the second time period. In the years 1982/1983, 10% of articles in JP and 9% in JCP referred to traditional periodontal surgery while 8% (JP) and 5% (JCP) examined regenerative periodontal surgery. The distribution changed 30 years later, with 1% (JP) or 3% (JCP) traditional periodontal surgery and 9% (JP) or 6% (JCP) regenerative periodontal surgery content in the years 2012/13.

**Conclusion:** The amount of publications with regenerative compared to traditional periodontal surgery content increased over time with minor differences between the journals analysed.

## P0622

### Granulation tissue preserving technique (GTPT) – case reports

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**Aim:** In the wound healing process following periodontal surgery the phases of inflammation, proliferation, and maturation can be distinguished. In the proliferative stage a granulation tissue rich of blood vessels, collagen, and cells develops and serves as a conductive structure during the following maturation process. Intrabony periodontal defects resulting from inflammatory periodontal diseases contain granulation tissue infected by periodontal pathogens. Therefore, until now the removal of this intra-lesional granulation tissue (IGT) was considered to be reasonable in regenerative periodontal surgery. Despite different origin, the comparison of these granulation tissues raises the question, if granulation tissue derived from periodontal defects has features, which may positively influence periodontal regeneration.

**Material and Methods:** Aim of the granulation tissue preserving technique (GTPT) is to preserve the IGT to a maximum extent during regenerative periodontal surgery. This leads to improved primary wound stability, provides a scaffold for periodontal regeneration and avoids a collapse of the periodontal soft tissue into the periodontal defect. The GTPT is introduced schematically and illustrated by four case reports documenting the effectiveness and stability of the surgical intervention.

**Results:** The GTPT leads to clinically and radiologically significant attachment gain in regenerative periodontal surgery. Recent investigations have shown that IGT contains pluripotent stem cells that are essential for periodontal regeneration. Thus, the GTPT provides not only blood vessels but also cells needed for periodontal regeneration.

**Conclusion:** As the GTPT has provided promising results, a prospectively based comparative investigation shall demonstrate the influence of this surgical procedure on clinical and radiological parameters.

## P0623

### Periodontal regeneration for zero-wall suprabony defects with simultaneous adjacent site vertical ridge augmentation: clinical case studies

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**Aim:** Background: With regards to periodontal regeneration it is commonly understood that shallow, wide, open type defects pose a major dilemma for the clinician considering regenerative therapy. Moreover, zero-wall suprabony defects are currently believed to be impossible to regenerate. This may not be true in some instances where there is extended biologic width. Rational: When the severity of the periodontal defect goes beyond the root apex, the defect morphology often extends mesio-distally negatively affecting adjacent supporting alveolar bone. As a result, the adjacent root loses supporting bone but attachment apparatus remains intact. Such a condition may be referred to as “extended biologic width” (EBW) and has very high regenerative potential.

**Material and Methods:** Observation from five consecutive clinical cases illustrates the regenerative potential of the aforementioned sites. Following a post extraction healing period, vertical and horizontal ridge augmentation and periodontal regeneration were administrated. Resorbable membranes, placed near the coronal end of the EBW, and in some cases using titanium mesh (4/5 cases) distanced 2 to 3 mms away from the root surface and under the membrane. Bone grafts with rhPDGF-BB were used in all cases.

**Results:** Pre-regeneration defect morphology was measured intra-surgically in terms of distance between the cemento-enamel junction and the bottom of the defect (CEJ-BD). The mean CEJ-BD distance was  $9.8 \pm 1.0$  mm. The open probing attachment gain mean measurement at time of reentry was  $4.1 \pm 0.8$  mm.

**Conclusion:** There seems to be high regenerative potential in extreme periodontal disease cases where EBW exists. Further evidence may be provided through regenerative clinical trials and research.

## P0624

### Bioabsorbable calcified triglyceride bone cement versus deproteinized bovine bone for guided bone regeneration: an experimental study in the rat

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**Aim:** Use of bone substitutes in combination with guided bone regeneration (GBR) is a common therapeutic procedure to obtain appropriate bone volume and morphology in association with implant therapy. The aim of the present preclinical *in vivo* study was to evaluate the potential of Bioabsorbable Calcified Triglyceride Bone Cement (BCTBC; Kryptonite<sup>®</sup>) to enhance bone formation, when used as adjunct to GBR, and compare it with that of deproteinized bovine bone (DBB; Gen-Os<sup>®</sup>).

**Material and Methods:** Forty-eight rats were randomly divided into three equal-sized groups. Following extra-oral incisions along the inferior border of the mandible, full thickness flaps were elevated, and custom-made rigid, hemispherical Tef-

ion capsules were packed with standardized amounts of BCTBC (group 1) or DBB (group 2), or were left empty (group 3), and were stabilized on the lateral aspect of the ramus. Four months post-operatively, tissue samples containing the ramus and the capsules were processed for decalcified histology. The amount of newly formed mineralized bone, graft particles, and soft connective tissue inside the capsules was estimated semi-quantitatively.

**Results:** Similarly limited amounts of mineralized bone were observed in the capsules filled with CTBCT and DBB, and the major portion of these capsules was filled with biomaterial particles embedded within connective tissue. No significant differences ( $P > 0.05$ ) were observed between the two grafted groups regarding any of the evaluated parameters. In contrast, significantly larger amounts of mineralized bone were observed in the originally empty capsules ( $P < 0.05$ ).

**Conclusion:** BCTBC and DBB were equally ineffective to enhance bone formation when used as adjunct to GBR.

## P0625

### Is collagen matrix suitable as a carrier in periodontal regeneration?

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**Aim:** The aim of the present study was to investigate the capacity of collagen matrix (CM) as a carrier for different blood derivatives to improve the periodontal regeneration.

**Material and Methods:** In the study 28 white New Zealand rabbits were used after approval from the ethical committee. After administration of premedication and general anesthesia, we created circular artificial defects on the buccal mucosa. The CM (Mucograft, Geistlich Pharma AG, Switzerland) was implanted into the defect alone (positive control), together with Platelet-Rich Plasma (CM+PRP), with Platelet-Rich Fibrin (CM+PRF), or was left untreated (negative control).

**Results:** The samples were analyzed at days 1, 7, and 28. Histological, immunohistochemical and molecular analysis were conducted and the capacity of CM as a carrier was evaluated. Light microscope revealed marginal differences among groups in wound reepithelization, neoangiogenesis, granulation tissue and collagen formation, but no differences in the markers of acute or chronic inflammation (Kruskal-Wallis,  $p > 0.05$ ).

**Conclusion :** The advantages and disadvantages of CM as a carrier for blood derivatives will be discussed. Our findings have not confirmed yet that CM as a carrier for the tested substances would improve wound healing and the outcomes of periodontal surgery therapy. The study was supported by the grant IGA NT14321 and by project MUNI/A/0951/2013.

## P0626

### Controlled, sequential release of IGF-I and BMP-6 and its effects on cementoblast cells

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**Aim:** Tissue engineering approaches using novel scaffolds and suitable biological mediators may be useful to develop predict-

able regenerative periodontal treatments. The aim of this study is to test the effects of sequential and controlled release of IGF-I (insulin-like growth factor-I) and BMP-6 (bone morphogenetic protein-6) from novel scaffold on cementoblasts.

**Material and Methods:** IGF-I loaded microparticles were fabricated using electrospinning method. BMP-6 loaded nanoparticles were produced using emulsion-difusion-evaporation method. For sequential and controlled release of growth factors, composite structure was fabricated using encapsulated microparticles and nanoparticles into chitosan scaffold. In-vitro release kinetics was investigated by ELISA (Enzyme-Linked Immuno Sorbent Assay). Cell proliferation was evaluated with MTT [3-(4,5-Dimethylthiazol-2-yl)-2,5-Diphenyltetrazolium Bromide] assay and mineral-like nodule formation was observed using von-Kossa staining. Morphologies of cementoblasts was examined using SEM (Scanning Electron Microscope). Gene expressions were determined with RT-PCR (real time- polymerase chain reaction).

**Results:** The results of ELISA showed the release of growth factors in a sustained manner. According to the results of MTT assay, composite structure showed greater effects at days 2, 4, 8 and 12. SEM images and von-Kossa staining revealed cementoblasts differentiation and mineralized tissue formation potentials were also enhanced in composite structure, compared to control groups. The results of RT-PCR showed greater gene expression levels in growth and differentiation factor containing groups in all time points.

**Conclusion:** Composite structure, composed of micro and nanoparticles and chitosan, is an appropriate scaffolds for periodontal regeneration applications enhancing differentiation via providing sequential and controlled release and have a promising future for tissue engineering approaches.

## P0627

### An in vitro scanning electron microscopic study evaluating the ability of MTAD-an endodontic irrigant to remove smear layer from periodontally affected root surfaces

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**Aim:** Instrumentation of the root surface, results in formation of a smear layer of organic and mineralized debris which serves as a physical barrier, inhibiting new connective tissue attachment to the root surface. The present study advocates the use of an endodontic irrigant MTAD (mixture of tetracycline, citric acid & detergent) as a root conditioning agent. The aim of the study was to compare the root conditioning ability of an endodontic irrigant MTAD with 17% EDTA.

**Material and Methods:** Sixty freshly extracted human single rooted teeth with confirmed periodontal involvement were selected for this study and decoronated. The apical third of each root was removed and the remaining root was sectioned longitudinally to produce a 6 mm to 8 mm long tooth section. The root surface was then instrumented by hand using a sharp Gracey 1-2 periodontal curette with 6 to 8 strokes per area to achieve a smooth glass-like surface. A total of 60 specimens were prepared which were randomly divided into three groups ( $n = 20$ ). Each group received the root conditioning treatments as follows: Group A: Control Group: only saline rinsing. Group B: root conditioning treatment with 17% EDTA for 5 minutes. Group C: root conditioning treatment with BioPure MTAD for 5 minutes.

**Results:** MTAD removed the smear layer successfully from the root surfaces. The mean smear score for samples treated with Biopure MTAD was lower than those treated with EDTA, ( $p = 0.04$ ).

**Conclusion:** MTAD can be used as a root conditioning agent with efficient smear layer removal ability and known antimicrobial and anticollagenase activity.

## P0628

### Validation of a new surrogate model using bull and boar sperm cells to assess the membrane's cell occlusive potential

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**Aim:** To assess the potential of bull and boar sperms when used as a surrogate cell model to assess the cell occlusive potential in vitro using membranes of standardized porosities.

**Material and Methods:** A special two-chamber model was fabricated, which allows for the placement of separating membranes. Isopore polycarbonate membranes with known standardized diameters of 0.6, 1.2, 2.0, 3.0, 5.0 and 8.0  $\mu\text{m}$ , respectively, were used to assess the penetration behaviour of spermatozoa. The latter were placed at minimum concentrations of 50 Mio/ml (up to max. 200 Mio/ml) in the lower chamber. Semen extender was placed in the upper chamber and after 10 min of incubation at room temperature, sperm number was assessed subjectively and using computer-assisted sperm analysis. A non-porous polyester membrane was used as negative control to assess the overall tightness of the set-up. Experiments with the different sperm populations and membranes were each carried out in triplicates.

**Results:** Both cell types have had average cell body lengths and widths of  $9 \times 5 \mu\text{m}$ . Both were not able to pass through pores  $\leq 2 \mu\text{m}$ , whereas pore sizes of  $\geq 3 \mu\text{m}$  revealed countable/detectable spermatozoa in the evaluation chamber. Their number increased with increasing pore diameters.

**Conclusion:** Within the limitations of this laboratory study and the xenogenic cell surrogate material, the model allows to easily assess cell penetration through porous structures like membranes. We hope to further assess, improve and validate this model, which we aim to use for the screening of membranes after different degradation methods.

## P0629

### Enhancing soft tissue contour around dental implant

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**Aim:** Extraction especially surgical one may produce buccal bony defects with reduced bone volume altering both quantity and position of Keratinized mucosa. Several surgical interventions including bone and soft tissue augmentation may be required. The aim of this prospective study is to evaluate the use of collagen Derma<sup>®</sup> in enhancing buccal contour around dental implant

**Material and Methods:** 18 patients evaluated by CBCT preoperative to determine defective site bone volume, indicated for transmucosal implant insertion. All buccal defects measured by

waxing up of the total defects to the normal contour of the counterpart, connected line from the cemento-enamel junction below contact points, the defects measured by graduated probe between this line and the second line resembling the outer contour. Precise full thickness flap and implant insertion. All exposed threads of implant augmented. Soft tissue enhancement achieved using collagen Derma<sup>®</sup>, fashioned around the implant neck and extended to cover all the augmentation material. All patients evaluated clinically and measurements of the defects through models is performed four months post-operatively. Descriptive statistic was expressed as mean + and standard deviation (SD). Soft tissue defects were calculated preoperatively and 4 months postoperatively.

**Results:** the mean value of buccal bony defects significantly reduced from the base line  $-3.4 + 0.49$  to 4 four months post-operative  $1.58 + 0.49$ . Significant increase in the keratinized mucosa is observed around implant neck

**Conclusion:** Within the limitation of this study using collagen Derma may provide soft tissue enhancement around dental implant

## P0630

### Foreign body of endodontic origin without any symptom for 25 years

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**Aim:** The purpose of this paper was to present an unusual case of a foreign body of endodontic origin (root-filling material) without any symptom for 25 years.

**Material and Methods:** A 52-year-old man who was referred to Bulent Ecevit University Faculty of Dentistry with complaining of tooth caries. The panoramic and periapical radiographs showed a radioopacity placing the anterior maxilla. The radioopaque lesion covered by radiolucent area and associated with the end of endodontic treatment of tooth 21. Patient told that he had endodontic treatment 25 years ago and he had no pain or any disturbance from there. Apical resection surgery was performed and foreign body eliminated under local anesthesia.

**Results:** Apical surgery is considered a standard oral surgical procedure. It is often a last resort to surgically maintain a tooth with a periapical lesion that cannot be managed with conventional endodontic re-treatment. A complication following the root canal therapy occurs as the result of over instrumentation and extrusion of endodontic obturation materials.

**Conclusion:** The postoperative course was uneventful, with no functional problems. Follow-up panoramic and periapical radiographs showed nearly complete osseous regeneration of the lesion.

## P0631

### Effect of Nd:YAG low level laser therapy on human gingival fibroblasts

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**Aim:** The aim of this in vitro study was to evaluate the effect of LLLT on human gingival fibroblasts in terms of proliferation and growth factors' secretion (EGF, bFGF and VEGF).

**Material and Methods:** Primary cultures of keratinized mucosa fibroblasts were irradiated by a Nd:YAG Laser 1064-nm for 20, 40, 60 or 120 seconds (energy densities: 2.6 J/cm<sup>2</sup>, 5.3 J/cm<sup>2</sup>, 7.9 J/cm<sup>2</sup>, 15.8 J/cm<sup>2</sup> respectively). An additional experimental group was irradiated by a light-emitting diode device (LED) for 20 seconds (12.5 J/cm<sup>2</sup>). The control group was not irradiated. Experimental and control groups, were examined for cell proliferation and growth factors' secretion after 24, 48 and 72 hours. All experimental procedures were performed in duplicate. Data were analyzed by Students t-test ( $p < 0.05$ ).

**Results:** All laser-irradiation doses applied, promoted a higher cell proliferation at 48 hours in a dose-response relationship compared to control group. This difference reached statistical significance for the group irradiated for 120s ( $p = 0.03$ ). Regarding EGF, all laser-irradiation doses applied, promoted a higher secretion at 48 hours in a reverse dose-response relationship compared to control group. This difference reached statistical significance for the group irradiated for 20s ( $p = 0.04$ ). EGF values at the other timepoints, bFGF and VEGF as well, showed a random variation between the groups.

**Conclusion:** Within limitations of this study, the results indicated that LLLT (1064-nm) may induce gingival fibroblasts' proliferation, in a dose response pattern and upregulate the secretion of EGF in a reverse dose response pattern. Further studies are needed in order to draw solid conclusions.

## P0632

### Isolation of palatal adipose tissue-mesenchymal stem cells (PAT-MSCs)

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**Aim:** To analyze whether mesenchymal stem cells (MSCs) can be isolated from palatal adipose tissue (PAT) and to compare PAT-MSCs with MSCs obtained from adipose tissue by liposuction (LAT) in respect to their potentials.

**Material and Methods:** Cells were isolated from palatal adipose tissues (n:2) from the adipose part of connective tissue grafts during gingival recession surgeries and liposuction materials (n:2) from plastic surgeries and they were assessed by flow cytometry to confirm the MSC-specific surface markers. MSCs were tested for multilineage differentiation capacity. Expression of embryonic stem cell markers (OCT4, Nanog, Rex1, Sox2) and ALP activity were compared in both MSCs. Proliferation of MSCs was evaluated using the real time-cell analyzer (RTCA-SP; xCELLigence system) for 245 hrs. Telomerase activity was evaluated by ELISA based TRAP assay.

**Results:** Although trend of cell proliferation was higher in LAT-MSCs, there was no significant difference between LAT- and PAT-MSCs. The increased level of ALP activity (4 fold) was found in PAT-MSCs. The expression of embryonic stem cell genes was observed higher in LAT-MSCs when compared to PAT-MSCs.

**Conclusion:** This is the first study presenting MSCs isolation from palatal adipose tissue. The results of this study demonstrated that these cells seem to have more osteogenic potential when compared to LAT-MSCs (This study was funded from The Scientific and Technological Research Council of Turkey, TUBITAK/SBAG-112S58) and Selcuk University Research Coordination Office-BAP, Turkey).

## P0633

### An innovative technique in ridge reconstruction: a pilot study with histological analysis

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**Aim:** Space provision is one of the main problems in alveolar ridge reconstruction. The goal is to create and maintain a secluded space where the blood clot may be established and stabilized. This defines the maximum bone volume that can be regenerated. The present study presents a novel technique to manage non-space making alveolar defects due to advanced periodontitis by using resorbable polydioxanone sutures as space-making device.

**Material and Methods:** Three patients, aged from 50 to 65 years with severe chronic periodontitis and requiring extraction of at least one anterior tooth were consecutively enrolled. The same surgical protocol was applied to every patient at the completion of the etiological treatment. At the time of teeth extraction a flap was elevated, and the sockets were debrided. Four holes were made on the socket walls to secure the polydioxanone sutures and to form a cage to support soft tissues. The flap was placed at the presurgical position and the obtained space filled by blood clot. No grafting material was used. The site healed by secondary intention. After 6 months a complete clinical evaluation was made together with CT scan and biopsy for histological analysis.

**Results:** The healing was uneventful. The X-ray images showed complete remineralization and bone volume augmentation at the treated sites. Histologically, new bone formation, complete polydioxanone readorption and absence of inflammatory infiltrate were observed.

**Conclusion:** These promising findings may represent the basis for future research on ridge reconstruction without the use of grafting materials.

## P0634

### Are guided tissue regeneration outcomes influenced by residual periodontal ligament and bone position? An experimental animal model with micro-CT analysis

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**Aim:** This preclinical in vivo study aims to evaluate in pigs the influence of the distance of residual periodontal ligament (PDL) and bone on periodontal healing in calibrated surgical defects in Guided Tissue Regeneration (GTR) procedure.

**Material and Methods:** Three adult Sus scrofa domesticus were used in this study. A total of six third mandibular incisors were analysed. After coronectomy of each experimental tooth at crest level a circumferential bone defect was created on five teeth using calibrated piezoelectric inserts maintaining a 2 mm constant width. The depths of the experimental defects were 3, 5, 7, 9 and 11 mm respectively. One tooth served as control. Each defect was accurately root planed and all teeth were submerged using a bio-resorbable bilayer collagen membrane. The mucosal flap was repositioned to achieve a full closure. After 6 months

the animals were euthanized, block sections were harvested and maintained at  $-20^{\circ}\text{C}$  for micro-CT analysis.

**Results:** Clear signs of root resorption were observed with values directly correlated to the extent of the vertical defect. The medial third of the root was the most impaired. Signs of ankylosis were also recorded in the 3 and 7 mm depth defects.

**Conclusion:** In GTR procedure periodontal ligament and alveolar bone seem to compete for periodontal wound healing and their proximity to the root surface seems to influence the final outcome. The results support the hypothesis of a critical defect dimension for GTR effectiveness.

## P0635

### Clinical and radiographic evaluation of the treatment of intrabony defects with use of nanocrystalline hydroxyapatite material: a case series with re-entry

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**Aim:** The aim of the study was the assessment of clinical and radiographic outcome of periodontal intrabony defects treatment with open flap debridement in combination with nanocrystalline hydroxyapatite bone substitute application.

**Material and Methods:** Seventeen non-smoking patients diagnosed from periodontitis were included into the study. Before treatment and one year post op the following examination were performed: PI, GI, PD, GR, CAL, INTRA, bone defect width and radiographic defect depth and width. During surgery after open flap debridement bone defects were additionally filed with alloplastic bone substitute material – nanocrystalline hydroxyapatite embedded in a silica.

**Results:** After treatment PPD and CAL showed a statistically significant reduction (PPD –  $2.88 \pm 2.47$ , CAL –  $2.05 \pm 2.70$ ). The dimension of GR increased significantly ( $0.82 \pm 1.18$ ). Analysis of radiographs showed statistically significant reduction of defects depth and width ( $2.02 \pm 1.51$ ,  $0.82 \pm 0.99$ ). INTRA evaluated during re-entry surgery significantly diminished of  $1.71 \pm 1.54$  mm.

**Conclusion:** Application of nanocrystalline hydroxyapatite bone substitute in the treatment of intrabony defects leads to improvement of clinical, radiographic and intrasurgical parameters. However validity of clinical use of this biomaterial needs to be confirmed by further studies.

## P0636

### Clinical and radiographic evaluation of treatment of intrabony defects with use of bioactive glass alone or in combination with collagen membrane: randomized controlled clinical study

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**Aim:** The aim of the study was the assessment of clinical and radiographic outcome of periodontal intrabony defects treatment

with use of bioactive glass alone or in combination with collagen membrane.

**Material and Methods:** Forty non-smoking patients diagnosed from periodontitis were included into the study. Patients were randomly equally allocated into two groups. In the first group (BG) open flap debridement procedure was done with following application of bioactive glass material into the bone defect. In the second group (BG+GTR), after the defect has been filled up with bioactive glass, additionally the collagen membrane has been positioned to cover the defect. Before treatment and six month post op the following examination have been performed: FMPS, FMBOP, PD, CAL, GR and radiographic defect depth and width.

**Results:** After treatment in both groups mean values of FMBOP, PD, CAL as well as radiographic defect depth and width significantly decreased. There was no differences in all examined parameters between two groups six months post-op, except radiographic defect depth. Reduction of this parameter was of 3.3 mm in BG group and 4.35 mm in BG+GTR group.

**Conclusion:** Application of bioactive glass alone or in combination with collagen membrane leads to improvement of clinical and radiographic parameters.

## P0637

### Collagen membranes adsorb the TGF- $\beta$ RI kinase-dependent activity of enamel matrix derivative

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**Aim:** Enamel matrix derivative (EMD) is frequently applied together with a collagen membrane in periodontal regeneration. Molecular and cellular mechanisms how EMD can support the performance of collagen membranes and vice versa remain unclear. The following hypothesis can be raised: EMD components adsorb to the collagen membranes which serve as pool for the growth factors, which then, are presented to the immigrating target cells.

**Material and Methods:** Three commercial collagen membranes, Jason<sup>®</sup>, Collprotect<sup>®</sup>, and Mucoderm<sup>®</sup>, were soaked with EMD for various time periods, followed by repeated vigorous washing. Then, oral fibroblasts were seeded onto the collagen membranes and subjected to gene expression analysis. Experiments were performed in the presence of the TGF- $\beta$  receptor I (TGF- $\beta$ RI) kinase inhibitor, SB431542, and protease inhibitor cocktails. Immunoassays determined the release of IL-11.

**Results:** Gingival fibroblasts exposed to three commercial collagen membranes previously soaked with EMD, increasingly expressed the typical TGF- $\beta$  target genes IL-11, PRG4, PTX3 and ADM. The relative gene expression was higher in Jason<sup>®</sup> as compared to Collprotect<sup>®</sup> and Mucoderm<sup>®</sup>, and could be blocked with SB431542. Also recombinant TGF- $\beta$ 1 readily adsorbs to the membranes and provokes expression changes of the respective genes.

**Conclusion:** These findings demonstrate that collagen membranes can adsorb EMD components that provoke a TGF- $\beta$ -like response in gingival fibroblasts. Adsorption of EMD components on the collagen membranes may, therefore, contribute to retardation of EMD effects at regeneration sites. Together with our previous evidence that EMD activity requires TGF- $\beta$ RI kinase signaling, our results also suggest that the active component of EMD adsorbs to the collagen membranes.

**P0638****Effect of Nd:YAG Low Level Laser Therapy (LLLT) on human PDL cells. An in vitro study**

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**Aim:** The purpose of this study was to investigate the effect of Nd:YAG (1064-nm) laser irradiation on human periodontal ligament (PDL) cells, concerning proliferation, differentiation and certain growth factors secretion.

**Material and Methods:** Primary PDL cell cultures established and the outgrowth seeded into 12-well plates, approximately 10000cells/ml. Irradiation performed with Nd:YAG laser (1064-nm, 0.5W, 50 mJ, 10 Hz) on day 0, for 20, 40, 60 and 120 seconds (energy densities: 2.6–15.8J/cm<sup>2</sup>) in duplicate. Non-irradiated cells used as controls. The effect of irradiation evaluated after 24 and 72 hours. Cells' proliferation assessed using hemacytometer. Cells' differentiation evaluated by ALP activity. Growth factors' (VEGF, EGF, bFGF) levels assessed using molecular techniques (Luminex). Statistical analysis performed with Students t-test.

**Results:** Cell cultures irradiated for 40s, 60s and 120s revealed higher proliferation compared to controls 24 and 72 hours after irradiation. Statistical significance was reached for the group of 60s at 24 h and for groups of 40s and 120s at 72 h ( $p < 0.05$ ). ALP levels were also found increased for most of the irradiated cell cultures compared to controls. This difference reached statistical significance for 120s group at 24 h as well as for 20s group at 72 h ( $p < 0.05$ ). Growth factors' levels were arbitrary during the experiment.

**Conclusion:** Within the limitations of this study, LLLT using Nd:YAG (1064-nm), with the energy densities applied, increased PDL cells proliferation 24 and 72 hours after irradiation. ALP levels in some cases found increased. Molecular techniques applied, did not reveal any influence of the selected settings on the examined growth factors secretion.

**P0639****Recombinant Human Full-length Amelogenin induces osteogenesis via the Wnt/ $\beta$ -catenin signaling pathway in human bone marrow stromal cells**

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**Aim:** Amelogenins are assumed to be responsible for enamel matrix derivative-induced periodontal regeneration; however, the signaling pathway(s) activated by human amelogenin alone have not been thoroughly investigated. This study aims to express and purify a recombinant full-length human amelogenin protein (rhAm175) in *Escherichia coli* system, and further investigates possible signaling pathway(s) of rhAm175 inducing osteogenic differentiation of human bone marrow stromal cells (BMSCs).

**Material and Methods:** Human cDNA encoding a 175-amino acid amelogenin was subcloned into the modified pET28a(+) vector. The rhAm175 expressed in *E. coli* cells stain BL21 (DE3) was purified and characterized. We examined morphological changes and gene expression characteristic of osteogenesis in human BMSCs induced by the purified rhAm175. Based on

the PCR array analysis, intracellular signaling molecules were further characterized by real-time PCR and western blot.

**Results:** The purified rhAm175 was confirmed as human amelogenin. The rhAm175 could induce mineralization of human BMSCs, and resulted in the up-regulation of 14 genes and down-regulation of 7 genes compared with the control. The rhAm175 activated GLI1,  $\beta$ -catenin and Fra-1 to induce osteogenesis.

**Conclusion:** The rhAm175 induce osteogenic differentiation of human BMSCs via Wnt/ $\beta$ -catenin signaling pathway.

**P0640****Comparison of canine multipotent mesenchymal stromal cells from various mesenchymal tissues**

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Tokyo/Japan

**Aim:** Recently, multipotent mesenchymal stromal cells (MSCs) from various mesenchymal tissues are expected for the periodontal regenerative medicine. Dogs are often used as large animal models for evaluating periodontal regeneration. However, the properties of dog MSCs are not well understood. Therefore we evaluated the properties of dog MSCs derived from various mesenchymal tissues.

**Material and Methods:** Dog MSCs derived from bone marrow, adipose, periodontal ligament, alveolar periosteum, and gingiva were primary cultured. Proliferation, cell surface markers (CD29, CD90, CD34, and CD45), colony forming ability, differentiation capacity (osteogenesis, adipogenesis, and chondrogenesis), and alkaline phosphatase (ALP) activity were evaluated in the each tissue derived MSCs.

**Results:** There were no differences in the cell proliferation and cell surface markers among all types of MSCs. Gingiva-derived MSCs were the highest in colony-forming ability. ALP activity was the highest in the MSCs derived from periodontal ligament. The Alizarin red S positive colony-rate demonstrated higher osteogenic potential in the MSCs derived from periodontal ligament and adipose. The Oil Red-O positive colony-rate demonstrated higher adipogenic potential in the MSCs derived from gingiva and adipose. The COL2A1 gene expression was the highest in the chondrogenic pellets of the MSCs derived from periodontal ligament.

**Conclusion:** There were distinct differences in the dog MSCs derived from various mesenchymal tissues. It is considered that the MSCs derived from periodontal ligament are the suitable cell source for the periodontal regenerative medicine.

**P0641****Bone marrow mesenchymal stem cells (BM-MSCs) as a cell source for the regenerative treatment of intrabony periodontal defects. Preliminary findings of a randomised controlled clinical trial**

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**Aim:** To determine the efficacy of a novel regenerative treatment of intrabony periodontal defects by transplantation of autologous BM-MSCs.

**Material and Methods:** Following non-surgical periodontal treatment, 60 advanced chronic periodontitis patients, who had at least one interdental osseous defect with pocket depth (PPD) and attachment level (CAL)  $\geq 6$  mm and an infrabony component of  $\geq 3$  mm were randomised into one of the three treatment groups. Group-A received regenerative treatment using autologous BM-MSCs free of animal derived reagents, produced in clean-room facilities, tested for sterility and seeded into collagen scaffolds enriched with autologous fibrin-glue. In Group-B, a collagen fleece enriched with fibrin-glue devoid of stem-cells filled the osseous defect. Group-C received open-flap debridement retaining the soft-wall of defects. Subjects were clinically and radiographically assessed before anaesthesia (baseline) and at several time-points over 12-months. The VixWin™ Platinum|Gendex software was used for radiographic assessment.

**Results:** Preliminary data are reported for 11 subjects who experienced no healing adverse events throughout the observation period. All defects regardless of the surgical approach demonstrated radiographic evidence of bone fill at 6-weeks and 3-months from baseline ( $p < 0.05$ ; Two-way Anova with repeated measurements). A baseline to 3-month reduction of, -the distance from cemento-enamel junction to bottom of defect: 21.8%; 6.4%; 11.4%; -infrabony depth: 34.7%, 16.6%, 29.1%; -defect width: 30.5%; 31.3%; 16.7% was noted for Group-A, -B, -C, respectively. Clinical data will be presented upon the 6-month re-assessment completion.

**Conclusion:** All surgical approaches demonstrated radiographic evidence of bone fill; this study is in progress to determine the merits of using BM-MSCs in periodontal regeneration.

## P0642

### Clinical Outcomes After Treatment Of Intra-Bony Defects With Porous Titanium Graft/Advanced Platelet Rich Fibrin: Case Series

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**Aim:** Porous titanium graft (PTG) is made of pure titanium, non-resorbable, osteoconductive graft material. Advanced-platelet rich fibrin(A-PRF), is new generation thrombocyte concentrates that including more monocytes that increased recovery. Objective of this study was to evaluate the clinical effectiveness PTG in combination with A-PRF in treatment of periodontal intra-bony defects.

**Material and Methods:** Patients were diagnosed at least one intra-bony defects of  $> 4$  mm. Assessments at baseline and after 6 months included bone sounding, attachment levels (AL), probing pocket depths (PPD), bleeding on probing (BOP) and attached gingiva width (AGW). Early wound-healing, adverse effects and patients' perceptions were also recorded.

**Results:** The study comprised 7 patients (mean age:56.4) and 9 intra-bony defects. According to the statistical evaluations, the mean clinical pocket depth in periodontal defects were 5.89 mm before the treatment and 3.21 mm at 6 months after the treatment. Radiographical surveys showed a mean defect depth 5.56 mm and mean defect width 3.12 mm at baseline. Following the treatment the mean filling amount of the defect depth and width was measured 4.57 mm and 2.68 mm, respectively. The average of AGW was increased by 0.73 mm after the treatment.

**Conclusion:** According to the study, PTG was successful for treatment of cases with intra-bony defects. The width of

attached gingiva around the teeth was increased after A- PRF application.

## P0643

### Intentional replantation of adhesively reattached vertically fractured single rooted teeth

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Izmir/Turkey

**Aim:** The aim was to evaluate the clinical outcomes of intentionally replanted single rooted teeth with vertical root fractures (VRFs) after repaired extraorally using adhesive resin cement.

**Material and Methods:** Twenty-three endodontically treated single rooted teeth with VRFs were included in the study. After the teeth were extracted, fractured fragments were adhesively cemented extraorally and the teeth were then replanted and splinted to neighboring teeth. Plaque index (PI), gingival index (GI), probing depth (PD) and clinical attachment level (CAL) were measured at baseline, 6 and 12th months. Radiographic evaluations were made at baseline and 12th months and the mobility was evaluated using periotest values (PTVs) at baseline, 1, 3, 6 and 12th months. Clinical parameters of contralateral teeth were used as the control teeth in the statistical analyses.

**Results:** Two teeth were extracted during the follow up period. PI, GI, CAL and PD scores were significantly lower at all evaluation time points compared to baseline in test teeth, but there were no difference between the groups comparisons. PTV in the test teeth were significantly increased after replantation and returned back to the baseline levels at 12th month. PTVs were significantly higher in the replanted teeth ( $p < 0.05$ ) during the follow up, but the scores were similar at 12th month observation.

**Conclusion:** Adhesive cementation and intentional replantation of vertically fractured teeth could be a treatment alternative for endodontically treated single rooted teeth.

## P0644

### Combined Treatment of Alveolar Bone Defect Caused by Subgingival Cement Remnants: A Case Report

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Izmir/Turkey

**Aim:** Cement remnants is known as a cause of periodontal abscess in which periodontal tissues may be rapidly destroyed. Treatment of such a bony defect carries the risk of a poor aesthetic and stability outcome. The aim of this case report was to evaluate the clinical effectiveness of the bone grafts in the treatment of intrabony defects.

**Material and Methods:** A 54 years old patient who had periodontal abscess on tooth 33 were examined clinically and radiographically at baseline. Cement remnants on the mesial surface of the root was observed. Scaling and root planning were performed and oral hygiene instructions were given. 3 months after, a full thickness flap was raised and intrabony defect was filled with xenogenic bone graft (Bio-Oss®). Clinical periodontal parameters were recorded at baseline, 12 and 18 months and standard photographs were taken. Coronally advanced flap with

connective tissue graft was applied for achieving sufficient keratinized tissue width at 3 months after the grafting procedure.

**Results:** Complete resolution of the defect was achieved at 12 months. The 8 mm baseline pocket depth was 4 mm at 18 month. The clinical attachment gain was 4 mm. The keratinized tissue width was 0.7 mm at baseline and following connective tissue grafting 2 mm. increased was observed.

**Conclusion:** Bio-Oss® was capable of providing considerable vertical bone augmentation in periodontal bone defects.

## P0645

### Bone formation after ridge preservation with a collagen matrix: a histological study in dogs

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**Aim:** Alveolar ridge resorption is an inevitable process occurring after tooth extraction. There is strong evidence that ridge preservation techniques significantly maintain more ridge width and height thus increasing the predictability of future implant treatments. The aim of this study was to evaluate at a cellular level the early healing process developed in post-extraction sockets preserved with a collagen matrix with or without a collagen membrane

**Material and Methods:** The extraction sockets in both quadrants of dog mandibles were preserved with a double-layered or a single-layered technique and were completely covered by the flaps. The samples were harvested one month after the surgery and histologically analyzed.

**Results:** In the areas where a double-layered technique was used the new bone was synthesized in the entire height of the sockets; trabecular bone was present in the external third of the alveolae with active osteoblasts alternating with areas containing inactive ones. Lacunae containing osteocytes were also present. The same pattern of healing was observed for the sockets preserved only with the collagen matrix, but the osseous healing involved only the two internal thirds of the sockets. A well-developed soft tissue lining the sockets was observed.

**Conclusion:** Both ridge preservation methods were associated with well-developed early healing phenomena inside the sockets; active osseous formation was demonstrated.

## P0646

### The evaluation of PRP (Platelet-Rich Plasma) in the treatment of periodontal intrabony defects

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**Aim:** The aim of this study was to evaluate the efficiency of PRP clinically radiographically and immunologically in the intrabony defects when it was used with deproteinized bovine bone graft which OPG, IL-1 $\beta$  and IL-17 levels of gingival crevicular fluid were collected and analyzed by the end of 3 and 6 months of healing periods.

**Material and Methods:** 30 defects of 15 patients with periodontitis were treated with bone graft or bone graft and PRP. The clinical, radiographic and immunological evaluation were

obtained and recorded before and 3–6 months after the treatment. The changes were tested statistically with independent t test and paired t test.

**Results:** After the treatment clinical and radiographical measurements improved in both groups, GCF OPG levels increased and IL-17, IL-1 $\beta$  levels decreased in both groups. However better improvements were recorded in test group, it was not statistically significant.

**Conclusion:** These results suggest that periodontal treatment with PRP/graft seems to be more effective than graft only in terms of GCF bone markers like OPG, IL-17 and IL-1 $\beta$  but it is not statistically significant.

## P0647

### The behaviour of palatal mesenchymal stromal cells in relation with some biomaterials

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**Aim:** This study analysed the behaviour of the palatal mesenchymal stromal cells (MSCs) when grown on the surface of two biomaterials used to restore cervical lesions associated with gingival recessions.

**Material and Methods:** The wastes from palatal tissue samples harvested in order to cover gingival recessions were processed following a standard protocol, stimulating the development of only undifferentiated cellular lines. Cells at passage four were analyzed by flow cytometry to identify surface antigens and were tested for multilineage differentiation capacity. Composite resin and compomer discs plated with expanded cells were used to analyze the cell characteristics by scanning electron microscopy (SEM).

**Results:** The cells displayed a surface antigen make-up characteristic for MSCs but did not express hematopoietic markers CD34/45. The palatal MSCs successfully differentiated into osteogenic, adipogenic, and chondrogenic lineages. SEM images revealed that the density of MSCs seemed to be higher on the compomer specimens than on composite resin specimens. Moreover, the dimension of the cells grown on compomer substrates seemed higher than those grown on composite resin discs. MSCs presented an extremely elongated-shaped morphology and long cytoplasmic prolongations originating from their membrane. The prolongations showed numerous attachment areas to the substrate, for both materials.

**Conclusion:** Resin composite and compomer materials seemed to have no cytotoxic effect on isolated cells since the cells had grown well on both biomaterials. This recommends them to be used to restore cervical lesions during root coverage surgeries. Acknowledgements: "This paper was published under the frame of European Social Fund, Human Resources Development Operational Programme 2007–2013, project no. POSDRU/159/1.5/S/138776".

## P0648

### Histological observation of the soft tissue healing after ridge preservation using a new 3D collagen matrix: a preclinical study

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**Aim:** Post-extraction alveolar ridge resorption is an inevitable process occurring after tooth removal and could frequently complicate restorative treatments. Ridge preservation procedures significantly maintain more ridge dimensions, with most materials being effective. This animal study aimed to observe the effect of a 3D new collagen matrix on the healing of the soft tissue overlying the post-extraction sockets preserved with the collagen-matrix alone or in association with a collagen membrane.

**Material and Methods:** The distal sockets of the mandibular second and fourth premolars of four dogs were used as experimental sites and were preserved using the collagen matrix alone or associated with a collagen membrane. The samples were harvested after 5 months of healing. Histometric analyses and microscopic observations were performed.

**Results:** The histological analysis showed that the healed extraction sockets were covered with a keratinized oral epithelium. Both groups revealed a well-structured connective tissue homogeneously permeated by collagen fibres running mainly parallel to the bone surface. However, the specimens from the double-layered preserved sockets exhibited a slightly increased amount of connective tissue. The mucosa covering the alveolar ridges was significantly more abundant in post-extraction sockets preserved with the double layered approach as the histometric evaluation showed

**Conclusion:** The double-layered approach used to treat post-extraction sockets may result in a better preservation of the mucosal seal than the single-layered approach. Acknowledgements. The research was partially funded by grant No PN-II-PT-PCCA-2013-4-1474

## P0649

### Effects of 5 MHz low-intensity pulsed ultrasound on human periodontal ligament cells

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**Aim:** LIPUS has been known for its multifunctional effects on various cells and tissues. Most of researchers used 1 or 1.5 MHz for their experiments. Low frequency ultrasound waves penetrate tissues deeper than high frequency waves. Alveolar bone is just beneath gingival tissue. Therefore, the aim of this study was to evaluate the effects of LIPUS with 5 MHz, superficially acting frequency, on human periodontal ligament cells.

**Material and Methods:** LIPUS (30 mW/cm<sup>2</sup>, 20% duty cycle) was irradiated on hPDL cells with 3 different frequencies, 1 MHz, 3 MHz, or 5 MHz each day for 3 or 7 days and examined the mRNA gene expression of ERK1, ERK2, and collagen type I. Then, 5 MHz LIPUS was irradiated on hPDL cells cultured in osteogenic medium and examined the expressions of genes and proteins related with osteogenesis.

**Results:** 5 MHz LIPUS group showed more prominent mRNA expressions of collagen type I, ERK1, and ERK2 than 1 MHz and 3 MHz groups. The expressions of genes and proteins related with osteogenesis were also enhanced in 5 MHz LIPUS group.

**Conclusion:** These results demonstrate that 5 MHz LIPUS can be more effective on hPDL cells than 1 MHz or 3 MHz LIPUS in many ways.

## P0650

### Modulation of the expression of differentiation / maturation markers in osteoblasts treated with low-level diode laser.

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Granada/Spain

**Aim:** Previous in vivo and in vitro studies have reported that low-level diode laser therapy induces a biostimulatory effect, such as cell proliferation. The objective of this study was to determine the effect of low-level diode laser on genic expression of the main markers involved in osteoblast differentiation and maturation: Runx-2, Alkaline Phosphatase (ALP), Collagen type I (Col-I), Osterix (OSX), Osteoprotegerin (OPG) and Osteocalcin (OSC).

**Material and Methods:** Osteoblast-like cells (MG63 cell line) were exposed to diode laser (ezLase) of 940 nm at 1–1.5 W/cm<sup>2</sup> and 3–4 J. At 24 hours of treatment, the genic expression of Runx-2, ALP, Col-I, OSX, OPG and OSC was evaluated by quantitative RT-PCR.

**Results:** At 24 h, treatment with low-level diode laser showed an increase in expression of the markers: Runx2, ALP, Col-I, and OSX, depending on the applied dose. However, we did not observe changes in the expression of OPG and OSC.

**Conclusion:** These results demonstrate that laser therapy can exert a biostimulatory effect on osteoblastic cells at different levels, which may be clinically useful in the regeneration of bone tissue.

## P0651

### The early healing modifications in post-extraction sockets preserved with a bone substitute and a collagen matrix: an animal study

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**Aim:** Following tooth extraction it is of interest to minimize the resorptive process of the socket walls by performing ridge preservation procedures. The present study aimed to evaluate the early histological modifications in post-extraction sockets preserved with a collagen matrix associated with a bone xenograft, in an animal model.

**Material and Methods:** The sockets resulted from the extraction of the distal roots of second and fourth premolars in both quadrants of dog mandibles were preserved. The samples harvested one month after the surgery were histologically processed and analyzed.

**Results:** The bundle bone lined the inner surface of the sockets. The trabecular bone occupying the sockets was mainly com-

prised of the well-developed trabeculae of lamellar bone alternating with islands of woven bone; large amounts of trabecular bone occupied the apical and central compartments of the socket. A continuous layer of osteoblasts could be observed on the surface of woven bone areas. No osteoclasts could be observed on the external surfaces of the bone walls. Residual xenograft particles contained in the provisional matrix were observed in the outer and central portion of the socket and with no connection with the osseous trabeculae.

**Conclusion:** The microscopic picture revealed an intense osseous synthesis in the post-extraction sockets one month after socket preservation. Acknowledgments. This study was partially founded by the Iuliu Hatieganu University of Medicine and Pharmacy (Grant 22714/10/06.10.2011 and 1493/5/28.01.2014).

## P0652

### Assessment of A Novel Third Generation Barrier Membrane for Promoting Bone Regeneration

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**Aim:** 1. To evaluate mechanical, in vitro drug release and biocompatibility properties of an indigenously prepared Poly Lactic – Glycolic Acid membrane incorporated with Simvastatin, for potential use in guided bone regeneration. 2. To assess bone healing histologically following placement of PLGA incorporated with Simvastatin in surgically created defects in rat models.

**Material and Methods:** PLGA membranes, in concentrations of 100 mg, 200 mg and 300 mg, were prepared using Solvent casting method. Load and tensile strength of the prepared specimens was measured using Universal Testing machine. Drug content uniformity and in vitro drug release from the membrane was assessed using UV spectrophotometer. Biocompatibility was verified by MTT Assay. Ethical clearance was obtained for the in vivo study, where Wistar albino rats were chosen as animal models. 4x4 mm surgical defects were prepared in the mandible and animals were divided into three groups based on placement of barrier membrane – no membrane, PLGA and PLGA with Simvastatin. Animals were sacrificed at 1, 3 and 6 months for histologic assessment of healing at defect site.

**Results:** 1. PLGA membrane with 100 mg polymer had better mechanical properties and in vitro drug release profile and was found to be biocompatible. 2. PLGA with Simvastatin showed better mineralized bone at 6 months compared to PLGA alone and sham operated sites.

**Conclusion:** PLGA membrane incorporated with Simvastatin could serve the dual purpose of drug delivery device as well as a barrier for Guided Bone Regeneration.

## P0653

### Use of bioengineering matrix for closure of mucogingival defect on rats.

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Odessa/Ukraine

**Aim:** Development of bioengineering matrix (amniotic collagen human membrane with stem cells) for closure of mucogingival defect.

**Material and Methods:** There were 40 syngeneic Lewis line rats who took participation in this experiment. The rodents were divided in 4 groups with 10 rats in each group. Ligature model was used. For scaffold it was used amniotic collagen membrane, on which mesenchymal stem cells and endothelial cells of donor rats were put. In the first group (gingiva defect in the area of upper incisors) and in the second group (gingiva defect in the area of lower incisors) for closure mucogingival defect it was used bioengineering matrix. In the control groups (3 and 4) the healing took place in a natural way. Rodents were got out of the experiment on 3, 5, 7, 14 day after operation. Morphological and immunohistochemical researches were conducted, to reveal vessels of microcirculatory direction using method of transillumination.

**Results:** By the rodents of researching groups on 7 th and 8th day new forming tissue did not differ in the matter of form and color as well as it's morphological characteristics from normal gingival tissue. By the rodents of controlling groups in these terms mucus membrane was light pink color. According to morphological data there was formation of cicatricial connecting tissue.

**Conclusion:** It is determined that bioengineering matrix during the closure of mucogingival defect is biocompatible, biodegrade in appropriate for regeneration terms, and promote formation of blood clot and provide good revascularization of tissues and according to histological study provides regeneration of all necessary tissues.

## P0654

### Treatment of deep infrabony periodontal pockets by using Bio-Oss

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**Aim:** It has been reported for very positive effects of Bio-Oss in treatment of periodontal defects, so we want in our clinical material to study effect of this material in healing and regeneration of periodontal tissues.

**Material and Methods:** We treat 14 patients, mean age 33.6 years, with deep periodontal infrabony defects, in Department of Periodontology and Oral Disease of School of Dentistry of Medical Faculty of University of Prishtina.

**Results:** Using Bio Oss in deep periodontal defects we conclude a good toleration, reduction of periodontal pocket depth, creating a reattachment and less tooth mobility.

**Conclusion:** Bio oss has a good mechanical and osteogenetic potential in treating osseous defects of periodontal diseases.

## P0655

### Reconstruction of previous maxilla with Onlay graft: case report

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Madrid/Spain

**Aim:** Tooth extraction and the prolonged absence of teeth, may cause bone resorption both in width and height. These two facts

lead us to solve complicated situations to assess the possibility of rehabilitation with implants.

**Material and Methods:** Patient 18 years old, comes to the Specialty Clinic Alfonso X el Sabio, to assess the replacement of teeth 1.1 and 2.1, extracted 4 years ago. Following assessment of the CT scan, severe bone deficiency in height and width is observed, so bone augmentation with autogenous calvarian blocks for a 3-dimensional ridge augmentation. Free gingival graft is previously performed to ensure a larger amount of soft tissue. After 8 months it comes to the placement of implants with a new free gingival graft.

**Results:** Calvarian bone has several advantages: it is a bone of easy accessibility, has a high proportion of cortical bone and not being a burden bone morbidity is lower. Calvarian onlay graft also suffers less resorption, as a cortical bone. When making decisions it is important to have in mind the patient decisions, and in this case the calvarian autograft was a minor discomfort and healing times that experienced in other grafts.

**Conclusion:** The calvarian autograft is an option to consider in the bone graft as it provides a good result of bone quality and greater satisfaction for the patient.

## P0656

### Changes in gingival crevicular fluid OPG levels following regenerative periodontal surgery

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**Aim:** The study aims to compare the changes in gingival crevicular fluid OPG levels after the treatment of intrabony defects with either Platelet Rich Fibrin (PRF) and deproteinized bovine bone mineral (DBBM) or DBBM alone.

**Material and Methods:** Forty intrabony defects were randomly treated with either PRF/DBBM (n:21) or DBBM (n:19) alone. Plaque index (PI), gingival index (GI), probing depth (PD), clinical attachment level (CAL), gingival recession (GR) were recorded after phase 1 therapy (baseline), 3 and 6 months after surgery. GCF samples were collected after phase 1 therapy (baseline), 3 and 6 months after surgery and detected by enzyme-linked immunosorbent assay.

**Results:** Initial measurements were similar for both sites. With regard to clinical parameters, the differences in GI, PD, CAL were statistically significant compared to baseline values at 3rd and 6th months in both groups. There were no statistically significant differences for the clinical parameters between the groups except for changes in gingival recession and clinical attachment level. The levels of OPG in GCF elevated significantly over the post-treatment periods compared with baseline values in both groups. The increase in OPG levels recorded at 3rd and 6th months compared to baseline was significantly higher in test group than the control group.

**Conclusion:** The results of this study indicate that although both tested treatments are effective in the treatment of human intrabony defects, the PRF/DBBM combination demonstrated more favorably results with less gingival recession, higher gain in clinical attachment level and higher increase in OPG levels.

## P0657

### Importance of keratinized gingiva to the predictability of fixed prosthesis on implants

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**Aim:** We show in this case report a 50-year-old woman, non-smoker, without significant medical history. Two implants were placed at the 4.5 and 4.6 position. After the healing period, we observed the lack of keratinized tissue in both implants at vestibular side, so we proceeded to the second surgical phase with the combination of a free palate graft.

**Material and Methods:** Following the technique described by Sullivan and Adkins in 1968, we proceeded to the preparation of the receiver bed. Then the flap was partially dissected releasing the tension zone of the bottom of the vestibular zone. We proceeded to the measurement of the receiving area size to obtain the size of donor site. We selected the right side of the palate at level of the premolars and molars. We marked the incisions taking into account that the graft must have 1 to 2 mm in order to prevent primary contraction. After obtaining the graft dimensions and its adaptation to the recipient bed, it was stabilized suturing it with simple and periosteal stitches with non-absorbable suture. Once the graft was stitched, it was slightly compressed to prevent the formation of a blood clot. The suture was removed 15 days after.

**Results:** A gain of at least 3 mm of attached gum to the entire labial surface surrounding the implants and crowns was noted. This flap design allows immediate correction of adaptation of the keratinized tissue around the implants.

**Conclusion:** Developed by mucogingival techniques we are able to offer to our fixed rehabilitation a better maintenance and long-term survival.

## P0658

### Clinical performance of conservative surgery in the treatment of Class II furcation periodontal defects challenging regenerative therapies: a systematic review and randomized clinical trials meta-analysis

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**Aim:** To update the scientific evidence regarding the assessment of the efficacy of regenerative surgery (RS) in the treatment of class II furcation defects (FD) against conservative surgery (CS), and to explore if the clinical performance of different flap design can affect clinical outcomes in the CS.

**Material and Methods:** The search has been performed using electronic databases and manual searching to identify RCTs on class II FD treatment. Primary outcomes were Vertical Probing Depth (VPD), Vertical Clinical Attachment level (VCAL), Horizontal Clinical Attachment Level (HCAL), Vertical Open Probing Attachment (VOPA), Horizontal Open Probing Attachment (HOPA) and Recession (REC). Secondary outcomes were Vertical Bone Fill (VBF) and Horizontal Bone Fill (HBF). Weighted means and forest plots were calculated for each outcome variable 6 months after surgery. Subgroup analysis was performed according to the type of flap in the CS.

**Results:** Twenty-one papers were considered for the analysis. A Der Simonian and Laird Test was used for metanalysis due to the strong heterogeneity among the studies. The overall comparison between RS and CS favoured the former in all the primary outcomes. The combination of barrier membranes with grafts or bioagents represent the most performing techniques for this purpose. In the CS a sensible better performance of coronally advanced flap than the replaced flap was recorded.

**Conclusion:** CS produce worst clinical outcomes in the treatment of class II FD in comparison with RS. A better performance of CS may be obtained with the use of a coronally advanced flap.

## P0659

### Generation of a bioengineered model of human periodontal tissue using mesenchymal stem cells derived from the umbilical cord

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**Aim:** This work was focused on the generation of a biological substitute of the human periodontal mucosa by using umbilical cord Wharton's jelly mesenchymal stem cells (WHJSC) as an alternative cell source.

**Material and Methods:** Human fibroblasts and WHJSC were isolated from periodontal tissue and umbilical cord biopsies by using enzymatic digestion. Then, bioengineered substitutes of the human oral mucosa stroma were generated in laboratory by using fibrin-agarose biomaterials with fibroblast cells immersed within, and WHJSC were subcultured on top of the stroma substitutes to resemble the oral mucosa epithelium. These tissue substitutes were grafted on the skin of immune-deficient mice for 30 days and analyzed histologically.

**Results:** Bioengineered tissues showed a stratified epithelium, although the number and differentiation level of the epithelial layers was low in tissues kept in vitro. After grafting, a proper b. The artificial stroma showed low synthesis of fibrillar components of the extracellular matrix during the 3 weeks that tissues were maintained in culture, but a significant increase in collagen content and organization was detected after in vivo grafting. No reticular or elastic fibers were present in the artificial stroma.

**Conclusion:** These results confirm the potentiality of WHJSC as alternative source of cells for the generation of a well-stratified epithelium. In vivo engraftment was necessary for a complete stratification and differentiation of the periodontal mucosa substitute. This suggests that tissue engineering may have potential usefulness for the replacement of periodontal tissues

## P0660

### Biphasic calcium sulphate and xenograft combination in a minimally invasive treatment of periodontal infrabony defects – case series

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**Aim:** The beneficial effect of bone grafts alone or in combination with bioactive agents in the treatment of intraosseous peri-

odontal defects has been shown in the literature, mainly in terms of significant bone fill and gains in clinical attachment levels. Nevertheless, graft stability of particulate bone substitutes remains an issue. Biphasic calcium sulphate is a fast setting synthetic bone grafting material that can act as a binder when combined with the granules of other bone graft materials.

**Material and Methods:** Five consecutive cases presenting a residual angular infrabony defect were treated according to the principles of minimally invasive surgical technique (MIST) and received a combination of biphasic calcium sulphate and a xenograft. Periodontal clinical parameters were taken at baseline and 6 months after treatment by a blind examiner. Digital standardized intraoral radiographs were obtained using an acrylic customized x-ray positioning stent at baseline and 6 months after surgery, and were evaluated by a calibrated examiner.

**Results:** Statistically significant clinical improvements were observed, regarding PPD reduction ( $3.4 \pm 1.51$  mm) and CAL gain ( $2.6 \pm 0.89$  mm). Radiographically, this treatment approach lead to statistically significant reductions of CEJ-BD distance ( $2.33 \pm 1.68$  mm) and in the infrabony component of the defect ( $2.52 \pm 1.65$  mm). Mean infrabony component defect fill was 47.98% ( $\pm 20.17\%$ ).

**Conclusion:** Within the limits of this study, the combination of biphasic calcium sulphate with a xenograft applied with MIST resulted in significant improvements in terms of PPD reduction, CAL gain and bone defect fill.

## P0661

### Stem-cell based technologies applied to periodontal regeneration by tissue engineering techniques

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**Aim:** Stem cell-based technologies are attracting intense interest in periodontal tissue engineering due to the transdifferentiation potential of mesenchymal stem cells. The aim of this study is to determine the potential of dental pulp stem cells (DPSC) to be transdifferentiate into epithelial-like cells for periodontal regeneration purposes.

**Material and Methods:** First, we established primary cultures of human stromal fibroblasts, and DPSC. Subsequently, we identified the presence of stem cell markers by flow cytometry. Then, we bioengineered a stromal substitute using fibrin-agarose scaffolds with fibroblasts immersed within and DPSC cultured on top during 7, 14, 21 and 28 days of in vitro development. For in vivo studies, these artificial tissues were implanted on nude mice during 28 days. Histological analyses were performed by H&E staining.

**Results:** Our results demonstrated that DPSC used in this study were positive for typical stem cell markers such as CD105, CD90. The in vitro analysis demonstrated that DPSC were able to transdifferentiate into epithelial-like cells from the first week of development to the third week forming a single epithelial layer. After 28 days, the DPSC became stratified with more than 6 cell layers. At the in vivo levels, we observed a well-differentiated epithelial tissue composed by basal, intermediate and superficial layers.

**Conclusion:** These results suggest the possibility that DPSC can efficiently differentiate into epithelial-like structures of periodontal tissues at the in vitro and in vivo levels by the influence of epithelial-mesenchymal interactions.

## P0662

### Radiographic analyses of regenerated bone following treatment with bovine-derived xenograft and allograft in sinus lifting

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Ankara/Turkey

**Aim:** The posterior maxillary region is difficult to rehabilitate with dental implants due to two main limiting factors: maxillary sinus prolapsed and low bone density. One treatment currently used to obtain sufficient vertical bone height for implant placement is a sinus membrane lift. The purpose of this study was to assess the influence of different grafts on the dimensional changes of complete maxillary sinus volume that used in laterally approached sinus lift.

**Material and Methods:** Analysis of 10 surgical procedures of maxillary sinus lift performed using two different grafting materials: mineralized allogenic particulate bone (cortical/cancellous) (n = 5) (grouped as G1) and decalcified freeze-dried bovine bone (n = 5) (grouped as G2). The CBCT scans of the maxillary sinus were obtained using the Morita Veraviewepocs F40-CP, measuring complete maxillary sinus volume (T0) and dimensional changes of different graft materials immediate post-operatively (T1) and after 6 months (T2).

**Results:** The residual bone height was measured an average of 4.02 mm in G1 and 3.065 mm in G2 at T0. After 6 months, radiographic bone gain was measured an average of 12.9 mm in G1 and 11.9 mm in G2, respectively. There was no statistically significant difference between the groups as regards degree of graft volume, residual bone height, postoperative graft height in sinus, radiographic bone gain ( $p > 0.05$ ).

**Conclusion:** Within limitations of this study, it can be concluded that both bovine-derived xenograft and allograft application resulted with a satisfactory bone height. These two graft materials may be good alternatives in sinus lifting procedure.

## P0663

### Evaluation of a hydrogel membrane for bone regeneration in a supraalveolar model in dogs

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**Aim:** The aim of the study was to evaluate bone regeneration in canine model. Supraalveolar periodontal defects were surgically created and filled with biphasic calcium phosphate (BCP) particles covered with a polymer reticulating membrane of silylated hydroxypropyl methylcellulose (Si-HPMC).

**Material and Methods:** Bilateral, critical-sized, supraalveolar periodontal defects were surgically created at the mandibular premolar teeth of six adult beagle dogs. The defects were randomly allocated and: (i) left empty for spontaneous healing (control condition) or filled with the following materials: (ii) BCP and a collagen membrane (reference treatment); (iii) BCP and hydrogel Si-HPMC used as a barrier membrane. After submerged wound closure, the defects were left to heal. The animals were euthanized 12 weeks later and dissected blocks were processed for light microscopy, scanning electron microscopy, micro-computed tomography, and histomorphometric analysis

(i.e., new bone formation [NB] and ratio of the area filled by new bone [BR]).

**Results:** Clinical healing was uneventful. At 12 weeks, the experimental conditions resulted in significantly enhanced bone regeneration compared to the control (BCP/Si-HPMC:  $0.524 \pm 0.104$  vs.  $0.134 \pm 0.095$ ,  $p < 0.05$ ). BCP exhibited osteoconductive properties and the resorption appeared to be more pronounced in the test group compared to the reference group. No histological features of foreign body reactions, ankylosis, or root resorption were noted in the study.

**Conclusion:** The hydrogel of silylated hydroxypropyl methylcellulose (Si-HPMC) may act as an occlusive barrier to effectively contribute to bone regeneration. It also enhances the initial biomaterial stability of the BCP granules in complex periodontal defects.

## P0664

### Clinical and radiographical evaluation of allogenic bone rings with simultaneously immediate insertion: case series

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Ankara/Turkey

**Aim:** Vertical augmentation of atrophic alveolar ridges is considered a challenging procedure. The different techniques and materials have been used to provide the structural base of bone and soft tissue support for dental implants. In the cases presented, the technique was used for vertical augment the alveolar bone three-dimensionally with "allogenic bone rings" that is a pre-fabricated and placed immediate implant in one stage vertical augmentation.

**Material and Methods:** 6 patients with severe alveolar bone resorption were selected to receive bone ring grafting and immediate dental implant placement. CBCT scans were performed before the procedure (T0) and 6 months postoperative (T1) to evaluate alveolar bone height and width, level of allogenic bone height and resorption around the implants. 6 months after loading of prosthesis, each gingiva attachment and probing depth (PD) of implants were analyzed. The survival rate of the bone ring and the retention rate of implants were measured. Complications and patient satisfaction were also recorded.

**Results:** Bone graft survival rate was 98% and dental implantation retention rate was 100% at 6<sup>th</sup> month after post operation. Average bone level increase was  $7.05 \pm 1.87$  mm; average bone resorption was  $1.33 \pm 1.4$  mm. No major postoperative complication was observed, restorations were successful, and patient satisfaction level was high.

**Conclusion:** Bone ring allograft technique which immediate dental implantation are relatively simple to perform and a viable technique in vertically deficient alveolar ridges. This procedure also facilitates reduction in required treatment time. Short-term effect is reliable and satisfactory.

## P0665

### Combined use of concentrated growth factor and bone grafting in the treatment of posterior infrabony defects: case reports

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**Aim:** The infrabony defects can be developed by periodontal disease, tooth loss, trauma and infection. Several methods are available to enhance the healing and regeneration of periodontal tissues after surgical therapy of infrabony defects. Concentrated Growth Factor (CGF) is used to generate new bone, periodontal ligament, and new attachment via enhancement of wound healing through an autologous source for growth factors obtained from the patient's own blood.

**Material and Methods:** Two male patients at the age of 43 and 57 were referred to our department for pain on their posterior maxilla associated with exudate formation. According to the radiological and clinical examination, probing depths (PD) of the defects were  $\geq 6$  mm and had radiographic angular infrabony defects existed. After phase I periodontal treatment, periodontal flap surgeries were performed. The defects were filled with deproteinized bovine bone mineral (DBBM) mixed with CGF. Double layers of CGF were used as membrane. Flaps were sutured with a primary closure. All patients were placed on amoxicillin+clavulonic acid (1000 mg, twice a day for 5 days) and chlorhexidine gluconate (0.12%, twice a day for 2 weeks). 26, and 52 weeks after surgery, PDs, plaque index (PI), bleeding on probing (BOP) were recorded and radiographs were taken.

**Results:** New bone formation was observed radiographically. Clinical parameters improved. CGF reduces pain, inflammation, and bleeding tendency. When CGF is mixed with bone graft, faster bone formation can be obtained.

**Conclusion:** CGF barrier is effective to regenerate bone formation and can be used to accelerate soft tissue healing and new bone formation.

## P0666

### Guided tissue regeneration (GTR) for periodontal infra-bony defect in a tooth of poor prognosis – case report

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**Aim:** A 29 year old patient was referred for treatment of generalised aggressive periodontitis at the Barts & The London Dental Hospital. The maxillary left second premolar (25) was grade II mobile had poor prognosis due to a large alveolar bony defect and distal bone loss of up to 90%. The aim was to treat the intrabony defect with GTR in order to prevent extraction.

**Material and Methods:** The patient underwent non-surgical and surgical periodontal therapy. A 7 mm three-walled intrabony defect on the distal aspect of 25 was present. Guided bone regeneration was carried out using Geistlich Bio-Oss Collagen<sup>®</sup> and Geistlich Bio-Gide<sup>®</sup>. This was reviewed at 3, 6 and 12 months interval. This tooth had an initial probing depth of 8 mm and a 12-month postoperative probing depth of 3 mm, a reduction of 5 mm in pocket depth. There was a gain of attachment of 5 mm and no recession. Radiographs taken at 6 and

12 months show that there are signs of periodontal regeneration.

**Results:** There are various factors which affect the success or failure of guided tissue regeneration in aggressive periodontitis patients. Choosing the right patient, maintaining patient oral hygiene to a high standard and providing regular supported periodontal therapy are all factors which can contribute to a successful treatment outcome. Prolonging the life of a vital tooth in the aesthetic zone of a young patient can be very beneficial for the patient's overall health and well-being.

**Conclusion:** Bio-resorbable collagen barrier membrane can give predictable outcomes taking into account that strict criteria are in place for patient case selection.

## P0667

### Evaluating the proliferative effects of resveratrol on human periodontal ligament and gingival fibroblast cells

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**Aim:** Antioxidants may suggest significant therapeutic potential for the treatment of inflammatory disorders. Resveratrol has been shown to possess multiple pharmacological activities including anti-tumor, anti-inflammation and immunomodulation. The objective of this study was to determine the effect of resveratrol on the proliferation of human gingival fibroblasts and periodontal ligament cells.

**Material and Methods:** Primary cultures of human gingival fibroblasts and periodontal ligament cells were isolated. Fibroblast cells were incubated with different concentrations of resveratrol and a control group free of medication was formed. Cell proliferation was assessed by MTT assay and real time cell analysis system xcelligence impedance method. Fibroblasts cells were monitored every 30 min for a period of up to 72 h by the xCELLigence system.

**Results:** Low dose resveratrol (<10  $\mu$ mol) revealed higher proliferation and viability in comparison to the control group. The cytotoxic effect was shown at higher doses (>100  $\mu$ mol, especially 1,10 millimol). By using real time cell analysis system xcelligence impedance method was useful of monitoring the optimisation of the growth of periodontal ligament cells and gingival fibroblasts.

**Conclusion:** This in vitro study showed that Resveratrol has a proliferative effects on periodontal ligament cells and gingival fibroblasts. Additional studies are necessary to explain effect of resveratrol on the periodontal cells. This antioxidant may be a useful wound healing and regenerative therapy agent for periodontal tissues.

## P0668

### Evaluation of substitute free gingival graft

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**Aim:** This case series aims to demonstrate the efficacy of a soft tissue graft substitute to increase the width of the attached mucosa around implants.

**Material and Methods:** Twenty Patients were enrolled in this case series with established peri-implant mucositis, wearing implant supported over denture for a year. Although no radiographic evidence of peri-implantitis was observed, excessive plaque accumulation and mucosal inflammation suggested mucositis around implants included. All implants (same brand and same diameter) were placed by the same oral surgeon and an immediate loading procedure was performed by a prosthodontist. Keratinised tissue dimensions were determined by iodine containing solution. A porcine collagen tissue matrix (Mucoderm®) was used to substitute free gingival graft. Post operative instructions were given to the patients and it was mentioned to patients not to use over dentures for a week.

**Results:** Patients were recalled at 1, 3 and 6 months after the surgical procedure. The extent of peri-implant mucositis was significantly reduced as evaluated by, bleeding scores. The increase in the amount of attached mucosa was clinically relevant around implants.

**Conclusion:** Harvesting soft tissue from patients palatine may be painful or irritating for the patient. Also sometimes harvesting may be difficult or harvested soft tissue may be insufficient for the periodontist due to anatomical considerations. Soft tissue substitute grafts may reduce the morbidity as well as enhance the attached mucosa around implants.

## P0669

### Clinical comparison of a subepithelial connective tissue and a biocollagen membrane as a barrier for the guided tissue regeneration of human periodontal defects

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**Aim:** The purpose of the present study was to evaluate the clinical efficacy of subepithelial connective tissue graft (SCTG) used as a barrier membrane for guided periodontal tissue regeneration (GTR).

**Material and Methods:** Ten patients who had a two- or three walled periodontal intrabony defect at least 4 mm deep were investigated. The defects were treated with GTR combined bone graft at the Department of Periodontics in Chonnam National University Dental Hospital. In experimental group, SCTG was used as a barrier membrane for 5 cases. Biocollagen membrane (Bio-gide®) was used for another 5 cases, comprised control group. Clinical conditions were evaluated by probing pocket depth (PPD), gingival recession and CAL. Mann-Whitney U test was used to compare the PPD reduction, gingival recession and CAL gain of both groups in 12 months. Statistical significance was set at the  $p < 0.05$  level.

**Results:** The sites treated with SCTG demonstrated a mean PPD reduction of  $3.00 \pm 1.46$  mm and CAL gain of  $3.50 \pm 1.12$  mm. The sites treated with biocollagen membrane showed a mean PPD reduction of  $3.00 \pm 1.22$  mm and CAL gain of  $2.60 \pm 1.29$  mm. No statistically significant differences in those parameters were observed. Gingival recession decreased  $0.80 \pm 0.90$  mm in experimental group, while  $0.40 \pm 0.42$  mm increased in control group, which was statistically significant.

**Conclusion:** From this study, periodontal regenerative therapy with subepithelial connective tissue graft as a biological barrier membrane can be considered an effective treatment option for osseous defect.

## P0670

### Strontium chloride enhances cell proliferation in human osteoblasts

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**Aim:** Strontium ranelate (SrRan) is the active component of drugs used for reducing the risk of fractures in patients suffering from osteoporosis. Despite extensive use, the underlying mechanisms of action of  $Sr^{2+}$  are not fully understood. The aim of the study was to assess the impact of  $SrCl_2$  on the human osteoblast-like cell line MG63.

**Material and Methods:** Cultures of the human osteoblast-like cell line MG63 were treated for 72 h in presence of 0.1 mmol/l, 1 mmol/l, 5 mmol/l and 10 mmol/l  $SrCl_2$  or vehicle, used in control groups. Cells were counted and total protein content was determined by colorimetric analysis. Alkaline phosphatase (ALP) activity was determined enzymatically and cell viability was assessed using MTT assay.

**Results:** Treatment with 5 mmol/l  $SrCl_2$  enhanced total MG63 cell protein content by 37% compared to controls ( $p < 0.01$ ). A lower concentration (0.1 mmol/l) of  $SrCl_2$  had no effect on total protein. Incubation with 5 mmol/l and 10 mmol/l  $SrCl_2$  increased MG63 cell number by 38% and 54%, respectively, compared to controls ( $p < 0.001$ ). The  $SrCl_2$ -induced increase in cell number was associated with enhanced (+14% compared to controls,  $p < 0.05$ ) cell viability. Treatment with 0.1 or 5 mmol/l  $SrCl_2$  had no effect on MG63 cell ALP activity, while 1 mmol/l  $SrCl_2$  reduced ALP activity as well as total protein content by about 25% compared to controls ( $p < 0.05$ ).

**Conclusion:** The results demonstrate that treatment with  $SrCl_2$  for 72 h, at concentrations higher than 1 mmol/l, promotes cell proliferation in human osteoblast-like cells, suggesting that  $Sr^{2+}$  may enhance bone formation through this mechanism.

## P0671

### Extracellular calcium up-regulates Wnt canonical signaling in mouse calvaria osteoblasts

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**Aim:** The aim of the present study was to investigate whether extracellular calcium up regulates Wnt canonical signaling in an osteoblast cell line model.

**Material and Methods:** Calvaria MC3T3-E1 cells were cultured in DMEM.  $CaCl_2$  was added to the culture medium at increasing concentrations, up to a total concentration of 12 mmol/l and cell viability was measured by a chemiluminescence-based assay. Osteoblastic and Wnt target specific genes were assessed by Real Time PCR after 1 or 3 days of stimulus. The activation of the canonical Wnt pathway was directly measured by transfecting cells with a reporter construct carrying a TCF/b-catenin responsive-Luciferase gene in the presence of 1.5 mmol/l  $rWnt3a$  and increasing concentrations of  $CaCl_2$ .

**Results:** Increasing Ca concentration affected cell growth, with a peak at 7 mmol/l, while higher concentrations appeared to inhibit cell viability. Gene expression was also affected by extra-

cellular calcium, and mRNA levels for Cyclin D1 were increased after 1 and 3 days of stimulation. Osteoprotegerin and Connexin 43 displayed a tendency to increase with increasing concentrations of calcium after 24 h and the expression levels of Cyclooxygenase-2 increased after 3 days of calcium stimulation. The reporter assay showed that Wnt canonical signaling was significantly increased by extracellular calcium already at the lowest concentration as compared to the control.

**Conclusion:** These data show that calcium increases canonical Wnt signaling in osteoblasts. Further studies are needed to investigate the role of Ca-mediated Wnt stimulation in local microenvironments such as calcium-phosphate containing biomaterials.

## P0672

### Healing of furcation defects following treatment with PRG or GTR. A preliminary study

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**Aim:** To evaluate clinically the results following treatment of mandibular grade II furcation defects with either platelet-rich gel (PRG) or a collagen membrane (GTR).

**Material and Methods:** Sixteen patients with advanced periodontal disease, each of whom displayed one mandibular furcation defect grade II, were randomly treated with PRG (test) or GTR (control). Clinical evaluation was performed at baseline and at six months. Main clinical parameter was the horizontal probing depth (HPD).

**Results:** In the PRG group mean PPD, measured at furcation entrance, changed from baseline  $5.63 \pm 1.19$  mm to  $3.38 \pm 0.51$  mm ( $p \leq 0.05$ ) at six months. In the GTR group mean PPD changed from baseline  $6.25 \pm 1.44$  mm to  $4.13 \pm 1.46$  mm ( $p \leq 0.05$ ). In the PRG group mean CAL changed from baseline  $6.88 \pm 1.25$  mm to  $4.88 \pm 0.99$  mm ( $p \leq 0.05$ ). In the GTR group mean CAL changed from baseline  $8.30 \pm 1.77$  mm to  $6.70 \pm 1.28$  mm ( $p \leq 0.05$ ). In the test group mean HPD changed from  $5.75 \pm 1.83$  mm to  $4.75 \pm 1.49$  mm ( $p = 0.126$ ), in the control group from  $7.10 \pm 2.14$  mm to  $5.63 \pm 2.39$  mm ( $p = 0.123$ ), respectively. Compared to baseline, the improvements of mean HPD values were not statistically significant. No statistically significant differences were observed between the treatment groups.

**Conclusion:** The present preliminary study has shown that (i) half year after surgery, both treatments resulted in statistically not significant HPD reductions (ii) mean PPD and CAL values measured at defect entrance showed significant improvements in both groups.

## P0673

### Enamel matrix derivative adsorption on hydroxyapatite and titanium in water and simulated body fluid studied using quartz crystal microbalance

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**Aim:** The precise molecular mechanism and efficacy of the use of enamel matrix derivative (EMD) as a therapeutic in peri-

odontology and potentially in implant dentistry is unclear, leading to unpredictability in clinical outcomes. The aim of the present study was to determine the protein binding affinity of EMD to relevant model surface. Through in vitro investigation, the mass of adsorbed EMD was quantified as a function of concentration, solvent and substrate.

**Material and Methods:** EMD was diluted in a concentration range from 0.01–0.8 mg/ml using either ultrapure water or simulated body fluid (SBF). Quartz-crystal microbalance (QCM) measurements were taken on two surfaces (hydroxyapatite and titanium) for each solvent (SBF and ultrapure water). The kinetics of adsorption of EMD was measured using QCM which recorded a change in resonant frequency of the substrate surface as a function of increasing mass adsorbing to the surface (using the Sauerbrey equation).

**Results:** An increase in concentration of EMD resulted in an overall increase in the mass of protein binding on the substrates. This was the case for hydroxyapatite ( $5.17$ – $14.22$  mg/m<sup>2</sup> in ultrapure water and  $1.39$ – $25.10$  mg/m<sup>2</sup> in SBF) and titanium ( $7.49$ – $13.34$  mg/m<sup>2</sup> in ultrapure water and  $1.3$ – $14.70$  mg/m<sup>2</sup> in SBF). Kinetically, there was a greater adsorption rate from ultra-purified water compared to SBF.

**Conclusion:** Results suggest that these proteins have the capacity to irreversibly adsorb to titanium and hydroxyapatite surfaces at relatively low concentrations. Evidence that EMD has the capacity to bind to surfaces in the presence of SBF, is significant and may help in determining whether the use of carrier vehicle is completely justified.

## P0674

### Treatment of intrabony defects with PRG or OFD. A preliminary study

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**Aim:** To evaluate clinically the results following treatment of intrabony defects with platelet-rich gel (PRG) versus open flap debridement (OFD).

**Material and Methods:** Sixteen patients with advanced chronic periodontal disease, each of whom displayed one intrabony defect, were randomly treated with PRG (test) or OFD (control). Clinical evaluation was performed at baseline and at six months following therapy. Main clinical parameter was the clinical attachment level (CAL).

**Results:** In the test group mean pocket probing depth (PPD) decreased from  $8.50 \pm 2.27$  mm to  $5.00 \pm 1.93$  mm ( $p \leq 0.05$ ) in six months and in the control group from  $7.50 \pm 0.75$  mm to  $6.13 \pm 1.81$  mm ( $p \leq 0.05$ ) respectively. In the PRG group mean CAL changed from baseline  $9.63 \pm 1.77$  mm to  $6.63 \pm 2.07$  mm ( $p \leq 0.05$ ) at six months. In the OFD group mean CAL changed from baseline  $8.63 \pm 1.19$  mm to  $7.88 \pm 2.23$  mm ( $p = 0.135$ ) at six months. Compared to baseline, the PPD and CAL values improved significantly only in the test group at half year. Between the treatment groups no statistically significant differences were observed.

**Conclusion:** The present preliminary study has shown that (i) 6 months after surgery, both treatments resulted in statistically significant PPD reductions (ii) mean CAL gain was statistically not significant in the control group (iii) PRG and OFD may result in comparable clinical outcomes, but these results are not satisfactory regarding the postoperative PPD values and periodontal healing.

## P0675

### Topological morphology and histology of collagen scaffolds; an in vitro study

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**Aim:** The purpose of this study was to observe topological morphology, cellular penetration and chronological transformation in soft tissue augmentation materials.

**Material and Methods:** Four commercially available collagen scaffolds were evaluated; MG (Mucograft<sup>®</sup>, Geistlich Pharma AG, Switzerland), MD (Mucoderm<sup>®</sup>, Botiss Dental GmbH, Germany), AD (AlloDerm<sup>®</sup>, BioHorizons, US) and DD (Derma, Tecnos, Italy). The morphologies of sectional surfaces for all scaffolds were observed using scanning electron microscopy. Additionally, human gingival fibroblasts (HGF) were cultured using medium containing 10% fetal bovine serum and 1% penicillin streptomycin. Cells were cultured at standard culture conditions and the 3<sup>rd</sup> passage was used for the following assessments of the penetrations and the density. After 30-min-, 24-h-, 5-days- and 9-days-, cellular penetration into the scaffolds was measured using cryo-sections. The scaffold density was calculated using image analysis software (Image-Pro, Media Cybernetics, Inc, USA).

**Results:** MG revealed a border layer with both a compact and spongy layer, whereas there was no border layer observed in the other scaffolds. HGF were observed in AD and DD at 30 min and 24 h, and in DD at 5 days, while no HGF were found at 9 days. The density assessment showed a chronological mutation that consisted of an absorption phase between 30 min and 24 h, and a desorption phase from 24 h to 9 days that was present in all scaffolds. Overall, DD showed significantly higher density than others.

**Conclusion:** The density of the collagen scaffolds may affect the cellular penetration of HGF.

## P0676

### Effects of EMD, amelogenin and tyrosine-rich amelogenin peptide on proliferation and migration of epithelial cell line – real-time in vitro study

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**Aim:** Enamel matrix derivative (EMD) have been widely used in treatment of periodontal tissue regeneration. EMD is a heterogeneous mixture composed of mainly amelogenin derived proteins. Nevertheless, the mechanism of action of specific bioactive components of EMD remains unclear. Therefore, we tested in vitro the effect of the commercial EMD and recombinated amelogenin fractions on proliferation and oral epithelial cell migration.

**Material and Methods:** Effects of commercial lyophilized EMD (Straumann, Switzerland) as well as porcine recombinated 21.3 kDa amelogenin (AMEL) and 5.3 kDa tyrosine-rich amelogenin peptide (TRAP) on SCC25 human tongue squamous carcinoma (ATCC; Manassas) cell line were investigated. Real-time cell analysis (xCELLigence system; Roche Applied Science) was performed to determine the effects of EMD, AMEL and TRAP (12.5–50 mg/ml) on SCC25 cell proliferation and

migration. The evaluation was performed 12, 24, 48, 60 i 72 h after stimulation.

**Results:** No changes in cell morphology were observed. AMEL blocked SCC25 proliferation in dose-dependent pattern ( $p < 0.001$ ). The proliferation of SCC25 were significantly stimulated by EMD and TRAP ( $p < 0.001$ ) EMD effect was much more apparent than TRAP ( $p < 0.05$ ) Regardless of different ligand, ligand doses and its stimulation time, no significant changes in SCC25 cell migration were observed.

**Conclusion:** Our real-time in vitro study indicates significant changes in proliferation effect among different amelogenin isoforms on epithelial oral cells.

## P0677

### Cellular senescence and autophagy in human keratinocytes by oxidative stress

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**Aim:** To elucidate whether autophagy is required for oxidative stress-induced premature senescence, we examined induction of both senescence and autophagy in H<sub>2</sub>O<sub>2</sub> stimulated human keratinocytes.

**Material and Methods:** HaCaT cells, human keratinocytes, were used in this study. Cells were treated with H<sub>2</sub>O<sub>2</sub> in the range of concentrations from 0.2 mol/l to 2 mol/l. The viability of cells was assessed by the CCK-8 assay. In certain experiments, H<sub>2</sub>O<sub>2</sub> treatment was preceded with 5 mmol/l chloroquine (CQ) and 5 mmol/l 3-methyl-adenine (3-MA). Induction of premature senescence was evaluated by cell staining of SA-β-Gal activity and immunoblotting of p21 and RB expression. Detection of autophagy in H<sub>2</sub>O<sub>2</sub>-treated cells was examined by immunocytochemistry and immunoblotting of LC3 and beclin-1.

**Results:** H<sub>2</sub>O<sub>2</sub>-treated cells showed positive staining of SA-β-Gal activity, a classic biochemical marker for cellular senescence. We found that H<sub>2</sub>O<sub>2</sub>-stimulated cells consistently induced p21 expression, but not RB, suggesting a potential involvement of p21 in cellular senescence. Treated cells induced conversion of LC3-I to LC3-II and punctate distribution of LC3-II, indicating an induction of autophagy in those cells. Senescent cells also showed beclin-1 expression, which was known as another marker for autophagy. These results showed that exposure of HaCaT cells to H<sub>2</sub>O<sub>2</sub> induced both cellular senescence and autophagy.

**Conclusion:** In this study, we demonstrated that oxidative stress could induce both cellular senescence and autophagy in HaCaT cells. From the results of pharmacological inhibition of autophagy, we suggest that autophagy may be responsible for regulating p21-mediated cellular senescence in human keratinocytes.

## P0678

### Alveolar preservation in anterior maxillary sector

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**Aim:** Nowadays the anterior maxilla has become in the main implant therapy challenge. With this therapy we can fix partial

or total edentulousness obtaining satisfactory results in terms of aesthetics and functionality for the patient.

**Material and Methods:** A 56 year old patient came to Alfonso X el sabio university clinic with a parcial fix prosthesis at 2.1, 2.2 and 2.3 being 2.1 and 2.3 the supported pillars and 2.2 a pontic. This prosthesis shown a mobility due to a caries lesion on the pillars that turn it unrestorable. In order to minimize the insurmountable bone resorption that follow a tooth extraction we decided to perform a socket preservation using bovine bone xenograft (Bio-Oss) jointly to a free gingival graft harvesting from the palate mucosa. After 4 months of healing, we proceed to do the implants, thereby restoring the aesthetics of this sector.

**Results:** There is wellknown that a tooth extraction allways will followed by a resoption that can range 40% for the first 6 months (5–7 mm horizontal bone loss and 2–4.5 mm vertical) (Barragán E. 2010) and the 50% in the first year (Schoop 2003)

**Conclusion:** With the immediate preservation alveolar we reduce this loss and maintain periodontal tissues.

## P0679

### Implant placement in maxillary aesthetic zone with regeneration and immediate loading: a case report

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**Aim:** Improvements in dental materials provide satisfying aesthetical prosthetic results and immediate implantation became possible with the developments in implant technology. Considering the aesthetic results, the emergency profile of implants, phenotype, gingival margin and the height of dental papillae should seriously be taken into account .

**Material and Methods:** 61 years old female patient was referred to Madrid Alfonso X University Periodontology Dpt. due to mobility in anterior maxillary teeth. During periodontal examination a severe periodontal tissue loss was observed in teeth 11. It was decided to extract teeth 11 and regenerate with xenograft and collagen membrane

**Results:** During postoperative 1 year controls no change in gingival levels or periimplantary bone was observed

**Conclusion:** The clinical case discussed here shows the effectiveness of current bone regeneration techniques that allow placing implants in areas with bone loss. however regeneration is a procedure that requires long wait. new designs of implant surfaces and new materials shorten waiting times. however currently able to make an immediate charge reduces waiting

## P0680

### Simultaneous surgical periodontal and endodontic approach for the periodontal-endodontic combined lesion

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**Aim:** Anatomical variations on tooth can result in a periodontal-endodontic problems. To recover destructed periodontal tissue in periodontal-endodontic combined lesion, both the

endodontic and periodontal therapy should be considered. This case report evaluated the treatment outcome of simultaneous surgical treatment including regenerative periodontal approach in periodontal-endodontic combined lesion.

**Material and Methods:** Two patient who had periodontal-endodontic combined lesion were treated with interdisciplinary regenerative surgical approach. One patient with tissue defect in apical and furcation area involvement on mandibular first molar and the other patient who had apical and buccal tissue defect on mandibular first premolar had undergone with apicoectomy and GTR, simultaneously. Tissue healing was evaluated up to 12 months after surgery using Cone Beam Computed Tomography.

**Results:** In cases, primary closure was achieved and soft tissue healing was successful. Excellent soft and hard tissue healing was achieved with simultaneous combined surgical treatment protocol, that is treated lesion exhibited significant reduction in pocket depth, gain in CAL and bone fill.

**Conclusion:** The results indicate that simultaneous regenerative surgical periodontal and endodontic approach is effective for the treatment of periodontal-endodontic combined lesion.

## P0681

### Open flap debridement (OFD) with and without intramarrow penetration (IMP) for intrabony defect therapy: baseline prognostic parameters of clinical and radiographic outcomes at 12 months

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**Aim:** A previous paper from the Authors investigated the contribution of IMP to the outcomes of OFD in treatment of intrabony defects. To analyze baseline parameters as possible predictors of success in intrabony defects treated with OFD or OFD+IMP.

**Material and Methods:** 42 patients enrolled in a previous RCT. Baseline parameters: PPD, CAL, # wall components of the defect, Supracrestal Soft Tissue (SST), Keratinized Tissue Width (KTW), Bone Sounding (BS), radiographic defect depth, width, angle (xBD, xBW, xANG°), treatment, patient age and gender. Primary outcomes: PPD, CAL gain, BS gain, xBD. Variables statistically associated with outcomes in univariate analysis, were then introduced in multiple regression model.

**Results:** Regarding postoperative PPD >4 mm: statistically significant difference was associated with provided treatment, in favour of OFD+IMP. Regarding postoperative CAL gain: baseline PPD, BS, KTW were statistically significant predictors of CAL gain; the greater the PPD and BS, the more likely CAL gain was >3 mm (p < 0.05). The opposite for KTW. Regarding postoperative BS gain: baseline PPD, CAL, BS, xBD showed a statistically significant association; the greater the PPD and BS, the more likely BS gain was >3 mm (p < 0.05). Initial CAL and BS were associated to xBD with statistical significance; the greater the CAL and BS, the less likely xBD was ≤2 mm. In multiple logistic regression models, tested variables did not maintain significance; only KTW resulted as negative predictor of CAL gain >3 mm (OR 0.74; 95% CI 0.53–1.03; p = 0.07).

**Conclusion:** Benefits of IMP+OFD were confirmed; a predicting association between baseline PPD, CAL; BS, xBD, KTW and primary outcomes was suggested.

## P0682

### The comparison of different periodontal healing of critical size contained and uncontained intrabony defects (1 wall and 3 wall) using grafts in beagle dogs

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**Aim:** This study aims to evaluate the healing of the one- and three-wall critical size periodontal defects and to select a more practical model for further investigation of novel treatment concept.

**Material and Methods:** Eight weeks after extraction of two premolars (P2 and P4), the one-wall (7 mm high × 4 mm wide) and three-wall (5 mm high × 4 mm wide) intrabony periodontal defects were surgically created at the mandibular first molars and third pre-molars in six beagle dogs. The bilateral defects in these animals were received Bio-Oss in combination with Bio-Gide, or served as sham-surgery controls. The animals were euthanized at 8 weeks post-surgery for histological analysis.

**Results:** Experimental group showed more cementum and bone formation compared with controls. Bone regeneration height averaged ( $\pm$ SD)  $4.99 \pm 0.70$  and  $3.11 \pm 0.59$  mm for the one- and three-wall defects versus  $3.38 \pm 0.49$  and  $1.57 \pm 0.45$  mm for the controls ( $p < 0.05$ ), and bone area  $10.41 \pm 1.84$  and  $6.57 \pm 0.62$  mm<sup>2</sup> for the one- and three-wall defects versus  $6.47 \pm 1.24$  and  $3.53 \pm 0.75$  mm<sup>2</sup> for the controls ( $p < 0.05$ ). Cementum regeneration averaged  $3.62 \pm 0.56$  for the one-wall defect versus  $1.58 \pm 0.33$  mm for the controls ( $p < 0.05$ ). The junctional epithelium averaged  $0.43 \pm 0.23$  mm for the one-wall defect versus  $1.09 \pm 0.33$  for the control ( $p < 0.05$ ). The higher quality and more maturity of newly formed bone was observed in three-wall control group than other groups. However, there was no significant difference between experimental and control group in cementum regeneration and junctional epithelium in three-wall defect.

**Conclusion:** Bone grafts with membrane could significantly promote periodontal regeneration in both intrabony defects in dog. But our one-wall defect may be a more proper candidate for further animal test.

## P0683

### Dexamethasone and Stanozolol affect osteogenic differentiation of SaOS-2 cells

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**Aim:** The aim of this study is to investigate the effects of Dexamethasone (DX) and Stanozolol (ST) in inducing osteogenic differentiation on SaOS-2 cells.

**Material and Methods:** Cells were cultured in DMEM-low glucose supplemented with Fetal Bovine Serum 10%, penicillin/streptomycin 100  $\mu$ g/ml, glutammin 4 mmol/l, ascorbic acid 50  $\mu$ g/ml, L-proline 260  $\mu$ mol/l,  $\beta$ 2-glycerophosphate 10 mmol/l. Either Dexamethasone or Stanozolol at concentrations of 0, 1, 10, 100, 1000 nmol/l were furtherly added as experimental conditions. After 6, 12 and 24 days, cells were stained with Alizarin Red (AR), Von Kossa (VK) for qualitative analysis and with

DAPI and calcein green for semi-quantitative analysis. Gene expression of RUNX-2 and BMP-1 was evaluated through RT-PCR.

**Results:** AR and VK stainings showed a dose-dependent mineral apposition in cells treated with ST. This finding was more evident at 12 days, while at 24 days all samples treated with ST were extensively calcified. Semi-quantitative evaluation of calcein/DAPI confirmed a dose-dependant mineralization even at the last time-point. Samples treated with DX exhibited similar results, with a less pronounced mineral apposition. Gene expression analysis revealed a dose-dependant increase of Runx-2 in samples treated with ST compared to controls ( $p < 0.05$ ), and not significant changes in DX-treated samples at any tested concentration ( $p > 0.05$ ). BMP-1 expression had a significant dose-dependant decrease in samples treated with DX ( $p < 0.05$ ).

**Conclusion:** Standing to our results, ST boosts osteogenic differentiation of SaOS-2 in a dose-dependent manner. Also DX may produce similar effects, at a lower rate. Further studies are required to understand steroids' mechanism of action on osteogenic cells as well as their possible use in the field of bone regeneration.

## P0684

### Recoverability of periodontal tissues during gingival recession

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**Aim:** Histopathological study was conducted to assess the characteristics of tissue regeneration formed after elimination of periodontal recessions.

**Material and Methods:** Recovery artificially created periodontal defects was observed in 10 dogs after 3, 6 and 12 months. Before fixing the flap enamel matrix derivative (EMD) used in the first group, EMD with Platelet-rich plasma (PRP) – in the second. In the comparison group plasticity defect biotransplant was not performed.

**Results:** After 3 months in group 1 lacunar resorption of the cortical plate and interstitial edema were noted, collagen fibers had a chaotic arrangement. In the periodontal ligament cellular elements were located in 2–3 layers, or not determined. In group 2, the defect was filled with vascularizing loose connective tissue. Fibroblasts and collagen fibers were in the correct position. In the periodontal ligament fibroblasts and cementoblasts were located in 6–7 layers. After 6 months in group 2 restoration of periodontal tissues, including bone was completed. In group 1 the emergence of osteocel tissue was observed after 12 months. In the comparison group bone was not identified. In group 1 the formation of the epithelial attachment was in 51%, full recovery of periodontal tissues was observed in 36%. In group 1 the restoration of periodontal tissue in 64%. In the comparison group epithelial growth along the root surface was observed in 98%, which prevented the formation of a new attachment.

**Conclusion:** These results may be experimental study of the effectiveness of combined application of EMD and PRP in the gingival recession's treatment.

## P0685

### Comparison of volume gain using sub-epithelial connective tissue graft harvested from the palate or tuberosity around dental implants

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**Aim:** The purpose of this study was to compare palate and tuberosity as donor sites for sub-epithelial connective tissue graft (SCTG) around dental implants when soft tissue volume gain is desired.

**Material and Methods:** Seventeen patients, in need of soft tissue volume augmentation around implants received randomly: SCTG from palate (control group) or SCTG from tuberosity (test group). Volume gain (VG) was evaluated by superimposition of 2 intraoral scans (baseline and 3 months after surgery) using a software. VG data was obtained and compared at 1, 3 and 5 mm apically in reference to the healing abutment. Also the following clinical parameters were examined: plaque index (PI), probing depth (PD), bleeding on probing (BOP) and keratinized tissue (KT). Statistical analysis included t-Student for quantitative variables and Chi square for qualitative variables.

**Results:** Preliminary results indicated that there were no statistically significant differences in VG for control and test groups (0.88 mm  $\pm$  0.94 mm vs 1.12 mm  $\pm$  0.57 mm). There was not statistically significant difference when increasing KT for both groups, although higher for the test group (control 0.67 mm vs. 1.16 mm test).

**Conclusion:** Both procedures were effective in increasing soft tissue volume. Even though a tendency of more VG was observed for the tuberosity SCTG group.

## P0686

### Use of erbium, chromium:yttrium scandium gallium garnet laser as an adjunct to root surface instrumentation: analysis of an extended case series

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**Aim:** This is an extended case series of patients treated with an Erbium, Chromium: Yttrium Scandium Gallium Garnet (Er, Cr:YSGG) laser as an adjunct to scaling for the management of infrabony periodontal defects.

**Material and Methods:** 27 consecutive patients with infrabony defects were treated non-surgically using ultrasonic scalers followed by an Er, Cr:YSGG laser using a radial firing tip (Bio-lase™). Probing depth analysis was carried out after 2 months and radiographs repeated after at least 5 months. Relative bone height of infrabony pockets were measured by a blinded examiner on randomised digital radiographs by dividing root length by apical and coronal extent of bone height.

**Results:** The mean pocket depth reduction was 5.42  $\pm$  2.07 mm. The total number of deep sites (those 5 mm +) was decreased by over 95% following treatment. Radiographic analysis showed increased bone volume in many of these sites, but no change in apical or coronal linear bone height at 6 months. 15 sites from 12 patients were available for further radiographic analysis after at least 12 months. In these sites

there was a significant gain in linear bone height within infrabony defects (18  $\pm$  11% of root length) but no change in suprabony bone height. 9 of the 15 sites showed 50% or more bony infill of the infrabony defect.

**Conclusion:** The treatment gave consistently impressive clinical and radiographic outcomes and suggest that significant gain of bone height can be seen with longer term follow up. These favorable results suggest the need for RCTs to test this clinical protocol further.

## P0687

### Effect of systemic and local boric acid administered on bone healing in calvarial defects: a histologic and histometric study in rats

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**Aim:** The purpose of this study was to evaluate the effects of systemic and local administered boric acid on bone healing in rat calvarial defects.

**Material and Methods:** Critical size defects were created in calvaria of 24 male Wistar rats. The animals were divided into four groups of six animals each: non-treatment (control) group (n = 9) autogenous bone graft group (n = 6); autogenous bone graft with ozone therapy group Critical size defects were created in calvaria of 24 male Wistar rats. The animals were divided into four groups of six animals each: non-treatment (control) group (n = 6); autogenous bone graft group (n = 6); autogenous bone graft group (n = 6); autogenous bone graft with local administered boric acid therapy group (1 mg/ml, n = 6); autogenous bone graft with systemic administered boric acid therapy group (30 mg/kg/day, n = 6). Animals were killed after 8 wk. Total bone area was analyzed histomorphometrically, using image analysis software. Osteoblast number and new bone formation were histologically measured.

**Results:** Osteoblast number and new bone formation were significantly higher in the boric acid groups compared to the other groups (p < 0.05). No significant difference was found among boric acid groups (p > 0.05). Total bone area in the local and systemic boric acid administered was significantly increased (p < 0.05) but no significant difference between local or systemic use (p > 0.05).

**Conclusion:** Boric acid administered, when administered systemically or locally enhances the bone regeneration with autogenous bone graft in the rat calvarial defect model.

## P0688

### Regenerative therapy of intrabony periodontal defect using bone substitute material and hyaluronic acid

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Zagreb/Croatia

**Aim:** Our aim was to achieve regeneration in intrabony periodontal defect using a bone substitute material, deproteinized bovine bone mineral (DBBM) combined with cross-linked hyaluronic acid gel (HA) to improve clinical outcome.

**Material and Methods:** A female patient was referred to our Dental Polyclinic Zagreb, with a bleeding and discomfort around lower right premolar region. During clinical examination and by measuring periodontal indices patient was diagnosed with generalized chronic periodontitis. Proper oral hygiene instructions were explained to the patient and non-surgical periodontal therapy was performed. Reevaluation after two months revealed residual pocket around the tooth 45, measuring 7 mm mesial, 6 mm buccal and 7 mm lingual. We decided to do a regenerative surgical procedure to eliminate residual pocket and manage the intrabony periodontal defect. A modified papilla preservation technique was used which revealed a wide 3-wall defect on the tooth 45. We decided to use a combination of DBBM and HA, with HA being used both as a membrane and with DBBM in a 50:50 ratio.

**Results:** Periodontal pocket around the tooth 45 was probably induced with occlusal trauma, so prior to surgery we adjusted the occlusion. Since HA is a major component of the extra-cellular matrix in almost all tissues, especially periodontal ligament, we decided to take advantage of its biocompatibility, bacteriostatic and anti-inflammatory effect, as well as its potential for regeneration of soft and hard tissues.

**Conclusion:** After 6 months control periapical radiograph was taken which showed bone fill of the intrabony periodontal defect and we measured a reduction of pocket depth from 7 mm to 4 mm.

## P0689

### Clinical case report and 5-year follow-up in a patient with severe generalized chronic periodontitis

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**Aim:** In this case report we describe the clinical course over a 5-year follow-up period in a 46 year-old patient with severe generalized Chronic Periodontitis.

**Material and Methods:** Clinical, radiographic and microbiological data were collected at Baseline (BL) and 6 weeks, 1, 2 and 5 years after treatment. Treatment plan included non-surgical periodontal treatment, advanced regenerative periodontal surgery at sites with infrabony defects using enamel matrix derived proteins and supportive periodontal therapy. Maxillary sinus floor augmentation was performed together with simultaneous placement of two dental implants. Final restorative treatment consisted of anterior direct composite veneers and implant-supported crowns.

**Results:** At BL attachment loss was generalized severe with 50% of the periodontal pockets ranging from 4 to 8 mm in depth. BoP and plaque scores were 7% and 22%, respectively. There was furcation involvement in all molar teeth and generalized radiographic infrabony defects. The subgingival plaque sample analyzed by culture revealed the presence of a putative periodontal pathogen in high levels. After initial cause-related therapy and subsequent surgical periodontal therapy there was a significant improvement in the clinical variables. At the 2-year re-assessment a clinical attachment gain ranging from 1 to 6 mm was observed in 9 sites together with radiographic evidence of bone formation. No recurrence was observed during supportive periodontal therapy and the results were maintained up to the 5-year follow-up.

**Conclusion:** These results suggest that comprehensive periodontal treatment with maintenance can halt the disease pro-

gression and provide an environment conducive to the long-term maintenance of natural teeth.

## P0690

### Which biomaterials may promote periodontal regeneration in furcation defects? A systematic review of histological studies

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**Aim:** To analyse the effect of biologic factors (BIO), GTR, bone or bone substitutes (BONE) alone or in combination (COMBI) for treatment of class II and III furcation defects evaluated in histological studies.

**Material and Methods:** A literature search was performed in PubMed and Cochrane database including hand searching. Outcome variable was periodontal regeneration after reconstructive surgery in animal or human class II and III defects with regenerative materials as demonstrated through histologic / histomorphometric analysis. New cementum (NC) and bone (NB) formation as linear measurement in mm or percentage of previously created furcation defects were recorded. Only studies reporting a healing period of at least 6 weeks were included.

**Results:** 18 studies with animal class II furcations (3 using BONE, 5 GTR, 10 BIO and 9 COMBI approach) were included. Mean values for NB were 3.39 mm (63.59%), 2.3 mm (49.83%), 3.24 mm (51.15%), 3.97 mm (54.06%) and for NC 3.49 mm (68.54%), 4.3 mm (90.36%), 3.38 mm (56.63%), 44.48 mm (66.22%). 19 studies with animal class III furcations (6 using GTR, 5 BIO and 9 COMBI approach) were analyzed. Mean values for NB were 1.8 mm (32.9%), 2.4 (59%) and 4.0 (51.1%) and for NC 4.1 mm (57.3%), 2.9 mm (55.2%) and 4.5 mm (66.2%). Only 2 studies with human II and III furcations were included for analysis showing mean values NB of 0.5 mm and NC of 2.5 mm.

**Conclusion:** Periodontal regeneration was demonstrated in class II/III animal furcations with variety of regenerative materials. In humans partial or complete regeneration was only demonstrated in class II furcations, while no evidence for regeneration exists in class III furcations.

## P0691

### Interest and attitudes of Kuwaiti dentists in periodontal regeneration: a questionnaire-based study

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**Aim:** The aim of the present pilot study, based on a previous UK questionnaire study by Siaili et al., (2014), was to evaluate the attitude and knowledge of periodontal regeneration procedures by Kuwaiti dentists.

**Material and Methods:** 31 questionnaires were distributed to Kuwaiti dentists by e-mail. The questionnaire consisted of 21 questions involving both multiple choices answers and open-ended or dichotomous options and was divided in two broad sections addressing: 1) the general profile of dentists and 2)

their preferences regarding the management of intrabony, inter-radicular and marginal tissue recession defects together with their opinions on smoking and antibiotics in regeneration procedures.

**Results:** 31 questionnaires were completed by Kuwaiti Dentists (20M:11F; mean age: 33.6 years). Mean graduation years was 8 years (SD 4.52). A reasonable level of interest in periodontal regeneration procedures was reported by dentists. The use of connective tissue grafts, coronally advanced flaps with/without enamel matrix derivatives were the most frequently chosen treatment modalities for root coverage procedures. The use of guided tissue regeneration procedures with absorbable membranes/enamel matrix derivatives were the most popular options for the regeneration of intrabony defects. 83.9% of respondents prescribed antibiotics of which Amoxicillin/Metronidazole (48.4%) was the most reported. Smoking did not appear to be a contraindication for periodontal regeneration for the majority of the respondents, which was not in agreement with Siaili et al., (2014).

**Conclusion:** Kuwaiti dentists appeared to be aware of current innovations in periodontal regeneration however there were some differences with the results of Siaili et al., (2014).

## P0692

### Status of the alveolar bone after autotransplantation of premolars to anterior maxilla. A pilot study using CBCT measurements

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Warsaw/Poland

**Aim:** To evaluate status of the alveolar bone after autotransplantation of developing premolars to replace traumatically lost maxillary incisors.

**Material and Methods:** 11 patients aged 10 to 12 years (mean: 10 years and 7 months) with unilateral loss of maxillary central incisor had undergone autotransplantation of developing premolar to replace missing tooth. Cone Beamed Computed Tomography (CBCT) was performed 1 year to 14 years (mean: 4 years) after the surgery to evaluate alveolar bone prior to orthodontic treatment. The thickness of buccal bone, the height and the width (marginal and also at half of the vertical dimension) of the alveolar process were evaluated at the transplant and control (non-affected contralateral incisor) sites.

**Results:** Mean thickness of the buccal bone at the transplant and control sites were 0.78 mm (range: 0.47–1.67) and 0.82 mm (range: 0.61–0.93) respectively. Mean alveolar bone height was 15.15 mm (range: 8.92–21.31) at the transplant and 15.12 mm (range: 9.12–21.41) at the control sites; mean marginal thickness of the alveolus was 7.75 mm (range: 5.87–9.92) at transplant and 7.98 mm (range: 6.46–8.86) at control sites. Mean thickness of the alveolus in a half of its vertical dimension at the transplant and the control sites was 7.54 mm (range: 4.72–10.98) and 8.03 mm (4.63–9.97) respectively.

**Conclusion:** The buccal bone thickness, the width and the height of alveolar process at the sites of the transplanted premolars replacing traumatized incisors did not significantly differ from the control sites.

## P0693

### A clinical and radiological evaluation of the intrabony defects in aggressive periodontitis patients with xenogenic graft and modified perforated membrane. A 6 months prospective randomized clinical trial

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**Aim:** To evaluate and compare the early effects of using a modified perforated collagen membrane (MPM) with traditional occlusive membrane (OM) on periodontal regeneration in localized intrabony defects.

**Material and Methods:** Ten non-smoking patients with aggressive periodontitis were included in this prospective and randomized clinical-trial. Two single deep intrabony defects from each patient were randomly assigned to either xenogenic graft plus modified perforated collagen membrane (MPM) (test group) or xenogenic graft plus traditional occlusive membrane (control group). The surgical part of the study took place in August–December 2014. Plaque index (PI), approximal plaque index (API), bleeding on probing, gingival index, probing depth (PD), clinical attachment level (CAL), defect base level (DBL) and crestal bone level (CBL) will be measured at baseline and reassessed at 1 week, 2 weeks, 4 weeks, 3 and 6 months after therapy.

**Results:** Clinical and radiological results of the study will be thoroughly assessed at 6-month observation period (February–May 2015) and presented at the EuroPerio 8 Conference.

**Conclusion:** It may be speculated that perforations in MPM may enable the penetration of gingival and periosteum-derived stem cells into the periodontal defects, which should have a positive effect on periodontal regeneration.

## P0694

### A novel regenerative surgical approach of teeth with advanced non-containing defect. A report of 10 cases

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**Aim:** Among treatment options of non-containing advanced defects, the literature data suggest that replacing missing bony walls by membranes could enhance periodontal regeneration. The aim of this case series was to evaluate the efficacy of membrane supported regenerative periodontal therapy on non-favourable defects.

**Material and Methods:** 10 patients, each presenting at least one tooth with non-containing advanced defects were treated. After initial periodontal treatment, two remote vertical incisions were made mesially and distally to treated sites, subsequently followed by bilaminar tunnel preparation. Following root debridement non-resorbable membrane (Cytoplast, Osteogenics, Lubbock) was led into the subperiosteal layer of tunnel and fixed with titanium pins. A collagen matrix (Mucograft, Geistlich, Wolhusen) was placed on the supraperiosteal layer or more coronally of the tunnel to increase soft tissue thickness at the region of keratinized gingiva. Enamel Matrix Derivative (Emdogain, Straumann, Basel) was applied on exposed root surfaces.

Prior to mean periodontal parameters (CAL:  $7.08 \pm 2.47$  mm) were recorded using periodontal probe (Hu-Friedy, UNC-15) at 6 sights of tooth. Furthermore after local anesthesia bone sounding (BS:  $8.2 \pm 3.04$  mm) was performed at the deepest side of the defect. 9 months postoperatively radiographical evaluation and direct measurements were performed after membrane removal. Mean CALgain ( $4.43 \pm 2.08$  mm) and mean bone sounding gain ( $5.2 \pm 2.69$  mm) were recorded.

**Results:** All treated teeth became stable 9 months postoperatively. Radiographic and metric parameters suggest that improvement of periodontal defects with favourable amount of radiographic bone fill was observed.

**Conclusion:** Enhanced wound stability and larger blood clot stabilization through utilizing barrier membranes to replace missing bone plate could be key factor of successful regenerative surgeries.

## P0695

### Enamel Matrix Derivative (Emdogain<sup>®</sup>) alone or in combination with HA/ $\beta$ -TCP graft (Bone CERAMIC<sup>®</sup>) in the treatment of intrabony defects

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Sant Cugat/Spain

**Aim:** Clinical and radiographic beneficial effects have been demonstrated with the addition of enamel matrix derivative (EMD) to several grafting materials compared to EMD alone. The purpose of this study was to compare the clinical and radiographic efficacy of EMD and EMD + Bone Ceramic (EMD+BC) in the treatment of intrabony periodontal defects.

**Material and Methods:** 24 patients with 24 intrabony non-contained defects  $\geq 3$  mm were randomly assigned to one of the treatment groups. Each subject received either EMD alone (11 sites) or in combination with BC (13 sites). Soft tissue measurements included pocket probing depth (PPD), gingival recession (GR), and clinical attachment level (CAL). Hard tissue measurements included defect depth and defect morphology in terms of number of bony walls. To standardize the procedure an acrylic stent and a millimeter radiographic grid were used.

**Results:** Analysis of the measurements demonstrated a statistically significant difference from baseline within each group ( $p < 0.05$ ), showing a difference in terms of PPD, CAL and intrabony component resolution at 6 and 12 months for both EMD and EMD + Bone Ceramic. However, there were no statistically significant differences between the groups.

**Conclusion:** Both treatments demonstrated their efficacy for regeneration of non-contained periodontal defects. However, the addition of BC to EMD seems to provide no statistically significant improvement to soft and hard tissue parameters.

## P0696

### Ridge augmentation using allogenic graft and PRGF supported by a configured titanium mesh

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Distrito Federal/Mexico

**Aim:** Because adequate alveolar bone is critical for both aesthetics and biomechanical support of the prosthesis, various

techniques have been developed for the reconstruction of defects in atrophic maxilla and mandible. On the one hand, ridge augmentation is an accepted and successful method used in dental practice to increase bone volume in sites chosen for the placement of dental implants. On the other hand, titanium mesh has been used for reconstruction of large and small defects, as a method for containing graft particles.

**Material and Methods:** This clinical case tries to throw light on the evaluation of the capability of a configured titanium mesh (CTM) to serve as a mechanical and biologic device for restoring a vertically defected and resorbed alveolar ridge; in this sense, a case of study of a patient with a severe resorption of the anterior maxilla is presented. On a plaster model, the titanium mesh were performed and placed for ridge augmentation using a combination of allograft and plasma rich growth factors during ten months.

**Results:** According to a CT scan, when the mesh was removed, a gain of sufficient height and width of the osseous ridge for the placement of implants (higher than 5 mm) was obtained, as well as an appropriate level of quality (type II).

**Conclusion:** In conclusion, titanium mesh are an excellent alternative for increasing bone width in atrophic jaws, giving the patient the possibility of placing dental implants.

## P0697

### Case report: regenerative treatment of periodontal originated bony defect between lower central incisors

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Szeged/Hungary

**Aim:** Aim of the study was to eliminate inflammation and achieve regeneration at the periodontal originated bony defect at site of lower central incisors.

**Material and Methods:** 20 years old female patient was referred to our clinic with periodontal abscess between her lower central incisors. Recording of periodontal parameters (pocket depth, bleeding- and plaque indexes, recession, tooth-mobility, involvement of furcations) revealed both teeth (31, 41) being vital. The treatment involved closed curettage and open flap debridement in conjunction with regenerative materials (Cera-bone and Jasone membrane, Botiss, Germany) in a latter surgery. Healing period was uneventful. As the aforementioned teeth lost vitality during healing period, we performed both root canal treatments.

**Results:** After the one year follow-up, the defect showed radiological bony fill, soft tissues underwent recession but the patient has no complaints.

**Conclusion:** We achieved substantial, radiologically proven bony fill at the defect site.

**P0698****Strategy for maintenance and treatment of combined endodontic-periodontal lesion: 2-year follow-up**

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*Istanbul/Turkey*

**Aim:** The term “perio-endo lesion” is used to describe lesions formed due to inflammatory products found in varying degrees in both periodontium and pulpal tissues. These types of lesions are known as a clinical dilemma because making a differential diagnosis and deciding a prognosis are difficult. This case report aims to describe treatment strategy for combined endodontic-periodontal lesion and its maintenance.

**Material and Methods:** A male 38 year-old patient complaint of gingival bleeding, mobility and unusual pain in the right lower jaw. Clinical and radiological examination showed that the patient presented with generalized chronic periodontitis and he had combined periodontal – endodontic lesion at tooth 36. Severe bone loss around the distal aspect and furcation of the tooth was revealed radiographically. After treated endodontically, regenerative surgical periodontal treatment was applied to the tooth. Oral status of the patient being treated by a multidisciplinary was evaluated during a period of 2 years

**Results:** The relationship between periodontal and endodontic disease has been a subject of speculation for many years. It is established that the prognosis of a combined perio-endo lesion is often poor or even hopeless, especially when periodontal lesions are chronic and characterized with extensive loss of attachment. Case presented here shows that combined treatment strategy with regeneration was more effective than root resection or extraction.

**Conclusion:** A detailed diagnosis, systematic treatment plan, and appropriate treatment procedures are very important for the long-term success of confusing dental problems such as combined endodontic-periodontal lesions, thus enhancing clinician’s ability to deal with these complex clinical problems

**P0699****Treatment of a periapical cyst: 2 sparing solutions (Case report)**

T. Fodor, T. Tián, P. Valyi, D.B. Hangyasi

*Szeged/Hungary*

**Aim:** The aim of this study is to prove that a periapical cyst can be treated in a periodontal way of thinking. It is also a less expensive solution, which can be a cardinal prerequisite in case of regenerative procedures.

**Material and Methods:** Two patients were referred to our department with a periapical cyst. In the beginning the endodontic treatment was repeated in both cases, but it wasn’t enough to solve the problem, so a periapical curettage seemed to be necessary. Following a full thickness flap elevation a fenestration of the buccal wall was found. We removed the cyst epithel and cleaned the surfaces of the neighbouring teeth. A piece of granulating tissue was sent to histology from both sites and the examinations proved that we were facing periapical cysts. These defects were well containing defects, which means these were ideal for regeneration. Regarding to certain literary sources bone substitute materials have no additional significant benefits in such cases. A collagene

sponge (Collacone Alveo Cone<sup>®</sup>, Botiss, Germany) was placed into each of the defects to stabilize the blood clot and to accelerate the healing. A collagene membrane (Jason membrane<sup>®</sup>, Botiss, Germany) was placed over the defects and the flaps were closed. The postoperative healing was uneventful.

**Results:** 6 months later bonefill was experienced in both cases.

**Conclusion:** The prevalence of periapical cysts is relatively high. This can be a money saving and predictable solution in these cases after proper endodontic treatment and thorough surgical handling.

**P0700****Aesthetic surgical approach of buccal bone dehiscence in single implant placement by means of interproximal periodontal tissue regeneration: a case report**G. Lombardo<sup>1</sup>, A. Pilloni<sup>2</sup><sup>1</sup>Verona/Italy, <sup>2</sup>Roma/Italy

**Aim:** Aesthetic surgical approach of buccal bone dehiscence in single implant placement by means of interproximal periodontal tissue regeneration: a case report.

**Material and Methods:** An hopeless 1.1 presenting a large bony lesion involving the buccal wall and the mesial aspect of the lateral neighbouring tooth was extracted in order to allow complete resolution of the lesion before implant placement. At 6 weeks, following a full thickness flap elevation and the defect degranulation, a locking-taper implant (Bicon LLC<sup>®</sup>, Boston, MA, USA) was subcrestally placed at the level of the bone dehiscence margin. Simultaneously, bone crest augmentation of the facial aspect was performed using a subepithelial connective tissue graft (CTG) as a membrane and a bovine xenograft (Bio-Oss<sup>®</sup> Collagen, Geistlich Pharma AG, Wolhusen, Switzerland). The diseased root surface of the lateral incisor was treated with a regenerative approach, with an enamel matrix derivative (EMD) (Emdogain<sup>®</sup>, Straumann, Basel, Switzerland). The vestibular flap was coronally advanced and sutured to cover the graft. After 6 months the final restoration was inserted.

**Results:** Clinical and radiographic evaluations after four years show successful bony and periodontal regeneration around the implant and the neighbouring lateral incisor.

**Conclusion:** The combined use of EMD and a deproteinized bovine bone as graft material, in conjunction with guided bone regeneration allows the clinician to optimize wound healing and tissue regeneration and bone remodelling on both the tooth and the implant defects.

Topic: Periodontal Therapy

**P0701****Evaluation of stress effects on periodontal diseases and treatment**

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**Aim:** The aim of this study is to evaluate the effects of stress on periodontal disease and to investigate the effects of psychoso-

cial stress on the outcome of non-surgical periodontal treatment (NPT).

**Material and Methods:** This study was performed with 50 adults, ranging from ages 38–55. Participants were divided into two sub categories according to the study protocol. First group were 10 healthy people, second group were 40 people with chronic periodontitis, respectively. Clinical parameters (PI, GI, PD and CAL) were recorded and inflammatory markers (IL-1 $\beta$ , IL-6 and IL-10) were analysed from GCF. Stress markers (chromogranin-A, cortisol,  $\alpha$ -amylase,  $\beta$ -endorphin) were measured from saliva. Stress questionnaires (STAI and HAD) were also used to determine stress severity as stressed and unstressed. All clinical and biological parameters were recorded before and at 1 month after NPT.

**Results:** The values of all the clinical parameters were significantly higher in the chronic periodontitis group than healthy group before and after NPT ( $p < 0.001$ ). Stress and salivary stress markers were significantly correlated with the clinical parameters of periodontal disease. The effects of stress was statistically significant for the clinical or biological parameters, with the response to treatment being poorer in the stressed group ( $p < 0.05$ ).

**Conclusion:** This study suggested that stress might be associated with periodontal disease through physiological and behavioral mechanisms. Patients under psychosocial stress had a poorer outcome following non-surgical periodontal treatment. According to the changes of inflammatory indices due to stressful situation, treatment protocols of periodontal disorders should focus on the control of the stress situation and psychological support.

## P0702

### Resveratrol corrects dicarbonyl stress in periodontal ligament fibroblasts in model hyperglycaemia in vitro

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**Aim:** The aim of this study was to evaluate the effect of resveratrol (RES) on glyoxalase1 (Glo1) activity and methylglyoxal (MG) metabolism in human PDL fibroblast (hPDLFs) in vitro in high and low glucose concentration.

**Material and Methods:** hPDLFs were cultured for three days in medium containing low glucose concentration (LG, 8 mmol/l) and also high glucose concentration (HG, 25 mmol/l) to model hyperglycaemic conditions. The effect of addition of Res (10  $\mu$ mol/l) was studied. The activity of Glo1, D-glucose consumption and D-lactate formation were measured. The concentrations of MG and MG-derived AGE, MG-H1, were quantified by stable isotopic dilution analysis using LC-MS/MS.

**Results:** There was a significant decrease in Glo1 activity in HG ( $529 \pm 106$  vs.  $930 \pm 84$  mU/mg protein,  $p < 0.001$ ). In HG there was an increase in D-lactate flux ( $4.95 \pm 0.42$  vs.  $3.48 \pm 0.52$  nmol per million cells per day,  $p < 0.003$ ) and an increase in cellular concentration of MG ( $10.7 \pm 1.5$  vs.  $7.6 \pm 0.5$  pmol per million cells,  $p < 0.002$ ). The concentration of MG was increased in HG culture medium ( $448 \pm 37$  nmol/l vs.  $276 \pm 82$  nmol/l;  $p < 0.01$ ). Decreased Glo1 activity in HG was corrected by RES treatment ( $996 \pm 55$  mU/mg protein,  $p < 0.0007$  with respect to HG control). RES also decreased MG content of cells ( $6.74 \pm 1.26$  pmol per million cells;

$p < 0.023$ ) and medium ( $351 \pm 36$  nmol/l;  $p < 0.018$ ) with respect to corresponding HG control.

**Conclusion:** hPDLFs suffer dicarbonyl stress and MG accumulation in high glucose concentration in vitro that may be corrected by RES treatment.

## P0703

### Indications and contra-indications of root resections. A 13-year prospective study

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**Aim:** Molars with furcation defects respond less favourably to periodontal treatment. Nevertheless, a good survival rate can be attained by different therapeutic approaches. In the treatment of teeth with furcation defects, root amputation (R.AMP.) still occupies a place but a systematic study of the literature relating to R. AMP. shows a wide divergence in success. In a study made in 1998 a survival rate of 64% after R.AMP. was observed. This poor success rate was attributed to a lack of clarity with regard to indication and case selection. The purpose of this new prospective study was to verify that case selection based on indications and contra-indications to R.AMP. could improve the survival rate of resected molars.

**Material and Methods:** In the evaluation, 68 root amputation cases were divided up into 3 groups: Perio “yes” – perio cases with no contra-indications to R.AMP. Perio “no” – perio cases with one or more contra-indications to R.AMP. Other – cases treated for non-periodontal reasons. The period of observation was 13 years (mean 5.8). The analysis of the differences uses the  $\chi^2$  Test.

**Results:** The survival rate in the perio “yes” group was 93.5% and in the perio “no” group 38.9% – a statistically significant difference ( $p < 0.001$ ). In the “other” group the survival rate was 57.9% and this difference was again statistically significant ( $p < 0.01$ ). These results and the corresponding success rates are discussed and compared with those of the literature.

**Conclusion:** A rigorous case selection can significantly improve the survival rate of teeth treated by root amputation.

## P0704

### Long-term periodontal status and glycemic control in adult patients with type 1 and type 2 diabetes mellitus, in response to periodontal treatment

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**Aim:** Aim of the study was to evaluate periodontal status and glycemic control in type 1 and type 2 diabetic (T1DM and T2DM) patients with severe periodontitis, during follow-up period of 12 months after periodontal surgery, in comparison with non-diabetic controls.

**Material and Methods:** A total of 23 T1DM and 10 T2DM patients, with 23 and 10 respective matched non diabetic controls participated in the study. All participants received periodontal surgery. Glycosylated hemoglobin (HbA1c) values served to reflect glycemic control of diabetic patients, while peri-

odontal status of all patients was evaluated by means of simplified oral debris index (DI-S), probing pocket depth (PPD), clinical attachment lost (CAL), and bleeding on probing (BOP). All measurements were performed at baseline, and at 3, 6 and 12 months after surgery.

**Results:** In diabetic and non-diabetic patients, DI-S, PPD, CAL and BOP indices improved significantly in 3 months after surgery, and remained so during entire follow up period. Significant improvement of CAL among T2DM patients was observed after 6 months ( $p < 0.05$ ). Mean HbA1c values decreased significantly in T2DM patients and remained so during 12 months ( $p < 0.05$ ), however they did not change among T1DM patients. Positive correlation between mean changes of HbA1c and CAL values was observed after 12 months of follow-up ( $r = 0.842$ ,  $p < 0.05$ ). Mean changes of all periodontal parameters during entire follow-up, did not differ between diabetics and their matched controls.

**Conclusion:** Periodontal treatment lead to significant improvement of periodontal status in all patients. The improved periodontal health had a positive impact on metabolic control of T2DM patients.

## P0705

### Salivary MMP-8 test and SRP in chronic periodontitis patients

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**Aim:** To use the salivary MMP-8 chairside test to follow-up periodontitis patients after scaling and root planing (SRP) in a private dental practice.

**Material and Methods:** After approval by the ethics committee a randomized clinical trial with 25 volunteers with generalized chronic periodontitis (mean age:  $54.2 \pm 6.4$  years, test group) and 25 periodontally healthy persons ( $53.0 \pm 8.3$  years, control group) was performed. The salivary MMP-8 chairside test (GlaxoSmithKline GmbH&Co. KG, Bühl, Deutschland) was performed at baseline (t1), after two sessions of dental prophylaxis (t2), before SRP (t3) as well as after two (t4) and six weeks (t5) in the test group. Clinical variables (PD, AL, BOP, GI, API) were recorded at t1, t2, t3 and t5. To evaluate the MMP-8 test the categories negative, very slight positive, slight positive and positive were used. In the control group a single clinical examination and a single salivary test were performed (t1). Friedman-/Wilcoxon-tests, Mann-Whitney *U*-test and Chi-square-test were used for statistical analysis.

**Results:** PD, AL, BOP, GI and API were significantly improved during the study period ( $p \leq 0.001$ ). At t5 there were no significant differences for GI and API between test and control groups. At t1 positive and negative results of the MMP-8-test were recorded in both groups ( $p \leq 0.05$ ). There was no significant correlation of MMP-8 and any clinical variable at any appointment. After therapy the results of MMP-8 were not significantly reduced.

**Conclusion:** The salivary MMP-8 test did not give any additional information or more sensitive results in comparison to the clinical recordings.

## P0706

### Antimicrobial photodynamic therapy as adjunct to the non-surgical treatment or aggressive periodontitis without the use of systemic antibiotics

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**Aim:** The management of aggressive periodontitis (AgP) represents a challenge for clinicians because there are no standardized protocols for an efficient control of the disease. This randomized controlled clinical trial evaluated the effects of repeated applications of Antimicrobial Photodynamic Therapy (aPDT) adjunctive to scaling and root planing (SRP) in patients with generalized AgP without the use of systemic antibiotics

**Material and Methods:** Using a split-mouth double-masked randomized controlled clinical trial, 20 patients with generalized AgP were treated with 4 weekly sessions of aPDT+SRP (Test Group) or SRP only (Control Group). All patients were monitored for 90 days. Clinical and microbiological parameters were statistically analyzed. No systemic antibiotics was used.

**Results:** All therapies led to a significant decrease in mean values of PD, CAL and BOP ( $p < 0.05$ ). Analyzing deep periodontal pockets, Test Group presented reduction in PD and gain in clinical attachment significantly different ( $p < 0.05$ ) from Control Group at 90 days. The frequency of residual periodontal pockets was significantly lower ( $p < 0.05$ ) in the Test Group. Test Group presented reduced proportions of Aa for moderate pockets after 30 days and also demonstrated significantly less periodontal pathogens of red and orange complexes after 90 days

**Conclusion:** The application of four sessions of aPDT, adjunctive to SRP, promotes additional clinical and microbiological benefits in the treatment of deep periodontal pockets in single-rooted teeth in patients with generalized AgP, without the use of systemic antibiotics.

## P0707

### The endodontic – periodontic lesion, “a diagnosis and Treatment dilemma”

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**Aim:** To present an overview of the different types of endodontic-periodontic lesions and their management: diagnosis, etiology, prognosis and treatment protocol. Different examples of endodontic-periodontic clinical cases will be presented along with different treatment approaches. A new modification to the current endodontic-periodontic classification will be suggested to help clinicians in their decision making while dealing with such cases that are not included with the current classification.

**Material and Methods:** Due to the close relationship between the periodontium and the root canal system a communication between the periodontal pocket (or sulcus) and the root canal system can occur in certain circumstances, causing what is commonly termed an endodontic-periodontic lesion. Those lesions have different etiologies such as: a necrotic pulp, advanced periodontal disease, external or internal resorption, or a combination of pulpal and periodontal pathology. The prognosis for those

lesions ranges from excellent to hopeless, which may lead to unnecessary extraction of treatable teeth if the clinician lacks the proper decision making skills to diagnose and treat those lesions. Clinical examples representing the Simon classification for Endodontic-Periodontic Lesions will be presented along with their management.

**Results:** Not applicable.

**Conclusion:** The diagnosis and treatment of Endodontic-Periodontic lesions is a dilemma for many clinicians and assigning the right classification type to the suspected endodontic-periodontic lesion could make the difference between extracting a perfectly treatable tooth and treating teeth with questionable or hopeless prognosis. The suggested modification to Simon classification will help clinicians in their decision making while dealing with all types of suspected endodontic-periodontic lesions.

## P0708

### The effect of mechanical versus manual instrumentation on calculus removal and root surface characteristics: an in vitro light microscopic study

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**Aim:** The aim of this study was to evaluate by light microscopy analysis the effect of piezoelectric versus manual instrumentation on calculus removal and root surface.

**Material and Methods:** A total of 20 extracted teeth were used. Two square surfaces (5x5 mm) were designed on each root surface. Before and after instrumentation, a series of images (jpeg format, 3216X2136 pixel) at 4.2X magnification for each analyzed area were taken. According to randomization lists, the two surfaces of each sample were instrumented either with mechanical (EMS PS slim tip, EMS<sup>®</sup>, Switzerland) or manual instrumentation (Gracey mini-five 7/8, Hu-Friedy<sup>®</sup>, USA). All the instrumentation procedures were carried out by a single operator experienced in non surgical periodontal instrumentation equipped with 2.0X magnifying loupes. A grid of 5X3 mm composed of 40 squares was then superimposed on each image in order to assist in the evaluation of the calculus removal and surface alterations and the images were analyzed with a specific image processor software (Image J, National Institute of Health). Two similar scores ranging from 0 (clean surface) to 4 (residual calculus >75% of the surface) for calculus removal and from 0 (completely planed surface) to 4 (more than 13% surface irregularities) for surface alterations were used

**Results:** Both the instrumentation methods were effective in removing most of the calculus deposits. The manual instrumentation resulted more frequently in minimally altered post-treatment surfaces compared to mechanical instrumentation.

**Conclusion:** Slim mechanical piezoelectric tips and manual mini-five curets have similar effects on calculus removal. Manual instrumentation may result smoother and more homogeneous root surface.

## P0709

### Plaque discloser as a motivational aid in plaque reduction: a controlled randomised clinical study

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**Aim:** The aim of this randomized controlled clinical study was to evaluate the clinical efficacy of a professional plaque disclosing gel as a motivational aid reducing gingival inflammation in patients with slight to moderate plaque accumulation after a period of 30 days.

**Material and Methods:** Adult patients with more than 20 teeth, plaque index >30%, proper hand abilities, were enrolled and randomly divided in two groups. In test group Tri plaque ID gel (GC Europe N.V.) and oral hygiene motivation were performed whereas control group received only oral hygiene motivation. Plaque index (PI) and Full mouth plaque score (FMPS) were assessed at the baseline (T<sub>1</sub>) and after 30 days (T<sub>2</sub>). The operator (O.V.) previously calibrated with periodontist (M.D.) reached an interoperator and intraoperator agreement. Plaque reduction between two groups was evaluated through Pearson's chi-squared test (p < 0.0001).

**Results:** 42 patients (18 to 65 years old) were recruited. Within each group, a statistically significant plaque reduction was reported between T<sub>1</sub> and T<sub>2</sub>. Plaque index mean value reduced from 1.36 ± 0.83 to 0.64 ± 0.69 in test group, and from 1.63 ± 0.89 to 0.78 ± 0.78 in control group. FMPS reduction was achieved in either groups in terms of 34.10% for test and 30.97% for control although it was not statistically significant.

**Conclusion:** Patients motivated with plaque disclosing gel showed a slight but not statistically significant improvement in plaque control compared to those patients who received only oral hygiene instruction motivation. The systematic use of a professional plaque discloser seems to be not compulsory as a motivational aid in plaque control.

## P0710

### A multidisciplinary approach for treatment of Papillon-Lefèvre syndrome (PLS) in 2 siblings: A 3-year follow-up: a case report

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**Aim:** Papillon-Lefèvre syndrome is a rare inheritance syndrome characterized by palmar-plantar hyperkeratosis and rapid progressive periodontitis, leading to premature loss of both primary and permanent dentitions. Several treatment modalities have been implemented in the literature; however a definitive treatment approached has not been established. This is a case report describing the management of two siblings with PLS who presented to the Department of Dentistry, KSU, Riyadh.

**Material and Methods:** 2 siblings were referred to the Periodontal clinic at KSU for Management of PLS. After initial presentation, a full periodontal examination was completed. Conventional probing depths (PD), clinical attachment levels (CAL), gingival index (GI), plaque index (PI) were measured. Initial therapy included extraction of hopeless teeth, scaling and root planning and /or surgery including antimicrobial therapy.

Patient followed up every 3 months for three years. Microbiologic and immunological monitoring was performed baseline and after treatment. Reevaluation of clinical parameters revealed a dramatic improvement in all parameters. After completion of TX. Patient received orthodontic treatment to correct the upper anterior teeth migration & subsequent implants placement. The patient is enrolled in a stringent maintenance program.

**Results:** A favorable clinical outcome was obtained. 3 years after initial treatment, the periodontal condition is stable. No further disease progression was noted and no more teeth were lost. Development of periodontitis on erupting teeth was prevented for a period of 3 years.

**Conclusion:** Treatment of PLS patients usually challenging, Arresting the periodontopathic microbiota, patient compliance, and a stringent maintenance program seem to play a significant role in the successful treatment of rapidly progressing periodontitis in PLS.

## P0711

### Evaluation of risk of bias in periodontology and implant dentistry trials: a systematic review

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**Aim:** A comprehensive assessment of risk of bias in a clinical trials is necessary to understand the level of good evidence supporting a clinical procedure. This systematic review aimed at evaluating whether authors of systematic reviews published in periodontology and implant dentistry comprehensively assess risk of bias of primary studies included in these reviews.

**Material and Methods:** A literature search for SRs was performed in PubMed and Cochrane library databases up to July 20th 2014. The reference lists of included articles were screened for further reviews. The standards of evaluating ROB in primary studies were evaluated by using a 14-item checklist based on the Cochrane approach for evaluating ROB. These items included the six ROB domains suggested by the Cochrane Collaboration: random sequence generation, allocation concealment, blinding of participant and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other sources of bias. Standards in ROB evaluations in Cochrane and paper-based SRs were compared using the Fisher's exact test. All searches, data extraction and evaluations were performed independently and in duplicate.

**Results:** Seventy SRs were included. The median percentage of items addressed was 58% (interquartile range 4–100%). Cochrane SRs included ROB assessments more frequently than paper-based reviews in terms of examiner blinding ( $p = 0.0026$ ), selective outcome reporting ( $p = 0.0207$ ), and other bias ( $p = 0.0241$ ).

**Conclusion:** The ROB evaluation in primary studies included in SRs in periodontology and implant dentistry is not sufficiently comprehensive. Cochrane SRs have more comprehensive ROB evaluation than paper-based reviews.

## P0712

### Role of 3D animation in periodontal patient education: a randomized controlled trial

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**Aim:** This randomized controlled parallel trial investigates the effect of 3D animation on the increase and recall of knowledge on periodontitis by patients with periodontitis. The effects of a 3D animation (3D animation group) were compared with narration and drawing (control group) for periodontal patient education.

**Material and Methods:** A total of 68 periodontitis patients were stratified according to educational level and then randomly allocated to control or 3D animation groups. All patients received: (1) a pre-test (baseline knowledge), (2) a patient education video (3D animation or control video), (3) a post-test (knowledge immediately after looking at the video), and (4) a follow-up test (knowledge recall after 2 weeks). Each test contained 10 multiple-choice questions.

**Results:** There was no significant difference in baseline knowledge. Patients receiving the 3D animations had significantly higher scores for both the post-test and the follow-up test, when compared with patients receiving sketch animations.

**Conclusion:** There was no significant difference in baseline knowledge. Patients receiving the 3D animations had significantly higher scores for both the post-test and the follow-up test, when compared with patients receiving sketch animations.

## P0713

### Efficacy of tapered toothbrush filaments compared to end-rounded: a systematic review

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**Aim:** Focussed question: What is the efficacy of a manual toothbrush (TB) with tapered shaped filaments (TFTB) as compared to end rounded filaments (ERTB) on clinical parameters of dental plaque (PS), bleeding (BS), gingival index (GI) and gingival abrasion (GA).

**Material and Methods:** The MEDLINE-PubMed, Cochrane-CENTRAL and EMBASE databases were searched up to September 2014. Data were extracted for PS, GI, BI and GA. A descriptive analysis and meta-analysis were performed where appropriate.

**Results:** Independent screening of 29 unique papers resulted in 5 eligible publications. Using the extracted data of 3 papers it was possible to perform a meta-analysis which showed no statistically significant difference in means on PS (DiffM = -0.0, 7 95% CI [-0.31, 0.17]). For the outcome parameter GI a mean difference favoring the TFTB (DiffM-0.08, 95% CI [-0.015, -0.02]) based on 2 papers was observed.

**Conclusion:** The collective body of evidence regarding the use of a toothbrush with tapered filaments indicates that there was no significant difference on PS but a significant but clinical small difference in favor for the TFTB on GI. Therefore the clinical relevance of a potential benefit remains questionable. The recommendation emerging from this review does not pro-

mote the TFTB over the ERTB or vice versa. Toothbrushes with both filament types are able to remove plaque and improve oral health to a comparable extent. The practical implications of this systematic review are applicable for dental healthcare professionals.

## P0714

### Systematic review and meta-analysis of the survival rate of removable dental prostheses (RDPs) with respect to pre-treatment and supportive therapy

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**Aim:** Systematic review and meta-analysis of the survival rate of RDPs.

**Material and Methods:** In 2014 a systematic review of dental literature was done by an online search in medical databases (Medline, Embase, Biosis, Scisearch, Cochrane, FIZ Technik Web) and by hand searching in relevant dental prosthodontic journals. RCTs, prospective and retrospective clinical trials with at least 15 participants, 2 years observation period and a drop-out <25% were included. The selection was done by title, abstract and full-text level by at least 2 of the co-authors.

**Results:** Of initially 12,994 hits, 1,923 were included based on title, 650 based on abstract and 111 full-text articles were evaluated. Nineteen studies were included, 6 of which were multiple publications with different observation periods. Clasp retained RDPs showed failure-rates of 33 to 50% after 5 years. A study over 25 years reported failure rates of 50%. Attachment retained RDPs showed 5-years failure rates of 11%–30% for bilateral design and 75% for unilateral design. Double-crown retained RDPs showed failure rates of 0–21.7% after 3–6 years. When used for the same indication, RDPs were more often prone to complications and failures than FDPs or the shortened dental arch. However, in studies with strict pre-treatment and supportive therapies, considerably better results were assessed.

**Conclusion:** It can be concluded that RDPs can be a satisfactory treatment modality when combined with a stringent pre-treatment and supportive therapy. In the opposite case they are more prone to complications and failures than fixed restorations.

## P0715

### The effects of non surgical treatment on advanced furcation involvement

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**Aim:** Surgical operations or extractions are usually practiced in advanced furcation involvement. In this paper, we report the treatment effects on furcation involvement which we improved by non surgical treatment on eight to eighteen years observations.

**Material and Methods:** Two female patients and one male patient with advanced furcation involvement were chosen. Their upper first molars had Lindhe and Nyman furcation classification II and III degrees. The careful plaque control techniques without excess stress against soft tissue around furcation were instructed. The root surfaces were smoothed carefully with a hand scaler. Occlusal adjustment took place as well. The two

female patients were improved by these treatment. However the male patient was not improved. So nocturnal sleeping bruxism was measured and treated with IKEDA method by using occlusal splint and auto suggestion. As a result, sleeping bruxism is reduced and patient was improved. The patients were maintained for 8 to 18 years. In the three cases, the furcation were filled with soft tissue, and regeneration of the bone was found in radiographs.

**Results:** Multi rooted teeth which have advanced furcation involvement were improved by careful initial preparation, treatment of sleeping bruxism and a long term maintenance. This is considered that the effects of non surgical treatment in removing the factors districting periodontal tissue healing force and displaying the ability of natural healing power.

**Conclusion:** It is considered that this non surgical treatment method was very effective for patients who cannot choose surgical treatment.

## P0716

### Clinical evaluation of full-mouth disinfection in generalized aggressive periodontitis

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**Aim:** To compare the clinical efficacy of conventional initial periodontal treatment (C-IPT), full-mouth IPT (FM-IPT) and full-mouth disinfection IPT (FMD-IPT) in patients with generalized aggressive periodontitis (GAgP) over a 6-months period.

**Material and Methods:** Forty-two GAgP patients were randomly assigned into 3 groups. After oral hygiene instructions, IPT was performed in a quadrant-wise manner at 1-week intervals in the C-IPT group, in 2 sessions within 24 h in the FM-IPT group, and in 2 sessions with application of chlorhexidine to the intra-oral niches within 24 h in the FMD-IPT group. FMD-IPT group also rinsed twice daily with chlorhexidine solution for 3 weeks. At baseline, 3 and 6 months clinical parameters consisting of plaque index (PI), gingival index (GI), probing depth (PD), bleeding on probing (BOP) and clinical attachment level (CAL) were recorded.

**Results:** PI, GI, PD, BOP were improved significantly in all 3 groups at 3 and 6 months, but CAL only in the FM-IPT and the FMD-IPT groups ( $p = 0.05$ ). The mean PI ( $p = 0.001$ ) and BOP ( $p = 0.014$ ) were significantly lower at 3 months in the FMD-IPT group compared to the FM-IPT group. The mean BOP and PD were significantly lower in the FMD-IPT ( $p = 0.002$ ,  $p = 0.001$ ) group compared to the C-IPT ( $p = 0.003$ ,  $p = 0.000$ ) group both at 3 and 6 months.

**Conclusion:** Our findings show that FMD-IPT results in an improved clinical outcome for the treatment of GAgP patients during 6-months as compared to C-IPT.

## P0717

### Evaluation of root debridement skill in periodontology preclinical module

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**Aim:** To evaluate the root debridement skill in periodontology preclinical module among year 3 dental students and to estimate

the effectiveness of conducting preclinical module before entering clinical module.

**Material and Methods:** A total of 47 year 3 students were included in this study. Single rooted extracted anterior teeth were collected and mounted. In 2012, the year 3 students were given the sample to perform root debridement only on the labial side for 10 min using Gracey's curette #5/6. The similar samples were distributed back to the same student (which is already in Year 4) to repeat the same procedure on the lingual surface of the same tooth. Root surface roughness was evaluated using Scanning Electron Microscope (SEM) and profilometer for labial and lingual surfaces. Statistical analysis was done using student t test (2-tailed). Significance level of  $p \leq 0.05$  was assumed for all analysis.

**Results:** Profilometer results (Ra) were reduced in the lingual surfaces in 2013 ( $-561 \pm 286$ ) compare to the buccal surfaces in 2012 ( $-520 \pm 313$ ). No statistically significant differences observed in the root roughness ( $p$ -value = 0.658) between the two surfaces. SEM Photomicrographs of root surfaces which were taken at magnifications  $100\times$  and  $800\times$  revealed incomplete removal of the calculus and the dental biofilm in both surfaces.

**Conclusion:** All of the students managed to achieve a smooth root surfaces in year 2013, however, low percentage of clean root surfaces were observed. Reinforcement of the periodontology preclinical module before entering the clinical module may be needed to improve the root debridement skill.

## P0718

### The periodontal pretreatment as a base for a successful prosthetic rehabilitation

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Vienna/Austria

**Aim:** Prosthetic rehabilitation.

**Material and Methods:** Case report.

**Results:** Periodontal disease is the main cause of tooth loss and loosening occlusion. Bacteria destroy the gum and in future the bone of the jaw. Full mouth rehabilitation always claims careful attention and meticulous treatment planning. The oral rehabilitation with fixed prosthetic crowns and bridge, plays an important role in restoring oral and systemic health, especially the patient is young. In my case report i demonstrate the long way from the first contact of the patient, above periodontal treatment, caries and endodontic treatment, orthodontic treatment, implant treatment, diagnostic electronic condylography and evaluation of telerradiograph, temporary prosthetic treatment and final prosthetic restauration.

**Conclusion:** A sufficient prosthetic treatment is not feasible without a periodontal pretreatment.

## P0719

### Hereditary gingival fibromatosis- a case report

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**Aim:** Generalized gingival enlargement is a rare condition of varying etiology, resulting in oral hygiene impairment and increased risk of periodontitis.

**Material and Methods:** A 40-year old male was presented with generalized hyperplasia of the gingiva, halitosis, bleeding gums, masticatory difficulties and compromised aesthetic. While the medical history was unremarkable, a positive family history was reported, since his mother was also affected. Clinical examination showed a firm, dense generalized gingival overgrowth, massive plaque, subgingival and supragingival calculus, and tooth migration. Periodontal charting revealed active deep pseudo pockets and periodontal pockets.

Generalized bone resorption was radiographically detected. Histological examination revealed connective tissue with dense collagenous fibers, large numbers of fibroblasts, fibrocytes and high quantity of chronic inflammatory cells. A hereditary gingival fibromatosis (HGF) and severe chronic periodontitis were diagnosed. Initial periodontal therapy with adjunctive systemic antibiotics was followed by surgical excision by means of internal gingivectomy and open flap debridement. Significant clinical improvement was achieved and remained stable up to one year. In addition, orthodontic treatment and periodontal maintenance are recommended.

**Results:** Gingival fibromatosis can be caused by number of factors, e.g. by inflammation, leukemic infiltration, systemic medication, or genetic origin is considered (hereditary isolated or as part of a syndrome). An association of HGF with periodontitis requires a combined antiinfective and surgical treatment approach.

**Conclusion:** HGF should be managed as early as possible to prevent periodontitis and further functional and esthetical impairment. Regular supportive periodontal therapy is important to maintain the treatment success.

## P0720

### Gingival crevicular fluid oxidant, antioxidant and protein carbonyl levels of smoker chronic periodontitis patients and adjunctive diode laser decontamination in their treatment

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**Aim:** To investigate the effects of non-surgical periodontal therapy and adjunctive use of diode laser decontamination on clinical periodontal parameters and total antioxidant status (TAS), total oxidant status (TOS), and protein carbonyl (PC) levels in gingival crevicular fluid (GCF) of smoker chronic periodontitis patients.

**Material and Methods:** The study group consisted of 15 smoker volunteers diagnosed with chronic periodontitis. Probing depth, clinical attachment level, plaque index, gingival index and bleeding on probing index scores of patients were recorded. GCF samples were collected from four sites (PD $\geq$ 5 mm) in each contralateral side (right and left) of patients. Full-mouth scaling and root planning was performed and then diode laser [940 nm; 1.5 W] pocket decontamination was applied to the randomly assigned test region (right or left side), the other side served as control. Clinical measurements and GCF samplings were repeated on the 1st and 3rd months. TAS, TOS and PC levels in GCF were determined by ELISA.

**Results:** Statistical analysis of the data revealed that treatment modalities applied in both groups improved clinical parameters and reduced GCF volume ( $p < 0.05$ ), except the attachment level ( $p > 0.05$ ). Despite observing a continuous increase of TAS in GCF for test group, differences were not significant

( $p > 0.05$ ). There were no significant differences between test and control groups for TAS, TOS and PC level changes in GCF ( $p > 0.05$ ).

Decontamination has no any additional benefits in the treatment of smoker patients with chronic periodontitis.

## P0721

### Localised aggressive periodontitis and bone regeneration: a non-surgical approach

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**Aim:** Following successful non-surgical periodontal treatment of periodontitis, alveolar bone generally fails to regenerate due to the rapid long junctional epithelial formation. A case is presented showing radiographic evidence of bone regeneration following non-surgical management of a patient with localised aggressive periodontitis.

**Material and Methods:** A 16 year old female patient was referred to the Leeds Dental Institute. She was well motivated and had a family history of periodontal disease. Her plaque control was excellent and probing depths of 7 mm detected on UR1, UR6, LL6, LR6 with radiographic evidence of vertical bone loss on the LL6 and LR6. A diagnosis of localised severe aggressive periodontitis was made. All pockets greater than 4 mm underwent root surface debridement under local anaesthesia. The first without antimicrobials; the second with adjunctive systemic antibiotics (250 mg amoxicillin and 200 mg metronidazole over 7 days) and the third with adjunctive topical Periochip in any residual pockets. Following treatment, all pockets were reduced to 4 mm or less with radiographic evidence of bone regeneration with the mandibular molar teeth.

**Results:** Managing aggressive periodontitis non-surgically with adjunctive antimicrobial therapy can result in pocket reduction and an improvement in clinical attachment via gingival recession and the formation of a long junctional epithelial. Bone regeneration is sometimes possible with surgical therapy using guided tissue regeneration or Emdogain (porcine derived enamel matrix proteins). This case demonstrates how bone regeneration may be possible with non-surgical management alone.

**Conclusion:** This case highlights that non-surgical treatment with adjunctive antimicrobials can have a profound effect on the periodontium in patients with aggressive periodontitis.

## P0722

### The treatment of necrotising ulcerative stomatitis

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**Aim:** The aim was to find the results of the treatment of necrotising ulcerative stomatitis.

**Material and Methods:** The disease known as trench mouth or Vincent's stomatitis was very common during the 20th century, especially in the World War I. Risk factors for disease are poor oral hygiene, young age, tobacco and alcohol use, HIV infection, malnutrition, and psychological stress. In Africa, where disease is associated with AIDS and malnutrition it can cross into noma, causing a severe destruction of the oral tissues. Patient A.T. (18) came to the Department of Oral medicine in October 2013. He suffered great pain in the month, had difficulty swal-

lowing due to necrotic changes on the uvula, and lost 20 pounds of weight. No drug abuse was reported; patient denied allergies, smoking and alcohol abuse

**Results:** Results of blood analysis were in normal ranges, including CRP values. We suggested HIV and a hepatitis test, but the patient did not comply. Severe halitosis was also present.

We performed the initial periodontal treatment in 4 visits, prescribed metronidazole 400 mg for 7 days and recommended rinsing with 3% hydrogen peroxide solution. Recall visits were performed after 1 week, 2 weeks and 1 month.

**Conclusion:** Only few cases of this disease have recently occurred in Croatia. This may be explained by the improved standard of life and medical care. Nowadays, necrotizing ulcerative stomatitis (NUS) might be connected with immunodeficiency and AIDS. The most important factors in the prevention of NUS are good oral hygiene and absence of bad habits.

## P0723

### Systemic and local effects of diode laser application as an adjunct to scaling and root planing

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**Aim:** In this study, we aimed to evaluate the systemic and local effects of diode laser treatment when applied adjunctive to scaling and root planing (SRP) in an experimental periodontitis model.

**Material and Methods:** In the study, average 230 g weight of Wistar-Albino strain ( $n = 60$ ) rats were used and the rats were provided from Inonu University Center of Experimental Animal Research and Reproduction. Experimental periodontitis was induced by ligature at the right first mandibular molar teeth in all rats. After 11 days, the ligature was removed and rats were divided into two groups. Control group ( $n = 30$ ), received only SRP treatment; Laser group ( $n = 30$ ), administered diode laser (GaAlAs, 810 nm, 1 W, 10 J, 20 s) treatment adjunctive to SRP. Ten rats in each group were sacrificed after 7, 15 and 30 days. The systemic effect of diode laser application was considered by serum CRP levels. The local effect of diode laser application was considered by IL-1 $\beta$ , IL-6, TNF- $\alpha$  and MMP-8 levels. IL-1 $\beta$ , IL-6, TNF- $\alpha$  and MMP-8 were evaluated by western blot in the gingival specimens.

**Results:** IL-1 $\beta$ , IL-6, TNF- $\alpha$  and MMP-8 levels in the laser group was statistically significantly lower compared to the control group ( $p \leq 0.05$ ). There were no significant differences between groups for CRP ( $p \geq 0.05$ ).

**Conclusion:** Within the limits of this study; we suggest that diode laser administration is an alternative treatment by reducing periodontal destruction and some mediators which play roles in tissue destruction when applied in addition to SRP in rats with experimental periodontitis.

**P0724****Effects of diode laser application as an adjunct to scaling and root planing on alveolar bone loss**M. Uslu<sup>1</sup>, A. Eltas<sup>1</sup>, S. Dundar<sup>2</sup>, M. Tuzcu<sup>2</sup>, I. Marakoglu<sup>3</sup><sup>1</sup>Malatya/Turkey, <sup>2</sup>Elazığ/Turkey, <sup>3</sup>Konya/Turkey

**Aim:** In this study, we aimed to evaluate the immunologic effects of diode laser treatment when applied adjunctive to scaling and root planing (SRP) in an experimental periodontitis model.

**Material and Methods:** In the study, average 230 g weight of Wistar-Albino strain (n = 60) rats were used and the rats were provided from Inonu University Center of Experimental Animal Research and Reproduction. Experimental periodontitis was induced by ligature at the right first mandibular molar teeth in all rats. After 11 days, the ligature was removed and rats were divided into two groups. Control group (n = 30), received only SRP treatment; Laser group (n = 30), administered diode laser (GaAlAs, 810 nm, 1 W, 10 J, 20 s) treatment adjunctive to SRP. Ten rats in each group were sacrificed after 7, 15 and 30 days. RANK, RANKL and OPG were evaluated by western blot in the gingival specimens. The immunological values were statistically analysed.

**Results:** RANK, RANKL and OPG levels in the laser group was statistically significantly lower compared to the control group in all experimental periods ( $p \leq 0.05$ ).

**Conclusion:** Within the limits of this study; we suggest that diode laser administration is an alternative treatment by reducing bone loss and some mediators when applied in addition to SRP in rats with experimental periodontitis. On the other hand, more researches need for the assessment of the effects of diode laser application to periodontal tissues.

**P0725****The effect of motivational interviewing on periodontal therapy: a randomized controlled study**J.P. Woelber<sup>1</sup>, N. Spann-Aloge<sup>1</sup>, G. Hanna<sup>1</sup>, G. Fabry<sup>1</sup>, K. Frick<sup>2</sup>, R. Brueck<sup>3</sup>, K. Vach<sup>1</sup>, P. Ratka-Krüger<sup>1</sup><sup>1</sup>Freiburg/Germany, <sup>2</sup>Berlin/Germany, <sup>3</sup>San Diego/United States of America

**Aim:** Aim of the study was to investigate the influence of Motivational Interviewing (MI) on 6 months of non-surgical periodontal treatment performed by dental students.

**Material and Methods:** The objects consisted of periodontal compromised patients attending to a cohort of dental students for periodontal treatment. In the experimental group, patients were treated by students who received an intensive training in Motivational Interviewing. In the control group, patients met students without further training in communication. Clinical oral parameters were assessed by a blinded periodontist additional to psychological questionnaires (stress, self-efficacy, demographic variables) before and after the non-surgical periodontal treatment. Conversations between patients and students were record-taped and rated with the Motivational Treatment Integrity Code (MITI-d) by a blinded psychologist.

**Results:** In the control group 99 patients and in the MI-group 72 patients were treated. The MI-group showed significant higher values in the MITI-d analyse. Due to differences

between the groups in clinical baseline values, a regression analyse was performed showing that there were no significant group differences for plaque levels, gingival bleeding, pocket depth reduction or bleeding on probing. However, patients of the MI-group showed a significant higher interdental cleaning self-efficacy than patients in the control group (MI=  $19.57 \pm 4.7$ ; Control =  $17.38 \pm 6.01$ ;  $p = 0.016$ ).

**Conclusion:** The teaching of MI to dental students showed no significant clinical benefits in the period of 6 months on non-surgical periodontal treatment compared to a group of non-trained students, except a significant higher interdental cleaning self-efficacy in patients of the MI-group

**P0726****Idiopathic gingival fibromatosis**

B. Koirala, S. Sharma (khanal)

*Dharan/Nepal*

**Aim:** Gingival enlargements are quite common and may be either inflammatory, non-inflammatory or a combination of both. Idiopathic gingival enlargement or idiopathic gingival fibromatosis (IGF) is a rare condition with a proliferative fibrous lesion of the gingival tissue that causes esthetic and functional problems. The cause is unknown, and thus the condition is designated as idiopathic.

**Material and Methods:** A 9-year-old male presented with a massive generalized diffuse gingival enlargement involving the entire maxillary and the mandibular arch. The enlargement extended on the buccal, lingual and palatal surfaces with just parts of occlusal surfaces of few upper and lower molars visible resulting in severe lip incompetence, difficulty in mastication and speech. As the family, medical and drug histories were non-contributory; a provisional diagnosis of IGF was made. Histopathologic report confirmed the diagnosis. The case was managed by gingivectomy under local anaesthesia.

**Results:** Gingival fibromatosis is a slowly progressive gingival enlargement caused by collagenous overgrowth of the gingival fibrous connective tissue. Literature reports high recurrence rate after surgery and a closer follow up. Present case has been followed for 3 years with evidence of mild recurrence. Though the tissue appeared to be pale and firm, the surgical procedure was complicated with excessive hemorrhage. Unusual finding during surgery also included severe bony enlargement which precluded from achieving full esthetics.

**Conclusion:** Though total esthetics could not be restored due to unusual bony enlargement, the general appearance improved satisfactorily. Treatment after complete excision however improved the masticatory function to a great extent.

**P0727****The effect of inter-radicular brushing on degree II furcation of lower molars: a randomized, single-blinded, prospective trial**

J.Y. Jang, A.K. Lee, S. Ji

*Seoul/Korea*

**Aim:** A randomized, single-blind, and prospective clinical trial was performed to evaluate the effect of inter-radicular brushing on Degree II furcation of lower molars.

**Material and Methods:** Twenty patients presenting at least one class II furcation involvement that bled on probing with horizontal probing pocket depth (PD)  $\geq 4$  mm were recruited. Each patient was randomly assigned to do either inter-radicular brushing with interdental brush (inter-radicular brushing test group,  $n = 10$ ) or not (control,  $n = 12$ ). After 4 weeks, the clinical indicators of furcated molars were evaluated and microbial analysis of the plaque collected from inter-radicular space was analyzed using quantitative real-time PCR.

**Results:** No statistically significant difference with regard to mean vertical PD, horizontal PD, gingival recession, clinical attachment level, and plaque index on furcation sites was registered between control and test groups. However, the mean modified gingival index of control and test sites was 2.3, and 1.2 and the mean bleeding index was 2.3 and 0.6, respectively, which were statistically significant between groups. Among total bacteria, 3 strains of orange complex and 3 strains of red complex pathogens, the copy number of total bacteria, *Fusobacterium nucleatum*, *Parvimonas micra* and *Tannerella forsythia* were significantly higher in control than test group.

**Conclusion:** The use of inter-radicular brushing can help to inhibit the inflammation on degree II furcation defects of lower molars.

## P0728

### The delivery of periodontal care by general dental practitioners in Singapore: an analysis of the referral patterns and associated factors

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**Aim:** To investigate periodontal procedures commonly performed by general dental practitioners (GPs), their periodontal referral patterns, and its associated patient- and periodontist-related factors.

**Material and Methods:** A questionnaire was sent to 1,012 practicing GPs in Singapore to assess the types of periodontal procedures performed, factors influencing periodontal referral and GPs' perception of periodontics. Descriptive, bivariate and multiple regression analyses were performed.

**Results:** Of the 305 respondents (31%), 50% were male, with mean age of 37.4 (SD = 11.9; range = 22–71) years. The mean practice duration was 13.3 (SD = 11.5) years, with 72% in private practice. Most GPs gave oral hygiene instructions (87.8%), performed scaling and root planing (85.2%), and enrolled patients in a periodontal maintenance program (87.5%). However, only 26.4% of GPs routinely performed periodontal charting. Of those who never carried out periodontal charting, 42.9% had practised for more than 20 years and 92.9% were in private practice. The mean threshold probing depth and radiographic bone level triggering a recommendation for surgery, extraction, or referral to a periodontist did not significantly differ between GPs who referred and those who did not. Most GPs referred patients for periodontal consultation (64.5%) and surgical periodontal therapy (94.3%). After adjusting for selected covariates, only years of practice was significantly associated with whether GPs referred or not ( $p = 0.043$ ), with younger GPs making more referrals.

**Conclusion:** Most GPs were able to diagnose and manage periodontal disease non-surgically. The more experienced the GP, in private practice, the less likely he/she made periodontal referrals. This was possibly because disease was missed as periodontal charting was not routinely performed.

## P0729

### Probing pocket depth changes in response to scaling and root planing. Part I. A retrospective cohort study

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**Aim:** To evaluate probing pocket depth (PPD) changes in response to non-surgical periodontal therapy and their dependence on teeth location and mobility.

**Material and Methods:** This retrospective study includes 330 patients with periodontal disease diagnosed at a private practice. PPD was measured at six points/tooth by the same calibrated/experienced periodontist using a Florida Probe<sup>®</sup> at baseline (previous to non-surgical treatment) and at re-evaluation (6–8 weeks after treatment). The six point's average was taken as the tooth PPD. Tooth mobility was assessed at baseline. PPD at baseline and pairwise after-previous changes were compared with respect to location and to mobility (without/with) by multivariate two-way ANOVA with Bonferroni corrections. Results are presented as mean  $\pm$  std error and  $p < 0.05$ .

**Results:** The 330 patients totalized 9240 teeth from which 950 were missing (52% molar). At baseline, PPD was  $3.47 \pm 0.02$  mm and exhibited differences for location and mobility ( $p < 0.05$ ), and no interaction. At baseline, the highest values were achieved for maxillary molars and pre-molars ( $4.16 \pm 0.07$  and  $3.79 \pm 0.06$ ) and teeth with mobility ( $3.97 \pm 0.04$  vs.  $2.97 \pm 0.01$ ). At re-evaluation, PPD decreased ( $-1.08 \pm 0.02$ ,  $p < 0.05$ ), with no location effect. Finally, there were mobility and interaction effects ( $p < 0.05$ ): treatment was more responsive for teeth with mobility ( $-1.24 \pm 0.03$  vs.  $-0.91 \pm 0.01$ ) except for maxillary molars ( $-1.12 \pm 0.03$  vs.  $-1.02 \pm 0.10$ ).

**Conclusion:** Non-surgical treatment decrease PPD ( $-1.08 \pm 0.02$  mm). Although initial PPD depended on location, the PPD reduction after treatment was similar for all locations. Furthermore, treatment showed higher efficacy for teeth with mobility (higher initial/reduction values). This reduction of PPD need to be careful interpreted in a clinical point of view.

## P0730

### Alternative approach to the management of postoperative pain after frenectomy procedures

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**Aim:** Labial frenulums are commonly regarded as sagittal fibrous folds of oral mucosa with a periosteal insertion that extend from the lips to alveolar or gingival mucosa. They may lead to functional and esthetic limitations. Labial frenectomy is the surgical procedure of removing the frenulum. Low level laser therapy (LLLT) is widely used during the post-operative period to accelerate the healing process. The aim of this case series report is to evaluate the effect of LLLT on reducing or eliminating pain during healing period.

**Material and Methods:** Frenectomy procedures were performed on 5 systemically conducted patients aged between 19 and 26 who had abnormal maxillary and mandibular labial frenulum attachments. After surgery LLLT (diode laser, 810 nm)

was performed maxillar or mandibular wound areas randomly. Pain levels in 2, 8 h and between 1–7 days of post-operative healing process were evaluated with a visual analog scale.

**Results:** Less postoperative pain levels and better patient comfort were observed on LLLT performed surgery regions. The difference on pain levels between application regions was not statistically significant after 4 days.

**Conclusion:** Diod laser application after frenectomy procedures provides better patient comfort by decreasing post operative pain.

## P0731

### PERIOCHIP.. The revolutionary chip!

A. Patel

Mumbai/India

**Aim:** The aim is to study clinical and microbiological effectiveness of PERIOCHIP as an adjunct to Scaling and Root planing in comparison to Scaling and Root planing alone in patients with chronic periodontitis.

**Material and Methods:** PERIOCHIP, is a controlled subgingival local drug delivery system. It is a orange-brown rectangular chip rounded at one end and measures 5 mm × 4 mm × 0.3 mm. The chip weighs 7.4 mg of which chlorhexidine gluconate weighs 2.5 mg. The chip shows a 2-phase release. An initial outburst of chlorhexidine was found over the first 24–48 hrs followed by a slower release of the remaining chlorhexidine bound to the matrix. This is a randomised, split mouth, 3-month trial. The study includes 30 sites in 15 patients aged 30–50 yrs with bilateral pocket depths of 5–7 mm. The test group recieved Scaling and Root planing and PERIOCHIP whereas control group recieved Scaling and Root planing alone. The clinical and microbiological results were taken at baseline, 1 month and 3 months. Anaerobic culture was done for periodontopathogenic bacteria-Provetella Gingivalis (Pg), Prophyromonas Intermedia (Pi), Aggregatibacter Actinomycetemcomitans (Aa), Fusibacterium Nucleatum (Fn).

**Results:** Clinical improvement was found and decrease in the total colony counts of all sites were seen. Significant improvement of the clinical and microbiological aspect was seen in the test group as compared with the control group.

**Conclusion:** The results suggest that application of the PERIOCHIP in the maintenance phase following Scaling and Root planing proved beneficial in the treatment of chronic periodontitis. PERIOCHIP, thus proven to be an effective local delivery of chlorhexidine. This study was conducted to evaluate the benefits in patients with chronic periodontitis.

## P0732

### Influence of ultrasonic tip distance and orientation on biofilm removal

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Zurich/Switzerland

**Aim:** To assess the effects of ultrasonic tip distance and orientation on the removal of a multi-species biofilm under standardized conditions in vitro.

**Material and Methods:** Six-species biofilms were grown on hydroxyapatite discs for 64.5 h and treated with an ultrasonic

tip (straight Slimline, Cavitron, Dentsply, York, PA, USA) placed either on contact or at 0.25 mm and 0.5 mm distance. The treatment was performed for 15 s with either the tip at right angle or sideways to the discs fixed in Teflon molds. The biofilm removal was evaluated by assessing the viable bacteria in each supernatant as compared to the untreated controls. While biofilms on controls were mechanically removed, bacteria were evaluated in the supernatants. CFU were determined by cultivation on solid media. Any remaining biofilm on the treated discs was also visualized after staining with green-fluorescent SYTO<sup>®</sup> 9 stain using a confocal laser scanning microscope (CLSM). Mann–Whitney-*U*-Tests and Bonferroni correction was used to analyze the results between the groups.

**Results:** Sideways application of the ultrasonic tip at a distances with 0.25 and 0.5 mm removed as many bacteria as present on the control discs compared to the tip on contact ( $p < 0.05$ ). All other application modes especially the ultrasonic tip applied perpendicularly on contact showed no statistical significance in removing biofilm.

**Conclusion:** Overall, data indicates that bacterial detachment depends on tip orientation and distance especially when the tip is applied sideways similar to clinical settings. To ensure sufficient biofilm removal the tip dose not require to be on contact.

## P0733

### Periodontal treatment protocols for solid-organ transplant patients

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**Aim:** The aim of the present communication is to describe periodontal treatment protocols for solid-organ transplant patients prior to surgery.

**Material and Methods:** Solid organ transplantation is one of the most remarkable and dramatic therapeutic advances in medicine during the past 60 years. Nowadays this procedure is considered clinically effective, life-saving and cost-effective. Nevertheless, infection continues to be one of the cause in graft loss or death of transplant recipients. In this respect, periodontal disease seems to have serious implications in solid-organ transplant deterioration and chronic rejection. We describes the periodontal treatment of patients prior to solid-organ transplantation. A patient-specific treatment plan was elaborated given the challenging periodontal and systemic scenarios, in close interaction with the referring physicians. Lastly, the article reviews current principles and protocols in managing these patients.

**Results:** We demonstrated that periodontal treatment in these subjects is feasible, but it should be performed by a multidisciplinary team. Upon completion of periodontal treatment, the patients were ready for solid-organ transplant.

**Conclusion:** Dentists and physicians should be more aware of the bidirectional nature of the relationship between oral health and systemic conditions. Standardized protocols for pre- and post-transplantation dental care should be established and implemented both in transplant centers and dental offices.

## P0734

### Endo-paro complications of generalized aggressive periodontitis – a case report

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**Aim:** Aggressive periodontitis (AgP) is a severe, rapidly progressive form of periodontitis, which occurs in early age with specific tendency of manifesting within families. It is characterized by rapid loss of CAL and surrounding bone. Generalized form of AgP usually affects people under 35 years of age. Bone destruction and attachment loss are affecting at least 3 permanent teeth other than the first incisors and molars. Endo-paro lesions are relatively frequent complications with this type of periodontitis. When one of these two tissues is infected, microorganisms circulate between them, and infections from one tissue may cause pathology of another or exacerbate the current disease.

**Material and Methods:** 26-year old female with clinical and radiographic evidence of severe attachment loss and bone destruction is diagnosed with generalized AgP with most affected upper left central incisor, with deep pockets PPD-15 mm and tooth mobility class III, according to Miller. Deep scaling and root planing with endodontic treatment is performed. Metronidazole 3 × 400 mg, and Amoxicillin 2 × 500 mg for 8 days is prescribed. Tooth 21 was also splinted after perio therapy and before endo therapy.

**Results:** After 2 years tooth 21 has no pockets and its mobility is class I, according to Miller.

**Conclusion:** Correct treatment technique in shaping and filling of root canal with thorough deep scaling and root planning, supported by antibiotic therapy in this case, are the keys to successful healing.

## P0735

### Effect of mechanical periodontal therapy on gingival thickness: a pilot study

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Singapore/Singapore

**Aim:** To determine the change in gingival thickness following mechanical periodontal therapy. Possible associations with biotype, gender and recession were also investigated.

**Material and Methods:** Patients with radiographic bone loss >10% and full mouth bleeding scores >20% were included. Exclusion criteria included patients on medications that might induce soft tissue alterations. Clinical measurements included probing depth, bleeding on probing, probe transparency through the gingiva, recession, and gingiva width. Gingival thickness was recorded midway between the free gingival margin and mucogingival junction using a finger spreader. Digital calipers (0.01 mm) were used under magnification ×10. An individualized silicon guide facilitated reproducible measurements at the same locations between baseline and review.

**Results:** 16 subjects with generalized severe chronic periodontitis completed the study with a mean age of 44 ± 6.4 years. There were 9 males and 7 females. 4 were smokers, 1 formerly smoked while the rest never smoked. There was an overall significant decrease in gingival thickness (0.14 mm) and width (0.19 mm) for all teeth between baseline and review. Teeth with

baseline gingival thickness ≤1 mm increased in thickness by 0.18 mm whilst those with >1 mm thickness experienced a decrease of 0.08 mm at review. There were no significant differences in post-instrumentation gingival thickness changes between biotypes, teeth with or without recession, biotypes and smoking status.

**Conclusion:** To our knowledge, this is the first study that quantified gingival thickness changes after one round of mechanical periodontal therapy. Mechanical periodontal therapy and resolution of inflammation decreased thickness in thicker (edematous) tissues and enabled thin tissues to thicken slightly in this patient cohort.

## P0736

### Evaluation of patient perceptions on the treatment of different oral soft tissue lesions with Nd: YAG laser surgery

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M. Topaloğlu, C. Kara

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**Aim:** The aim of this clinical study was to determine the anxiety levels of patients after Nd: YAG laser oral soft tissue surgery on the degree of postoperative pain, discomfort, functional complications (eating and speech), and recurrence.

**Material and Methods:** Ten patients with oral soft tissue problems (pyogenic granuloma, verruca vulgaris, giant cell granuloma, fibroma, etc.) were included in the study. Levels of pre-operative fear and post-operative satisfaction, pain, functional complications and esthetic concerns for each patient were recorded using a visual analog scale at 3 h, 1 day, and 1 week post-laser surgery (320 μm optic fiber; 4W; 100mj, 40 Hz; emission mode, pulsed, and contact mode).

**Results:** The results indicated that the patients had less postoperative pain and fewer functional complications, and immediate relief of pain. The laser surgery produced less bleeding, minimal damage to surrounding tissue, and reduction in post-surgical edema.

**Conclusion:** The results suggest that in the population studied, Nd: YAG laser treatment of soft tissue disorders provides better patient acceptance, shorter treatment time, and lower rates of pain and post-treatment adverse events among patients with oral soft tissue lesions.

## P0737

### Helping anxious patients with periodontal disease as a dental hygienist

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London/United Kingdom

**Aim:** To characterise the levels of dental anxiety in periodontal patients attending regularly for treatment and improvement of the disease.

**Material and Methods:** Survey of a consecutive 100 patients with Basic Periodontal Examination (BPE) scores of 2 and above using the modified dental anxiety scale (MDAS) and a preform a dental anxiety questionnaire created by the dental hygienist.

**Results:** Amongst new patients 14% of respondents scored 19 and above on the MDAS indicating a phobic level of dental fear (mean score 12.76 (SD:5.78)). For existing patients no respondents scored 19 or above (mean score 10.90 (SD:3.64)). There were also significant improvements in oral health as well as periodontal disease for existing patients. Over 70% of the participants confirmed that the hygienist's communication and application of psychological knowledge had been helpful in creating a sense of trust of the practitioner and reducing patients' anxiety and periodontal disease. Almost 80% rated their own dental health as being maintained or very good.

**Conclusion:** Dental hygienists can play an important role in enabling individuals who are anxious about visiting the dentist and who have periodontal disease, to overcome their fears and enjoy improved oral health.

## P0738

### Efficacy of an adjunctive subantimicrobial dose doxycycline in smoking patients – a preliminary results of a randomized study

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**Aim:** Smoking has been identified as a risk factor for periodontitis. Previous studies, which have investigated the clinical benefits of subantimicrobial dose doxycycline in the treatment of chronic periodontitis in smokers, report equivocal results. There is limited availability of data for clinicians to use in making treatment recommendations to smokers. The aim of this study was to investigate the efficacy of SDD therapy over a the three month period as an adjunct to scaling and root planing (SRP) in smoking patients with chronic periodontitis.

**Material and Methods:** 14 smoking patients with CP were included in the placebo-controlled, double-blind study. After scaling and root planing (SRP) patients were randomly assigned to two groups, receiving either SDD or placebo bid for 3 months. The probing depth (PD), clinical attachment level (CAL), bleeding on probing (BOP) approximal plaque index (API) were recorded at baseline and after three months of therapy.

**Results:** BOP improved significantly ( $p < 0.05$ ) in both groups after the therapy. SRP+SDD group demonstrated significant improvements also in CAL, PD and tooth sites with initial  $CAL \geq 4$  ( $p < 0.05$ ). There were no significant differences between the two groups in any parameters before and after treatment.

**Conclusion:** Adjunctive SDD therapy in smoking patients provides little benefit in periodontal therapy but the gain in PD and CAL is similar to SRP alone. Larger study groups and long-term studies are needed to investigate the effect of SDD therapy in smoking patients.

## P0739

### Influence of physical activity on periodontal treatment

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 Ulm/Germany

**Aim:** Obesity and lack of physical activity are one of the main causes of chronic diseases and are common in population.

Studies have shown that also periodontal diseases are effected by these factors. This investigation will show the effect of regular physical activity on systematic periodontal treatment.

**Material and Methods:** 80 patients (mean age  $42.6 \pm 9.41$  years) with chronic periodontitis were included in this study. A complete periodontal examination was done (PD, AL, BoP, PCR), BMI was calculated and patients were interviewed to exercise habits (endurance sports). The patients were divided into 2 groups: group 1 (40patients = G1):  $< 2$  h of sport activities/week and group 2 (40patients = G2):  $> 2$  h of sport activities/week. Patients underwent a periodontal treatment (SRP) and after 6 months treatment outcome was correlated to BMI and sport activity.

**Results:** At baseline (BL) both groups showed similar clinical parameters for BoP (G1:  $87.63 \pm 24.72\%$ ; G2:  $84.67\% \pm 26.43\%$ ), PD (G1:  $5.62 \text{ mm} \pm 1.23 \text{ mm}$ ; G2:  $5.84 \text{ mm} \pm 0.87 \text{ mm}$ ) and AL (G1:  $6.52 \text{ mm} \pm 1.07 \text{ mm}$  und G2:  $6.38 \text{ mm} \pm 1.12 \text{ mm}$ ). PCR was BL for G1:  $87.56 \pm 21\%$  and for G2  $67.63 \pm 28.54\%$  ( $p < 0.001$ ). BMI was  $23.2 \pm 4.27$  (G1) and  $21.91 \pm 3.32$  (G2). After 6 months (T1) G1 showed following results: BoP =  $15.74\% \pm 20.32\%$ ; PD =  $4.42 \text{ mm} \pm 1.24 \text{ mm}$ , AL =  $4.86 \text{ mm} \pm 0.97 \text{ mm}$  PCR =  $16.65\% \pm 10.56\%$  and BMI =  $23.14 \pm 3.76$ . G2 showed T1: BoP =  $14.57\% \pm 18.43\%$ ; PD =  $3.46 \text{ mm} \pm 0.83 \text{ mm}$ ; AL =  $3.92 \text{ mm} \pm 0.75 \text{ mm}$ , PCR =  $5.34\% \pm 11.56\%$  and BMI =  $21.84 \pm 3.26$ . There were significant differences between G1 and G2 for the parameter PD and AL accounting to BL and T1 ( $p < 0.001$ ).

**Conclusion:** This study shows that an increased health and body awareness with regular physical activity has a positive influence to the success of periodontal treatment.

## P0740

### Hereditary Gingival Fibromatosis: a family study

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**Aim:** Hereditary gingival fibromatosis is the most common syndromic gingival hyperplasia. It is usually an autosomal dominant disease. Studies have provided evidence about a mutation in the SOS-1 gene causing gingival fibromatosis. The purpose of this case report is to give insight into the biological mechanism, the diagnosis and the treatment of the disease.

**Material and Methods:** This poster reports a case of a 13-year-old female with generalized gingival overgrowth with familial aggregation. The diagnosis was made based on clinical examination and family history. Excess gingival tissue was removed by conventional gingivectomy. After two years the gingival overgrowth relapsed and a second periodontal surgery was performed. After a 2-month follow-up period, orthodontic treatment was started. An 18-month postoperative period showed no recurrence of the disease. A sibling has been also diagnosed with hereditary gingival fibromatosis and the mother reported that she had gingivectomy done in the past. Peripheral blood was collected from the patient, the mother and the grandmother of the patient. DNA was extracted and PCR amplification and sequencing for a mutation in SOS-1 gene was done.

**Results:** The mutation that caused the disease does not have complete penetrance in this family. Fibromatosed gingivae may hinder tooth eruption, mastication and oral hygiene. In the present case, enlargement was not found to cover the occlusal surface, although the patient experienced difficulty in speech and maintaining oral hygiene measures due to gingival enlargement.

**Conclusion:** Hereditary gingival fibromatosis can be familial with incomplete penetrance. Tooth prognosis is usually good, although partial relapse of the disease is frequent.

## P0741

### Clinical and microbiological evaluation of the effect of non surgical periodontal therapy with and without photo-antibacterial disinfection: a clinical trial

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Tehran/Iran

**Aim:** Researchers have introduced laser irradiation as an effective and non-traumatic method in periodontal tissue healing. The aim of this study was comparing the effect of scaling and root planning with and without photodynamic therapy using LED on clinical indices of periodontal health and Porphyromonas gingivalis.

**Material and Methods:** 20 patients suffering from moderate to severe chronic periodontitis, who have referred to periodontics department of dental school of Shahid Beheshti university of medical sciences, were selected. Each quadrant of each patient was randomly dedicated to one of the following treatments: (1) SRP in base line, (2) SRP in base line and one month after treatment, (3) SRP+PDT in baseline and 4) SRP+PDT in base line and one month after treatment. Photodynamic therapy was performed using Fotosan 630 (CMS Dental, Denmark) with wavelength of 620–640 nm and Toloiden Blue as photosensitizer. Probing Depth, clinical attachment loss and plaque index were measured at the base line, one and three month after treatment.

**Results:** An improvement in PD and CAL was observed after treatment in all groups; however there is no difference among group. In microbial evaluation, all groups have shown a great reduction, also PDT treatment with one repeated course led to a significant reduction in the percentage of sites positive for P. gingivalis in compared to SRP alone.

**Conclusion:** It seems that adjunctive periodontal treatment such as PDT additional to conventional SRP may lead to reduction of microbial load in periodontal pockets specially if repeated in specific interval.

## P0742

### The lateral sling suture

C. Bain

Dubai/United Arab Emirates

**Aim:** In implant and periodontal surgery, buccal vertical relieving incisions are used to limit the surgical area, and allow flap repositioning. Traditionally incisions are placed at line angles of adjacent teeth. Because of root prominence, keratinized tissue is usually thin and suturing is difficult with a risk of tissue tearing. This paper presents a novel suturing method to minimize this problem.

**Material and Methods:** Normal flap design is used with a slight internal bevel of the flap side of the vertical incisions. After the surgical objectives have been completed, a simple suture is used to approximate buccal and lingual flaps, however, instead of cutting this, the suture is taken lingually one tooth

unit beyond the vertical incision, passed through the embrasure and brought back laterally to engage the buccal flap from inside to out. The suture is returned through the same embrasure and tied off to the original knot.

**Results:** Avoidance of vertical relieving incisions reduces the flexibility of repositioning a part of the surgical site apically or coronally. This technique eliminates the need to engage the thin fixed keratinized tissue and permits apical or coronal repositioning. It was proven particularly useful where a small surgical area is involved as in single tooth crown lengthening, extraction incorporating use of bone graft and membrane and in placing implants in small edentulous areas.

**Conclusion:** This technique offers a simple method of closing a vertical incision and minimizes the risk of tissue tearing. It has wide applications in localised areas of periodontal and implant surgery.

## P0743

### Comparing the efficiency of dental lasers during the treatment of periodontal diseases by measuring human $\beta$ -defensin-1

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Van/Turkey

**Aim:** Dental lasers are frequently used in periodontal disease treatment. There has been increased use of the Er, Cr:YSGG for the treatment of periodontal diseases. The aim of this study is to determine and compare the efficiency of the Er, Cr:YSGG laser for the treatment of chronic periodontitis by measuring the levels of human  $\beta$ -defensin-1 in gingival crevicular fluid.

**Material and Methods:** A total of 13 patients were included in our study. The study was designed as a “split-mouth” experiment. The clinical examination included recording the probing depths, clinical attachment loss, plaque index, gingival index, and bleeding on probing. Gingival crevicular fluid samples were taken prior to treatment and 1 month after treatment from all of the individuals who participated in the study.

**Results:** Based on the statistical analysis, the mean values of site-specific probing depths, clinical attachment loss, plaque index, gingival index, and bleeding on probing in patients with chronic periodontitis significantly decreased following treatment when compared to prior treatment values. When the pre- and post-treatment human  $\beta$ -defensin-1 levels of the study groups were evaluated, a decrease in human  $\beta$ -defensin-1 was observed in the quadrants where the Er, Cr:YSGG laser was applied in the chronic periodontitis group.

**Conclusion:** In addition to scaling and root planning, Er, Cr:YSGG is used to treat individuals with chronic periodontitis. The use of the Er, Cr:YSGG laser decreased human  $\beta$ -defensin-1 levels. It is likely that the Er, Cr:YSGG laser is more efficient for the treatment of chronic periodontitis. To support these results, further studies are required regarding dental lasers and periodontal disease.

**P0744****The effect of ozone on treatment of the endodontic-periodontal combined lesions in aggressive periodontitis: case report**

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Tokat/Turkey

**Aim:** Aggressive periodontitis is a severe destructive form of periodontitis causing bone loss that can even reach apices of the relevant teeth. Endodontic-periodontal combined lesion frequently occurs and combined lesions in aggressive periodontitis are serious infections and anti-bacterial agents or procedures like pocket disinfection with ozone, may increase success of treatment. Here we present successful treatment of endodontic-periodontal combined lesions with ozone disinfection procedure.

**Material and Methods:** 32 and 30 years old two male patients were referred to Gaziosmanpasa University Faculty of Dentistry Department of Periodontology. Based on the intraoral and radiographic examination patients were diagnosed with localized aggressive periodontitis. 3 teeth were treated in this case report: tooth 16 and 46 in one patient and 47 in other patient. All three teeth had pocket depth beyond 10 mm and primary periodontal endo-perio combined lesions were seen on radiographic and clinical examination. Root-canal treatments were performed and pocket disinfection of ozone device was used immediately after scaling and root planning. Ozone administrations were repeated 3 times. Patients were recalled 4 weeks and 3 months after.

**Results:** At 4 weeks and 3 months follow up appointments, excellent recovery of pockets was observed. No bleeding on probing, sign of inflammation or pus formation was observed. Average pocket depth of teeth was decreased from 10 mm to 5 mm.

**Conclusion:** Treatment of endodontic-periodontal lesions is difficult especially in aggressive periodontitis. Reducing pocket depth and treating disease is main goal by any means necessary. Pocket disinfection with ozone might be useful for fulfilling this purpose.

**P0745****Adjunctive diode laser decontamination in the treatment of smoker chronic periodontitis patients and gingival crevicular fluid interleukin-1 $\beta$  levels**T. Ataoglu<sup>1</sup>, A.A. Erbeyoglu<sup>1</sup>, S.A. Kayis<sup>2</sup>, N. Dundar<sup>1</sup><sup>1</sup>Konya/Turkey, <sup>2</sup>Karabuk/Turkey

**Aim:** To examine the effect of non-surgical periodontal therapy and adjunctive diode laser decontamination on clinical periodontal parameters and gingival crevicular fluid (GCF) interleukin-1 $\beta$  (IL-1 $\beta$ ) levels of smoker chronic periodontitis patients.

**Material and Methods:** The study group consisted of 15 smoker volunteers diagnosed with chronic periodontitis. They were systemically healthy, smoking minimum 15 cigarettes in a day and their ages ranged between 30 and 60 years. Whole mouth probing depth, clinical attachment level measurements and plaque index, gingival index, and bleeding on probing index scores were recorded for each patient. GCF samples were collected from predetermined four sites (PD $\geq$ 5 mm) in each contralateral side (right and left) of patients. Full-mouth scaling and root planning was performed and then the diode laser pocket decontamination was applied to the randomly assigned test region

(right or left side), the other side served as control. Following the treatment, clinical periodontal measurements and GCF sampling were repeated on the 1st and 3rd months. The IL-1 $\beta$  level in the GCF was determined by ELISA.

**Results:** Statistical analysis revealed that the treatment modalities applied in both groups improved the clinical parameters and reduced the GCF volume ( $p < 0.05$ ), except the attachment level ( $p > 0.05$ ). GCF IL-1 $\beta$  level changes in test group were not significant when compared to control group ( $p > 0.05$ ).

**Conclusion:** Within the limits of this study, we concluded that non-surgical periodontal treatment and the adjunctive use of diode laser decontamination in smoker chronic periodontitis patients has no any additional benefits for clinical periodontal parameters and GCF IL-1 $\beta$  level.

**P0746****Biochemical and immunohistochemical of the effect of radiotherapy in periodontium in rats with experimental periodontitis**T. Arabacı<sup>1</sup>, E. Kermen<sup>1</sup>, O. Köse<sup>2</sup>, A. Kızıldağ<sup>3</sup>, A. Kara<sup>1</sup>, A. Toraman<sup>1</sup><sup>1</sup>Erzurum/Turkey, <sup>2</sup>Rize/Turkey, <sup>3</sup>Denizli/Turkey

**Aim:** The aim of this study is biochemical and immunohistochemical of the effects of radiotherapy in periodontium in Sprague Dawley rats with experimental periodontitis.

**Material and Methods:** Forty male Sprague Dawley rats weighing 200–220 g were used in the study. Rats were divided into 4 groups. Group 1: Control group were not given any treatment, Group 2: Animals first molar teeth were ligatured for induction of periodontitis for 4 weeks, Group 3: Single dose radiation therapy were applied to group's animals, Group 4: ligatures were removed after 4 weeks and radiation therapy were applied to group animals, At the end of the study, all animals were anesthetized biochemical and immunohistochemical markers was analyzed.

**Results:** TNF- $\alpha$  concentration were significantly increase in the group 3 compared with the group 1. Analysis of serum IL-1 $\beta$ , there was found higher in the group 2 and 4 than remaining groups. Additionally, serum concentration of IL-1 $\beta$  were increased for groups 2 compared with control group, but not significant ( $p < 0.05$ ). In analysis of IL-10 levels, significant increases were determined in the all groups except for control group ( $p < 0.05$ ). The highest concentration of IL-10 was observed in the group 4. Therefore, RANKL value were significantly higher than in the group 2 and 4 compared with the group 1.

**Conclusion:** Radiotrapp application was lead to significant differences on analysis of biochemical markers' level and RANKL value.

**P0747****The effect of antibiotic-associated diarrhoea on the clinical outcomes of scaling and rootplaning**I. Laleman<sup>1</sup>, M. Baltali<sup>2</sup>, M.C. Haytac<sup>2</sup>, O. Ozcelik<sup>2</sup>, W. Teughels<sup>1</sup><sup>1</sup>Leuven/Belgium, <sup>2</sup>Adana/Turkey

**Aim:** The adjunctive use of antibiotics to scaling and rootplaning (SRP) has shown clinical benefits in specific patient groups.

However, antibiotic-associated diarrhoea (AAD) is an important issue associated with this treatment protocol. The goal of this study was to investigate if the occurrence of AAD influenced the clinical outcome at re-evaluation 3 months after initial non-surgical therapy.

**Material and Methods:** 62 periodontitis patients were recruited in Leuven (Belgium) and Adana (Turkey) for which the use of antibiotics has been judged appropriate. During the ten days following the start of the antibiotic usage, the patients filled in a form at home examining diarrhoeal parameters. Frequency and consistency (according to the Bristol stool chart) were recorded. At baseline and re-evaluation, local clinical parameters (probing pocket depth, gingival recession, clinical attachment loss and bleeding on probing) were assessed.

**Results:** 12 of the 60 patients experienced AAD. At re-evaluation all clinical parameters were reduced in both groups. There was however significantly ( $p < 0.05$ ) less pocket reduction in the patients who developed AAD. Besides, the frequency of patients with pockets  $\geq 6$  mm and  $\geq 7$  mm is significantly ( $p < 0.05$ ) higher in these patients. They also had significantly ( $p < 0.05$ ) more sites in need of surgery. All patients who developed AAD needed additional surgery, 91.7% of them for  $\geq 3$  sites. In the non-diarrhoea group, for 90% additional surgery was necessary, in 60% of the patients for  $\geq 3$  sites.

**Conclusion:** These results indicate that the occurrence of AAD could lead to less favourable clinical outcomes of SRP.

## P0748

### The clinical efficacy of a new dentifrice with zinc on plaque and gingivitis

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**Aim:** To compare the clinical efficacy of a new toothpaste with 8% arginine, calcium carbonate, 1450 ppm fluoride as MFP and zinc (test) to a 1450 ppm fluoride toothpaste (negative control) in reducing plaque and gingivitis.

**Material and Methods:** Before the study, the protocol was approved by IRB. The study had a randomized, double-blind, parallel-group design. Subjects who had initial Quigley-Hein plaque index at least 1.5 and initial Loe-Silness gingival index at least 1.0 participated in the study. Subjects were assessed at baseline, 3 months and 6 months of product use.

**Results:** A total of 88 subjects completed the study in Malaysia. At baseline, no significant differences in plaque and gingivitis scores were indicated between the two groups. At 3 months, gingivitis scores for the test and negative control groups were 1.07 and 1.37, respectively, and plaque scores were 2.58 and 2.72 respectively. The test group provided statistically significant reductions in gingivitis (21.9%), but not in plaque (5.1%) relative to the negative control. At 6 months, gingivitis scores for the test and negative control groups were 0.89 and 1.20, respectively, and plaque scores were 2.07 and 2.41 respectively. The test group provided statistically significant reductions in gingivitis (25.8%) and in plaque (14.1%) relative to the negative control group.

**Conclusion:** The study results supports the conclusion that the toothpaste with 8% arginine, calcium carbonate, 1450 ppm fluoride as MFP and zinc is significantly more effective than a

toothpaste with 1450 ppm fluoride in reducing gingivitis after 3 and 6 months, and in reducing plaque after 6 months.

## P0749

### Effects of periodontal treatment on serum peptidylarginine deiminase levels in patients with rheumatoid arthritis

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**Aim:** Recent studies suggested a role of protein citrullination in the link between periodontitis and rheumatoid arthritis (RA). The aim of the present study is thus to evaluate the effects of periodontal treatment on the clinical condition and serum levels of Porphyromonas gingivalis peptidylarginine deiminase (PAD) and endogenous PAD-4 in patients with RA.

**Material and Methods:** Fifty-two participants with RA and periodontitis were assigned to receive non-surgical periodontal treatment including oral hygiene instruction and supragingival scaling (test group:  $n = 26$ ) or no periodontal treatment (control group:  $n = 26$ ). The following parameters were evaluated at baseline and 8 weeks later: RA disease activity score including 28 joints (DAS28), the number of tender and swollen joints, the patients' general assessment of their condition scored on a visual analog scale, serum levels of PAD-4, immunoglobulin G (IgG) to P. gingivalis PAD, citrulline, anti-cyclic citrullinated peptide antibodies, and rheumatoid factor.

**Results:** The test group showed a significantly greater decrease in DAS28 and serum citrulline levels than the control group ( $p < 0.05$ , for both comparisons). A significantly greater decrease in serum PAD-4 levels were observed in the test group compared with the control group ( $p < 0.05$ ). However, Changes in serum levels of IgG to P. gingivalis PAD proved comparable between the two groups.

**Conclusion:** These results suggest that non-surgical periodontal treatment may decrease the disease activity of RA and serum levels of PAD-4.

## P0750

### Efficacy of various side-to-side toothbrushes for noncontact biofilm removal in an interdental space model – preliminary results

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**Aim:** To evaluate the efficacy of three different powered toothbrushes with side-to-side action for noncontact biofilm removal in an adjustable interdental space model.

**Material and Methods:** A three-species biofilm, consisting of Porphyromonas gingivalis, Fusobacterium nucleatum and Streptococcus sanguinis, was formed in vitro on protein-coated titanium disks using a flow chamber combined with a static biofilm growth model. Subsequently, the biofilm-coated substrates were exposed to three different commercially available side-to-side toothbrushes (A, B, C) with frequencies  $>30,000/\text{min}$ . Two brushing (bristle-to-artificial tooth) distances (0 and 1 mm)

were tested. The biofilm volumes were measured using volumetric analyses (Imaris 7.7.2) with confocal laser scanning microscope images (Zeiss LSM700).

**Results:** The median percentages of biofilm reduction by the analyzed toothbrushes ranged from 21 to 64%. The three tested toothbrushes were capable of significant biofilm reduction by noncontact brushing ( $p < 0.05$ ). No significant differences between the tested toothbrushes were found ( $p > 0.05$ ).

**Conclusion:** The three side-to-side toothbrushes tested reduced the three-species biofilm in an interdental space model by non-contact brushing.

## P0751

### The effect of titanium-prepared platelet-rich fibrin (T-PRF) treatment on the angiogenic biomarkers in gingival crevicular fluid (GCF) in infrabony defects of patients with chronic periodontitis

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**Aim:** The aim of this study was to investigate the effect of T-PRF treatment on the angiogenic biomarkers in GCF in infrabony defects of patients with chronic periodontitis.

**Material and Methods:** 25 systemically healthy participants who complied with inclusion criteria with periodontal infrabony defects were recruited. In each patient, the infrabony defect of one side of arch was designated as control group (allograft), while the infrabony defect on the contralateral side of same arch was designated as test group (allograft+T-PRF). The therapy methods (test or control) were randomly decided. GCF samples were collected at baseline (pre-surgery) and then the 3rd, the 7th, the 14th and the 30th days after surgery. Platelet-derived growth factor (PDGF)-BB, vascular endothelial growth factor (VEGF)-A, fibroblast growth factor (FGF)-2, angiogenin (ANG), angiostatin (ANT) in the GCF samples were measured using human enzyme-linked immunosorbent assay kits.

**Results:** In both groups, total amounts of PDGF-BB, VEGF-A, FGF-2, ANG and ANT peaked in the GCF samples obtained at the early postoperative day (day 3) and decreased over time in the samples obtained at the 7th, 14th and 30th days post-surgery. There were no significant differences between groups for the total amounts of PDGF-BB, VEGF-A, FGF-2, ANG and ANT at all evaluation periods.

**Conclusion:** Application of T-PRF combined with allograft in infrabony defects of patients with chronic periodontitis had no significant effects on angiogenic biomarkers in GCF.

## P0752

### This study aimed to evaluate clinical efficiency of ceramic drill, laser and conventional scalpel in gingivectomy surgery.

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**Aim:** This study aimed to evaluate clinical efficiency of ceramic drill, laser and conventional scalpel in gingivectomy surgery.

**Material and Methods:** The study included 30 systemically healthy patients with the complaint of gingival overgrowth. After baseline periodontal measures (vertical gingival overgrowth index, horizontal Miranda&Brunet indeks, plaque index, gingival index, probing pocket depth and bleeding on probing), the patients underwent surgery. Patients were randomly assigned to treatment with ceramic drill ( $n = 10$ ) or laser ( $n = 10$ ) and control with conventional scalpel surgery ( $n = 10$ ). Functional complications were evaluated on 1st, 3rd, 5th, 7th, and 21st days after surgical operation by VAS scale.

**Results:** No significant differences were observed in regards to periodontal parameters such as PI, GI, PD and BOP among three groups ( $p > 0.05$ ). Statistically, MBI value was significantly lower for the control group on 21st day. Postoperative bleeding was not observed in any of the three groups. Although burning, erythema and carbonization were significantly lower in the test groups, vascularization was higher than the control group.

**Conclusion:** According to study results, the application of ceramic drill in gingivectomy surgery might be an alternative method by the virtue of being reliable, effective and satisfactory.

## P0753

### Clinical effect of diode laser adjunctive to mechanical periodontal treatment on residual pockets

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**Aim:** The aim of this randomized controlled parallel-designed clinical study was to evaluate the efficacy of diode laser as an adjunct to mechanical periodontal treatment on the clinical parameters of the residual periodontal pockets in chronic periodontitis (CP) patients.

**Material and Methods:** Systemically healthy and non-smoker 11 CP patients were included in this study. Initial periodontal treatment (IPT) consisting of oral hygiene instruction, scaling and root planing was applied in 2 sessions with one week interval. Eight weeks after IPT, periodontal pockets demonstrating  $PD \geq 5$  mm and BoP (+) were defined as residual periodontal pocket. A total of 56 residual pockets of single-rooted teeth were randomly assigned to 2 groups. At baseline, the residual pockets were treated either only by mechanical treatment (Group M) ( $n = 28$ ) or diode laser disinfection (810 nm, 1.0 Watt, 200  $\mu$ m tip, 20 sec/pocket) followed by mechanical periodontal treatment (Group M+L) ( $n = 28$ ). Plaque index (PI), gingival index, PD, clinical attachment level and BoP were assessed at baseline and 8 weeks after treatment of residual pockets.

**Results:** All periodontal parameters, except PI, showed significant clinical improvements in both groups ( $p < 0.001$ ). No significant difference was observed between 2 groups ( $p > 0.05$ ). Approximately 14% and 11% of the residual pockets remained as residual after treatment in the Group M and Group M+L, respectively, without any difference between them ( $p > 0.05$ ).

**Conclusion:** The results suggest that adjunctive application of diode laser doesn't demonstrate any additional clinical effect on the residual pockets in CP patients compared to mechanical periodontal treatment.

## P0754

### Micro-CT assessment of area-specific curet working ends after manual versus automated sharpening

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**Aim:** To assess by Micro TC area-specific curet working ends after manual versus automated sharpening

**Material and Methods:** A set of 3 brand new Gracey curets were used (SG7/87H<sup>®</sup> Hu-Friedy, Chicago, IL, USA). First, the two functional shanks and instrument working ends of one instrument were removed and assessed by MTA (Skyscan<sup>®</sup>). The remaining two curets were used during two sessions of non surgical therapy. After sterilization, the functional shanks and instrument working ends were removed and assessed by MTA. The four working ends were divided in two subgroups randomly assigned to manual versus automated sharpening. Manual sharpening was performed with a stationary instrument/moving stone technique. Mechanical sharpening was performed with a specific device (Sidekick<sup>®</sup> Hu-Friedy, Chicago, IL, USA). During the sharpening procedures, all the shank-working end units were secured to a surgical forceps and ceramic stones used. Post-sharpening MTA was carried out and quantitative and qualitative changes investigated.

**Results:** Sample 1BN analysis (brand new) showed remarkable characteristics of homogeneity. Sample 2PM/2PA assessment (used, non sharpened) showed altered working ends. Several worn regions were observed as empty areas. In Sample 3A (mechanically sharpened used), the original morphology of the working end was completely recovered. Sample 3M (manually sharpened used) was characterized by a satisfactory recovery of the original morphology

**Conclusion:** After two session of nonsurgical periodontal therapy sharpening of instruments is highly recommended. Sharpening with an automated device seems to provide better results in terms of accuracy and recovery of the original morphology of the instruments.

## P0755

### Antiplatelet and antigingivitis effect of dental floss impregnated with 2% chlorhexidine: a randomized controlled clinical trial

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**Aim:** This study aimed to evaluate the antiplatelet and antigingivitis effect of a dental floss impregnated with 2% chlorhexidine digluconate.

**Material and Methods:** This randomized, parallel, single-blinded, controlled clinical trial used thirty dental students, who were equally randomized into three groups: negative control group (NC) did not realize any interproximal cleaning; positive control group (PC) used twice daily a dental floss without impregnation; and test group (T) used the same dental floss impregnated with 2% chlorhexidine digluconate, also twice daily. The study lasted 15 days for all groups. Whole mouth control of supragingival biofilm was done at baseline. The presence of

biofilm was evaluated by the Quigley-Hein Index (Turesky modification) in the last appointment and the percentage of gingival inflammation was performed by Marginal Bleeding Index on both baseline and last appointments. The Kruskal-Wallis test was used to assess the differences between groups regarding plaque scores and percentage of marginal bleeding.

**Results:** T group presented the lowest plaque index, with statistically significant differences compared to NC ( $p < 0.001$ ) and CP ( $p < 0.001$ ). The NC group did not demonstrate differences in the pattern of marginal bleeding. Regarding NC e T group, a statistically significant marginal bleeding reduction was demonstrated between both examinations. However no statistically significant difference was demonstrated in these groups at the end of the study.

**Conclusion:** It was concluded that the use of dental floss impregnated with 2% chlorhexidine gluconate showed additional reductions in plaque accumulation compared with a conventional dental floss. However, it failed to show additional improvement in marginal bleeding.

## P0756

### Gingival fibromatosis in association with aggressive periodontitis

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**Aim:** Gingival fibromatosis is a rare benign oral condition characterised by slow and progressive enlargement of both maxillary and mandibular attached gingiva. It can be isolated or associated to other signs, generalised or localised to one maxillary area and can lead to several complications. Unfortunately, relapse rate is important and namely in most severe cases.

**Material and Methods:** A case of a 16 year old male child who presented with generalised severe gingival overgrowth, involving both arches and covering almost the entire dentition, associated with an aggressive periodontitis. In this non-syndromic case, the excess gingival tissue was removed with conventional gingivectomy with a cold steel blade using local anaesthesia associated with scaling and root planning.

**Results:** A good aesthetic result was achieved and the general appearance of the patient improved considerably. The patient was able to maintain good oral hygiene. After the surgery recall visits are mandatory in order to follow and control the pathology and also to maintain an acceptable healthy gingival condition.

**Conclusion:** Although infrequent, the gingival fibromatosis is a part of childhood gingival pathologies. Its clinical impact with the esthetic, functional and dental aspects prompts a diagnosis and early treatment

## P0757

### Pilot study on toothbrush wear after varying periods of use and its effect on plaque removal using two brushing techniques.

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**Aim:** Determine the efficacy of toothbrushes in removing artificial plaque over 4 months, using a stationary bristle technique

(modification of the Bass technique) or a scrub technique. Determine the amount of wear that a toothbrush shows when brushing for 2 min twice a day for 4 months, using a stationary bristle technique or a scrub technique, on a typodont.

**Material and Methods:** At baseline and at each two week interval, axial photographs of each brush in three sections under 40X magnification were taken. At the same intervals, artificial plaque was applied to the buccal/lingual surfaces of the "Ramfjord" teeth. The teeth were photographed buccally and lingually and the models were brushed for 2 min. The teeth were photographed again. Scrub (N = 2) stationary bristle (N = 2) techniques were used. Each typodont was brushed on the facial, lingual, and occlusal surfaces, for 2 min per brushing session. This was repeated to simulate brushing twice a day for four months. Technique and temporal indicators were removed from toothbrush and typodont photographs, each was assigned a randomized identification number. Two blind evaluators measured the length and width of each toothbrush section to analyze wear and assessed plaque removal using the Sillness and Loe plaque score.

**Results:** The scrub technique removed significantly more plaque than the stationary bristle technique. Toothbrush length and width significantly increased with time. The scrub technique significantly deformed the toothbrush more than the stationary bristle technique.

**Conclusion:** The scrub technique was more effective at removing supragingival plaque than the stationary bristle technique but lead to more toothbrush bristles deformation.

## P0758

### Clinical effect of full mouth scaling and root planing in diabetic and non diabetic patients with chronic periodontitis: a 6-month study

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**Aim:** The aim of this study was to clinically evaluate the effect of full mouth scaling and root planing (FMSRP) in diabetic and non-diabetic patients with chronic periodontitis.

**Material and Methods:** Twenty-eight patients in the test group (diabetic) and 17 in the control group (non-diabetic) were treated and evaluated for the following clinical parameters: Probing pocket depth (PD), gingival recession (GR), clinical attachment level (CAL), gingival index (GI) and plaque index (PI), as well as blood parameters (hemoglobin tests), at baseline, 3 and 6 months. Data were statistically analysed by the Mann Whitney test (intergroup) and the Friedman test (intragroup).

**Results:** The intergroup analysis showed statistically significant difference only for PD, where the test group presented lower values than the control group ( $p = 0.014$  at 3 months and  $p = 0.017$  at 6 months). Intragroup analysis showed that the median (P25–P75) values for PI and GI improved at 3 months [44.44 (25.97–59.70) for diabetics and 32.90 (9.88–45.68) for non-diabetics] and 6 months [43.57 (15.63–55.73) for diabetics and 30.90 (19.82–49.16) for non-diabetics], compared with baseline, independently of the group ( $p < 0.05$ ). Additionally, only PD was significantly reduced in the test group at 3 [2.26 (1.87–2.40)] and 6 [2.07 (1.88–2.36)] months, compared with baseline [2.60 (2.25–2.60)]. Blood parameters did not differ in the test group among periods ( $p > 0.05$ ).

**Conclusion:** Based on these results, we conclude that FMSRP promoted a positive effect on the treatment of periodontitis in both diabetic and non-diabetic patients, without influencing glycemic parameters.

## P0759

### Retention of mobile teeth following five years' supportive periodontal therapy

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**Aim:** One of the success criteria of periodontal therapy is long-term retention of the natural dentition. This may be influenced by risk indicators at the tooth level, one of which its mobility. The aim of this study was to determine the retention rate of mobile periodontally-involved teeth following five years' of periodontal therapy.

**Material and Methods:** This longitudinal retrospective study utilized clinical records of patients with at least 30% of sites that had periodontal probing depth of at least 4 mm. These patients had undergone five years of periodontal treatment by the same periodontist at a public sector specialist unit. We identified 672 mobile teeth at baseline and followed through for their retention status and degree of mobility at five years.

**Results:** At 5 years, a total of 552 (82.14%) teeth retained intraorally. Overall retention rate was 0.16 teeth per patient per year. Teeth with grade I mobility showed the highest retention rate (0.19 teeth/year, 93.0%) followed by grade II (0.15 teeth per year, 76.0%) and grade III (0.05 teeth/year 25.8%).

**Conclusion:** Mobile periodontally-involved teeth have good retention rate following five-year supportive periodontal therapy and this is determined by the degree of tooth mobility.

## P0760

### The effects of nonsurgical periodontal therapy on salivary cytokines in diabetics with chronic periodontitis

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**Aim:** To explore the effect of nonsurgical periodontal treatment on clinical parameters and levels of interleukin (IL)-1 $\beta$ , IL-6, IL-8, TNF- $\alpha$  and IL-10 in saliva and HbA1c in blood of chronic periodontitis patients with type 2 diabetes mellitus (DM2).

**Material and Methods:** Thirty patients with DM2 (HbA1c 5.7–8%) and chronic periodontitis (CP) were enrolled to this study. DM patients with CP received scaling and root planing. Clinical periodontal measurements and saliva sampling were performed at baseline, 1. and 3. months after periodontal treatment. Concentrations of IL-1 $\beta$ , IL-6, IL-8, TNF- $\alpha$  and IL-10 in saliva were analyzed by enzyme-linked immunosorbent assay while HbA1c was measured by high-performance liquid chromatography.

**Results:** Significant improvements were observed in clinical parameters (PI, GI, PD and CAL,  $p < 0.05$ ) and in HbA1c

[before: 6.55 (median), after treatment: 6.2 (median),  $p < 0.001$ ] in DM2 patients after nonsurgical periodontal therapy. While a significant reduction was observed in IL-1 $\beta$  levels at the first and 3rd month, a significant increase was noted in TNF- $\alpha$  levels in saliva at 3rd month after nonsurgical periodontal treatment ( $p < 0.05$ ). There were no statistically significant differences in the saliva levels of IL-6, IL-8, and IL-10 after nonsurgical periodontal treatment in diabetics with CP.

**Conclusion:** Non-surgical periodontal treatment improved clinical parameters and glycemic control in DM2 patients with CP. The IL-1 $\beta$  level in saliva might be a biomarker for improved periodontal condition and metabolic control in DM2 patients with CP (This study was supported by The Scientific and Technological Research Council of Turkey TUBITAK/SBAG-114S229 and Research Project Coordination of Selcuk University BAP-11202014)

## P0761

### Papillon-Lefevre syndrome in 6-year old child. A case report

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**Aim:** Introduction Papillon-Lefevre syndrome (PLS) is a rare autosomal recessive genetic disorder belonging to the category of ectodermal dysplasia. Its characteristic symptoms include hyperkeratosis of the palms, soles, elbows, knees and the area of the mouth. In the oral cavity PLS is characterized by aggressive periodontitis which results in the loss of both primary and permanent dentition. The study presents the case of a multi-specialized 2 – year treatment of a 6-year-old patient diagnosed with PLS.

**Material and Methods:** At the age of 4 the patient was diagnosed with generalized advanced severe periodontitis by means of API, mSBI, PPD, CAL parameters. An X-ray examination revealed considerable vertical and horizontal bone loss in the alveolar process of the maxilla and mandible. Additionally, the patient suffered from exfoliating lesions on the soles which had already been treated dermatologically. The initial diagnosis of PLS was confirmed in Children's University Hospital.

**Results:** Ullbro's et al. periodontal treatment was introduced. Seven milk teeth with a significant degree of mobility were extracted under antibiotic protection to minimize the risk of infection. The patient had her temporary dentures made. While permanent teeth were erupting periodontal, prosthetic and orthodontic treatment was carried out. The check-ups take place every three months.

**Conclusion:** Early diagnosis and multi-specialized treatment in PLS cases is crucial for proper rehabilitation and comfort of the patient.

## P0762

### Severe generalized chronic periodontitis in a patient with Behcet's disease: a case report

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Tokyo/Japan

**Aim:** We conduct comprehensive treatment for extensive-type severe chronic periodontitis in patients with Behcet's disease,

and report a case in which good control of aphthous ulcers of the oral mucosa was obtained. To the best of our knowledge, this is the first report of a patient presenting with generalized chronic severe periodontitis and Behcet's disease.

**Material and Methods:** A 54-year-old man presented with generalized chronic severe periodontitis. He was diagnosed with Behcet's disease by his physician, but active treatment was not initiated. The patient presented with severe gingival inflammation, odontogenic maxillary sinusitis and alveolar bone loss. Non-surgical periodontal treatment and enamel matrix derivative (EMD) therapy were completed and pharmacotherapy to treat Behcet's disease was also started. After 1 year, systemic and periodontal conditions remained stable.

**Results:** The effects of systemic factors related to Behcet's disease, particularly symptoms of stomatitis and deterioration of oral hygiene, may play a significant role in the progression of periodontal disease. Even if the relationship between Behcet's disease and periodontal tissue destruction is unclear, clinicians should consider that Behcet's disease may provide an important contribution to periodontal breakdown by modifying the conditions that affect host responses to the accumulation of dental biofilm.

**Conclusion:** Sequential periodontal treatment and control of Behcet's disease improved overall function in this patient. Regenerative therapy using EMD was effective in this case of generalized chronic severe periodontitis, and results remained stable.

## P0763

### Treatment of dentine hypersensitivity with using nanolaser technology

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**Aim:** The proposed method envisages treatment of dentine hypersensitivity by application of nanoparticles onto tooth sensitive surface with their subsequent penetration in microtubule orifices and laser irradiation.

**Material and Methods:** Sixty extracted human teeth with dentine hypersensitivity were stored in the physiological saline solution. The samples were assigned to the three different experimental groups. The samples in the first group remained untreated and served for controlling purposes. Second group: samples were covered with nanodispersed fluorine apatite and irradiated with Er:YAG laser emitting at a wavelength of 2,940 nm (0.5 W, 50 Hz, 5 times x 5s). Third group: were covered with Nanodispersed fluorineapatite and irradiated with CO2 laser, 10600 nm (0.5 W, 5s, 5 times). The samples were cut longitudinally with a diamond-coated band saw ("Trennschleif System", Exakt, Norderstedt, Germany) then studied under the scanning electronic microscope to evaluate morphological changes induced by laser irradiation

**Results:** Fluorine apatite nanoparticles penetrate into open dentinal microtubules and make obturation. The laser irradiation induce photothermal activation, the melting of nanoparticles – the effect of coalescence of nanoparticles leads to sealing of dentin microtubules. Laser irradiation was carried out with the wavelength that lies at the maxima of the spectral absorption of calcium fluorineapatite (CO2 laser – 10.6 microns or Er: YAG laser is 2.94 microns). The energy regimes of laser irradiation were determined by computer simulation in order to minimize the thermal load on the pulp.

**Conclusion:** The proposed method provides reliable CaFAP adhesion in microtubules orifices – obturation and effective remineralizing function on the hypersensitive dentin surface.

## P0764

### The effect of different operating angles of Er, Cr: YSGG laser irradiation on the implant surface

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**Aim:** To find the appropriate operating angle of Er, Cr: YSGG laser irradiation on the surface of implant.

**Material and Methods:** 80 Titanium plates were divided into 4 groups randomly. Er, Cr: YSGG laser was applied on them with an energy output of 1.5W, 30 Hz. The irradiation was performed with the working tip held at angles between 15°–75°, group A with 15°, group B with 45°, group C with 75° and group D was blank control. Then, a SEM was used to observe the morphology of the irradiated and un-irradiated areas. And Titanium plates surfaces roughness were measured by a profilometer. The data were analyzed statistically using analysis of variance.

**Results:** A SEM examination of the irradiated areas showed equal roughness with no signs of melting, carbonization, not different from the un-irradiated areas (group D). The surface roughness (Ra) after Er, Cr: YSGG laser irradiation in groups A, B, C and D was 1.25  $\mu\text{m}$ , 1.29  $\mu\text{m}$ , 1.37  $\mu\text{m}$ , and 1.41  $\mu\text{m}$ , respectively. These findings revealed no significant difference among the four groups ( $p > 0.05$ ).

**Conclusion:** The operating angle of Er, Cr: YSGG laser irradiation has no impact on the surface of Titanium. So the operation of Er, Cr: YSGG laser applied on the implant is safe and convenient.

## P0765

### The effect of a new antiseptic mouthwash on in situ biofilm development

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**Aim:** Two objectives were pursued in this study: (i) To assess the capacity of a newly designed intraoral device to develop biofilms in situ, (ii) To assess the activity of a new antiseptic mouthwash containing chlorhexidine and cetylpyridinium chloride on an in situ formed biofilm.

**Material and Methods:** Seven healthy subjects wore a customized acrylic device containing hydroxyapatite discs for two consecutive periods of four days. The first four-day period consisted of wearing the device all day long to allow the biofilms to form on the hydroxyapatite discs. During the second four-day period, rinsing was performed twice a day with a new mouthwash (CPC 0.05% and CHX 0.03%). After each four-day period, the quantity and quality of the in situ grown biofilms were examined using culture techniques and Confocal Laser Scanning Microscopy.

**Results:** Firstly, after four days of in situ biofilm formation, good quality biofilms were obtained from the intraoral devices. Secondly, bacterial culture count reductions were statistically significant when the new antiseptic mouthwash was used. Also,

CLSM image analysis depicted a statistically significant reduction of the thickness, total biofilm volume and live/dead bacterial ratio, when the new antiseptic mouthwash was used.

**Conclusion:** This newly designed intraoral device has made it possible to grow good quality biofilms in situ. The new antiseptic mouthwash has shown effectiveness for controlling bacteria of the in situ grown biofilms.

## P0766

### The combined orthodontic-periodontal treatment of generalized aggressive periodontitis: a case report

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**Aim:** To assess clinical outcome of a case with severe generalized aggressive periodontitis (GAgP) after the combined orthodontic-periodontal treatment. Orthodontic forced bone repair is also investigated.

**Material and Methods:** A 28-year-old Chinese female complaining of gum bleeding and mobility of majority teeth was diagnosed as GAgP with poor prognosis. Right mandibular premolars are mobile with a deep angular bony defect. After 12 months SRP treatment, the anterior teeth was intruded by full-mouth orthodontic treatment combined with circumferential fiberotomy of supracrestal gingival fibres (CSF). Tooth 44 was extruded by gentle orthodontic force before extraction in order to gain maximum bone repair. Dentition, BOP, clinical attachment loss and residue bone volume were evaluated before, during, and after treatment.

**Results:** After 12-month orthodontic treatment, improved periodontal indices, satisfactory occlusion and alveolar bone repair in certain positions were achieved. The bone defect areas were guided repairing during 6 months of forced intrusion (anterior teeth) and eruption (44). The whole periodontal health, esthetic and functional results have maintained stable for 5 years.

**Conclusion:** The bone repair could probably be guided with cooperation of periodontal and orthodontic approaches in severe GAgP patient. This technique may be an inspiring approach for treatment of compromised periodontal condition.

## P0767

### The comparison of clinical, histological and radiographic results of allograft and titanium-prepared platelet rich fibrin (T-PRF) in sinus lifting procedure

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**Aim:** The aim of this study was to evaluate the radiographic, histological and clinical comparisons of the completely autologous T-PRF and allograft effectiveness at the maxillary sinus elevation procedure.

**Material and Methods:** Participants randomly divided into 2 groups and in the test group, Schneiderian membrane elevation with using balloon lifting technique was applied and after that sinus was filled with T-PRF obtained from the patients' blood. At the end of the 4th month, the bone samples were harvested from the implant slots and sent to histological evaluation. After

3 months, implant stability was measured and recorded. For the control group, the same procedures were followed and sinus was filled with only allograft. In this group, for implant placement, waiting period was 6 months.

**Results:** Radiological results showed that the allograft group had better results by 62% in volume, 53% in density and 69% in height than T-PRF group ( $p < 0.05$ ). Histomorphometric results showed that while newly formed bone ratio in allograft group and T-PRF group was  $17.28 \pm 2.53$  and  $16.58 \pm 1.05$ , respectively ( $p > 0.05$ ). In clinical outcomes, the value of the implant stability in the allograft group and in the T-PRF group was 66.37 ISQ and 68.50 ISQ, respectively ( $p > 0.05$ ).

**Conclusion:** Single use of T-PRF in the sinus lift operation had successful clinical and histomorphometric results; however in the radiological observation T-PRF material had unsatisfactory results. There is requirement for a scaffold at the single use of the material in the two-step sinus lift operation.

## P0768

### Diagnosis and treatment aspects of endo-perio lesions: case report

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**Aim:** Clinically, an exceptionally deep pocket probing depth that extends close to the apex may reflect, other than periodontal infection, lesions of endodontic origin, root fracture, and external resorption. This report aims to demonstrate the diagnostic process of distinguishing different infection origins and treatment outcomes following basic management principles.

**Material and Methods:** Several cases of marginal apical communication lesions with different infection origins are presented.

**Results:** Determination of the pulp vitality is the most important measure in cases wherever the probing depth extends close to the apex. Dental pulp disease is the most common cause of Endo-Perio lesions. If the lesion is sustained by endodontic infection alone, following endodontic therapy, the lesion can be expected to heal rapidly. Adjunctive periodontal treatment is inappropriate. However, in rare cases root canal infection and periodontitis co-exist and merge together. In this case of a negative pulp test, root canal treatment should still be attempted first and periodontal treatment postponed until the result of the endodontic treatment can be evaluated. In another scenario when pulp vitality testing is positive, treatment should be limited to periodontal therapy. One also cannot rule out vertical root fracture that may present positive or negative pulp vitality testing. Roots with vertical fracture usually have a poor prognosis and are candidates for extraction.

**Conclusion:** Endo-Perio lesions may occur as a result of a number of causative factors which may mimic the clinical findings of periodontitis and thus warrant the attention of the periodontist.

## P0769

### Connective tissue graft versus connective tissue graft with PRP in recession treatment: Case report

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**Aim:** Gingival recession is defined as the displacement and destruction of the soft tissue margin, apically to the cement-enamel junction. Many techniques have been described for the treatment of gingival recession. Predictable root coverage seems to be more efficient when supported by a significant level of tissue regeneration.

**Material and Methods:** Patients with good general health, presenting gingival recessions are treated whether by connective tissue graft (CTG) associated to platelet rich plasma or only with (CTG). The recession coverage is evaluated and compared to see whether the association of PRP to CTG in these cases has improved the clinical result.

**Results:** Nowadays, it's not to be discussed that the application of connective tissue grafts is a widely efficient therapeutic option in aesthetically oriented periodontal plastic surgery especially in root coverage. What if we seek more clinical results by using the platelet-rich plasma? The Platelet-Rich Plasma (PRP), is a concentrated suspension of growth factors found in platelets. Clinical and histological data reveal that these growth factors are involved in wound healing and are postulated as promoters of tissue regeneration. We will discuss the efficacy of both techniques, connective tissue graft CTG versus CTG associated to Platelet rich plasma (PRP), in treating periodontal recessions. Treated cases will be illustrated to support the discussion.

**Conclusion:** Both CTG and CTG associated to PRP are effective in treating gingival recessions.

## P0770

### Prevention of periodontal impairment in transplanted patients. A long term observational clinical study

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**Aim:** Transplanted patients are generally compromised and high risk subjects that may have oral complications. They should be insert in a strict oral health program to find and treat any oral foci. Periodontal tissues are commonly involved in modifications due to Cyclosporine (CsA) in association with low standards of oral hygiene. The aim of this study is whether the supportive periodontal therapy (SPT) can maintain those patients in a good periodontal status.

**Material and Methods:** Since 2002 we followed more than 130 transplanted patients in the Periodontal Unit of the School of Dental Science (University of Trieste). Every patient assumed an immunosuppressive therapy. Only 54 assuming Cyclosporine (CsA) were eligible for this study. They were scheduled for two or three recalls per year and the registration of gingival and hematological parameters, such as Plaque Index (PI), Bleeding on Probing (BoP), Hypertrophy Index (HI) and CsA blood concentration was performed. Time of follow up varied from 12 up to over 48 months.

**Results:** The cohort showed an improvement of the mean gingival indexes with only periodontal nonsurgical treatment:  $PI_{baseline} = 38.2$   $PI_{12mo} = 31.6$   $PI_{24mo} = 29.4$   $PI_{36mo} = 24.6$   $PI_{48mo} = 24.6$   $PI_{over48mo} = 25.1$ ;  $BoP_{baseline} = 18.8$   $BoP_{12mo} = 10.6$   $BoP_{24mo} = 10.5$   $BoP_{36mo} = 11.5$   $BoP_{48mo} = 8.6$   $BoP_{over48mo} = 11.8$ ;  $HI_{baseline} = 23.3$   $HI_{12mo} = 16.2$   $HI_{24mo} = 12.6$   $HI_{36mo} = 13.1$   $HI_{48mo} = 16.0$   $HI_{over48mo} = 11.6$ . HI decrease was statistically significant over time ( $p = 0.022$ ). No adjunctive surgical therapy for gingival hypertrophy was needed.

**Conclusion:** With the limits of the present study, it is possible to state that SPT is a reliable option for periodontal health of transplanted patients assuming Cyclosporine. Transplanted patients should be referred to the dental department to maintain high level of oral hygiene.

## P0771

### Decision for extraction periodontally compromised teeth based on initial examination data – an overtreatment?

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**Aim:** There is increasing evidence that the progression of periodontitis as well as the effect of the periodontal therapy varies greatly from one individual to another. Accurate periodontal therapy including sufficient individual risk-assessment and risk-management often resulted in considerably improvement of initially as “unfavorable” classified clinical conditions. Even teeth with advanced periodontal attachment loss, which were initially classified as “hopeless”, could often be successfully maintained for many years, if included in the cause related therapy.

**Material and Methods:** Analysis of external and internal evidence i.e. well documented clinical long-term results of periodontally compromised teeth, initially classified as “hopeless”.

**Results:** The decision for extraction of teeth affected with advanced periodontal disease should not be made on the basis of data, which were recorded at the initial examination.

**Conclusion:** Because of an individual positive capability in response to periodontal therapy, the decision for extraction based on data elevated at the initial examination seems often to be a decision for overtreatment.

## P0772

### Impact of phase I periodontal therapy on levels of interleukin-17 and interleukin-23 in the serum and gingival crevicular fluid of patients with generalized aggressive periodontitis

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**Aim:** The aim of this study was to evaluate the serum and gingival crevicular fluid levels of interleukin-17 and interleukin-23 before and after phase I periodontal therapy in generalized aggressive periodontitis (GAP) patients and compare with healthy controls (HC).

**Material and Methods:** Gingival crevicular fluid (GCF) and serum samples were taken from 19 GAP patients and 22 healthy controls (HC) to measure Interleukin-17 and interleukin-23. Also, the levels of these molecules were reassessed at 3 months after periodontal therapy. Periodontal clinical parameters were recorded at baseline and 3 months post-therapy.

**Results:** The investigated molecule levels in serum decreased significantly at 3 months as a result of the Phase I therapy ( $p = 0.014$  for IL-17,  $p = 0.000$  for IL-23). Significant reductions were also observed in IL-17 and IL-23 levels in GCF at 3 months after therapy ( $p = 0.000$ , for both molecules). In addition, the levels of IL-17 and IL-23 in GCF were still higher in GAP patients than HC at 3 months ( $p = 0.001$ ).

**Conclusion:** The statistically significant decrease in the local and systemic levels of IL-17 and IL-23 based on the phase I periodontal therapy might indicate a precise role of these cytokines for tissue destruction in periodontal tissues

## P0773

### Comprehensive periodontal, orthodontic and prosthetic rehabilitation of a patient suffering from generalised chronic periodontitis and severe malocclusion. Case report

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Budapest/Hungary

**Aim:** Treatment of periodontitis with severe malocclusion is challenging and requires multidisciplinary team work. The combined therapy may boost periodontal regeneration through reducing occlusal trauma and bone apposition on tensile side. The reduction of treatment time would also be beneficial for the patient. However, early and excessive forces may dislocate teeth out of the reduced periodontium. Ideal treatment sequence and time intervals of such combined therapy is not yet established.

**Material and Methods:** A 41-year-old female periodontal patient with good oral hygiene was treated. Following successful initial periodontal therapy a lower multiband orthodontic appliance was inserted. On the upper jaw a bite plate and later a multiband appliance were used. Light and immediate orthodontic forces were applied. Regenerative periodontal surgeries were then carried out on each quadrant with enamel matrix derivatives and autogenous particulated bone grafts. After one year of healing and orthodontic tooth movement prosthetic rehabilitation was delivered. Patient received fix partial dentures on left lateral quadrants. Upper right molar region was restored with implant supported crowns after staged sinus floor augmentation. Teeth were splinted with intracorally anchored, fibre-reinforced composite splint in the lower right quadrant. Finally, the patient was enrolled in periodontal maintenance program.

**Results:** After 18 months stable periodontium ( $PPD \leq 4$  mm) was achieved alongside satisfactory occlusion. Radiographs showed mineralisation and corticalisation of the former intrabony defects.

**Conclusion:** Cautious orthodontic tooth movement combined with simultaneous regenerative periodontal therapy may be safe resulting in satisfying occlusion with stable periodontal environment. Controlled trials with more cases are warranted to support clinical decision-making.

**P0774****Impact of non-surgical therapy on myeloperoxidase levels in serum and gingival crevicular fluid of patients with generalized aggressive periodontitis**

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**Aim:** The aim of this study was to investigate the levels of myeloperoxidase (MPO) levels in serum and gingival crevicular fluid (GCF) before and after non-surgical periodontal therapy (n-SPT) in generalized aggressive periodontitis patients (GAP) and compare to these molecules with periodontally healthy controls (PH).

**Material and Methods:** 19 previously untreated GAP patients and 22 PH controls were recruited to investigate the MPO levels in GCF and serum. In addition, the levels of MPO were reassessed at 3 months after n-SPT in the GAP patients. Clinical parameters were evaluated at baseline and 3 months post-therapy.

**Results:** Significantly higher MPO levels were observed in the GAP patients than in PH controls at baseline ( $p < 0.001$ ). The MPO levels in serum decreased significantly at 3 months as a result of the n-SPT ( $p = 0.001$ ). Significant reductions were also observed in MPO levels in GCF at 3 months after therapy ( $p = 0.000$ ). However, the levels of MPO in GCF were still higher in GAP patients than PH controls at 3 months ( $p = 0.001$ ).

**Conclusion:** GAP patients had significantly higher levels of MPO both in their serum and gingival crevicular fluid. The levels of MPO significantly decreased both locally and systemically after therapy, possibly indicating specific roles for this enzyme in the active inflammation of periodontal tissues.

**P0775****Periodontal diseases prevention: psychological aspects of individual prevention programs**

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**Aim:** The aim of the study is to create efficient programs for periodontal disease prevention with the account of patient's individual psychological status

**Material and Methods:** The study enrolled 157 individuals. The dental examination assessed dental status, oral hygiene index and periodontal index, filling up a questionnaire inquiring about their particular reasons of visiting the dentist. The psychodiagnostic tests were performed: the Interpersonal Diagnosis of Personality, Big Five Personality Test, Rotter's Locus of Control Scale, Test anxiety after the patients' informed consent.

**Results:** The study found reliable relation ( $p < 0.05$ ) between personality type (style interactions of personality) and his attitude to personal dental health and prophylaxis. Emotionally stable, extroverts with low levels of anxiety and prone to competitive style of interactions with the highest rates of their cooperation, as well as the psychological resources (learning capability, openness to new experiences and readiness to perceive information) regularly follow dentist's recommendations, replace their toothbrush regularly.

The patients with responsible altruistic and aggressive-independent style of interactions are the second most compliant with the hygienic prescriptions, with high rates of their cooperation and psychological resources.

**Conclusion:** It is important for consultant physicians to select psychological and educational strategies and approach with the account of individual personality traits of their patients in order to teach them the correct way to take care of their teeth, to motivate them for a healthy lifestyle and to adhere to medical recommendations and the rules of "efficient dental care" behaviour.

**P0776****Comparison of the effectiveness of powered versus manual toothbrushes. Systematic review**

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*Budapest/Hungary*

**Aim:** Comparison of powered and manual toothbrushes on the basis of various aspects.

**Material and Methods:** Systematic electronic search on MEDLINE and EMBASE was carried out (May 2014). Inclusion criteria were: randomised controlled clinical trials, adult population, presence of at least 15 permanent teeth, absence of any mental or physical handicap. Split-mouth protocols and interventions by dentist or hygienist were excluded. Primary outcomes were the changes of plaque and gingival indices. Secondary outcomes were probing pocket depth (PPD), calculus formation, safety and quality assessment. The effect-size of the interventions was expressed by the standardised mean difference (SMD) with 95% confidence interval (CI).

**Results:** 21 trials with the total number of 1500 subjects were eligible and included in the meta-analysis. Powered toothbrushes were more effective in removing plaque, reducing gingivitis and preventing calculus formation. The SMDs for plaque and gingival indices were  $-0.40$  (95% CI:  $-0.95$  to  $-0.16$ ) and  $-0.29$  (95% CI:  $-0.56$  to  $-0.03$ ) respectively, in favour of the powered devices. This difference disappeared where patients received thorough oral hygiene instructions (OHI). There was no significant difference in changes of PPD. Toothbrushes were safe, causing only minuscule and transient side effects. Quality assessment and sensitivity analysis revealed that the trials presented with medium to high level of bias.

**Conclusion:** Powered toothbrushes seemed to be more effective than their manual counterparts, but only in the hand of those patients, who had not received sufficient OHI. The study design of the reported trials showed high heterogeneity, therefore the clinical implications of the statistical analyses should be handled carefully.

**P0777****Laser biostimulation and periodontal treatment in patients with diabetes and systemic health**

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**Aim:** This study evaluates the efficiency of Nd:YAG laser biostimulation (LB) adjunctive to phase 1 treatment (PT) in chronic periodontitis (CP) patients with poorly-controlled type 2 Diabetes Mellitus (DM) and systemic health (SH).

**Material and Methods:** Two symmetrical mandibular CP teeth of 15 DM and SH individuals, as of in each mouth, were selected to constitute 4 study groups: DM+PT (group 1), SH+PT (group 2), DM+PT+LB (group 3) and SH+PT+LB (group 4). LB was applied at days 30, 37, 44, 51, 58, 65 during PT while the non-LB groups received a placebo simultaneously. Plaque index (PI), bleeding on probing (BOP), gingival index (GI), probing pocket depth (PPD), clinical attachment level (CAL), gingival crevicular fluid volume (vGCF), and GCF IL-1 $\beta$  and IL-10 levels were used as parameters of the prospective intra/intergroup assessments. Clinical parameters were evaluated with the baseline and day 30, 37, 72 data whereas vGCF and cytokines were evaluated with day 0, 15, 30, 37, 72 data.

**Results:** Intragroup assessments demonstrated a decrease in the clinical parameters of all groups at day 72 ( $p < 0.05$ ). There were more PPD and CAL decreases in group 3 than in group 1 at day 37 ( $p < 0.05$ ). The decrease in IL-1 $\beta$  and increase in IL-10 were higher in group 3 than in group 1 at day 37 ( $p < 0.05$ ). vGCF, IL-1 $\beta$  and IL-10 levels were harmonious to PT in all groups at day 72 ( $p < 0.05$ ).

**Conclusion:** Our results suggest that Nd:YAG LB may have a short-term additive therapeutic effect only in impaired host response conditions such as in DM.

## P0778

### Potential beneficial of bone mononuclear stem cells (bmmncs) cd 34—/cd45+ in the treatment of periodontal disease in rats

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**Aim:** The aim of this study was to evaluate the impact of auto transplantation of the bone marrow mononuclear stem cells in regeneration of periodontal tissues. The aim of this study was to evaluate the impact of auto transplantation of the bone marrow mononuclear stem cells in regeneration of periodontal tissues.

**Material and Methods:** 54 adult male rats were divided in two groups with 27 rats each: scaling and root planning group (SRP) and scaling and root planning with mononuclear stem cell auto transplantation group (SRP+MNSC). In both groups periodontal disease was induced in the first left lower molar. Histologic analysis had included: number of blood vessels and amount of type I and III collagen. The presence of red blood cells within the endothelium of the blood vessels was used as the criterion for counting the number of blood vessels. For quantitative evaluation of type I and III collagen was used polarized light by birefringence. The Image Pro Plus was used for digital analysis. Student t test was performed to compare the groups.

**Results:** The mean number of blood vessels in SRP group ( $0.68 \pm 0.38$ ) was lower than SRP+MNSC group ( $1.00 \pm 0.66$ ). The mean of type I collagen ( $34.64 \pm 11.85$ ) in the SRP group was also lower than SRP+MNSC group ( $56.31 \pm 22.85$ ). Finally, the mean of type III collagen in the SRP group ( $65.35 \pm 11.85$ ) was higher than the SRP+MNSC group ( $43.69 \pm 22.85$ ).

**Conclusion:** Scaling and root planning associated with auto transplantation of mononuclear stem cell improves the structural integrity of the periodontium when compare with scaling and root planning procedure alone.

## P0779

### The clinical efficacy of a new dentifrice with zinc on supragingival calculus formation

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**Aim:** This double-blind clinical study compared the efficacy of a dentifrice containing 8% arginine, calcium carbonate, 1450 ppm fluoride as sodium monofluorophosphate (MFP) and zinc (test) to that of a negative control dentifrice containing 1450 ppm fluoride, as MFP, in reducing supragingival calculus formation.

**Material and Methods:** Adult subjects from the Santo Domingo, Dominican Republic area were given a complete oral prophylaxis and were randomly assigned to brush twice daily with either the test or the negative control dentifrice for the twelve-week test phase of the study. Participants were stratified by gender and Volpe-Manhold Calculus Index scores presented at the completion of an 8-week pretest phase (brushing with a fluoride dentifrice).

**Results:** Seventy-nine (79) subjects completed the pretest and the test phases of the clinical study and their data were analyzed. At the 3-month examination, subjects assigned to the Test Dentifrice presented mean Volpe-Manhold Calculus Index score of 14.02 and subjects assigned to the Negative Control Dentifrice presented a mean score of 17.95. After 3-months of product use, subject assigned to the Test Dentifrice exhibited 21.9% less calculus formation than subjects assigned to the Negative Control Dentifrice, which was statistically significant ( $p < 0.001$ ).

**Conclusion:** The overall results of this randomized and double-blind clinical study support the conclusion that after 3-months of product use, a dentifrice containing 8% arginine, calcium carbonate, 1450 ppm fluoride as MFP, and zinc provides a statistically significant reduction in the formation of supragingival calculus relative to the fluoride control dentifrice.

## P0780

### Periodontal management of maxillary lateral incisors with palato-radicular groove: Two clinical cases

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**Aim:** Palato-radicular groove (PRG) is a rare developmental anomaly of maxillary incisors worsening periodontal condition. Its clinical significance is related to lack of epithelial closure along the root resulting in periodontal breakdown with or without pulpal involvement. This case report describes two cases of PRG on maxillary lateral incisor and interdisciplinary approach towards successful management.

**Material and Methods:** In first case, an unilateral PRG was located on the maxillary left lateral incisor of a 35-year-old male patient. The groove was extended to middle 1/3 of root and associated with deep local periodontal pocket. An interdisciplinary management was carried out using a combination of odon-

toplasty, restorative therapy, and periodontal regenerative procedure resulting in successful healing of the lesion. In second case, a pulpal-periodontal combined lesion occurring on the maxillary right lateral incisor with PRG extended to root apex was observed in a 31-year-old male patient. A combination of intentional replantation, restorative therapy, and periodontal regenerative procedure was carried out. A satisfactory healing was seen on palatal aspect.

**Results:** In managing the PRG, unfavorable anatomical factors should be eliminated first. Then the condition could be viewed as a periodontal defect. The prognosis of a tooth with PRG depends on the type of groove, accessibility of the defect, and severity of the periodontal problem.

**Conclusion:** This case report showed that the localized periodontitis associated with developmental anomalies in maxillary lateral incisors could be managed successfully by correcting the anomalies and performing regenerative therapy.

## P0781

### Treatment of gingival enlargement associated with chronic periodontitis: a case report

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**Aim:** Chronic periodontitis is an inflammatory disease of the supportive tissue of teeth caused by a variety of etiological factors. Although it is the most common form of periodontitis, it is rarely associated with a massive generalized gingival enlargement. This case report aimed to show the spectacular results following a complete periodontal therapy. The purpose was to reduce gingival tissue inflammation and to achieve an optimal esthetics, function, and oral health.

**Material and Methods:** This is a case of a 25-year old female patient with an unusual inflammatory gingival enlargement and a chronic periodontitis which was managed surgically. Periodontal maintenance was started after completion of active periodontal therapy and continued at varying intervals. Patient's co-operation in oral hygiene was also instructed as supportive therapy. The case was referred to orthodontist for correction of malaligned teeth.

**Results:** Scaling and root planing combined with flap procedure are effective methods for the treatment of chronic periodontitis in terms of attachment level gain and reduction in gingival inflammation. Lesion healed successfully and no recurrence was observed after 1 year follow up.

**Conclusion:** There have been few reports on gingival enlargement where it was associated with chronic periodontitis. Successful treatment depends on the proper identifying the etiologic factors and providing adequate periodontal environment around teeth. Combined periodontal and orthodontic treatment can greatly enhance periodontal health and dentofacial esthetics.

## P0782

### Nonsurgical multiple epulis therapy: a case report

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**Aim:** Epulis is a generic term used clinically to designate all discreet tumors and tumorlike masses of the gingiva. It serves to

locate the tumor but not to describe it. Epulis lesions are most likely to be inflammatory rather than neoplastic.

**Material and Methods:** A 33-years-old woman consulted for facial and palatal posterior gingival overgrowth that appeared two months ago. The patient showed no general health problem and no drug was taking that may induce such lesion. The clinical and radiographic investigations showed that she has an aggressive periodontitis. The aim of the treatment protocol was to reduce the amount of gingival inflammation and swelling by treating the periodontal disease associated before the surgical excision. Initial periodontal therapy and plaque control lead to the complete regression of the epulis in 6 months after treatment. This proves that it's most likely an inflammatory lesion.

**Results:** The etiology of inflammatory epulis is however not clear. Some features were used to classify them and to raise matches between age, location and the existence of underlying bone resorption. The surgical excision is considered a standard approach to the removal of epulis and preventing its recurrence.

**Conclusion:** The role of plaque controle as well as the initial treatment led to the complete resolution of two epulis on this young patient with periodontitis. Maintenance, to eliminate the biofilm, is the only guarantor of stability of the gingival healing and optimal cell maturation.

## P0783

### Resveratrol decreases periodontal breakdown in smoking rats during periodontitis modulating the immune response

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**Aim:** Cigarette smoke is related to increased severity and prevalence of periodontal disease. Resveratrol, a naturally occurring product found in numerous plants, may promote immunomodulatory effects on the host response. This study investigated the effect of continuous administration of resveratrol on the progression of experimental periodontitis in smoking rats.

**Material and Methods:** Sixty rats were randomly assigned to: CS+RESV (n = 20): cigarette smoke inhalation + 10 mg/Kg of resveratrol; CS+PLA (n = 20): cigarette smoke inhalation + placebo solution; NCS (n = 20): non-cigarette smoke inhalation + placebo solution. Cigarette smoke inhalation (three times per day, for 8 min per exposure) was initiated one week before the beginning of substances administration and was performed until the end of study. Periodontitis was induced on rats in one of the first molars chosen to receive a ligature. The therapies, resveratrol or placebo, were daily administered systemically for 30 days—for 19 days before periodontitis induction and then for another 11 days. Then, the specimens were processed for morphometric analysis of bone loss, and the gingival tissue surrounding the first molar was collected for quantification of IL-1 $\beta$ , IL-4, IL-6, IL-17, INF- $\gamma$  and TNF- $\alpha$  levels using a Luminex/MAGpix assay.

**Results:** Inter-group comparisons of the morphometric outcomes revealed lower bone-loss values in ligated molars in the CS+RESV group than CS+PLA and NCS groups (p < 0.05). The immuno-enzymatic assay of the gingival tissue showed a lower concentration of pro-inflammatory markers in the CS+RESV group than the other groups (p < 0.05).

**Conclusion:** Continuous administration of resveratrol may decrease periodontal breakdown induced experimentally in smoking rats by modulating the host immune response.

## P0784

### Therapeutic approaches for necrotizing periodontal diseases

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**Aim:** The aim of this poster is to provide an overview of the literature concerning the therapeutic approaches for necrotizing periodontal diseases.

**Material and Methods:** A research was carried out on Pubmed and Cochrane, using the key-words: "Necrotizing periodontal diseases"; "Necrotizing gingivitis"; "Necrotizing periodontitis" with different combinations. All published papers between 1991–2014 were selected for abstract evaluation and chosen according their level of evidence and relevant data.

**Results:** The standardization of the therapeutic approach is difficult and depends on the patient collaboration and health status in general. The aim of the acute phase treatment is to eliminate disease activity and avoid pain and discomfort. The consensual approach of the acute phase in the literature is: scaling using ultrasonic instruments, rinse with oxygen release agent such as hydrogen peroxide; mouthrinse twice a day with 0.2% chlorhexidine and careful oral hygiene; in unresponsive or fever is recommended metronidazole 250 mg three times a day; daily revisions. In the maintenance phase: surgical correction, shallow craters – gingivectomy, deep defects – flap surgery. Periodontal surgery is not indicated in HIV patients, it is recommended to carry out intensive interproximal cleaning to prevent recurrence.

**Conclusion:** Due to the low prevalence and severity of these particular diseases, controlled trials are not easy to perform. The standardization of the therapeutic approach of this disease is complex. These patients should be well informed and motivated at the initial presentation for the potential risk of permanent gingival deformities and a high recurrence rate and the then importance of follow-up therapy.

## P0785

### The influence of periodontal treatment on circulating markers of oxidative stress, endotoxin and neutrophilic activity

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**Aim:** Periodontal treatment triggers acute and chronic inflammatory changes associated with endothelial function. The aim of this study was to ascertain the effect of periodontal treatment on plasma levels of endotoxin, markers of oxidative stress and neutrophilic activity.

**Material and Methods:** 120 participants suffering from severe generalized periodontitis were randomized to receive either intensive periodontal therapy (IPT) or control (CPT). Endothelial function was assessed by flow-mediated dilatation (FMD) of the brachial artery. Plasma samples were collected at baseline, 1, 7, 30, 60, 180 days and assayed for: endotoxin activity (LPS), oxidative burden (D-ROM and BAP), immunoglobulin(Ig)G/IgM autoantibodies to malondialdehyde (MDA)-LDL and apoB-immune complexes (apoB-IC), Lectin-like oxLDL receptor-1 (LOX-1), Lipoprotein a (Lpa), oxidized phospholipids/apolipoproteins (OxPL-apo(a) and OxPL-apoB), apoB-IC, neutrophil matrix metalloproteinase (MMP)-8, tissue inhibitor of MMP-1 (TIMP-1) and myeloperoxidase (MPO).

**Results:** Acute vascular dysfunction observed 24 h following IPT was associated with increased (a) endotoxin activity ( $p < 0.01$ ), (b) reactive oxygen species (D-ROM,  $p < 0.05$ ), (c) lipid oxidation (LOX-1,  $p < 0.01$ , IgM MDA-LDL and apoB-IC,  $p < 0.05$ ) and (d) increased neutrophil activity (raised MMP-8 and MPO levels,  $p < 0.01$  and reduced TIMP-1,  $p < 0.01$ ) when compared to CPT. Most of these markers returned to baseline values within one month following IPT. Improvement of FMD at 6 months was associated with a reduction in ROS production (D-ROM,  $p < 0.01$ ), increased anti-oxidant potential (BAP,  $p < 0.05$ ) and reduced Neutrophilic enzyme activity ratios (MMP-8/TIMP-1 ratios,  $p < 0.05$ ).

**Conclusion:** Changes in markers of oxidative stress including lipid oxidation and neutrophil activation are predictive of acute impairment and 6 months improvement in endothelial function observed in individuals with severe periodontitis.

## P0786

### Tooth loss after active periodontal therapy: Long term results after 5, 7, 10, 12, 15 and 20 years – Preliminary results

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**Aim:** To assess patient related factors influencing tooth loss during supportive periodontal therapy (SPT).

**Material and Methods:** 55 patients with chronic and aggressive periodontitis participating SPT after active periodontal therapy (APT) were reevaluated after 5 ( $n = 55$ ), 7 ( $n = 38$ ), 10 ( $n = 30$ ), 12 ( $n = 22$ ), 15 ( $n = 12$ ), and 20 ( $n = 3$ ) years. Tooth and patient related factors including sex, age, diagnosis, periodontal risk, compliance, periodontal probing depth (PPD), and oral hygiene indices were assessed. According to their compliance with appointments (intervals based on modified individual risk assessment according to Ramseier and Lang 1999), patients were categorized as fully compliant (compliant with all appointments  $\pm 6$  weeks), partially compliant (compliant with all appointments  $\pm 9$  weeks), insufficient compliant (missing at least one appointment) or noncompliant (SPT interval interruption of at least one year). The association between tooth loss and following factors was calculated using statistical tests of fixed effects: sex, age, bleeding on probing (BOP), gingival bleeding index (GBI), plaque control record (PCR), periodontal risk, and compliance.

**Results:** Compared to baseline median PPD was reduced from 3.3 mm to 2.6 mm after APT. While SPT median PPD showed a tendency to further reduction with the lowest value

after 10 years (2.15 mm). Median number of teeth after APT was 25 per patient; after 10 and 15 years of SPT there was a decreased to 24 respectively 21.5 teeth per patient. A statistically significant association on tooth loss was found for age ( $p < 0.01$ ), PCR ( $p < 0.0001$ ) and compliance ( $p < 0.0001$ ).

**Conclusion:** Age, PCR as well as compliance were detected as prognostic factors for tooth loss during SPT.

## P0787

### Efficient use of toothpaste Blend-a-med Complete 7 expert

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**Aim:** To evaluate the effectiveness of using toothpaste Blend-a-Med 7 Complete Expert on the basis of clinical trials.

**Material and Methods:** The test of the paste was conducted for one month in 20 volunteers, aged 22–26 years. Subjects are obliged to use only give them paste and brush teeth regularly (2 times a day, morning and evening). All participants had to undergo an initial investigation. The information were recorded in the medical record, and then we carried out the procedure of professional teeth cleaning to remove all deposits. A month later, each subject was investigated again under such circumstances and on the same criteria as in the beginning of the test. During the test the toothpaste there were used following clinical codes: 1. Simplified hygiene index. 2. The bleeding index. 3. Schiller-Pisarev test.

**Results:** The use of toothpaste Blend-a-Med 7 Complete Expert during 30 days showed the clinical improvement of periodontal tissue in study participants. Positive changes were confirmed by the clinical condition of the gums improvement index numbers (table 1). Index data before and after the test toothpaste A) Indicators (1) Initial examination (2) After 1 month (3) Improvement from baseline inspection (4) Reduction of index, % A)SHI (1)  $0.94 \pm 0.14$  (2)  $0.47 \pm 0.03$  (3)  $0.47 \pm 0.14$  (4) 50 A)The bleeding index Muhlemann-Cowell (1)  $2.0 \pm 0.09$  (2) 0 (3)  $2.0 \pm 0.09$  (4) 100 A)Schiller-Pisarev test (1)  $0.71 \pm 0.12$  (2)  $0.28 \pm 0.08$  (3)  $0.43 \pm 0.1$  (4) 60.6

**Conclusion:** The definite improvement in oral hygiene and reduction of gingivitis, which are proof of the high clinical efficacy of the use of toothpaste Blend-a-Med7 on the basis of clinical trials.

## P0788

### Comparative evaluation of root surface roughness after periodontal scaling using manual, ultrasonic and sonic scaler – an in-vitro profilometric study

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**Aim:** Newly designed powered scalers and manual cures show differences in the effectiveness of biofilm removal. However, the magnitude of the damaging effect to the root surface is controversially discussed. The present study compares the effects of three different methods for periodontal scaling on root surface roughness.

**Material and Methods:** In an experimental study on dummy heads a sonic (AIR), an ultrasonic device (TIG) and double sharpened special Gracey cures (GRA) were utilized by five experienced, calibrated operators to remove experimental biofilm (nail lacquer). After instrumentation plastic teeth were analyzed by a laser-profilometer to measure surface roughness ( $R_a$  [ $\mu\text{m}$ ],  $\text{mean} \pm \text{SD}$ ) and special care was taken to make the post experimental tracing in the same positions for each tooth at every time point. Findings were compared to corresponding sites from uninstrumented teeth using a one-way-ANOVA and a Tukey's post-hoc test. Significance was assumed at a level of 5%.

**Results:** Untreated plastic teeth showed a mean  $R_a$  of  $8.1 \pm 2.1 \mu\text{m}$ . Significantly higher roughness was observed after scaling with AIR ( $12.7 \pm 7.9 \mu\text{m}$ ;  $p = 0.009$ ) and GRA ( $12.5 \pm 6.7 \mu\text{m}$ ;  $p = 0.014$ ), whereas instrumentation with TIG showed similar results to the baseline value ( $8.1 \pm 3.4 \mu\text{m}$ ;  $p = 1.00$ ). There was no difference detectable between operators, sites or teeth ( $p > 0.05$ ).

**Conclusion:** Within the limits of the present in-vitro study, it can be concluded, that sonic devices and cures produce higher root surface roughness compared to ultrasonic scalers. Nevertheless, the efficacy for creating a biologically compatible root surface seems to be similar for all tested instruments.

## P0789

### Comparison between periodontal self-examination and self-reported periodontal disease among adult patients

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**Aim:** To compare between periodontal self-examination and self-reported periodontal disease among adult patients

**Material and Methods:** A cross-sectional pilot study involving fifty one patients mean age  $50.2 \pm 14.5$  attended Dental Polyclinic, The National University of Malaysia, Kuala Lumpur. Patients randomly assigned into two groups following the Basic Periodontal Examination score. Group one (SE) performed and answered the periodontal self-examination according written instruction manual and group two (SR) received similar content of self-reported questionnaire. Clinical evaluation performed by trained examiner in both groups and findings were compared. Data were analysed using SPSS version 21.0.

**Results:** From 51 patients, 50.9% ( $n = 26$ ) presented in SE group and 49% ( $n = 25$ ) in SR group with mean total number of teeth  $24.3 \pm 6.8$  (SE) and  $22.8 \pm 6.9$  (SR). Mean probing pockets depth for SE was  $3.1 \pm 0.74$  and  $2.8 \pm 0.61$  in SR. Mean clinical attachment level showed similar in both group ( $3.7 \pm 1.17$ ). Tooth mobility had higher agreement in SE (80.7%) compared to SR (48.0%) group. Counting number of teeth had the highest agreement found in both groups. Knowledge about periodontal disease showed almost the same in both group (SE = 53.8%, SR = 40%). In SE group, 61.1% had experienced bleeding from gingiva while higher in SR group (84%). The easiest instruction were counting number of teeth (57.6%) and most difficult were examined colour of gingiva (69.2%). Inspection of bleeding on brushing showed the most informative (53.6%) item.

**Conclusion:** Only selected item in periodontal self-examination had showed positive effect towards educating patients in early detection of periodontal disease.

**P0790****Effects of rosuvastatin on alveolar bone loss in periodontitis-induced oxidative stress**

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**Aim:** This study aimed to evaluate the effects of rosuvastatin on alveolar bone loss (ABL) and oxidative status in ligature-induced periodontitis.

**Material and Methods:** Thirty nine male Wistar rats randomly divided into 4 groups: nonligated group (NL); nonligated+rosuvastatin group (RSV); ligated group (LO); and ligated+rosuvastatin group (L+RSV). All rats were treated with water or rosuvastatin by oral gavage until sacrifice and in the LO and L+RSV groups periodontitis was induced by ligature for 14 days. ABL was determined by histomorphometric and histological analysis. Serum malondialdehyde (MDA), superoxide dismutase (SOD), glutathione (GSH), glutathione peroxidase (GSH-Px), and nitric oxide (NO) concentrations were evaluated by ELISA.

**Results:** Administration of rosuvastatin significantly reduced ABL in the L+RSV group compared to the LO group ( $p < 0.05$ ). MDA concentrations were statistically higher in the LO group than the NL group ( $p < 0.05$ ) and there was not statistically significant difference between the NL and L+RSV groups ( $p > 0.05$ ). NO levels were higher in the RSV group than NL group, and in the L+RSV group than the LO group ( $p < 0.05$ ). GSH levels were significantly higher in the LO and L+RSV groups compared to the NL group ( $p < 0.05$ ). There were no significant differences among the study groups regarding SOD and GSH-Px levels.

**Conclusion:** Our findings suggest that rosuvastatin reduces alveolar bone loss and improves oxidative status in ligature-induced periodontitis. The antioxidant effects of rosuvastatin may result from decreasing MDA, and increasing NO and GSH rather than SOD and GSH-Px.

**P0791****The effect of chemotherapeutic agents and mechanical tongue cleaning on morning bad breath: a single blind randomized clinical trial**

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**Aim:** The effect a dentifrice and a mouthwash with chemotherapeutic agents, and a tongue cleaner on the concentration of Volatile Sulphur Compounds (VSC) and Morning Bad Breath (MBB) in periodontally healthy subjects.

**Material and Methods:** In total, 66 non-dental students participated in a 3 week parallel single-blind, randomized, controlled clinical trial. After selection, the subjects were randomly assigned to a specific regimen or control therapy group. The regimen group used a manual toothbrush, tooth/tongue gel and mouthrinse containing amine fluoride, stannous fluoride, 0.2% zinc lactate and Oral Malodour Counteractives and a tongue cleaner. The control group used an identical toothbrush and standard fluoride toothpaste. Clinical assessments were performed at baseline, day-1, day-7, and day-21, between 7:30

AM-12:00 PM noon. The primary outcome was the Organoleptic score (ORG) scored by trained judge. The secondary outcomes were VSC measurements using the Oral Chroma<sup>®</sup> (OC | gasses assessed: H<sub>2</sub>S, CH<sub>3</sub>SH, (CH<sub>3</sub>)<sub>2</sub>S), and Halimeter<sup>®</sup> (HM) readings as recorded by a second examiner. In addition tongue surface discoloration was assessed.

**Results:** At day-1 a statistical difference between groups ( $p < 0.05$ ) was obtained in favor of the regimen treatment regimen for ORG, H<sub>2</sub>S, (CH<sub>3</sub>)<sub>2</sub>S and HM readings. On day-21 this effect on H<sub>2</sub>S, CH<sub>3</sub>SH and HM was still maintained ( $p < 0.05$ ). The regimen group showed a statistical significant reduction ( $p < 0.05$ ) of tongue surface discoloration at day-7, and day-21.

**Conclusion:** MBB was significantly reduced overnight with the regimen treatment for several parameters. At day-21, the prolonged effect of the regimen treatment was detectable with the HM recordings and the OC readings for H<sub>2</sub>S and CH<sub>3</sub>SH.

**P0792****Clinical and SEM evaluation of Bioactive glass in the management of dentinal hypersensitivity**

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**Aim:** To evaluate efficacy of bioactive glass as a desensitizing agent by comparing with strontium chloride, another tubule occluding agent

**Material and Methods:** 20 patients experiencing dentinal hypersensitivity were randomized into two groups. One group used bioactive glass containing dentifrice, the other was given Strontium chloride dentifrice for 6 weeks. Hypersensitivity was assessed prior to and following the use of dentifrice using subjective visual analog scale score of 0–10 with tactile, air blast and thermal stimuli. For in vitro study, 10 extracted teeth were collected and dentin disks of 2–4 mm thickness were obtained, etched using 6% citric acid for 2 min to open the tubules. 5 specimens were applied with bioactive glass dentifrice and other five with strontium chloride, for 2 min. Specimens were examined using QUANTA 200 with EDS/EDX Scanning Electron Microscope. ANOVA and independent sample t-test were used for statistical analysis.

**Results:** Clinically, 67 hypersensitive teeth in 20 patients were evaluated. Mean percent reduction in tactile, air-blast and thermal stimuli in bioactive glass group was 78.74%, 77.11% and 74.88% respectively. In the strontium chloride group, it was 41.83%, 41.53% and 54.32% respectively. Intra group analysis showed statistically significant reduction in sensitivity for both groups. However, inter-group comparison showed higher difference in bioactive glass group. SEM showed tubule occlusion within and around the dentinal tubules with bioactive glass. Strontium chloride group showed partially occluded tubules with deposits scattered peri-tubularly.

**Conclusion:** Bioactive glass was found to be superior to strontium chloride in blocking the dentinal tubules, thereby providing a lasting desensitization effect.

**P0793****The comparison of the effects of caffeic acid phenethyl ester and/or low dose doxycycline on oxidative status and gingival apoptosis in an experimental periodontitis rat model**U. Yigit<sup>1</sup>, F.Y. Kirzioğlu<sup>1</sup>, Ö. Özmen<sup>2</sup>, A.C. Uguz<sup>1</sup><sup>1</sup>Isparta/Turkey, <sup>2</sup>Burdur/Turkey

**Aim:** The aim of the study was to evaluate the effects of caffeic acid phenethyl ester (CAPE) and/or low dose doxycycline (LDD) on oxidative stress and gingival apoptosis in an experimental periodontitis model.

**Material and Methods:** Forty-eight male Wistar albino rats were randomly divided into five groups: Control group (C, n = 8), Periodontitis+CAPE group (P<sub>C</sub>, n = 10), Periodontitis + LDD group (P<sub>D</sub>, n = 10), Periodontitis + CAPE + LDD group (P<sub>CD</sub>, n = 10), and Periodontitis group (P, n = 10). Experimental periodontitis was induced by placement of sterile 3/0 silk ligatures for 14 days. CAPE (10 µmol/kg/day) was administered by intraperitoneally and LDD (10 mg/kg/day) by oral gavage. Glutathione (GSH), glutathione peroxidase (GSH-Px) and malondialdehyde (MDA) values were examined in serum and apoptosis levels in gingival tissue of rats.

**Results:** The histomorphometric findings showed that CAPE reduced alveolar bone loss (ABL) more than LDD or LDD-CAPE. MDA levels were significantly increased in the P group and decreased in the P<sub>C</sub> and P<sub>CD</sub> groups. In the P<sub>C</sub> group, both GSH and GSH-Px levels were the highest levels while the lowest levels were in the P group (p < 0.05). Apoptosis levels were higher in the P group than the other groups and decreased by CAPE and/or LDD administrations (p < 0.01).

**Conclusion:** The present data suggest that CAPE and/or LDD are effective therapeutics in periodontitis. However, CAPE is a stronger protective agent on periodontitis induced oxidative stress and gingival apoptosis.

**P0794****Periimplantitis complications following the incorrect design of hybrid prosthesis**E. Quiroga<sup>1</sup>, X. Ripoll<sup>2</sup>, A. Agra<sup>1</sup>, S. Perez<sup>3</sup><sup>1</sup>Madrid/Spain, <sup>2</sup>Zaragoza/Spain, <sup>3</sup>Colchester/United Kingdom

**Aim:** Treatment of periimplantitis mixing regenerative and restorative techniques.

**Material and Methods:** 85-year-old goes for consultation for mobility of hybrid prosthesis. Poor hygiene, high probing depth, gingival bleeding and suppuration was observed. CT scan showed bone loss around implant in position 4.5. Flap is raised, debridement of soft tissue and decontamination of implant surface with chlorhexidine. Guided bone regeneration with collagen membrane is performed. Patient is followed 1, 3, 6 and 12 months. After 12 months, bone gaining, reduction of gingival index and reduction of probing depth is seen comparing to presurgical situation.

**Results:** Patient is followed 1, 3, 6 and 12 months. After 12 months, bone gaining, reduction of gingival index and reduction of probing depth is seen comparing to presurgical situation.

**Conclusion:** Guided bone regeneration, may be a predictable treatment option for periimplantitis defects when bone defect is four walls and a good decontamination is achieved. Periimplantitis is one of the most prevalent diseases today. More investigation is needed on implant surfaces, regeneration materials y bacterial decontamination to avoid that problem or to solve it when it appears.

**P0795****Effects of smoking in response to non surgical periodontal therapy**

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Kathmandu/Nepal

**Aim:** To establish the effect of smoking in response to nonsurgical periodontal therapy in smokers and nonsmokers

**Material and Methods:** Non-surgical periodontal therapy was performed in 60 male subjects (30 smokers and 30 nonsmokers) ranging from 35–54 years without any systemic diseases. Probing pocket depth, clinical attachment level, oral hygiene status and gingival status were assessed at baseline, 3 and 6 months after completion of non-surgical periodontal therapy. Six tooth sites (mesio-buccal, mid-buccal, disto-buccal, mesio-lingual, mid-lingual and disto-lingual) of each tooth were evaluated.

**Results:** Both groups (smokers and nonsmokers) showed probing pocket depth (PPD) reduction. Mean PPD reduction in smokers was 1.02 mm from baseline in 6 months whereas in nonsmokers mean PPD reduction was 2.37 mm. At 6 months smokers have high mean residual pockets compared to nonsmokers. Mean gain in clinical attachment level (CAL) in smokers was 0.39 mm and in nonsmokers was 1.11 mm. Nonsmokers showed significantly more PPD reduction and more gain of attachment than smokers. PPD reduction in light smokers (LS), was more compared to moderate smokers (MS) and heavy smokers (HS) and reduction in MS was more compared to HS. Regarding CAL, there was no significant difference between LS, MS and HS.

**Conclusion:** Our study showed smokers responded less favorably than non-smokers to nonsurgical periodontal therapy and increased tendency for smokers to have supragingival plaque and gingivitis.

**P0796****Evaluation of the efficiency of platelet-rich plasma on acellular dermal matrix application with coronally advanced flap in the treatment of gingival recessions**Z.T. Çankaya<sup>1</sup>, P. Gökalp<sup>2</sup>, D. Ozbay Cetiner<sup>1</sup><sup>1</sup>Ankara/Turkey, <sup>2</sup>Istanbul/Turkey

**Aim:** The aim of this study was to compare the coronally advanced flap plus acellular dermal matrix (CAF+SureDerm) with and without platelet-rich plasma (PRP) to determine the effectiveness of PRP in terms of gingival recession defect coverage.

**Material and Methods:** 12 patients with a total of 84 Miller Class I or II recession defects were participated in this study. Sites were randomly assigned into CAF+PRP+SureDerm (test

group) or CAF+SureDerm (positive control group) groups. Clinical parameters, included recession depth (RD), recession width (RW), width of keratinized tissue (WKT), clinical attachment level (CAL), probing depth (PD), gain of creeping attachment (CRA), plaque index, gingival index, were recorded at baseline and 3rd, 6th and 12th months postoperatively.

**Results:** Within each group, CAL, RD, RW values showed statistically significant decreases  $5 \pm 0.4$  to  $2.3 \pm 0.2$ ;  $3.7 \pm 0.4$  to  $0.8 \pm 0.1$ ;  $3.8 \pm 0.3$  to  $0.8 \pm 0.2$   $p < 0.05$  in CAF+PRP+SureDerm and  $4.8 \pm 0.4$  to  $1.1 \pm 0.4$ ;  $3.8 \pm 0.3$  to  $1.1 \pm 0.3$   $p < 0.05$  in CAF+SureDerm, respectively. WKT and CRA showed statistically significant increases in 3rd, 6th and 12th months with regard to the baseline. But CRA remained stable with no statistical difference at all postoperative periods in group CAF+SureDerm. RD and RW values were statistically higher in group CAF+SureDerm compared to the CAF+PRP+SureDerm group at 6th and 12th month ( $p < 0.05$ ).

**Conclusion:** Within the limits of the study, results showed that coronally advanced flap plus acellular dermal matrix with PRP may provide better root coverage and gain of creeping attachment in the treatment of multiple gingival recessions at long term follow-up.

## P0797

### Treatment of gingival recession by the use of an acellular dermal matrix graft and enamel matrix derivative: case presentations

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**Aim:** The proper management of gingival recession continues to pose significant therapeutic challenges for clinicians. Subepithelial connective tissue grafts in conjunction with a coronally advanced flap have been considered as the “gold standard” treatment for gingival recession defects. However, major shortcomings of harvesting connective tissue grafts are patient morbidity and the limited availability of palatal donor tissue. For these reasons, the use of 3D collagen matrices of porcine origin has been introduced as a soft-tissue graft substitute for the treatment of gingival recession. The aim of this report is to describe the use of a 3D collagen matrix combined with enamel matrix derivative (EMD) for the treatment of multiple gingival recessions.

**Material and Methods:** Three patients showing multiple Miller class I and II recession defects were treated by means of an envelope-type coronally advanced flap associated with EMD and a 3D collagen matrix (mucoderm<sup>®</sup>, Botiss, Germany) as a substitute for the connective tissue graft.

**Results:** Postoperative healing was uneventful in all cases. Improved outcomes were seen for root coverage 3 months postoperative with a high level of esthetic satisfaction.

**Conclusion:** This report demonstrates successful gingival recession coverage using the combination of EMD and a 3D collagen matrix. Future research is needed to prove the benefits of combined EMD and 3D collagen matrix therapy.

## P0798

### Multi-disciplinary treatment of patients with aggressive periodontitis and its long-term evolution

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Granada/Spain

**Aim:** To determine the effectiveness of periodontal treatment, monitoring the evolution of aggressive periodontitis, and to stress the importance of early diagnosis and treatment.

**Material and Methods:** Four patients with aggressive periodontitis and malocclusions received periodontal and orthodontic treatment. Patients underwent check-ups every three months during orthodontic treatment and every six months thereafter.

**Results:** Of the four patients, only three were able to complete their orthodontic treatment. The fourth, due to the rapid evolution of periodontitis over two years, during which it was uncertain whether to proceed with the treatment, lost the posterior sectors of the upper and lower maxillas as well as the upper anterior sector. One of the three patients undergoing orthodontic treatment, lost an upper incisor as a result of the periodontitis process and two upper first molars during the orthodontic treatment, making it necessary to perform atraumatic sinus elevation and to place three implants, as well as provide gingival augmentation in the incisor region. Three patients received regenerative treatments, producing stable results after 4, 10, 12 and 25 years when patients were recalled for monitoring.

**Conclusion:** Malocclusions can compromise periodontal treatment. For this reason, combined ortho-perio treatment is recommended, providing that the periodontitis is brought under control first, which will facilitate oral hygiene management.

## P0799

### The frankfurt catalogue of educational objectives in periodontal diseases – an interdisciplinary analysis

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Frankfurt Am Main/Germany

**Aim:** The aim of this study was to evaluate the Frankfurt curriculum in periodontal diseases with regard to the German national competency-based catalogue of educational objectives in dentistry (Nationaler kompetenzbasierter Lernzielkatalog Zahnmedizin: NKLZ).

**Material and Methods:** In cooperation with dental students a team of 7 teaching-experienced faculty members of all departments (conservative dentistry, oral and cranio-maxillofacial / facial plastic surgery, orthodontics, periodontology, prosthodontics) evaluated the curriculum. The working package “Periodontal diseases” (WP 16b) of the NKLZ provided a basis for the analysis. All members of the interdisciplinary team reviewed the catalogue of 40 educational objectives, whether they are represented in the own field (teachers) or in the courses (students), and whether they are important for the dental profession in general.

**Results:** Both teachers and students considered all listed educational objectives as important for the dental profession. While the teachers identified 39 (98%) represented educational objectives, the students identified 35 (88%). Aside from the department of periodontology (n = 32 objectives), other departments participate in teaching the field of periodontal diseases, above all the departments of conservative dentistry (n = 16 objectives) and oral surgery (n = 12 objectives). After clearance with further results – the complete curriculum in dentistry was evaluated step by step – recommendations for interdisciplinary courses with reference to periodontal diseases were given, e.g. “Extraction versus tooth preservation”.

**Conclusion:** Teachers and students evaluated the Frankfurt curriculum in periodontal diseases. The Frankfurt curriculum covers nearly all of the NKLZ educational objectives. Furthermore the present analysis may support the development of the future curriculum.

## P0800

### Dose- and carrier- dependent effects of simvastatin in periodontal therapy

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Banja Luka/Bosnia And Herzegovina

**Aim:** Successful periodontal regenerative therapy requires an agent which not only treat the tissue destruction, but also enhances the regenerative capabilities of the periodontal tissue. Statins are specific competitive inhibitors of 3-hydroxy-2-methyl-glutaryl coenzyme A reductase. Due to pleiotropic effects, statins have many benefits in periodontal therapy. Recent studies have demonstrated that among statins, simvastatin (SMV) is the most potent statin in terms of promotion of the bone formation. The successful use of SMV depends on the local dose and carriers. Therefore the aim of this study is to give a systematic overview of SMV dose and delivery system in order to obtain the best treatment approach in periodontal therapy.

**Material and Methods:** A systematic review of published articles in PubMed database was carried out using keywords: “statin” and “periodontal therapy”, “simvastatin” and “periodontal disease”.

**Results:** Eventhough the doses should be carefully chosen considering benefits and risks, the majority of available literature suggests that 0.5–1.5 mg SMV is the optimal dose for single local application, while the higher doses cause soft tissue inflammation and scabbing of the skin. Regarding carriers, the most commonly used carrier is biodegradable, bioresorbable, controlled-release gel or sponge, that adapts easily to the shape of the defects.

**Conclusion:** However, the results should be interpreted with caution since they are very limited number of clinical studies published so far. Therefore, further long-term randomized controlled clinical studies on the larger number of the patients are, however, necessary in order to give the recommendation on the optimal SMV dose and carrier for the best periodontal therapy outcome.

## P0801

### Multidisciplinary approach to the traumatically injured permanent mandibular incisors of a 9-year old boy

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**Aim:** The aim of this clinical trial is to show the clinical effectiveness of combined endodontic and periodontal treatment of traumatically injured permanent teeth with open apex.

**Material and Methods:** A 9-year-old boy appealed to the pediatric dentistry clinic of Uzmandent Private Dental Hospital for evaluation of lower right and left first permanent incisors with a history of traumatic injury and buccal swelling severe tooth mobility and sensitivity on percussion and palpation on clinical examination. The teeth had an open apex associated with a large radiolucency and a buccal sinus tract was presented that traced to the apex of the tooth #41. Periodontal probing depths were higher (mean PD = 4.66 mm) compared to the neighbour incisor teeth diagnostic testing inconclusive on cold air and electric pulp testing for #41. After first month of a 3 stage endodontic treatment, the patient returned asymptomatic with no pain. Some reduction in the radiolucency was already evident but on the other hand the sinus tract and higher periodontal probing depths were still present with tooth mobility for #41. Periodontal surgery was performed by flap reflection, scaling and root planning in addition with removing granulation tissues.

**Results:** At 1-month and 6-months recall visits, the patient was asymptomatic neither with signs of the sinus tract nor tooth mobility for both teeth. The radiograph showed complete resolution of the radiolucency.

**Conclusion:** This case has been followed for one year and can be considered as a success since teeth mobility resolved completely and the teeth were healthy both periodontically and endodontically.

## P0802

### Contamination of suture materials in the surgical site: an in vivo study

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<sup>1</sup>Rome/Italy, <sup>2</sup>Cagliari/Italy

**Aim:** To compare the level of contamination of Polyglactin 910 suture materials with and without triclosane.

**Material and Methods:** Two types of same diameter suture (Vicryl Plus™ or Vicryl™) were used in fifteen patients during periodontal surgery. Samples of 3–4 mm from each suture were collected at 48 h and 7 days post surgery. Each suture sample was conserved in codified eppendorffs and delivered to the laboratory for the bacterial load calculation with classical and Real Time PCR.

**Results:** A total of 60 samples were collected. The total bacterial count decreased at 48 h but increased afterwards. Significant bacterial increase was observed at 7 days in both sutures, but this contamination was below the limit of bacterial load (100 bacteria/PCR equivalent to approximately 1000 bacteria per sample). Triclosane suture showed lower bacterial load at each time level, however this difference was not statistically important.

**Conclusion:** Triclosane adjuction to the suture structure did not improve significantly the performance of the suture against contamination in the oral cavity.

## P0803

### Peripheral giant cell granuloma originating from a fresh extraction socket- A case

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Adana/Turkey

**Aim:** Peripheral giant cell granuloma is a relatively uncommon lesion of the oral cavity, arising mainly from the connective tissue of the gingiva, periodontal membrane, periosteum of alveolar ridge or in response to local irritation. Peripheral giant cell granuloma is painless, soft, shiny, nodular type, stalk or stalkless, is seen dark red, purple and blue colour. The aim of this case report is to present the peripheral giant cell granuloma localised at maxillar tuber region.

**Material and Methods:** A 34 years old male patient referred to faculty clinic with a complaint of gingival enlargement originated from extraction socket at left maxillar posterior region. In intraoral examination purple and dark red colored lesion that had 2.5 × 1.5 × 0.4 cm dimensions was examined. In radiological examination bone resorption was also examined. The first phase of treatment that included oral hygiene instructions was initiated. Scaling and root planing were performed and then gingivectomy procedure was used to removal of the gingival enlargement. At the time of the surgery gingival biopsies were obtained and fixed in neutral buffered 10% formaldehyde solution.

**Results:** As a result of histopathological examination of the biopsy peripheral giant cell granuloma was diagnosed.

**Conclusion:** Adequate surgical procedure, regular dental visits and oral hygiene are important for recurrence of peripheral giant cell granuloma.

## P0804

### Efficacy of non-surgical periodontal treatment on teeth considered hopeless: a case report

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Paris/France

**Aim:** Introduction Clinical results of non-surgical periodontal treatment are well documented and predictable. Periodontal surgery seems to be the most effective option in patients with deep intra-osseous defects. However, since non-surgical treatment is a part of the initial periodontal therapy, what can we expect from this treatment alone ?

**Material and Methods:** Case report The case of a 51-year-old woman with signs of severe gingival inflammation is presented here. Clinical examination revealed pocket probing depth ranging from 8 to 12 mm in association with deep intra-osseous defects and class 4 mobility on several teeth. Microbiological testing revealed the presence of *Aggregatibacter actinomycetemcomitans* and red complex periopathogens. She was diagnosed with generalized severe aggressive periodontitis. Those teeth were considered hopeless. The patient expectations were to treat her disease and keep her teeth. We observed unexpected clinical results after initial therapy: 4 to 5 mm pocket depth reduction,

comparable gain of clinical attachment level and radiographic evidence of almost complete bone healing.

**Results:** Discussion Various non-surgical protocols, with reduced number of visits and/or use of adjunctive antibiotics, may induce additional clinical and microbiological benefits. Fulfill the objectives of initial therapy remains elemental. Non-surgical periodontal treatment alone can achieve fair results in terms of clinical parameters improvement.

**Conclusion:** After 18 months of follow-up and rigorous management of risk factors, this clinical case shows positive periodontal healing of teeth considered hopeless. In case of extreme alveolar bone loss every recovered millimeter may extend teeth survival and postpone or avoid implant option.

## P0805

### Peripheral ossifying fibroma – a case report

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Lodz/Poland

**Aim:** Introduction Peripheral ossifying fibroma (POF) accounts for 9.6% of gingival lesions. It develops in response to chronic and recurring tissue injury or irritation. It originates from the cells of the periodontal ligament and tends to occur in the 2nd and 3rd decades of life. In most cases concerns females, with a predilection for the anterior maxilla. The treatment of choice is surgical excision and removal of irritating factors.

**Material and Methods:** Case report A 28-year-old female patient presented with the complaint of slowly growing gingival tumor in maxilla since 2 years. Medical and dental history was irrelevant. Clinical examination showed a solitary, pedunculated, round, firm and pink exophytic growth in the anterior region of maxilla measuring around 1 cm. On radiographic examination no abnormality was detected. A provisional diagnosis of fibrous epulis was given. After the surgical excision performed using diode laser it was verified by histopathological examination to be peripheral ossifying fibroma. After 6 months of follow up, there has been no complication or recurrence of the growth

**Results:** Discussion The recurrence rate of POF as high as 20%, due to incomplete removal of the lesion or persistence of the etiological factor. To prevent recurrence, adjacent periodontal tissues should be removed and smoothed after complete excision. Subsequently the lesion should be examined histopathologically to verify clinical diagnosis.

**Conclusion:** Complete excision of POF is essential for treatment prognosis. Also, it has an impact on psychological aspect of the therapy. Frequent recurrences may generate the patient's fear about health condition, that even can lead to cancerophobia.

## P0806

### Extracoronary splinting for the management of secondary occlusal trauma and Grade III mobility

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Boston/United States of America

**Aim:** Successful management of periodontal disease and secondary occlusal trauma in the mandibular anterior sextant.

**Material and Methods:** A systemically-healthy 36-year-old male presented for periodontal evaluation. Clinical examination

revealed severe periodontal inflammation and loss of attachment. A periodontal abscess on tooth 4.1, grade III mobility, 15 mm probing depths, 5 mm recession and bleeding around mandibular incisors were detected. All teeth were vital. Severe horizontal and vertical bone loss was present between 4.3 and 3.3, reaching the apex of 4.1. The patient was concerned with progressively increasing mobility of 3.2–4.2 and relative impact on function. All incisors displayed generalized attrition. The diagnosis was generalized aggressive periodontitis, periodontal abscess, and secondary occlusal trauma. The acute infection was treated with a 7-day-course of amoxicillin. Once resolved, full-mouth scaling and root planing with amoxicillin/metronidazole and occlusal adjustments were performed. Extracoronary lingual splinting was performed from 3.3–4.3. After 8 months, the case was re-evaluated radiographically. Radiographs revealed positive changes including apparent gains in bone density and trabeculation.

**Results:** Trauma from occlusion may increase tooth mobility and cause loss of bone height and density. Extensive loss of support often requires occlusal adjustments to reduce excessive forces and remove pathologic contacts. Splinting may reduce mobility, improving patient comfort. The present case describes successful management of secondary occlusal trauma with occlusal adjustments and permanent splinting. Increase in bone trabeculation and regeneration were detected radiographically 8-months post-splinting. Splinted teeth maintain stable bone levels over time.

**Conclusion:** Splinting improves comfort and decreases progressive mobility, leading to signs of bone regeneration when inflammation is absent.

## P0807

### Clinical assessment of the effect of thioglycosides extracted from white mustard on the oral bacteria

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Warsaw/Poland

**Aim:** Thioglycosides are chemicals formed by bonding of glycone group, different amino acids and sulfuric acid. The raw extracts have been proven to have antibacterial and antifungal activity. Thioglycosides are present mainly in plants belonging to Cruciferae and Brassicaceae. The aim of the study was clinical assessment of the effect of thioglycosides extracted from white mustard „Bamberka” on the oral bacteria.

**Material and Methods:** The study comprised 55 subjects aged 30 to 60 with chronic periodontitis. Subjects were divided into two groups: test and control. In the test group patients were using experimental toothpaste containing fragmented entire mustard seeds, in the control group conventional fluoride toothpaste. Subjects were monitored at baseline, after 6 and 12 months of therapy. During visit microbiological samples of subgingival plaque were collected and verified by real-time PCR for quantification of nine periopathogens and total bacterial counts. Before the initiation of treatment as well as after 6 and 12 months in all the patients PI index, API index, BoP index, PD and CAL were recorded. In each of the qualified patients professional hygienization was performed according to the treatment needs.

**Results:** There was a statistically significant decrease in all the examined parameters in test group. After one year treatment Friedman's ANOVA test revealed decrease of the total count of micro-organisms ( $p = 0.02$ ), and of the total count of periopathogens ( $p = 0.03$ ).

**Conclusion:** The present study suggest that thioglycosides might be effective against periopathogens.

## P0808

### The influence of maxillary gingival display on magnetic smile

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<sup>1</sup>Adana/Turkey, <sup>2</sup>Leuven/Belgium

**Aim:** To evaluate maxillary gingival display (GD) of the models who appeared in the cover of Vogue fashion magazine between the periods of 1989–1994 and 2009–2014 and to compare any possible inter-country differences of the editions of the magazine.

**Material and Methods:** The spontaneous smile photos of the cover models of American, French, Italian editions between the periods of 1989–1994 and 2009–2014 were analyzed for the GD during smile. GD was scored as negative if the upper lip was at (adjacent to) the cervical margin of maxillary teeth (both anterior and premolars) and as positive if the lip was elevated higher to expose gingiva.

**Results:** The findings of the present study showed a significant increase of the GD of the smile of the cover models appearing on a global fashion magazine between 1989–1994 and 2009–2014 and this finding was similar in three countries from three continents.

**Conclusion:** The results of this study may indicate that GD may have no negative effect on a magnetic smile. A beautiful smile, which will be resulting from the overall face beauty will be the way of a mesmerising communication.

## P0809

### Comparative evaluation of different methods of Platelet Rich Fibrin (PRF) Membrane preparation

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Pécs/Hungary

**Aim:** Our aim was to investigate the effect of different methods of autologous PRF membrane preparation on membrane size and residual plasma content for protocol optimization.

**Material and Methods:** Two tubes of 10 ml peripheral blood was collected from each of the 20 healthy, non-anticoagulated volunteers participating in the study. Centrifugation of samples was performed using the original Choukroun protocol. Weight of the PRF preparations was measured after separation from the red thrombus. One of the two clots from each subject was randomly selected to either Group 1 ( $n = 20$ ) and was processed to a 1 mm thick membrane, or to Group 2 ( $n = 20$ ) and was processed to a 2 mm thick membrane in wet conditions using standard sized spacers. Standard digital photographs were taken from all membranes and their surface, maximum length and maximum width was measured using ImageJ software.

**Results:** Weight of freshly prepared PRF clots in the two groups did not show significant difference. Weight loss during membrane preparation was significant in both groups. Weight of membranes in Group 1 ( $0.4 \pm 0.08$  g) was significantly smaller than in Group 2 ( $0.61 \pm 0.10$  g). No significant difference was observed between the two groups in membrane surface, length or width ( $p = 0.53$ ,  $p = 0.72$ ,  $p = 0.80$  respectively).

**Conclusion:** Although the preparation of PRF clots is well standardized, membrane compression methods require more refinement. Thinning of PRF membranes cannot significantly increase their size however it leads to significantly more loss of residual serum, containing valuable growth factors. Therefore a more cautious compression protocol is recommended in order to achieve optimal biological effects of PRF membranes.

## P0810

### Interdisciplinary care of aggressive periodontitis: a conservative option

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Rabat/Morocco

**Aim:** Aggressive Periodontitis is a frequent disease in Morocco. It is particularly associated with the JP2 clone of *Aggregatibacter actinomycetemcomitans*. The management of patients with this disease requires, in most cases, periodontal surgery combined with antibiotics therapy and a multidisciplinary approach to restore function and aesthetics, and improve the patient's comfort. The aim of this work is to highlight, through a clinical case, the reliability of conservative management in such clinical situations.

**Material and Methods:** Case report: The case involves a young female patient with aggressive periodontitis who was offered two treatment options: both consisting of a periodontal treatment combined with either an implant-prosthesis or a orthodontics and prosthodontics. With the patient's consent, we chose a largely conservative approach including periodontal therapy, orthodontic treatment and prosthodontics followed by a periodontal monitoring.

**Results:** Discussion: Treating aggressive periodontitis requires multidisciplinary coordination. The choice of a treatment plan involving orthodontics and fixed prosthesis is an extremely conservative option, having no use of dental extractions and implants, which is often traumatic with heavy psychological impact on the patient. Several parameters must be studied in order to choose the most fitted treatment option: the patient's wish, the timing of orthodontic treatment and prosthodontics, the evaluation of the risk / benefit of each option in the particular context of aggressive periodontitis. Indeed, using implants may present a higher risk of peri-implantitis in patients with aggressive periodontitis.

**Conclusion:** Aggressive periodontitis can be treated in a conservative perspective, more challenging for the medical staff but less traumatic and safer for patients.

## P0811

### The combined endodontic and periodontal surgical treatment for the endo-perio lesions: cases reports

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Iasi/Romania

**Aim:** The aim of this study is to present a surgical approach for the treatment of teeth with endo-perio lesions, characterized through severe bone loss, deep periodontal pockets or wide periradicular defects.

**Material and Methods:** A number of 5 patients diagnosed with endo-perio lesions on different teeth, have been surgically

treated in one session, by the use of apical section procedure for removing the multiple apical canals to the pulp and periodontal therapy using GTR.

**Results:** After 24 months follow-up, the clinical and radiographic findings have shown an improvement of the tooth stability on dental arch through the decrease of mobility, reduction of probing depth and bone fill of the defects.

**Conclusion:** The presented treatment strategy has been proven to be useful in keeping and treatment of teeth with severe bone loss, caused by endo-perio lesions and in the same time, it is a method embraced by patients, due to the fact that it involves a single surgical stage.

## P0812

### Aggressive periodontitis with necrotizing ulcerative gingivitis: a case report

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Ordu/Turkey

**Aim:** Introduction: Necrotizing ulcerative gingivitis (NUG) is a relatively uncommon periodontal disease (0.5–11% of the population) characterized by gingival necrosis, ulceration, pain, and bleeding. NUG is more common in young adults, but reports of morbidity in young children with malnutrition in the background are not uncommon. NUG also may be seen with the other oral diseases as aggressive periodontitis that is characterized by a considerable attachment loss over a relatively short period of time.

**Material and Methods:** Case report: This case report describes a 17-years old male patient who presented with severe gingival necrosis and attachment loss that was diagnosed as a NUG accompanied by aggressive periodontitis. Patients complaint about gingival bleeding with little provocation, gingival pain and oral malodor. Under local anesthesia pseudomembrane was removed using cotton pellets and then debridement was performed. After resolution of the acute condition, comprehensive periodontal treatment included scaling and root planing was performed.

**Results:** Discussion: Treatment of acute conditions followed by routine periodontal treatment are helpful in the treatment of NUG accompanied by aggressive periodontitis. Physiological stress and poor oral hygiene are the main predisposing factors in this case.

**Conclusion:** Resolution of the necrotic ulceration and related symptoms with appropriate periodontal treatment and home care can be achieved. This case report shows the successful treatment of a patient suffering from NUG with aggressive periodontitis.

## P0813

### Indocyanine green photosensitiser as an adjunct to non-surgical periodontal therapy

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Ljubljana/Slovenia

**Aim:** To evaluate the use of an applied agent that could be activated using laser photonic energy and its adjunctive effect to

the initial periodontal therapy by means of decreasing the need of surgical treatment.

**Material and Methods:** Nineteen subjects were randomly assigned to receive Scaling and Root Planing (SRP) -only (control group, CG) or SRP with Indocyanine Green Photosensitizer (IGP)(test group, TG). IGP may be activated using a Diode laser wavelength of 810 nm, leading to the destruction of target cellular structures. For clinical evaluation we have measured periodontal scores: probing pocket depth (PPD), plaque index (PI), gingival index (GI) and bleeding scores (BS). After third mechanical debridement at both groups we performed adjunct IGP therapy at Test Group only.

**Results:** One hundred fourteen teeth were treated in both groups and 5355 scores were collected in this 3 month clinical trial. We scored significant improvement of PPD, PI, GI and BS measurements at both, CG and TG, after periodontal treatment. The increase of observed periodontal parameters was significant higher at TG, treated in addition with an applied agent IGP, compared to CG.

**Conclusion**The Indocyanine Green Photosensitizer and Diode laser may present an adjunctive effect to initial non-surgical periodontal treatment. Improved treatment results may lead to decrease of periodontal surgical needs.

## P0814

### Clinical and microbiological effects of photodynamic therapy associated with systemic antibiotic therapy in the treatment of smokers with generalized chronic periodontitis

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São Paulo/Brazil

**Aim:** Smokers do not respond as well as non-smokers to periodontal treatment, including when systemic metronidazole (MTZ) and amoxicillin (AMX) are used as adjuncts to scaling and root planing (SRP). Therefore, the aim of this study was to evaluate the clinical and microbiological effects of photodynamic therapy (PDT) adjunctive to SRP+MTZ+AMX in the treatment of smokers with generalized chronic periodontitis (GChP).

**Material and Methods:** Thirty-six smokers with GChP were randomly assigned to receive SRP combined with MTZ (400 mg, TID/14 days) + AMX (500 mg, TID/14 days), with (n = 18, test group) or without (n = 18, control group) PDT. SRP was performed in 14 days and a single PDT course was applied immediately after SRP in all subgingival sites of subjects from the test group. Subjects received clinical and microbiological monitoring at baseline, 3 and 6 months post-therapy.

**Results:** No major differences were observed between the two groups post-therapy ( $p > 0.05$ ). Both therapies were equally effective in reducing mean PD (Control:  $2.8 \pm 0.1$  mm, Test:  $3.1 \pm 0.1$  mm) and improving mean clinical attachment level (Control:  $2.3 \text{ mm} \pm 0.1$  mm, Test:  $2.4 \pm 0.1$  mm) in initially deep sites ( $\text{PD} \geq 7$  mm; primary outcome variable) at 6 months. The mean counts and proportions of the three red complex species were statistically significantly reduced by both treatments. Subjects receiving PDT showed a lower mean percentage of orange complex species in comparison with subjects from the control group at 6 months ( $p < 0.05$ ).

**Conclusion:** A single course of PDT does not improve the clinical benefits obtained with SRP+MTZ+AMX in the treatment of smokers with GChP.

## P0815

### Aggressive periodontitis: a case series

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**Aim:** Aggressive periodontitis (AgP) is a type of periodontal disease, which affects younger patients. Primary features include rapid loss of attachment, family history of periodontitis and no systemic impairment. Treatment generally involves mechanical therapy in conjunction with antibiotics. Surgical therapy is often required.

**Material and Methods:** A total of 4 patients (3 females and 1 male, mean age of 37.5) were included in this case series with a diagnosis of generalized aggressive periodontitis. None of the patient reported relevant medical history. Family history of periodontal disease was presented in all patient and all of the cases have been reported as non-responsive to previous treatment. All patient had full mouth non-surgical debridement and pocket irrigation with 2%CHX within one visit. One patient was prescribed antibiotics.

**Results:** From initial examination, mean plaque score (PI) was 28.02%, mean bleeding score (BI) was 22.17%, percentage of teeth with moderate and severe pockets was 50.82% and 17.28%, respectively. The results from non surgical therapy showed PI and BI of 25.33% and 13.65%, respectively and reduction in probing pocket depth. Thus, the surgical therapy with or without regenerative techniques was performed in most cases which allow the elimination of residual pockets and regeneration of infrabony defects.

**Conclusion:** AgP is a challenging disease in terms of diagnosis and treatment. Early diagnosis and management are key factors for the successful treatment outcome. Non-surgical therapy is most of the times not enough and advanced periodontal techniques should be considered as part of the treatment.

## P0816

### Evaluation of plaque removal capacity of dental floss with ellipsoidal knots

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**Aim:** To clinically determine the reduction in bacterial plaque by a prototype dental floss with soft ellipsoidal knots compared with a conventional dental floss.

**Material and Methods:** A blind, randomized controlled trial of 33 volunteers who had allowed plaque accumulation for 24 h. Using a split-mouth model the floss under trial was used in 2 quadrants and the control floss in the others. Applying the Refinement of the Modified Navy Plaque Index (RMNPI), total plaque index (TPI), interproximal plaque index (IIP) and gingival plaque index (GPI) were compared for the two groups (study and control).

**Results:** Plaque reduction expressed by both TPI and IPI were similar with both flosses. However, GPI showed greater plaque reduction with the test floss than the conventional ( $p = 0.15$ ), with a slightly greater difference among subjects who did not habitually use dental floss.

**Conclusion:** The test group showed similar plaque removal performance to control. However, the knotted floss did show a greater capacity to remove plaque than conventional from surfaces close to the gingival sulcus and a trend close to significance was observed, even though the data obtained did not reach statistical significance. Plaque removal with the test floss was slightly greater among subjects who did not habitually floss, and so knotted floss could be an optimal choice for first-time users, or when flossing is sporadic, or when the subject has a reduced ability to floss.

## P0817

### Periodontal treatment and maintenance phase impacts on Oral Health Related Quality of life – a randomized clinical trial

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**Aim:** The aim of the present study was to evaluate the impact on Oral Health Related Quality of Life (OHRQoL) of a non-surgical periodontal therapy and a preventive periodontal maintenance (PPM, 6 months) phases.

**Material and Methods:** Sixty-one patients (40 women,  $51 \pm 9.36$  years old) diagnosed with gingivitis and moderate-to-severe periodontitis were included. The non-surgical periodontal therapy consisted of a supragingival (30-days coronal scaling and polishing plus oral hygiene instructions) followed by a subgingival intervention (30-days subgingival scaling and root planning per quadrant). In sequence, participants were randomized to receive a professional supragingival biofilm control (SUPRA) or a supra-plus-subgingival (SUPRA/SUB) biofilm control regimen during the PPM. Clinical examinations and the OHIP-14 were evaluated at baseline (T1), after supragingival (T2) and subgingival treatment (T3) and at baseline (T4), 3 (T5) and 6 months (T6) of the PPM period. Repeated measures ANOVA and Friedman Test were used for the statistical analysis.

**Results:** The median OHIP-14 score at T1 was 16 (0–42). Median scores reduced continuously along the experimental times (T2 and T3 = 6, T4 and T5 = 4, T6 = 3,  $p \leq 0.05$ ). Plaque, marginal bleeding, probing depth, attachment level and bleeding on probing improved significantly over time ( $p \leq 0.05$ ). During maintenance, no differences were observed between SUPRA and SUPRA/SUB regarding OHIP-14 scores and clinical indicators, neither within groups, over time.

**Conclusion:** Perceptions on OHRQoL improved along periodontal therapy and periodontal maintenance. However, the greatest impact occurred after supragingival treatment. The intervention employed along the PPM phase did not influence OHRQoL.

## P0818

### Probiotic therapy can reduce the expression of IL-1 $\beta$ and the number of osteoclasts in rats with ligature-induced periodontitis

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**Aim:** The aim of this study was to evaluate the effects of probiotics in rats with ligature-induced periodontitis.

**Material and Methods:** 48 rats were assigned to 4 groups: C (control), PROB (probiotic), EP (experimental periodontitis) and EP/PROB. In groups EP and EP/PROB, the mandibular first molars of the animals received a cotton ligature. After 14 days (day 0 of the experiment), the ligatures were removed. The probiotic agent *Bifidobacterium animalis* subsp. *lactis* HN019 ( $1.5 \times 10^8$  CFU/mL) was daily added to the water of the animals of groups PROB and EP/PROB for 15 days starting from day 0. Each group was divided ( $n = 6$ ) for euthanasia at days 7 or 15. Histomorphometric analysis was performed to evaluate the alveolar bone loss (ABL – distance between the cemento-enamel junction and the alveolar bone crest in mm) on the distal root of the mandibular first molars. Immunohistochemical detections of tartrate-resistant acid phosphatase (TRAP) and interleukin (IL)-1 $\beta$  were also executed. The data were statistically analyzed (ANOVA or Kruskal–Wallis, Tukey,  $p < 0.05$ ).

**Results:** Group EP presented ABL significantly greater than groups C, PROB and EP/PROB at 7 and 15 days ( $p < 0.05$ ). Group EP presented a significant increase ( $p < 0.05$ ) in ABL from 7–15 days. Group EP/PROB presented a reduced expression of IL-1 $\beta$  and less TRAP-positive multinucleated osteoclasts when compared with group EP at 7 and 15 days ( $p < 0.05$ ).

**Conclusion:** The administration of the probiotic HN019 can reduce the ABL progression, the expression of IL-1 $\beta$  and the number of osteoclasts in rats with ligature-induced periodontitis.

## P0819

### Clinical and microbiological study about subgingival debridement by air-polishing

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**Aim:** The purpose of this study was to investigate the effect of air-polishing using low abrasive glycine powder on subgingival plaque removal in the pocket with moderate depth. For this, we clinically and microbiologically evaluated the results, and then compared these results with SRP.

**Material and Methods:** In this study, 15 patients diagnosed as chronic periodontitis and single-root tooth over 5 mm of pocket depth symmetrically in left and right quadrant, was investigated. Subgingival debridement is performed by scaling and root planning (SRP) and air-polishing. And the results are evaluated and compared clinically and microbiologically.

**Results:** After treatment, PPD and BOP was decreased, and attachment gain was observed in air polishing. There was no clinical difference compared to SRP. The volume of GCF decreased at 14 days and increased again at 60 days. Comparing

to SRP, there was a statistical significance of the volume of GCF at 60 days in air-polishing. In microorganism, high-risk bacteria to cause periodontal disease decreased remarkably. It decreased immediately after treatment but increased again as time went by.

**Conclusion:** For this study, subgingival debridement by air-polishing was effective for decrease of pocket depth, attachment gain, decrease of GCF and inhibition of microorganism. The further study should compare Air-polishing to SRP according to degree of pocket depth and calculus existence.

## P0820

### Pre-procedural rinsing with an essential oil-based mouthrinse to reduce aerosol contamination

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**Aim:** To evaluate effectiveness of an essential oil-based (EO) mouthwash (Listerine®) in reducing aerosol contamination in dental clinic during treatment of caries and periodontal patients and to identify microbial contaminants in the aerosol.

**Material and Methods:** 60 subjects, receiving treatment for periodontitis (30 subjects) and caries (30 subjects) were randomly assigned to pre-rinse with either 20 ml of Listerine or placebo. Subjects were instructed to rinse for 1 min prior to ultrasonic scaling or caries removal with air turbine handpiece. Saliva and microbial samples of clinic air on agar plates, were collected before and during treatment. All samples were analysed for total plate counts (cfu), and isolated microbial colonies were identified using Gen III Omnilog® ID System and further tested to see their killing-rate by exposing to EO mouthwash.

**Results:** Use of EO mouthwash showed significant difference in reduction of microorganisms between control and test groups in saliva and bioaerosols produced during treatment, by 61% ( $p = 0.007$ ) and 87.7% ( $p = 0.011$ ) respectively in Periodontitis group and by 36% ( $p = 0.000$ ) and 86.1% ( $p = 0.002$ ) respectively in Caries group. Analysis done at two defined working intervals showed significant differences ( $p < 0.05$ ) for both groups. *Bacillus subtilis* ss *subtilis*, *Staphylococcus kloosii*, *Staphylococcus xylosum*, *Streptococcus suis* serogroup 4/6 and *Klebsiella oxytoca* were in the bioaerosols after EO mouth rinsing. Time-killing effect on identified microorganisms showed 93.87% average reduction after 30 s exposure to Listerine® and 100% elimination in 60 s.

**Conclusion:** EO mouthwash is effective in reducing spread of microorganisms of bioaerosols produced during dental treatment in cross infection measures.

## P0821

### Cytologic changes in periodontal tissues during local anti-inflammatory therapy

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**Aim:** Cytomorphometric analysis for evaluation of Holisal-gel effectiveness in treatment of patients with chronic generalized periodontitis (CGP) of different severity.

**Material and Methods:** 133 patients, aged 22–46 years ( $36.8 \pm 1.9$ ), with CGP were involved in the study. (88 – the main group and 45 – control). OHI-S, PMA, SBI and PI were used to evaluate periodontal status. Instillations and applications of Holisal gel were added to conventional treatment. Efficiency of treatment was assessed by inflammatory-destructive index – (IDI) =  $[N+M+F]/U$ , N– number of segmented neutrophils, M– “naked” mononuclear cells, F– fibroblasts, U– unbroken mononuclear cells. Leukocyte differential count  $L(\%) = 100L/L+E$  was also determined. IDI normally equals to 0–20, and leukocyte count is 20–50%. The received data was statistically processed (Statistica 6.0).

**Results:** Periodontal condition improvement was observed in all patients after the course of treatment. In the main group IDI and L (%) significantly decreased and remained within normal limits. In mild periodontitis cases normalization of cytology occurred in 70% of cases: IDI – from  $27.8 \pm 5.7$  to  $7.7 \pm 2.5$ , L (%) from  $45.9 \pm 7.6$  to  $15.8 \pm 3.1$ ; in moderate cases IDI changed from  $32.3 \pm 9.7$  to  $8.8 \pm 1.5$ , L (%) from  $60.7 \pm 10.1$  to  $28.1 \pm 7.3$ . In severe CGP cases IDI and L (%) decreased by 50% and 36%, and they normalized in 50% of cases: IDI– from  $43.4 \pm 10.1$  to  $20.8 \pm 5.6$ , L (%) from  $91.7 \pm 15.6$  to  $51.4 \pm 8.2$  ( $p < 0.05$ ).

**Conclusion:** Cytologic normalization was more expressed in mild and moderate CGP cases, at that anti-inflammatory effect was more prominent and sustained if Holisal gel was applied.

## P0822

### Acidity of mouthrinses and their potential effect on salivary pH

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**Aim:** To evaluate pH of three different mouthrinses as well as salivary pH changes in vivo after their use, with and without tooth brushing.

**Material and Methods:** Effect of Colgate Plax, Listerine-cool mint and Curasept 212 mouthrinses on the salivary pH changes were evaluated in 10 non-smoking volunteers with good oral health. One hundred milliliters of each mouthrinse was titrated with 1M NaOH, added in 0.5 ml increments, until the pH reached 10. Unstimulated saliva was collected in a test tubes using “spitting” method, immediately before and 5, 15, 30 and 45 min after mouth rinsing. The same procedure was repeated right after tooth brushing during the next visit. pH was measured using a pH-meter (Eutech 510, Eutech Instruments). Statistical analysis was performed using two-way ANOVA, at a level of significance of 0.05.

**Results:** Initial pH of tested solutions was 4.06 for Listerine-cool mint, 5.62 for Curasept 212 and 5.81 for Colgate Plax. 1.5 ml of 1M NaOH was used to neutralize 100 ml of Colgate Plax and Listerine-cool mint, whilst 6.5 ml of NaOH for Curasept 212 was used. When used solely, there was no significant difference in salivary pH changes between examined mouthrinses. In combination with tooth brushing, Colgate Plax and Listerine significantly increased salivary pH over 5 min post-rinsing, whereas Curasept 212 significantly decreased salivary pH. Interestingly, salivary pH returned nearly to basal values after 15 min.

**Conclusion:** All examined mouthwashes resulted in similar changes in the pH of unstimulated saliva in vivo, whereas tooth brushing had no influence.

## P0823

### Class IV recessions (PRESTON MILLER 1985): a clinical challenge in decision making: a case report

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**Aim:** Throughout dental literature, many techniques have been described for the treatment of recessions of Types I, II and III according to Preston Miller, 1985. However, Type IV recessions remain one of the great unknowns in clinical periodontics. In this paper, a multidisciplinary approach to the treatment of this gingival defect is presented.

**Material and Methods:** A 28 year old woman's case: a Class IV recession defect caused by trauma to the lower lip frenum is presented. A free gingival graft was used to partially cover the root and increase the vestibular length. Subsequently, veneers were placed on 3.1 and 4.1 to camouflage the defect and absence of interproximal soft tissue.

**Results:** Following the development of different treatment plans based on patient needs, her aesthetic interests and bio-availability of graft materials, treatment conducted was adapted to the patient, achieving a favorable result.

**Conclusion:** In this type of gingival defect, the cooperation of a perio-prosthetic multidisciplinary team is necessary to find a treatment with as favorable a prognosis as possible, and to ensure a modicum of success to the patient.

## P0824

### The effect of low-level laser therapy on PDGF-BB, TGF- $\beta$ 1 and IL-8 levels in gingival crevicular fluid following free gingival graft

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**Aim:** Low-level laser therapy (LLLT) may accelerate the wound healing process and may affect the release of cytokines and growth factors in gingival tissues. The aim of this study was to evaluate the effect of LLLT on PDGF-BB, TGF- $\beta$ 1 and IL-8 levels in gingival crevicular fluid (GCF) following free gingival graft (FGG).

**Material and Methods:** This study was a longitudinal test of 6 months' duration conducted using a blinded, placebo-controlled and randomized design. Thirty healthy subjects (fifteen in each group) with completely lacking attached gingiva associated with gingival recessions at lower incisors were enrolled in the study. The control group was treated with FGG whereas the test group was treated with FGG followed by a Nd:YAG laser applied in the immediate postoperative period and every 24 h for 5 days. GCF samples were obtained from all patients for evaluation of PDGF-BB, TGF- $\beta$ 1 and IL-8 levels. GCF samples and clinical measurements were taken at baseline, 15 days, 1, 3 and 6 months following surgery.

**Results:** There was no significant difference between test and control groups for PDGF-BB, TGF- $\beta$ 1 and IL-8 levels at both concentrations and total amount values in GCF at any time period ( $p > 0.05$ ). Clinical measurements showed improvement at 6 months according to the baseline, however, no statistically significant difference was found between the groups.

**Conclusion:** Within in the limits of this study, LLLT may not seem to accelerate the wound healing process of FGG and may have no prominent benefit on PDGF-BB, TGF- $\beta$ 1 and IL-8 levels in GCF and clinical measurements after FGG operation.

## P0825

### Clinical and microbiological effects of adjunctive probiotic yoghurt in the treatment of chronic periodontitis: randomized controlled clinical trial

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**Aim:** The aim of this study is to evaluate the clinical and microbiological effects of probiotic containing yoghurt as an adjunct to mechanical periodontal treatment (MPT).

**Material and Methods:** Thirty chronic periodontitis patients were randomized into 2 groups. As adjunctive to MPT, Group1 consumed  $2 \times 10^8$  CFU/day of Bifidobacterium animalis subsp. lactis DN-173010 containing probiotic yoghurt whereas Group2 natural yoghurt once daily for 28 days. Subgingival plaque samples were obtained from 2 periodontal sites with a probing depth (PD) of  $4 \leq PD < 7$  mm via paper-points at baseline, 28th day, 3rd month. Samples were cultured to evaluate total flora (TF), the proportions of obligate anaerobes (OA) and Bifidobacterium species (B) (TF%). The full-mouth recorded clinical parameters were plaque index, gingival index, probing depth, bleeding on probing, and clinical attachment level.

**Results:** Within both groups, the proportions of OA were reduced at 28th day compared to baseline ( $p < 0.05$ ) and the differences were insignificant between 28th day-3rd month. In the Group1 the proportion of B was found significantly higher on day 28 compared to baseline and the Group2 ( $p < 0.05$ ), whereas it was significantly reduced at 3rd month ( $p < 0.05$ ). There were no significant B changes within the Group2. These microbiological improvements were concomitant in a statistically-significant lower plaque accumulation/gingival inflammation in the Group1 compared to the Group2 on 28th day ( $p < 0.05$ ). The increases in plaque and inflammation parameters between 28th day-3rd month did not reveal any significant difference in inter-group comparison.

**Conclusion:** The results indicated that compared to MPT alone, the adjunctive use of probiotic yoghurt contributed for better clinical and microbiological improvements as long as it is consumed on a daily basis.

## P0826

### Pyogenic granuloma associated with open flap debridement: a case report

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**Aim:** Pyogenic granuloma is a benign tumour like gingival overgrowth seen as a response to physical trauma, hormonal factors, or local irritation. It can occur in all ages, with slight tendency to appear more in young adult females. Clinically, the lesion is rapidly growing, asymptomatic sessile or pedunculated tissue mass that have a smooth or lobular appearance. It is fiery red to pink in colour, bleeds easily, and may present with ulceration.

tion. The most common site for occurrence is the labial gingiva of the maxilla anterior region. Diagnosis is confirmed with histological examination, with surgical excision as the usual treatment.

**Material and Methods:** Case Report: a 20 years old female patient referred for treatment of a deep periodontal pocket associated with maxillary left central incisor. Diagnosis of localised aggressive periodontitis is made. Open flap debridement was performed. Three weeks post-surgery, the patient presented with asymptomatic gingival overgrowth involving the buccal gingivae. The lesion was managed with weekly visits of scaling, polishing, and chlorhexidine irrigation, in addition to meticulous oral hygiene instructions, resulting in significant reduction of the lesion size within 2 months.

**Results:** This report describes the management of pyogenic granuloma involving the buccal mucosa of maxillary central incisor in a young female patient.

**Conclusion:** Careful considerations must be applied on a lesion involving an aesthetic area. Surgical excision can severely compromise aesthetics. A period of regular maintenance therapy before planning for the surgery can be applied. This may decrease the size, or as seen in this case, eliminate the gingival lesion.

## P0827

### Amlodipine-induced gingival overgrowth

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**Aim:** Drug-induced gingival overgrowth occurs in genetically susceptible individuals as a side effect of various drugs. There is a gross disfiguring enlargement of gingiva mostly in the anterior region leading to difficulty in mastication, speech and maintenance of oral hygiene. In this case report, two patients who were referred to the Department of Periodontology, Faculty of Dentistry, Selcuk University with complaint of amlodipine-induced gingival overgrowth and their management are presented.

**Material and Methods:** Case report: Case 1: 62-years-old female patient had complaints of gingival enlargement, foul odor and bleeding from gums. Intraoral examination revealed poor oral hygiene, generalized nodular enlargement of gingiva mainly on the facial aspect of teeth. Gingiva was inflamed and soft to firm in consistency. Patient was hypertensive with history of taking amlodipine daily. Case 2: 60-years-old male had complaints of gum swelling and generalized sensitivity of teeth. Patient was under treatment of essential hypertension and was taking amlodipine daily. Intraoral examination revealed poor oral hygiene; generalized gingival enlargement covering one-third to half of the tooth surface.

**Results:** Following consultation, amlodipine was changed with a substitute one. Patients were motivated for oral hygiene habits and scaling and root planning was performed. After 6 months, we clinically observed regression of gingival overgrowth and reduced probing pocket depths. Patients are under regular follow-up.

**Conclusion:** We conclude that drug substitution, appropriate non-surgical periodontal treatment along with excellent plaque control can lead to the regression and prevention of recurrence of anti-hypertension drug (amlodipine)-induced gingival overgrowth.

## P0828

### Surgical management of idiopathic gingival fibromatosis: a case report

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**Aim:** Idiopathic gingival fibromatosis (IGF) is a rare, benign condition characterized by a progressive enlargement of the gingiva involving the maxillary and mandibular arches. The oral manifestations of this condition are partially erupted teeth, fibrous and particularly dense gingiva that causes esthetic, phonetic and functional problems and malpositioned teeth. In this case report, the surgical treatment of a patient diagnosed as IGF was presented.

**Material and Methods:** A 23-year-old male referred with esthetic, phonetic and chewing problems due to generalized enlargement of the buccal and lingual/palatal aspects of the attached and marginal gingiva that substantially cover the crowns. Unerupted and partially erupted teeth were noted. After initial therapy, hyperplastic fibrous gingiva was removed by conventional gingivectomy operation. The histopathological examination of the tissue samples was performed.

**Results:** Postoperative healing was uneventful and desired crown lengthening was achieved with significant improvement in speech and masticatory problems. This case was followed for 12 months and no recurrence was seen during supportive periodontal treatment.

**Conclusion:** The surgical excision is needed when the gingival enlargement lead to difficulty in speech, loss of masticatory ability, pain and esthetic problems in IGF cases. Oral hygiene and the superimposition of plaque accumulation have a crucial effect on the prognosis of IGF. Supportive periodontal treatment may prevent the recurrence.

## P0829

### Does splinting of periodontally compromised teeth affect the oral health related quality of life?

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**Aim:** Tooth mobility could be increased by reduced periodontal support and/or occlusal trauma. Splinting of periodontally compromised teeth restore function and increase patient comfort. This study aimed to investigate the effect of splinting treatment on patients oral health related quality of life (OHRQoL) levels.

**Material and Methods:** Twenty five chronic periodontitis patients with anterior tooth mobility were recruited. Teeth were splinted if Miller mobility scores were  $\geq 2$  and pocket depth were  $\geq 3$  mm after non-surgical periodontal treatment. All splinting procedures were made with resin materials with special attempt to obtain functional occlusion and aesthetic results. OHRQoL levels were assessed by self-completed OHRQoL-UK and OHIP-14 scales, and evaluation of patients' comfort and aesthetic point of view were made literally before and 1 month after splinting. Friedman 2-way analysis of variance (ANOVA) and Wilcoxon signed rank tests were used to compare the relative changes of OHRQoL among the different time points

**Results:** Significant changes in the total and subscale scores of both the OHIP-14 and OHRQoL-UK were observed.

**Conclusion:** Improvement of OHRQoL and chewing function could be obtained by splinting periodontally compromised teeth in periodontitis patients

## P0830

### Effects of periodontal treatment on serum lipid and CRP levels in obese patients

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**Aim:** The aim of this study was to compare the effects of periodontal treatment (PT) on serum lipid levels in obese patients.

**Material and Methods:** 15 obese patients with chronic periodontitis (OCP) and 15 non-obese patients with chronic periodontitis (CP) and 15 non-obese periodontally healthy patients (HC) aged between 25-50 were enrolled in this study. Body mass index (BMI), waist-to-hip ratio (WHR), plasma tri-glyceride (TRG), low-density lipoprotein cholesterol (LDL), high density lipo-protein cholestereol (HDL), CRP and periodontal clinical parameters (including plaque index [PI], probing depth [PD, clinical attachment level [CAL], bleeding on probing [BOP]) were measured before and 3 months after non-surgical PT.

**Results:** All periodontal parameters improved after therapy ( $p < 0.05$ ). however, there was significantly more improvement in OCP ( $p < 0.05$ ). OCP had higher TRG, LDL and CRP levels than CP and HC ( $p < 0.05$ ) and lower levels for HDL ( $p < 0.05$ ) at baseline. HDL levels were significantly increased in OCP and CP groups after therapy ( $p < 0.05$ ). There was no significant difference in TRG, LDL levels after therapy ( $p > 0.05$ )

**Conclusion:** PT is effective in the improvement of HDL levels in OCP and CP groups. Serum lipid levels do not seem to interfere with the clinical outcomes of PT. CRP levels are primarily affected by obesity rather than PT.

## P0831

### IL-1 $\beta$ levels in generalized aggressive periodontitis treated with Er,Cr:YSGG laser

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**Aim:** Lasers are used during periodontal treatment and are safe for the patient when used appropriately during antimicrobial treatments. The aim of our study is to determine the IL-1 $\beta$  levels in gingival crevicular fluid (GCF) following treatment with scaling and root planing (SRP) in pathological periodontal pockets of individuals diagnosed with generalized aggressive periodontitis with Er,Cr:YSGG laser.

**Material and Methods:** A total of 13 individuals were included in our study. The study was designed as a "split-mouth" experiment. Clinical periodontal assessments, including periodontal status, were conducted by measuring bleeding on probing, plaque index, gingival index, probing depth, and clinical attachment loss at six sites per tooth. GCF samples were taken prior to treatment and 1 month after treatment from all of the indi-

viduals who participated in the study. The levels of IL-1 $\beta$  in the GCF were assessed using ELISA.

**Results:** Following periodontal treatment of the generalized aggressive periodontitis, a decrease in the site-specific, plaque index, gingival index, bleeding on probing, probing depths and clinical attachment loss average values was observed. When the pre- and post-treatment IL-1 $\beta$  levels were evaluated, it was noted that the IL-1 $\beta$  levels in the quadrant that received treatment with the Er,Cr:YSGG laser the generalized aggressive periodontitis had decreased.

**Conclusion:** The application of Er,Cr:YSGG lasers to SRP is more efficient compared to other treatment methods generalized aggressive periodontitis. In addition to periodontal treatment, Er,Cr:YSGG lasers have decreased clinical periodontal indices, IL-1 $\beta$  levels in generalized aggressive periodontitis patients. To support these results, further studies are required regarding dental lasers and periodontal disease.

## P0832

### Comperative effects of riboflavin, nicotinamide and folic acid on alveolar bone loss in experimental periodontitis rat model

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**Aim:** The aim of this study is to evaluate the effects of riboflavin (RBF), nicotinamide (NA), and folic acid (FA) on alveolar bone loss in experimental periodontitis rat model

**Material and Methods:** Sixty-four male Wistar rats were randomly divided into 8 groups: Control (C), Ligated (L), RBF 50 (RBF 50 mg/kg/daily), NA 50 (NA 50 mg/kg/daily), FA 50 (FA 50 mg/kg/daily), RBF 100 (RBF 100 mg/kg/daily), NA 100 (NA 100 mg/kg/daily), FA 100 (FA 100 mg/kg/daily). Periodontitis was induced using ligature model. After 14 days rats were sacrificed. Mandible and serum samples were collected. Changes in alveolar bone levels were measured clinically, and periodontal tissues were histopathologically examined to assess the infiltration of inflammatory cells, osteoblastic activity and osteoclast numbers. IL-1 $\beta$  (pg/ml) was measured in serum samples by using ELISA.

**Results:** Serum IL-1 $\beta$  levels among groups were not statistically significant ( $p > 0.05$ ). Alveolar bone loss was significantly higher in L from all the other groups ( $p < 0.05$ ). Osteoblastic activity was found significantly higher in L, RBF100 and NA100 than the C ( $p < 0.05$ ). Osteoclast numbers were the highest in the L but only significantly higher from C and FA100 group ( $p < 0.05$ ). Inflammatory cell infiltration scores only significantly differ among C and L ( $p < 0.05$ ).

**Conclusion:** The rats which were received RBF, NA and FA showed significantly lower alveolar bone loss than the other groups. RBF100 and NA100 significantly improved osteoblastic activity. FA100 significantly reduced the osteoclast numbers.

## P0833

### Acute necrotizing ulcerative gingivitis in a patient with Behcet's disease

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**Aim:** Behcet's disease (BD) is a rare immune-mediated-small-vessel systemic vasculitis that often presents with mucous membrane ulceration and ocular problems. Acute necrotizing ulcerative gingivitis (ANUG) is an infection characterized by gingival necrosis presenting as "punched-out" ulcerated papillae, gingival bleeding, and pain. Fetid breathe, metallic taste, and pseudo-membrane formation may be secondary diagnostic features. Systemic symptoms that may occur in ANUG include lymphadenopathy, fever and malaise. Predisposing factors may include: stress, smoking, poor diet, and HIV infection.

**Material and Methods:** A 25-year-old female applied with complaining about the ulcerative lesion at the lateral side of the tongue and intense pain in her gingiva. She had BD. Gingival bleeding with little or no provocation, necrosis of the interdental papillae, pseudomembrane formation, halitosis and submandibular lymphadenopathy were noted. When the cause of ANUG was questioned, she stated that she conflict in work recently. Ornidazole (500 mg, 2 × 1), 3% hydrogen-peroxide (diluted, 4 × 1) and chlorhexidine-digluconate mouthwash (2 × 1) were prescribed, she was encouraged for tooth brushing with a soft toothbrush, and discharged with dietary suggestions. Three days later, supragingival scaling was performed under anesthesia. At the following appointments, SRP was performed under anesthesia, and scheduled for follow-up visits.

**Results:** BD is a chronic disease that recurs. Although there is no cure, the symptoms can be controlled with proper medication, rest, exercise, and healthy lifestyle. ANUG's treatment includes irrigation and debridement of the necrotic areas, oral hygiene and dietary instructions, use of mouthwashes and in the presence of systemic involvement, antibiotics. ANUG usually responds well to treatment.

**Conclusion:** Complete healing was achieved uneventfully, and patient's complaints were over after 2 weeks. The patient is being controlled regularly in every month.

## P0834

### Gingival recession treatment with laterally positioned flap technique: case series

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**Aim:** Gingival recession is the exposure in the root surface of the teeth caused by a loss of gingival tissue and/or retraction of the gingival margin from the crown of the teeth. The aim of periodontal plastic surgery is to enlarge attached gingiva and obtain root coverage. The result of root coverage success of laterally positioned flap techniques was presented in this case series.

**Material and Methods:** Case report: Nineteen patients (15 female, 4 male) with localized gingival recession [15 central teeth (1 maxilla, 14 mandible) 4 premolar (2 maxilla, 2 mandible), 1 molar tooth (maxilla)] were treated using laterally positioned flap technique after phase I periodontal therapy.

**Results:** Discussion: Satisfactory root coverage percentage  $87.26 \pm 12.7$  (mean  $\pm$  SD) was obtained at the end of 6–30 months healing period. While, root coverage percentage was  $89.42 \pm 12.42$  at anterior region, it was  $81.2 \pm 12.74$  at posterior region.

**Conclusion:** The findings of this case series demonstrated that laterally positioned flap technique is predictable technique to rehabilitate gingival recessions.

## P0835

### Impact of self-perceived oral health related quality of life after non-surgical periodontal therapy

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**Aim:** The efficacy of periodontal therapy has mainly been expressed in terms of clinical outcomes. However, patient-based outcomes have gained more attention since these capture patients' perspectives of disease and/or therapy. The aim of this study was to longitudinally evaluate the impact of non-surgical periodontal therapy after 3 months on the self-perceived oral health quality of life (OHRQoL).

**Material and Methods:** Thirty-eight individuals (18 males and 20 females, mean age was 54 years) diagnosed with chronic periodontitis were included at baseline. All received oral hygiene instructions and non-surgical periodontal treatment in a quadrant-wise approach by ultrasonic instrumentation and whenever needed supplemented with hand instrument, followed by recalls at 4 and 12 weeks post treatment, where oral hygiene and prophylaxis were repeated. Clinical variables were recorded, and oral health impact profile short-form (OHIP-14) was administrated at baseline and 12 weeks post-treatment.

**Results:** Based on conventional non-surgical periodontal therapy moderate to deep sites ( $\geq 4$  mm) decreased from 48.1% to 24.8% at 12 weeks post treatment evaluation ( $p < 0.001$ ) which corresponded well with reductions in mean full-mouth plaque index 48.2% to 28.0% ( $p < 0.001$ ) and bleeding on probing 51.3% to 18.9% ( $p < 0.001$ ). Median OHIP-14 scores gradually reduced from 26 at baseline to 24 ( $p = 0.043$ ) over 12 weeks post treatment.

**Conclusion:** These results confirm the clinical experience that conventional systematic non-surgical therapy has statistical significant positive influences on self-perceived oral health related quality of life expressed as OHIP-14 scores. From a clinical point of view the findings in the present study can further be used in patient-centered motivation during periodontal therapy.

## P0836

### Oral pyogenic granuloma: a case report

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**Aim:** Pyogenic granuloma is a relatively common reactive hyperplasia of connective tissue in response to low-grade local irritation, traumatic injury, hormonal factors or certain kinds of drugs. It is a tumourlike growth of the oral cavity, frequently located surrounding the anterior teeth that is considered to be neoplastic in normally. The purpose of this report is to present a case of Pyogenic granuloma at the vestibular side of the maxillary right lateral incisor region of a 33-year-old female patient.

**Material and Methods:** In intraoral examination revealed a solitary red exophytic, pedunculated, well-circumscribed growth on the gingiva. Bleeding on provocation was positive. The dimensions of the lesion were approximately  $2.2 \times 2.2 \times 1.2$  cm.

**Results:** The lesion was completely excised with diode laser and histopathologically evaluated. Histopathological examination showed a hyperplastic, parakeratinized stratified squamous epithelium. The connective tissue was loose fibrillar and comprised of numerous proliferating capillaries, dense mixed inflammatory infiltrate, and extravasated red blood cells. Microscopical examination was confirmed the clinical diagnosis of Pyogenic granuloma. Patient was recalled after 5 months without any signs of recurrence of the lesion and still on regular follow-up.

**Conclusion:** Pyogenic granuloma can be adequately treated with the correct diagnosis and proper treatment planning. A careful management of the lesion also helps in preventing the recurrence of this benign lesion.

## P0837

### Odontogenic myxoma, case report

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**Aim:** Odontogenic Myxomas are tumors derived from embryonic mesenchymal tissues of dental origin. According to the WHO, OM is classified as a benign tumor of ectomesenchymal origin with or without odontogenic epithelium. It may originate from the dental papilla, follicle or periodontal ligament. OM is classified as a locally invasive, non-metastasizing benign tumor, which presents in 3% to 6% of all odontogenic tumors, of the jaws, more frequently seen in the mandible rather than maxilla. In this case, 36 year old female patient, reported swelling in the right posterior of maxilla.

**Material and Methods:** A 36-year-old female patient, reported with swelling on the right side of the maxilla, just located above molar teeth, since 8–9 months. Extraorally, no evidence showed a serious swelling; intraorally, on palpation patient felt significant pain and asked for anesthesia, the swelling was rigid and firm and was greyish-white in color, extended on the right maxillary molar region, approximately  $5 \times 3$  cm in size. The treatment involved local excision, curettage and radical resection.

**Results:** Odontogenic myxoma is a locally invasive, benign neoplasm, consisting of mesenchymal cells that can attribute to fibroblastic differentiation. OM is a slow-growing neoplasm, radiologically can be seen as unilocular or multilocular radiolucency. Lesions are usually painless, however in this case patient felt pain during palpation. The recurrence rate depends on the therapy.

**Conclusion:** Local excision and curettage are involved in the first phase of the treatment, after the histopathological result the radical excision concluded the case. On recalls the patient is stable and no recurrence since 6 months.

## P0838

### Outcomes of non-surgical periodontal therapy in chronic and aggressive periodontitis

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**Aim:** The goal of non-surgical periodontal therapy is arresting the inflammation and stopping the loss of attachment by removal and control of the biofilm and establishing a local environment and microflora compatible with periodontal health. The aim of this study was to evaluate the effectiveness of non-surgical periodontal therapy in chronic periodontitis (CP) and generalized aggressive periodontitis (G-AgP).

**Material and Methods:** A total of eight patients, 4 with CP (age between 37 and 55) and 4 with G-AgP (age between 30 and 34) were included in the study. Patients treated with non-surgical periodontal therapy including scaling, root planning and oral hygiene instructions. Clinical parameters including probing depth (PD) and bleeding on probing (BOP) were recorded at baseline and at the end of 6 months.

**Results:** The mean PD of the CP group was  $4.3 \pm 0.86$  mm at the baseline and was reduced to  $3.02 \pm 0.77$  mm at the end of 6 months. The PD of the G-AgP group was  $3.43 \pm 0.56$  mm at baseline and decreased to  $2.56 \pm 0.43$  mm at 6 months. The number of sites with BOP was 92.5% at the baseline and 12.5% at 6 months in CP while 34% at the baseline and 8.85% at 6 months in G-AgP. Significant reduction of PD and BOP was found in all treated patients at end of 6 months.

**Conclusion:** The results of the study suggest that nonsurgical periodontal therapy is effective in managing both chronic and aggressive forms of periodontal disease. It can also obviate the need to use a surgical periodontal treatment modality.

## P0839

### Different rehydration protocols influence the biomechanical properties of acellular collagen matrices in-vitro

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**Aim:** Acellular collagen matrices (ACM) are very promising connective tissue substitutes for the treatment of gingival recessions. One of the challenging problems associated with the use of these matrix grafts is the appropriate rehydration protocol. The aim of this study was to investigate the influence of different rehydration media and rehydration periods on the biomechanical properties of three commercial available ACM.

**Material and Methods:** 39 specimens of each tested ACM (mucoderm<sup>®</sup>, Mucograft<sup>®</sup>, Dynamatrix<sup>®</sup>) were randomized into two groups and subsequently rehydrated either in sterile 0.9% saline solution or human peripheral blood for varying time periods (5, 10, 20, 30, 40, and 60 min). Specimens under dry condition served as controls. Biomechanical properties of the ACM were then tested using an universal tensile strength machine.

**Results:** Hydration periods of 10–20 min resulted in optimal mechanical behaviour and properly hydrated mucoderm<sup>®</sup> and Dynamatrix<sup>®</sup>. Clearly, the Mucograft<sup>®</sup> demonstrated the lowest

tensile strength values following the different rehydration periods compared to mucoderm® and Dynamatrix®. No significant influence on biomechanical parameters could be observed following prolonged hydration periods (30–60 min) compared to shorter periods (5–20 min) for any of the ACM investigated. A tendency of improved biomechanical properties following rehydration in blood was only observed for the mucoderm® matrix in comparison to hydration in saline solution.

**Conclusion:** In summary, the data of the present study demonstrated that the rehydration protocol substantially affects the biomechanical properties of acellular collagen matrices.

## P0840

### Accelerated tooth movement with corticotomy and piezocision

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**Aim:** Orthodontic tooth movement can be controlled by the size of the applied force and the biological responses from the periodontal ligament. The force applied on the teeth will cause changes in the microenvironment around the periodontal ligament. Piezocision-assisted orthodontic treatment is a minimally invasive surgical technique designed to achieve accelerated orthodontic tooth movement. The total time length of an orthodontic treatment is still a big problem, to solve this concern there are ways like piezocision or corticotomy.

**Material and Methods:** The surgeries are carried out on 6 patients, by two methods, piezocision and corticotomy, three patients each. With the corticotomy technique the incisions are made on the cortical bone, aiming to reduce the resistance of the cortical bone and improving the treatment. With the piezocision technique, the primary incision placed on the buccal gingiva followed by incisions with Piezo surgical knife to the buccal cortex.

**Results:** In both groups, there were no significant differences in the duration of healing process. However, after corticotomy process the acceleration of the movement increases in 3–4 months and it decreases with time as seen in control sessions. The results of the piezocision did not cause any periodontal damage and improved esthetic region with accelerated tooth movement.

**Conclusion:** According to the surgical procedures six cases also referred to Orthodontics department and observed on control sessions, both piezocision and corticotomy procedures accelerated the tooth movements on both surgical groups and both procedures are found significantly effective.

## P0841

### Periodontal treatment outcomes in a specialist clinic in the county of Halland, Sweden

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**Aim:** The aim of the study was to evaluate the routine periodontal treatment outcomes at the county specialist clinic of Halland, Sweden.

**Material and Methods:** A database was constructed in which all patients that were treated at the clinic were registered between the years 2000 to 2013. Periodontal status was monitored using PI%, Bop%, percent pockets  $\geq 5$  mm (Pd %) and

number of teeth. Medical history was taken routinely. Patients that completed their treatment were sorted into group C, patients that for whatever reason terminated their treatment were sorted into group Q and patients in the O-group were still under treatment in 2013.

**Results:** Total of 2523 patient (57.4% women) referred for periodontal treatment were included in a database. 45.3% were smokers and 7.3% had diabetes. In 2013 the respective groups included 750 in the C-group, 225 in the Q-group and 1548 patients in the O-group. At baseline examination the C-group showed somewhat less PI%, Bop %, Pd % and proportion of smokers. The majority of the diabetic patients were in the O-group. The Q-group consisted to a greater extent of smokers and younger patients than the other groups.

**Conclusion:** Within the limitation of the data we suggest that smokers and diabetics still represent a group of patients that are more difficult to treat periodontally.

## P0842

### Treatment of self-and non-containing intraosseus defects with enamel matrix derivative in combination with autogenous cortical bone graft: a case series

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**Aim:** The aim of this study was to evaluate the healing of intrabony defects treated with enamel matrix protein derivative (EMD) used in combination with Autogenous Bone (AB) for the treatment of self- and non-containing intrabony defects.

**Material and Methods:** Six number of systemically healthy and non-smoker patients were treated with at least one intrabony defect. total of 6 deep, mainly two-wall intraosseous defects were treated. Probing pocket depth (PPD), clinical attachment level (CAL), gingival recession (REC) and peridontal x-rays were recorded at baseline, at 12 months after surgery. Pre- and post-treatment radiographs and clinical measurements were compared to evaluate the efficiency of this treatment technique in periodontal regeneration.

**Results:** PPD amounted to 3.89 mm before surgery and decreased to 2.85 mm at 1 year follow-up. CAL varied from 4.22 mm pre-surgery to 2.96 mm at 1 year follow-up, with CAL gain averaging 1.26 mm.

**Conclusion:** The results of this study showed, that the combination of autogenous bone and EMD predict a good outcome, in terms of periodontal regeneration. Radiographical inspection showed bone filling in the defects, which seems also clinically stable.

## P0843

### Probiotic therapy promotes bone repair in rats with ligature-induced periodontitis

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**Aim:** The purpose of this study was to evaluate the effects of the probiotic therapy in rats with ligature-induced periodontitis.

**Material and Methods:** 40 rats were assigned to 5 groups: C (control), PROB, EP-0, EP-15 and EP-15/PROB. In groups EP, the mandibular first molars of the animals received a cotton ligature. After 14 days (day 0 of the experiment), the ligatures were removed in groups EP-15 and EP-15/PROB. The probiotic agent (Bioplus<sup>®</sup>,  $1.5 \times 10^8$  UFC/mL) was daily added to the water of the animals of groups PROB and EP-15/PROB for 15 days starting from day 0. The animals of groups C, PROB, EP-15 and EP-15/PROB were submitted to euthanasia at day 15. The animals of group EP-0 were submitted to euthanasia 14 days after the placement of the ligatures. The mandibles of the animals were excised and alveolar bone loss (ABL, mm<sup>2</sup>) was evaluated by histometric analysis in the furcation region of the first molars. Data were statistically analyzed (ANOVA, Tukey,  $p < 0.05$ ).

**Results:** Groups EP-0 and EP-15 presented ABL significantly greater than groups C and PROB ( $p < 0.05$ ). The ABL of group EP-15 was significantly greater than that of group EP-0 ( $p < 0.05$ ). Group EP-15/PROB presented ABL significantly reduced when compared with groups EP-15 and EP-0 ( $p < 0.05$ ).

**Conclusion:** Within the limits of the present study, it can be concluded that the administration of probiotic may be effective for the alveolar bone repair in rats with ligature-induced periodontitis.

## P0844

### The fluctuations in anxiety during non-surgical periodontal therapy as measured by salivary alpha amylase

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**Aim:** To investigate the relationship of self-reported anxiety levels with the stress biomarker salivary  $\alpha$ -amylase, and examine the fluctuations in anxiety during both non-invasive and invasive periodontal therapies.

**Material and Methods:** All participants in this randomised controlled clinical trial completed the Modified Dental Anxiety Scale (MDAS) and 6-item State-Trait Anxiety Inventory (STAI-6) and provided a saliva sample before and after their periodontal assessment. Participants were then randomised to receive either root surface debridement or oral hygiene instruction. MDAS and STAI-6 scores were completed and saliva samples were taken both before and after interventions.

**Results:** There were 20 participants at baseline. Mean salivary  $\alpha$ -amylase levels significantly ( $p = 0.02$ ) decreased after periodontal assessment from 77.24 U/ml to 63.51 U/ml. In phase two, mean amylase levels increased in the intervention group from 62.99 U/ml to 74.30 U/ml ( $p > 0.05$ ) and decreased in the control group to 59.34 U/ml ( $p > 0.05$ ). Changes in both MDAS and STAI-6 were statistically insignificant across all time points and there were no significant correlations between all three variables.

**Conclusion:** Salivary  $\alpha$ -amylase levels, MDAs and STAI-6 scores not correlating with each other may be due to the differences between the physiological, cognitive and emotional components of stress experiences in the periodontal setting. When assessing anxiety, future patient care planning and research should consider these aspects separately.

## P0845

### The survey on the effect of non-surgical periodontal treatment for gingival overgrowth induced by nifedipine in the aged patients

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**Aim:** To evaluate the effect of non-surgical periodontal treatment on gingival overgrowth induced by nifedipine in the aged patients.

**Material and Methods:** Eighteen patients with gingival overgrowth induced by nifedipine were recruited. The plaque index (PLI), probing depth (PD), bleeding index (BI) and gingival overgrowth index (GO) were scored at baseline. After non-surgical periodontal treatment, above indices were examined again at 1, 3, 6 and 12 months. Thirteen patients were observed until the survey finished.

**Results:** The scores of PLI, PD, BI and GO at each time point after non-surgical periodontal treatment were significantly lower than that at baseline ( $p < 0.05$ ). The scores of 1, 3 and 6 months were gradually reduced, and there were significant differences between each other ( $p < 0.05$ ). The values of PD and GO at 12 months were no significant differences as compared with 6 months ( $p > 0.05$ ), but the values of PLI and BI at 12 months were significantly higher than that at 6 months.

**Conclusion:** Non-surgical periodontal treatment might successfully decrease the severity of drug-induced gingival overgrowth induced by nifedipine in the aged patients. However, the maintenance of oral hygiene it should be strengthened in long-term follow-up.

## P0846

### Nd:YAG laser-assisted periodontal surgery in puberty gingivitis: case series

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**Aim:** Puberty gingivitis, the most prevalent type of gingival disease in childhood, is caused by the elevated hormone levels triggering the immune system to give excessive response to dental plaque which leads to gingival inflammation, bleeding and overgrowth.

**Material and Methods:** In this case series, clinical findings and periodontal treatment of 5 patients (F:M 4:1, mean age 14,8) with chief complaints of gingival bleeding and overgrowth, were presented. The patients were diagnosed as puberty gingivitis based on medical history and intraoral clinical and radiographic examinations. Initial periodontal treatment (IPT) consisted of oral hygiene instruction, scaling and root planing was applied to all patients in 3 sessions. Following IPT, gingivectomy operations were performed to remove overgrown fibrotic gingival tissues using Nd:YAG laser (1064 nm, 4.00 W, 70 Hz, 400  $\mu$ m fiber tip, pulsed, contact mode). Plaque index, gingival index, probing depth and gingival overgrowth index were measured at baseline and 1, 3 and 6 months post-operatively. Clinical improvements were obtained.

**Results:** Nd:YAG laser-assisted surgical periodontal therapy provided acceptable clinical outcome in all patients. However, wound healing was restricted in two patients because of the

presence of local contributing factors including tooth crowding and mouth breathing. Laser-assisted gingivectomy procedure was well tolerated by patients due to short operation time and comfortable postoperative period.

**Conclusion:** The presented case series demonstrate that overgrown gingiva in puberty gingivitis can be successfully eliminated by Nd:YAG laser-assisted periodontal surgery.

## P0847

### Effect of rosuvastatin on induced periodontitis in hypertensive rats

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**Aim:** The aim of this study was to evaluate the effects of rosuvastatin (ST) in the modulation of ligature-induced periodontal disease in hypertensive rats (SHR) through examining bone loss by histometry, determining osteoclastogenesis using staining tartrate resistant acid phosphatase (TRAP) and analyzing gene expression of proinflammatory molecules using PCR

**Material and Methods:** Seventy-two adult male rats were divided into three groups (n = 18): SHR-C, SHR-DP and SHR-DP-ST (C – Control groups and DP – Groups Periodontitis). In the ST group animals were treated with ST administration 2 mg/kg daily. The animals in each group were euthanized at two times 10 and 21 days postoperatively. DP 21 days Groups ligature was removed after 10 days postoperatively.

**Results:** The animals in groups SHR-DP-ST showed less bone loss in the furcation area when compared to animals of the SHR-DP group at 10 and 21 postoperative days (p < 0.05). ST decreased amount of TRAP-positive cells in the SHR DP 10 days group (p < 0.05). The animals in the SHR-DP-ST group compared to animals of the SHR-DP group at 10 days postoperatively showed 85.7% of down-regulate genes. At 21 days postoperatively 80% of them were up regulated

**Conclusion:** Rosuvastatin therapy was able to reduce bone loss in hypertensive rats having influence on osteoclasts and in the amounts of pro-inflammatory genes expression data.

## P0848

### Effectiveness of two-time tooth brushing on root caries and periodontal health in periodontal treated elderly patients

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**Aim:** The aim of this clinical study was to evaluate, if two-time tooth brushing results in an improvement of periodontal health and a decrease of the risk for root caries in elderly patients with a periodontal treated dentition.

**Material and Methods:** A total of 61 patients with periodontal treated dentition were included and divided in two groups (test group (TG)/control group (CG)). Both groups were instructed, how to clean their tooth and both had to brush with the same systematic. Additionally the TG had to brush their teeth directly once again with normal fluoridated toothpaste (F-

1400 ppm). All patients were examined at the beginning (t0), after 3 weeks (t1), after 6 (t2), 12 (t3) and 36 (t4) months. Multiple clinical parameters were assessed (DMF-T/S, RCI, HI, PBI, PSI) and evaluated statistically.

**Results:** The average age of the TG (n = 32, 20 males, 12 females) was 68.66 ± 6.57 years and of the CG (n = 29, 18 males, 11 females) 68.97 ± 6.16 years at t4. The TG revealed a significantly improved PSI (t0:3.47 ± 0.5, t4:2.81 ± 0.59; p < 0.05) and RCI (t0:21.78% ± 15.92%, t4:20.87% ± 13.2%; p < 0.05). The CG showed an improved PSI (t0:3.55 ± 0.5, t4:3.1 ± 0.61; p > 0.05) and a significantly increased RCI (t0:17.95% ± 12.40%, t4:20.37% ± 10.21%; p < 0.05) at t4.

**Conclusion:** The data shows that two-time tooth brushing may improve dental and periodontal health and induce a decreased risk for root caries.

## P0849

### Outcomes of autotransplanted tooth with complete root formation

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**Aim:** This retrospective study was aimed to evaluate the survival rate for the autotransplantation of teeth with complete root formation and analyze the failure cases and their features.

**Material and Methods:** This study enrolled 39 patients (20 men and 19 women, mean age 37.38 years), in whom 42 teeth were transplanted from October 2007 to August 2014 at department of periodontology, Chonnam National University Hospital, Gwangju, Republic of Korea. Factors influencing prognosis were evaluated.

**Results:** The mean follow-up period of 42 cases was 29.40 months (range: 2 months – 85 months). Sixteen cases were autotransplanted from maxilla to maxilla (38.10%), 15 cases were from mandible to mandible (35.71%), six cases from mandible to maxilla (14.29%), five cases from maxilla to mandible (11.90%). Thirty-six cases of donor tooth were the 3rd molar (85.71%). Among 42 cases, seven cases were rated as unsuccessful. The survival rate was 83.33%. Four women and three men were included in this group. The mean age of this group was 44.4 years, and mean follow-up period was 43.71 months. Five cases were extracted due to attachment loss and two cases were extracted due to root resorption. All failure cases were associated with transplanted multi-rooted donor tooth.

**Conclusion:** Percentage of unsuccessful outcome was higher in cases cause of tooth loss at recipient site was periodontitis, and the most common sign and symptom was the attachment loss. The outcome of autotransplantation depends on wise case selection and consideration of all biological aspects. Careful consideration is needed at cases of periodontitis.

## P0850

### Multidisciplinary approach for esthetic rehabilitation in a periodontally compromised patient

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**Aim:** This case report describes the multidisciplinary therapy used to treat a patient having pathologic tooth migration on

anterior teeth and missing teeth in posterior area. The treatment outcome was satisfying, less invasive through periodontic, endodontic, orthodontic and prosthodontic integrated treatment.

**Material and Methods:** A 54-year-old female visited for mobile maxillary right central incisor and missing posterior teeth. Periodontal examination revealed hypermobile, extruded #11, flared #21 with diastema and compromised incisive papillae. Radiographic examination revealed #32 horizontal root fracture, #42 apical lesion, #17,46,36 missing state, and #47,37 furcation involvement. A multidisciplinary treatment strategy was planned. Scaling and root planing was done, #11 extracted and ridge preservation was done using collagen material (Teruplug®). Endodontic treatment of #42 was done. Orthodontic treatment of upper and lower anterior teeth was done. Using orthodontic device named Mini-Tube Appliance, with the combined use of light NiTi wire and interproximal stripping, rapid anterior alignment and implant site development of #11 obtained efficiently. Implant (3i FullOSSEOTITE®) surgery with GBR (Gore-tex®, Bio-Oss®) was done at site of #11. Implant surgery at site of #36, site of #46 with GBR (autobone, Bio-Oss®, Bio-Gide®) was done. Prosthetic restoration of implants was done. These treatment performed from 05 October 2010 to 05 February 2014. Follow-up was done with every 3–6 months.

**Results:** In this multidisciplinary approach, the use of orthodontic treatment for restoration of incisive papillae demonstrates the benefit of orthodontic correction of the adjacent teeth for developing the implant site.

**Conclusion:** This case has shown successful tooth replacement and improved esthetic appearance achieved by multidisciplinary treatment.

## P0851

### Clinical evaluation of an in-office dental hypersensitivity treatment

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**Aim:** The aim of this clinical study was to evaluate the clinical efficacy of an in-office desensitizing paste containing arginine (8%) and calcium carbonate in providing instant relief of dentin hypersensitivity after a single Professional application of the product. This blind, single treatment clinical study was conducted amongst healthy subjects with dentinal hypersensitivity

**Material and Methods:** 16 adults with two hypersensitive teeth enrolled to the study. Teeth, anterior to molars, with cervical erosion/abrasion, sensitivity to airblast stimuli were included. All subjects received a professional, full mouth scaling and oral prophylaxis with a prophypaste. Immediately after the Professional tooth cleaning procedure, hypersensitivity assesment was performed by Schiff Cold Air Sensitivity Scale. Arginine (8%) and calcium carbonate containing paste applied to 10 subjects and placebo paste applied to 6 subjects. After application Schiff Cold Air Sensitivity Scale repeated.

**Results:** Results of the study demonstrated that arginine (8%) containing paste induced a change of average Schiff Cold Air Sensitivity Scale from 2.45 to 1.1. On the other hand placebo controls has demonstrated score change from 2.16 to 1.6.

**Conclusion:** The single in-office application of arginine (8%) and calcium carbonate paste provided significant immediate reduction of dentinal hypersensitivity. Although the change in the sensitivity in both groups were significant, within the groups

the amount of reduction in the arginine group was significantly higher than the controls. The significant reduction in placebo group is surprising and this could be due to psychologic expectancy.

## P0852

### The effects of LED photo-activated disinfection on periodontal clinical parameters in patients with chronic periodontitis

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**Aim:** The purpose of the study was to assess the effects of LED PAD and tlonium chloride on periodontal clinical parameters in chronic periodontitis patients.

**Material and Methods:** We recruited 66 patients with chronic periodontitis, divided in two groups (control group and study group which, besides the conventional therapy measures, also received PAD therapy). The periodontal clinical parameters (probing depth, bleeding on probing and clinical attachment level) were registered at baseline and after 3 months.

**Results:** The post-therapy evaluation revealed significantly improved results for the periodontal clinical parameters in the study group, when compared to the control group. Decreased values for the probing depth and for the bleeding on probing were noticed for both groups, with higher differences for the study group than the control group. We also remarked a gain of periodontal clinical attachment, more significant for the PAD group.

**Conclusion:** The PAD disinfection, as an adjunctive periodontal therapy, determined a significant improvement for the periodontal clinical parameters in patients with periodontal disease.

## P0853

### Effect of doxycycline in induced periodontitis on spontaneously hypertensive rats (shr)

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**Aim:** The aim of this study was to evaluate the effects DOX sub-doses in spontaneously hypertensive rats (SHR) with induced periodontitis by alveolar bone loss (histometric analysis), the number of osteoclasts (histochemistry) and expression of inflammatory genes 84 (array PCR)

**Material and Methods:** 72 adult male rats were divided into three groups (n = 18): SHR-C, SHR-DP and SHR-DP-DOX (C – Control and DP – Groups periodontitis). In the DOX group animals received daily treatment with 5 mg/kg administration. Half of the animals in each group were sacrificed at 10 days postoperatively. The other half were sacrificed at 21 days postoperatively, and in groups DP ligature was removed after 10 days postoperatively.

**Results:** The animals in groups SHR-DP-DOX showed less bone loss in the furcation area when compared to animals of the SHR-DP group at 10 and 21 postoperative day (p < 0.05). Using doxycycline decreased the amount of TRAP-positive cells in the SHR group DP 10 days p < 0.05). The animals of SHR-

DP-DOX group compared to animals of the SHR-DP group at 10 days postoperatively showed 75% of down-regulated genes. At 21 postoperative days 25% of the genes were down regulated.

**Conclusion:** Doxycycline therapy was able to reduce bone loss in hypertensive rats having influence on osteoclasts and the amount of gene expression.

## P0854

### Comparative surgical treatment of gingival overgrowth in kidney transplanted patients

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**Aim:** The purpose of the study was to compare two methods of surgical treatment of gingival overgrowth in patients with kidney transplant.

**Material and Methods:** Our study included 10 patients with kidney transplant and gingival overgrowth in the anterior area of the mandible. The sample population was randomly divided into two groups named A and B with an equal number of patients. The patients included in the group A benefited of classical removal of the overgrowth using a scalpel and the patients included in the group B benefited by laser-assisted surgery using a 940 nm wavelength diode laser. The same team operated all the patients that were included in the current research. All removed tissues were sent to Anatomic Pathology examination.

**Results:** The classic periodontal surgery was more difficult, less precise and took more time than the laser assisted one. In the same time during the laser assisted surgery we had less bleeding and less post-operative discomfort. Although epulis surgical removal has a high rate of recurrence we had none at 3 months follow up in the patients treated with the laser. In group A he had 2 recurrence cases in which we had to redo the surgery.

**Conclusion:** The laser assisted periodontal surgery technique proved to be minimally invasive, efficient and predictable for a successful result.

## P0855

### Update on the use of photodynamic therapy periodontics

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**Aim:** We reviewed the literature in order to ascertain the benefits of incorporating photodynamic therapy treatments everyday our daily clinic.

**Material and Methods:** We included randomized clinical trials, 14 in total, with keyword "photodynamic therapy" and "chronic periodontitis" to analyze the improvement in terms of reduction in probing depth and attachment level.

**Results:** It seems that the union of photodynamic therapy and basic treatments periodontal provide a short-term benefit, being necessary more studies long term and better to evaluate the results in the medium and long term.

**Conclusion:** The present review of the literature suggests that photodynamic therapy as an adjuvant may offer additional benefits to the techniques of scaling and root planing. The photody-

amic therapy can have several indications to be the most useful during maintenance periods. The studies analyzed throw short to medium term data which are necessary long-term studies.

## P0856

### Phototherapy – A new tool for daily oral care?

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**Aim:** Oral periodontopathogenic bacteria are investigated to determine the content of endogenous porphyrins which are proposed to act as photosensitizers for phototherapy treatment. These studies are combined with a randomized clinical study (RCT) to obtain a scientific basis for the implementation phototherapy in everyday personal oral care for prevention and treatment of periodontal diseases.

**Material and Methods:** Two oral bacteria associated with periodontitis, *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis*, were cultivated on agar plates, harvested and the content of porphyrins determined. Lysis of the bacteria was followed by clean-up on solid phase extraction (SPE) and analysis of the porphyrins with high performance liquid chromatography - mass spectrometry (HPLC-MS) using electrospray ionization in positive mode (ESI+) and selective reaction monitoring (SRM). Further, the effect of blue light irradiation using LED light sources on the growth of *A. actinomycetemcomitans* and *P. gingivalis* was investigated.

**Results:** We have demonstrated the presence of porphyrins and heme in the two studied bacteria. In a *in vitro* pilot study we have shown that the growth of *A. actinomycetemcomitans* can be inhibited by irradiation with blue light with a wavelength of 405 nm.

**Conclusion:** The results from these experiments have been used as the basis for setting up a RCT study to investigate the effect of blue light phototherapy. The patients use a toothbrush with an incorporated LED for oral exposure to blue light during ordinary daily oral care. This study was supported by the Swedish Research Council, contract No K2014-70X-22533-01-3.

## P0857

### Treatment of angular bone loss with non-surgical periodontal treatment: case report

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**Aim:** The aim of this case report is to describe treatment of angular bone loss on maxillary first molar teeth with non-surgical periodontal treatment.

**Material and Methods:** 44 years male patient referred to our clinic with pain on maxillary first molar teeth. In clinic and radiographic examination, there were angular bone loss on mesio-buccal, mesio-palatinal and buccal region of maxillary first molar teeth. After oral hygiene instruction SRP procedure was performed. Clinic and radiographic examination was performed 6 months and 1 year after treatment.

**Results:** In clinic examination, there was significantly gain at the clinic attachment level after treatment without surgery.

**Conclusion:** Nonsurgical periodontal treatment and good oral hygiene applications may lead to significantly clinical improvements.

## P0858

### Osteotropic therapy in treatment of generalized periodontitis

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**Aim:** Comparative assessment of effectiveness of osteotropic agents included in treatment for chronic generalized periodontitis (CGP).

**Material and Methods:** 112 CGP patients, aged 28–49 years (mean age  $36.3 \pm 1.6$ ) were evaluated and treated. In the main group (72 patients) comprehensive treatment included CalcyDS<sup>®</sup>, containing 300 mg Ca and D3 100 IU, and Holisal<sup>®</sup> gel (3 tid). Patients from comparison group (40 persons) received Calcium-D3 Nycomed. Alveolar bone density (ABD) was evaluated using CT (PlanmecaProMax<sup>®</sup>3DMid), expressed in Hounsfield units. Laboratory assessment of mineral metabolism was made using calcium total, inorganic phosphate, serum alkaline phosphatase, RANKL level in gingival crevicular fluid. The findings were statistically processed (Statistica 6.0).

**Results:** Clinical improvement of periodontal tissue condition was observed 1 month after treatment in both groups. In group 1 PMA index decreased from  $6.4 \pm 3.84$  to  $7.51 \pm 0.67$ , SBI- from  $2.6 \pm 0.19$  to  $0.37 \pm 0.06$ ; Pi- from  $3.28 \pm 0.36$  to  $1.50 \pm 0.36$ . In group 2 PMA decreased from  $36.7 \pm 2.98$  to  $10.42 \pm 0.83$ , SBI- from  $2.64 \pm 0.20$  to  $0.68 \pm 0.04$ ; Pi- from  $3.26 \pm 0.29$  to  $2.01 \pm 0.18$ . RANKL level declined from  $103.4 \pm 9.7$  to  $0.12 \pm 0.014$  in the 1st group in comparison to the 2nd group- from  $118.6 \pm 11.3$  to  $0.23 \pm 0.015$   $p < 0.01$ . Biochemical measurements of blood serum were within normal limits that indicated treatment safety. Radiological bone density (1 g) was  $410.15 \pm 30.6$ HU before treatment and  $475.77 \pm 32.8$ HU  $p > 0.05$  after treatment. It was  $389.9 \pm 43.7$ HU before and  $452.28 \pm 42.9$ HU  $p > 0.05$  after treatment in group 2. Wide range of individual ABD measurements before treatment increased by 15–16% after treatment in both groups.

**Conclusion:** Osteotropic therapy included in comprehensive treatment for chronic generalized periodontitis increases alveolar bone density regardless severity of CGP.

## P0859

### Advantages of orthodontic treatment in periodontal patients

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**Aim:** To show, based on case-reports, that the orthodontic treatment may represent an advantage in the treatment of periodontal patients.

**Material and Methods:** Patients diagnosed with chronic generalized severe periodontitis, mid-age, presenting diastemas and dental migration among several periodontal sequelae. Treatment started with oral hygiene instructions followed by scaling and root planing and resective surgery as needed. The orthodontic

treatment was started after at least two consultations and when it was clear that patients were able to accomplish with all recommendations, presenting low plaque and gingival index.

**Results:** During orthodontic it was possible to maintain low plaque and gingival indexes due to a adequate maintenance program. Doing that we could assure that the absence of periodontal inflammation and bone loss. As stated by some authors, orthodontic treatment is highly recommended for patients with severe periodontitis as it can contribute to the improvement of aesthetics, function and recovery of the occlusal stability. The used therapeutic methods had resulted in a positive outcome, leading to happy and motivated patients.

**Conclusion:** The orthodontic treatment in cases of severe periodontitis can be a great option to improve periodontal sequelae and help in the oral rehabilitation. Despite there are other treatment options for this patients, such as dental implants and fixed prosthesis, those are clearly an alternative less biologically conservative. However, patients must be monitored with frequent supportive periodontal treatment to avoid progression of periodontal disease.

## P0860

### Evaluation of the efficacy of perisolv on scaling and root planing

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**Aim:** A Gel based on hypochlorite and amino acids (perisolv<sup>®</sup>) was introduced to improve cleaning efficacy on the root surfaces. The purpose of this study was to evaluate the time reduction and number of strokes required to scale untreated root surfaces in vitro.

**Material and Methods:** 60 extracted human teeth displaying areas with subgingival calculus were assigned equally to one of three treatment groups (n = 20) according to the size of occupied areas, estimated by the number of pixels. The groups were assigned to either 30 sec penetration time (I) or 300 sec (II) or no perisolv application (III). The working force was calibrated for a M25A curette (Deppeler/CH) with 500 g. Completely new instrument was used for every group, each instrument was sharpened after single use by an EasySharp Device (Deppeler/CH). All treatments were carried out by one investigator and checked by a second investigator.

**Results:** The time (in seconds) for instrumentation was recorded as follows: Group I: 32/23.5/50 (median/ first quartile/ third quartile); group II: 33/20/52.5; group III: 46.5/35.5/52.3. The results for the numbers of strokes were: Group I: 18/14.3/28; group II: 18.5/13/30.5; group III: 17.5/15/25. None statistically significant differences ( $p < 0.05$ ) were calculated between the three groups for the variables time and number of strokes.

**Conclusion:** Within the limits of this in-vitro study pre-conditioning of the calculus on root surfaces with perisolv failed to reduce the number of strokes and time of instrumentation significantly. However there was a tendency for time reduction in the perisolv treated groups which has to be validated in future clinical trials.

## P0861

### Low-level laser irradiation (810 nm) with toluidinblue photosensitizer promotes proliferation and differentiation of human oral fibroblasts evaluated in vitro

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**Aim:** Low level laser therapy (LLLT) as photodynamic therapy (PDT) using wavelength of 810 nm with ToluidinBlu (TBO) sensitization in vivo would require a therapeutic window where bacteria could be killed without adjacent normal tissue damage. The aim of the present study was to investigate the effect of LLLT with TBO sensitization on proliferation and differentiation of a human fibroblast cell line.

**Material and Methods:** For the assessment of viability a 3-D collagen matrix Assay (MetaVi Labs) was used. Two sets of tests were performed with human dermal fibroblasts. TBO or PBS were added to the same amount, resulting in a concentrations of 50% and 5%. After centrifugation (3 min at 220 g), the cells were resuspended in 1 ml PBS. Four aliquots were generated, each containing 60,000 cells. Two of each sample were treated with laser-light (810 nm) for 1 min at 0.3 Watt, sensitization with TBO. Locomotor behaviour was analyzed for a 10 h period.

**Results:** At a concentration of 50% TBO, the locomotor activity of the fibroblasts was significantly impaired, whereas 5% TBO did not affect the part of locomoting cells. Concomitantly, the speed of locomotion was significantly reduced in cells treated with 50% TBO, but showed only a weak tendency to a reduced speed in samples treated with 5% TBO.

**Conclusion:** High concentrations (50%) of TBO affect the locomotory behaviour of human fibroblasts, whereas concentrations that are supposed to occur in physiological conditions (5% and below) have only weak influence on the locomotory behaviour. PDT treatment does not influence locomotory behaviour of human fibroblasts.

## P0862

### Acute necrotizing ulcerative gingivitis triggered by fear of the dentist: a case report

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**Aim:** Acute necrotizing ulcerative gingivitis (ANUG) is a rapidly destructive gingival infection with a complex etiology. It is clinically characterized by necrosis and pseudomembrane of the crest of the papillae, bleeding, pain, halitosis, sensitivity, stimulated salivary flow rate and metallic taste sensation.

**Material and Methods:** We report a 22-year-old female patient applied to our clinic with complaining about "gingival pain". The other complaints were halitosis, metallic taste sensation and discomfort during eating. The dental history revealed that her upper right canine had erupted approximately 1 week before and surgeons decided the tooth extraction. She reported that idea of this oral surgery caused a lot of stress in her. On intraoral examination, halitosis with gingival pain and interdental necrosis was noticed with plaque deposition. In the first visit, the gingiva was gently swabbed by cotton pellet diluted H<sub>2</sub>O<sub>2</sub>

to remove the pseudomembrane and she was prescribed amoxicillin 625 mg&metranidazole 500 mg, 3% H<sub>2</sub>O<sub>2</sub>&sterile serum physiologic(1:2), 3 × 1 and 0.12%chlorhexidine diglukonate, 2 × 1.7 days.

**Results:** The main predisposing factors of ANUG consist of pathogenic microflora, smoking, malnutrition, poor oral hygiene and stressful living conditions. The correlation between mental stress and ANUG affected by high secretion of adrenocortical hormones. These conditions may lead to ischemia of gingival tissue and change pathogenicity of microorganisms. Similarly, in our case, ANUG had been triggered by only psychological stress conditions.

**Conclusion:** The patient recalled 1-week later and subgingival scaling and root planning was performed due to the all symptoms were disappeared. One month later, complete healing of the lesions was observed. One-year follow-up of the patient showed no recurrence.

## P0863

### Periodontal therapy improves gastric Helicobacter pylori eradication only in patients who sustained a good oral hygiene: an update

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**Aim:** This study was updated for examine the effect of concomitant periodontal treatment with triple eradication therapy compared to triple eradication therapy alone on the gastric eradication success rate of Helicobacter pylori.

**Material and Methods:** Ninety-eight patients with gastric H.pylori infection enrolled in this study. H.pylori infection was confirmed by both rapid urease tests and tissue histology by performing endoscopies. H.pylori in dental plaque was identified of rapid urease tests. The therapeutic regimen consisted of lansoprazole (2 × 30 mg), amoxicillin (2 × 1gr), and clarithromycin (2 × 500 mg) administered for 2 weeks. Fifty-one patients made up of study group. clinical parameters were assessed. Phase I periodontal therapy was performed. Six months after completion of eradication therapy patients underwent control examination by urea breath tests to monitor the success of the applied therapy.

**Results:** Our results showed that while triple eradication therapy combined with periodontal treatment resulted in 64.7% success rate, the triple eradication therapy alone resulted in 51.1% success rate. Although combined therapy showed clinical improvements in eradication rate of gastric H pylori. This was not statistically significant (p = 0.05). We further analyzed the difference between oral hygiene status of successful and unsuccessful Hp eradication groups. We found that group with successful outcome manifest a lower oral hygiene index compared to unsuccessful outcome (1.002 vs. 2.093 p = 0.04).

**Conclusion:** This study suggests that oral hygiene instruction and patient motivation should be integral part of full mouth debridement in order to achieve complete elimination of gastric HP infection. HP eradication was successful only in group who has or sustained a good oral hygiene.

## P0864

### Summarizing systematic reviews in a meta-review – exemplified by the example of interdental mechanical plaque control in managing gingivitis

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**Aim:** The aim of this study was to describe a technique in order to gather the evidence of existing systematic reviews in a meta-analysis using the example of interdental cleaning devices in managing gingivitis.

**Material and Methods:** After posing a focused question (PICO) three internet sources including the National Library of Medicine, Washington, D. C. (MEDLINE-PubMed), the Cochrane Library and the evidence database of the ADA Center for Evidence-based Dentistry were searched by a strategy designed to include systematic-reviews on interdental cleaning devices. Furthermore the PROSPERO (2014) database, an international database of prospectively registered systematic reviews, was checked for reviews in progress. According to the PRISMA (2014) guidelines characteristics of selected papers were extracted. The potential risk of bias was estimated and the acquired evidence was graded.

**Results:** In the example of interdental plaque control 6 systematic-reviews were identified. The evidence was graded for the efficacy of dental-floss, interdental brushes (IDB), woodsticks and the oral-irrigator. Weak evidence of unclear or small magnitude was retrieved that supported dental-floss, woodsticks and the oral-irrigator to reduce gingivitis in addition to toothbrushing. There for IDB's in combination with toothbrushing was found to be moderate.

**Conclusion:** Meta-review might give the dental community a better guidance by summarizing the inflationary increasing number of systematic reviews.

## P0865

### Soft-rubber-interdental-cleaner compared to an interdental brush on dental plaque/gingivitis/gingival abrasion scores

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**Aim:** To determine the effectiveness of a rubber bristles interdental cleaner (RIBC) as compared to an interdental brush (IDB) on, gingivitis (bleeding on marginal probing (BOMP)), dental plaque (Q&H) and gingival abrasion scores (GAS). Furthermore participants' attitudes were evaluated towards these devices.

**Material and Methods:** The study used a parallel, examiner-blind, randomised, split-mouth design. 40 Systemically healthy right-handed volunteers refrained from mandibular brushing for 21 days. In the 4-week treatment phase participants brushed 2 × daily and used RIBC/IDB contra-lateral 1xdaily. BOMP, Q&H, GAS were assessed at baseline (Day 0), after 21 days of no oral hygiene and after 1, 2 and 4-weeks. Only those sites fitting the devices were analysed.

**Results:** After experimentally induced gingivitis (EIG) the use of both interdental devices resulted in a significant decrease of

bleeding scores and plaque scores. The BOMP score reduced for IDB from 1.10 (0.47) to 0.45 (0.26) and for RIBC from 1.04 (0.48) to 0.34 (0.24). Only at 4-weeks there was a difference between the 2 products ( $p = 0.009$ ). For Q&H the IDB reduced from 3.32 (0.56) to 2.57 (0.54) and RIBC from 3.34 (0.55) to 2.55 (0.64) which was not significant between the devices. The mean GAS was 0.26 for the IDB and 0.22 for the RIBC at the end of the treatment period.

**Conclusion:** When used in combination with toothbrushing there were no statistically significant differences between the two interdental devices in reducing plaque and gingival inflammation. Less gingival abrasions occur with the RIBC and participants without any previous experience of interdental cleaning considered the RIBC to be more pleasant to use.

## P0866

### Treatment of oral malodour: medium-term efficacy of mechanical and/or chemical agents: a systematic review

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**Aim:** In systemically healthy patients what is the effect of a dentifrice (DF), a mouthwash (MW), tongue cleaning (TC), or any combination of these as adjunct to toothbrushing on intra-oral malodour and tongue coating as compared to toothbrushing alone, when used for a minimum follow-up period of 2 weeks?

**Material and Methods:** The MEDLINE-PubMed, Cochrane-CENTRAL and EMBASE databases were searched up to August 2014. Measurements of Volatile Sulphur Compounds (VSC) and organoleptic (ORG) scores of oral malodour were selected as outcome variables. Data were extracted and a descriptive analysis was performed.

**Results:** Independent screening of 1054 unique papers resulted in 12 eligible clinical trials with a medium-term ( $\geq 2$  weeks) duration. The majority of studies provided a significant reduction in oral malodour when evaluating products with an active ingredient (incorporated in a DF or a MW) used adjunctively to toothbrushing. The added value of tongue cleaning over a MW was evaluated in 1 study.

**Conclusion:** The collective evidence regarding the adjunctive use of a dentifrice, a mouthwash or a tongue scraper for reducing oral malodour is in general unclear. For mouthwashes containing the active ingredients CHX+CPC+Zn and ZnCl+CPC, beneficial effects have been shown but the strength of this recommendation was graded to be "weak" (based on the limited body of evidence).

## P0867

### Effectiveness of adjunctive therapy with PDT in initial periodontal therapy: a clinical split mouth study

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**Aim:** Photodynamic therapy (PDT) is a modern approach to reduce the bacterial load in periodontal pockets. Aim of this

clinical trial was to evaluate the clinical effect of PDT application as an adjunct to the classical treatment with scaling and root planning (SRP) in patients suffering from chronic periodontitis.

**Material and Methods:** A total of 31 non-smoking, systemically healthy patients suffering from chronic periodontitis were enrolled. In a split mouth design study 62 premolar teeth with probing depths (PD)  $\geq 4$  mm were divided randomly into two groups. On the PDT site after SRP a photosensitizer (Methylen blue) was applied and irradiated with soft laser ( $\lambda = 670$  nm) for 60 s subsequently. On the control site only SRP was performed. Periodontal parameters were measured at baseline and after 3 and 6 months. Subsequently, statistical analyses were performed.

**Results:** The average age was  $42 \pm 9$  years. 51.6% ( $n = 16$ ) were female. At baseline the measured PD was  $4.7 \pm 0.7$  mm in the PDT-group and  $4.7 \pm 0.6$  mm on the control site ( $p = 0.703$ ). After 3 and 6 months a significant improvement was observed compared to baseline. The PDT site showed a significantly higher reduction of PD compared to the control site after 3 (PDT =  $3.7 \pm 0.6$  mm; SRP =  $4.0 \pm 0.6$  mm;  $p = 0.004$ ) and 6 months (PDT =  $3.6 \pm 0.5$  mm; SRP =  $4.0 \pm 0.5$  mm;  $p < 0.001$ ).

**Conclusion:** The adjuvant use of PDT shows additive therapeutic effects to the established standard therapy with SRP. Further clinical studies are needed to illuminate the importance of this modern treatment concept.

## P0868

### Integrated periodontal treatment and behavioral management of an autistic patient affected by severe generalized aggressive periodontitis

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**Aim:** Aggressive periodontitis usually affects young individuals and its treatment can be particularly challenging in developmentally disabled patients.

**Material and Methods:** A 28-years-old Hispanic patient presented with a complaint of mobility of upper central incisors. He was autistic and showed little to no interactions communicating only through his mother. Presentation of dental instruments using a "show then do" procedure was used for familiarization with diagnostic procedures. The radiograph showed multiple dental anomalies attributable to taurodontism. Periodontal charting, disease progression, familiar history, age and radiographic findings, strongly suggested a condition consistent with generalized aggressive periodontitis. SRP and systemic therapy with amoxicillin-250 mg+metronidazole-250 mg TID per 10 days were planned. The presence and comforting voice of the mother was used as an anti-anxiety stimulus eliciting a good response in terms of aggressiveness. SRP was done after desensitization with a bland supragingival scaling that prepared him for the actual SRP performed with prilocaine/lidocaine-2.5%/2.5% subgingival gel. 3 and 7 weeks re-evaluations showed progressive PD and BoP improvements, stabilization of mobilities. The patient was more cooperative and manifestations of aggressiveness were almost disappeared. 5-months re-evaluation revealed a stable healthy periodontal status.

**Results:** A deep understanding of how mental disability affects the patient and the provision of dental care is essential for the efficacy of the treatment and management of the behavior. A

possible correlation has been reported in literature between autism and aggressive periodontitis showing a high prevalence of Aggregatibacter actinomycetemcomitans.

**Conclusion:** Adequate psychological and behavioral management of the developmental disabled patient affected by aggressive periodontitis lead to positive and successful results.

## P0869

### Increase in the effectiveness of surgical treatment of gingival recession defects

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**Aim:** The aim of the study was to investigate the effectiveness of surgical treatment of recession defects with the use enamel matrix derivative (EMD) and Platelet-rich plasma (PRP).

**Material and Methods:** The clinical and radiographic results were investigated in patients with gingival recessions Miller class I-II before treatment, after 6 months and long-term.

**Results:** The initial depth of recession was  $3.07 \pm 0.25$  mm, width -  $3.79 \pm 0.26$  mm. After 6 months the combined use of EMD with PRP the depth of recession has significantly decreased up to  $0.09 \pm 0.09$  mm, and the width to  $0.45 \pm 0.45$  mm in thick gingival biotype, and to  $0.17 \pm 0.08$  mm and  $0.21 \pm 0.15$  mm in thin biotype, respectively. After 12 months, the percentage of fully resolved recessions increased to 90% in thick gingival biotype and to 76% for hereditary thin. The indicator of the attached keratinized gingiva zone was significantly increased from  $2.50 \pm 0.23$  mm to  $3.64 \pm 0.14$  mm regardless of gingival biotype. Significant growth of bone tissue was detected using by multislice spiral computed tomography. The initial indicators of bone loss amounted to  $4.17 \pm 0.15$  mm. Increase after 6 months was  $2.36 \pm 0.24$  mm in thick gingival biotype and  $2.00 \pm 0.2$  mm in thin biotype. Clinical examination in long-term after 6 years of treatment revealed a stable effect in 80% of patients. Recurrence without the symptom of hard tissues hypersensitivity was observed after orthodontic treatment.

**Conclusion:** The combined use of EMD and platelet-derived growth factors in a single-layer treatment regardless of gingival biotype gingival tissue is an effective way of recession defects treatment.

## P0870

### Retrospective study of tooth loss in 100 treated periodontal patients: 10 years of maintenance therapy

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**Aim:** To determine the incidence and reasons for tooth loss during active therapy (AT) and maintenance therapy (MT)

**Material and Methods:** 100 patients with chronic periodontitis, 2552 teeth were evaluated, observed over a mean period of 10 years (5–23 years). After active therapy patients were incorporated maintenance therapy in intervals 3–6 months. The group was divided into three subgroups according to the frequency of maintenance therapy: (i) 1–6 months (62 patients,

1543 teeth), (ii) 7–17 month (21 patients, 546 teeth) and (iii)  $\geq 18$  month (17 patients, 463 teeth). The incidence and reasons of tooth loss in AT and MT were established

**Results:** In active therapy 36 teeth were lost, group: (i) 27 teeth (ii) 4 teeth (iii) 5 teeth. In maintenance therapy 139 teeth were lost, group: (i) 70 teeth in 62 patients, (ii) 24 teeth in 21 patients, (iii) 45 teeth in 17 patients. The main cause of tooth loss in MT was periodontal disease, group: (i) 54 teeth (60% molars and 40% anterior), (ii) 12 teeth (75% molar and 25% anterior), (iii) 27 teeth (63% molars and 37% anterior). The second cause was root caries (22%). Group A lost a mean of 1.56 teeth per patient per year. The B group lost 1.34 teeth per patient per year and the group C lost 2.94 teeth per patient per year

**Conclusion:** Tooth loss is higher in patients with longer intervals of 18 months of maintenance therapy; periodontal disease was the main reason for tooth loss and molars were the most teeth lost

## P0871

### Gingival cyst of adult: a rare entity with diagnostic importance

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**Aim:** The gingival cyst of the adult (GCA) is a very uncommon, non-inflammatory lesion originating from rests of the dental lamina within the facial gingiva. In contrast to the lateral periodontal cyst, the GCA is not related to the periodontal ligament or the root of the teeth.

**Material and Methods:** A 56-year-old Caucasian female presented with an asymptomatic nodular, bluish swelling of the mandibular left canine/premolar area above the mucogingival junction, that had been continuously rupturing and re-forming over the last month. The radiograph was not suggestive of osseous involvement. The cystic lesion was completely excised without affecting the upper zone of the attached gingiva & papilla. No scaling, root planning or bone substitute were performed. Hyaluronate gel and an overlying periodontal dressing was placed and left in situ upon suturing. Microscopically, a cyst exclusively covered by a thin flattened cuboidal and squamous epithelial lining, with surrounding connective tissue was observed and the diagnosis of a GCA was placed. After 1 week, the sutures were removed and hyaluronate gel was applied for 2 weeks leading to the complete healing.

**Results:** GCA may be easily misdiagnosed as a lateral periodontal cyst, or other periodontal and odontogenic cysts or tumors leading to an unnecessarily wide section and possibly to gingival/osseous defects. A radiograph is helpful to exclude severe osseous involvement.

**Conclusion:** CGA should be included in differential diagnosis of gingival nodular lesions and then a careful, not extended excision can be safely performed because of the not severely affected bone or root exposure.

## P0872

### Local application of hyaluronan gel in conjunction with scaling and root planing in patients with chronic periodontitis

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**Aim:** The purpose of this study to evaluate the effect hyaluronan gel in conjunction with Scaling and Root Planing in patients with chronic periodontitis

**Material and Methods:** Experimental design This is a split-mouth design study. It was conducted on 9 female patients attending the dental clinics of Qassim University. They were informed of study scope and their consents were obtained. Population screening All subjects underwent a periodontal examination, including evaluation of plaque index (PLI), gingival index (GI) probing pocket depth (PD) and clinical attachment level (CAL). After the periodontal diagnosis was established, all subjects who fulfilled inclusion/exclusion criteria were invited to participate in the study until the desired sample sizes were reached. Inclusion criteria age 20–35, presence of 20 natural teeth in mouth excluding third molars Having severe chronic periodontitis according to (Armitage 1999) for test group & control Exclusion criteria diagnosis of aggressive periodontitis (Armitage 1999), presence of acute condition, smoking, presence of systemic disease or medication affecting the periodontium The procedure Contralateral pairs of premolar and molar teeth in the maxilla or the mandible were randomized to receive the test treatment (SRP+ hyaluronan gel) or to serve as SRP controls.

**Results:** Clinical Plaque Index Comparison B/w the Groups <http://store2.up-00.com/2015-01/1422625310521.png> Gingival Index Comparison B/w the Groups <http://store2.up-00.com/2015-02/1423060152791.png> Histologic In control group histological stained section shows dilated blood capillaries and infiltration of chronic inflammatory cells In test group H&E stained section shows proliferation of mature collagen and nearly no inflammatory reaction

**Conclusion:** From the clinical parameter we can conclude that hyaluronan enhanced the results of scaling and root planing by improving the gingival parameters. Also helped in preventing the progression of periodontal lesion. In patient with periodontitis, more favorable results may be expected if hyaluronan is used in conjunction with surgical periodontal therapy.

## P0873

### Terms of Class V carious lesions treatment in patients with inflammatory periodontal diseases

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**Aim:** Class V lesions filling requires compliance with good cavity isolation. In patients with acute exacerbation of inflammatory periodontal diseases it can be difficult due to abundant exudation of periodontal pockets.

**Material and Methods:** We examined 43 patients, mean age  $21.6 \pm 0.9$  years, with chronic gingivitis and Class V decay. Exclusions: the presence of brackets, crowns. Patients were divided into 2 groups: the 1st group – smokers (21 persons) and

the 2nd – non-smokers (22 persons). Periodontal condition was evaluated by PLI, PBI, GI.

**Results:** Oral hygiene estimation didn't reveal significant differences in the 1st and 2nd groups ( $p = 0.89$ ), oral hygiene was equally bad in both groups:  $PLI = 2357 \pm 0.355$  and  $PLI = 2342 \pm 0.376$  respectively. At that, inflammation and bleeding was more pronounced in non-smokers ( $PBI = 2516 \pm 0.412$ ;  $GI = 2006 \pm 0.277$ ) than in smokers ( $PBI = 1896 \pm 0.166$ ;  $GI = 1226 \pm 0.150$ ) ( $p < 0.01$ ).

**Conclusion:** The sharp edges of the cervical carious cavities are an additional traumatic factor in inflammatory periodontal diseases. However smokers show less bleeding due to sclerotic changes in gingiva and it allows to fill a lesion during a period of periodontal disease exacerbation.

## P0874

### Effect of topical ozone therapy on denture-related traumatic ulcers: a case report

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**Aim:** The aim of this clinical case report study was to evaluate the effect of topical ozone therapy on healing time and pain level of denture-related lesions of the oral mucosa in an mandibular edentulous individual.

**Material and Methods:** A patient with newly fabricated implant retained overdenture who subsequently developed three ulcerative lesions related to her complete denture were included in the study. The smaller two lesion (control lesion) located posterior buccal side was allocated to usual care, that is, adjustment of the denture's margin, whereas the larger lesion (test lesion) located anterior buccal side was assigned to receive usual care plus application of a topical ozone therapy. Topical ozone therapy was applied directly on the affected area three times with 2 min within the first 1 week (baseline-1.day-3.day). The primary outcome measures were changes since baseline in each lesion's greatest dimension at days 1 and 3.

**Results:** At baseline, test lesion treated with the topical ozone were 6.3 mm in greatest dimension, and the smaller lesions receiving usual care were 3 and 3.4 mm. 24 h after first application of topical ozone therapy and usual care of lesions, the greatest dimensions were 6.1 mm (test lesion), 3 and 3.4 mm (control lesion). 3 days after, the greatest dimensions were 3 mm (test lesion), 2 and 2.1 mm (control lesion).

**Conclusion:** The result of this study suggest that application of topical ozone may represent a novel, effective treatment for accelerating the healing process and pain reduction in mucosal lesions associated with complete dentures.

## P0875

### How dentists perform supportive periodontal therapy in private practice

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**Aim:** Different instruments and materials can be considered in supportive periodontal therapy. Little is known about auxiliary instruments and materials applied in general dental practice as part of the therapy such as ultrasonic devices, cures, air-pol-

ishing and chlorhexidine-gluconate-gel. This study was conducted to evaluate the devices that are routinely used during periodontal treatment.

**Material and Methods:** Data was collected by means of an online-questionnaire. German dentists received an invitation to a questionnaire which was provided online. 263 completely processed questionnaires were analyzed. The questionnaires included different sections. The section of interest included general questions regarding procedure and organization of supportive periodontal treatment in practice. The main question was: "Which auxiliary instruments and materials are used in supportive periodontal therapy?" Participating dentists had a choice of seven auxiliaries. Their frequency of use could be classified in four categories: "always", "often", "rarely", "never".

**Results:** Ultrasonic instruments, cures, air-polishing and chlorhexidine-gluconate-gel are common in application during supportive periodontal therapy. More than 78% of the interviewed practitioners specified the use of ultrasonic devices as "always". The frequency of use for cures was quoted "always" by more than 60% of the participants. Most dental surgeries use an air-polishing device during supportive periodontal therapy. Chlorhexidine-gluconate-gel is frequently applied in more than 40% of participating dental surgeries.

**Conclusion:** The above mentioned auxiliary instruments and materials used in supportive periodontal therapy are suitable for achieving treatment goals in patients with chronic periodontitis. Due to the fact that ultrasonic devices are most commonly used in private practice further research should be focused on this device.

## P0876

### Quality of life of edentulous patients living in the city of ufa (russia)

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**Aim:** Partial or complete tooth loss causes different disorders in the whole body. This process can be regarded not only a health but a social problem as well. The aim of our study was to evaluate the clinical and sociological aspects of quality of life of the elderly.

**Material and Methods:** We used a classical examination schedule including case reports review, clinical examination of patient determination of clinical indices, the OHIP-14 questionnaire and other methods of investigation. Treatment was carried out for 200 people and the effects of treatment were assessed.

**Results:** The study has shown that the number of patients with secondary partial edentia was 163, with complete edentia – 133. The number of females was 254 versus 42 males. The mean age of patients was 63.4 years (females – 64.66 years, males – 67.25). The results have shown that 100% of patients have somatic diseases. Most patients had 2 or 3 concomitant disorders.

**Conclusion:** The results obtained show that the prevalence of secondary partial edentia was 84.09%, secondary complete – 15.91%. It has been shown that 100% of patients have diseases of other body organs and systems. Cardiac diseases prevail (50%). Analysis of the questionnaires has revealed that one of the reasons for late treatment of this patient group is related to their financial problems.

**P0877****A comparison of in-vitro properties of calcium phosphate cement as a bone grafting material**

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**Aim:** The aim of the study was to investigate the influence of a storage media (Tris buffer solution and Simulated Body Fluid (SBF)) on a modified Calcium Orthophosphate cement (CPC) combined with a Bioactive glass composition, with respect to both its properties (e.g., compressive strength) and the phase formed (e.g. conversion of Octacalcium phosphate [OCP] to Hydroxyapatite [HA]).

**Material and Methods:** The CPC/Bioglass composition was formulated by measuring 0.98 g of calcium phosphate and mixing with 1.02 g. of bioactive glass. The cement paste was mixed and packed into 6 by 4 cylindrical steel moulds and placed in an incubator at 37°C for 120 min. The samples were subsequently immersed in 50 ml of either TRIS buffer or SBF at 37°C for 1, 24 h, 7 and 28 days. Compressive strength testing (Mpa) and characterisation of the different phases of the samples (n = 8) was by Instron universal testing machine type 5567, FTIR spectrum and XRD respectively.

**Results:** The results suggested that the media used to store the cements influenced the phases formed, e.g. immersion in Tris buffer compared to SBF favoured the conversion of OCP to hydroxyapatite (HA). The cements exhibited an increasing compressive strength on immersion in SBF from 1 to 24 h but then a marked decrease from up to 168 h, compared to a reduction in Tris buffer.

**Conclusion:** Storing the combined CPC/Bioglass composition in Tris buffer and Simulated Body Fluid had an influence on both the compressive strength and the phase formed over time.

**P0878****Comparative analysis of photodynamic therapy in combination with SRP, ozonotherapy in combination with SRP and SRP alone during the non-surgical periodontal treatment in patients with chronic periodontitis**

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**Aim:** To assess the efficacy of photodynamic therapy (PDT) and ozonotherapy adjunctively administered to scaling and root planing (SRP) against SRP only during the non-surgical periodontal therapy in subjects with chronic periodontitis (CP).

**Material and Methods:** We examined 60 patients with CP divided into groups: SRP and PDT (group 1), SRP and ozonotherapy (group 2) and SRP (control group). Before and during the treatment, subgingival plaque samples were collected by an endodontic paper cone for microbiological analysis by real time polymerase chain reaction for detection of *Porphyromonas gingivalis* (Pg), *Prevotella intermedia* (Pi), *Tannerella forsythensis* (Tf), *Treponema denticola* (Td), *Aggregatibacter actinomycetemcomitans* (Aa). Clinical parameters including plaque index (PI), bleeding on probing (BOP), pocket depth (PD), clinical

attachment loss (CAL) were also measured at baseline, after 40, 90 and 180 days.

**Results:** The results in group 1 and group 2 showed an improvement in all the clinical parameters and a significant reduction in the counts of Pg, Pi, Td, Tf at 40 days compared to control group (p < 0.05). Next the periodontal parameters PI, BOP, CAL, PD and the amount of Pg, Td, Tf showed the more significant results in group 1 (p < 0.05) at 90 days compared to the control group. None of the periodontal parameters exhibited differences between groups 1 and 2 (p > 0.05) at 180 days compared to the control group.

**Conclusion:** In spite of the limitations of our study, the results showed additional benefits from PDT and ozonotherapy as an adjunctive treatment for patients of chronic periodontitis. But the effect of PDT is more long-termed.

**P0879****In vitro study of four different toothpaste treatments for dentin hypersensitivity**

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**Aim:** To determine the sealing performance “in vitro” of dentin tubules through the application of four different desensitising toothpastes (Oral-B® Pro-Expert, Desensin® Repair, Colgate® Sensitive Pro-Alivio, Sensodyne® Repair&Protect) and to evaluate how dietary acids affect the tubular occlusion.

**Material and Methods:** The dentine discs from 135 extracted molars were used. These were prepared using orthophosphoric acid for analysis with a Pashley machine. The samples were divided into four groups. Each group was brushed with the test toothpaste and perfusion was carried out. A second perfusion was carried out after the samples had been exposed for 1 min to Coca-cola® and Minute Maid®. Following this preparation, the samples were analysed using an electron microscope to check the degree of tubular sealing achieved.

**Results:** With Oral-B® Pro-Expert permeability was reduced from 100% to 88.035%, and following the application of the acids this varied to 74.675%. With Desensin® Repair hydraulic conductivity was reduced to 68.270% and permeability of 60.586% was obtained from submersion in the acids. With Sensodyne Repair® permeability was reduced to 63.53%, and following the application of the acids this held at 66.20%. Finally, after applying Colgate Sensitive® permeability was reduced to 88.25 and following the application of the acids a permeability of 90.36% was obtained.

**Conclusion:** Without the presence of acids, the performance of Desensin® Repair is comparable to that of Sensodyne Repair® and, in both cases, far better than Colgate Sensitive® and Oral-B® Pro-Expert. Following exposure to acids, a negative differentiation results for Colgate Sensitive® in comparison to the other three more uniformly performing toothpastes.

## P0880

### Localized aggressive periodontitis in African adolescent harbouring *Aggregatibacter actinomycetemcomitans* of previously unknown genotype

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**Aim:** Localized aggressive periodontitis (LAP) is characterised by fast breakdown of periodontal tissue. *Aggregatibacter actinomycetemcomitans* (*A. actinomycetemcomitans*) is a microbe belonging to the oral commensal microflora associated with LAP. A specific genotype of *A. actinomycetemcomitans* called JP2 has the ability to produce vast amounts of leukotoxin and is stronger associated to LAP than other genotypes. The JP2-genotype is lacking 528 bp in its leukotoxin-promoter region compared to the full genome. This mutation is suggested to be the reason of the JP2-genotypes leukotoxicity. The JP2 genotype is predominantly harboured in individuals of North and West African origin.

**Material and Methods:** Case report: This case report describes the examination and treatment of a young adolescent female of East African origin (Ethiopia) diagnosed with LAP harbouring *A. actinomycetemcomitans* of a previously unknown genotype that lacked 638 base pair (bp) in its leukotoxin-promoter and showed similar amount of leukotoxin production as the JP2-genotype. Full mouth periodontal examination was carried out, plaque samples was collected and analysed. Non-surgical periodontal treatment with adjunctive antibiotics (Metronidazol and Amoxicillin) was carried out. Residual pockets were treated surgically and the patient was referred to a maintenance programme. The clinical and microbiological outcome is presented.

**Results:** Discussion It seems that other high leukotoxic genotypes other than JP2 exist. Previously these high leukotoxic genotypes have been found predominately in West and North Africa but it seems that they also exist in individuals of East African origin.

**Conclusion:** Conventional treatment strategies used for treatment of LAP appears successful in treating patients harbouring high leukotoxic *A. Actinomycetemcomitans* of previously unknown genotype.

## P0881

### Effects of an 0.2% hyaluronic acid gel on periodontal tissues in rats

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**Aim:** The aim of the present study is to evaluate the efficacy of an hyaluronic acid (HA) gel on periodontal tissues in rats.

**Material and Methods:** The study was conducted on 32 white Wistar rats. The animals were divided into three groups: 1 – intact rats; 2 – rats with a “peroxide” model of periodontitis, which was reproduced by the addition to the diet of overoxidized sunflower oil, daily for 60 days (model); 3 – rats with a “peroxide” model and local application of an 0.2% HA-gel on gingiva, daily for 14 days. Elastase activity, malondialdehyde (MDA) and HA levels in the gingiva and in the blood serum and activity of alkaline phosphatase (ALP) and tartrate-resistant

acid phosphatase (TRAP) in the alveolar bone were measured by biochemical method. Histologic researches of periodontal tissues were conducted.

**Results:** The elastase activity and MDA level in the gingiva ( $p < 0.005$ ) and in the blood serum ( $p < 0.05$ ) significantly decreased in HA-gel group as compared to those in model-group. Also the HA level in the gingiva increased ( $p < 0.005$ ). The activity of ALP ( $p < 0.001$ ) and TRAP ( $p < 0.05$ ) in the alveolar bone significantly increased in treatment group (HA-gel). It indicates activation of process of remodeling of a bone tissue under the influence of HA-gel. Sites of new alveolar bone formation and many “active” osteoblasts was histologically observed in tissues sections in rats of treatment group.

**Conclusion:** The present results indicate that the local application of an 0.2% hyaluronic acid gel on gingiva in rats renders anti-inflammatory, antioxidant and osteoinductive effects on periodontal tissues.

## P0882

### RCTs of scaling and root planing alone (SRP) or adjunctive MTZ + amoxicillin (AMX) in the treatment of chronic periodontitis (ChP)

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**Aim:** To evaluate the risk of bias in the RCTs of the adjunctive use of metronidazole (MTZ) + amoxicillin (AMX) + scaling and root planing (SRP) or SRP alone in the treatment of chronic periodontitis (ChP)

**Material and Methods:** An electronic search of two databases and a hand-search of dental journals were conducted from the last 5 years records through 7 November 2014. The papers were classified with criteria of judgments from low to high risk of bias of seven domains.

**Results:** Among the limitations of the studies from the last 5 years, only two RCTs have low risk and three RCTs has low to high risk of bias respect to the study methodology, in the adjunct use of MTZ + AMX + SRP compared to SRP alone. Subjects receiving MTZ + AMX exhibited a greater mean gain of clinical attachment, reduction of sites with persisting probing depth (PD>4 mm) and BOP, greater reduction in the levels of periodontal pathogens. Additionally, CHX rinsing enhanced the microbiological effects of the MTZ + AMX treatment in shallow sites.

**Conclusion:** The adjunctive use of MTZ + AMX offers short-term clinical and microbiological benefits (reduction in probing depth and levels of periodontal pathogens), over SRP alone, in the treatment of subjects with generalized ChP. The use of antibiotics adjunctive to SRP will promote the effects of the treatment but never will be tested as an alternative of mechanic therapy. The dosage and administration time remains unclear.

## P0883

### Lateral sliding flap: a case report

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**Aim:** A localized gingival recession constitutes a special therapeutic problem that often requires some form of mucogingival

surgery. One of these is lateral sliding flap. It may provide a satisfactory solution to the problem of denuded root surfaces.

**Material and Methods:** A 24-years-old female patient applied to our clinic with a localized gingival recession. Her teeth were thoroughly scaled and root-planed to remove all supragingival and subgingival plaque, calculus and root surface roughness. The subject was given oral hygiene instruction including toothbrushing and dental flossing techniques. An appointment for the surgical procedure was arranged 7 days after this initial procedure. The distance from the cemento-enamel junction to the gingival margin was recorded. The measurements were taken at the mid-line of the facial aspect of the tooth. Following the application of local anesthesia, lateral sliding flap was designed with using PRF. The same measurements were repeated at 10th day, 6th week and 3rd months after surgery. Photographs also were taken pre- and post-operatively.

**Results:** The present study showed that the initial gingival recession present on the recipient tooth was significantly reduced in all time postoperatively. At the 6th week and 3rd month, a little gingival recession was found.

**Conclusion:** It is probable that lateral sliding flap with using PRF is a satisfactory method to solve the problem of denuded root surfaces.

## P0884

### Effect of non-surgical periodontal therapy and adjunctive use of diode laser decontamination on clinical parameters in smokers with chronic periodontitis

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**Aim:** The aim of this study is to investigate the effects of diode laser application in addition to non-surgical periodontal treatment on the clinical periodontal parameters in smokers with chronic periodontitis.

**Material and Methods:** The study group was consisted of 15 systemically healthy smokers who had been diagnosed with chronic periodontitis. Prior to periodontal treatment, whole mouth probing depth, clinical attachment level, plaque index, gingival index and bleeding on probing index scores were recorded. Full-mouth scaling and root-planning was performed and then right or left half of the jaws were randomly assigned as test regions for diode laser (940 nm; 1.5 W) decontamination. Clinical periodontal measurements were repeated on the 1st and 3rd months.

**Results:** Statistical analysis of data revealed that all clinical parameters showed statistically significant reduction in all treatment groups at the end of the 3rd month ( $p < 0.05$ ). After the treatment, compared to baseline, the improvements in probing depth, clinical attachment level and gingival index parameters were found to be more statistically significant in laser group ( $p < 0.05$ ).

**Conclusion:** When the result of this study was evaluated, it was concluded that pocket decontamination with diode laser adjunct to non-surgical periodontal treatment has additional benefits on clinical periodontal parameters of smoker chronic periodontitis patients.

## P0885

### Dihydropyridine induced gingival overgrowth: case series

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**Aim:** Gingival overgrowth (GO) is a common feature of gingival diseases which is frequently seen in periodontal practice. While GO can be caused by a numerous factors, the most recognized one is drug-induced GO that is known as a side effect of calcium channel blockers-especially dihydropyridine group. Drug-induced GO can be localized or generalized, and can range from mild to extremely severe, affecting patient's appearance and function.

**Material and Methods:** Four patients between 52 and 69 year-old with GO due to long-term administration of dihydropyridine for the treatment of hypertension applied to the periodontology clinic with the complaint of swollen and unaesthetic view of their gum. The patients were presenting lobulated enlargement which extends towards occlusal plate and interfered with mastication and speech. Cardiology referral was given in all patients for substitution of their drugs. The drugs were substituted with beta blockers and angiotensin-converting-enzyme inhibitors. Periodontal therapy was comprised two-stage scaling and root planing to reduce the inflammatory component of the GO; followed by periodontal flap surgery to remove excessive gingival tissue. Antibiotics (metronidazole and amoxicillin with clavulanate) and chlorhexidine mouthwash were prescribed, patients received oral hygiene instructions and scheduled for follow-up visits.

**Results:** The complete healing was achieved in all cases uneventfully. In the present report, substitution of the medications, successful periodontal therapy and meticulous oral hygiene are resulted with significant and sustainable clinical improvements.

**Conclusion:** The most effective treatment of drug-induced GO is substitution or withdrawal of the drug, which usually decreases the need for further treatment and allows maintaining of the results.

## P0886

### Squamous cell papilloma of gingiva: a case report

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**Aim:** Squamous cell papilloma (SCP) is the most common papillary lesion of the oral mucosa and makes up approximately 2.5% of all oral lesions. These kind of mucosal enlargements are non-transmissible and benign lesions. Squamous cell papillomas may be a result of infection with human papillomavirus. Clinical differentiation from verruca vulgaris, condyloma acuminatum, verruciform xanthoma and verrucous carcinoma may be difficult. In this case report, the clinical and histopathological findings of a patient with SCP in gingiva was presented.

**Material and Methods:** A 39-year-old male applied our clinic for the gingival enlargement which was noticed 3 months earlier at the lingual side of mandibular canine area. Single, painless, pedunculated and cauliflower-like lesion which was 8x5 mm in diameter was examined. He was a heavy smoker with no sys-

temic disorder. After Phase I periodontal therapy lesion was removed by excisional biopsy. Histopathological examination showed SCP with cytopathic changes in the upper levels of epithelial layer. Postoperative 1 week healing was uneventful. He was suggested 3 months recall visits, however, recurrence was observed after his first visit at 18 months.

**Results:** The treatment for SCPs and related papillary lesions is surgical removal and recurrence is uncommon, except in lesions associated with human immunodeficiency virus (HIV) infections. On the other hand, recurrence is more common in condyloma acuminatum. Presented case was HIV negative and histopathological examination verified SCP.

**Conclusion:** Oral SCPs are benign lesions, however, in the differential diagnosis verrucous carcinoma should be differentiated. Excisional methods are preferred for the surgical treatment and histopathological examination is required.

## P0887

### A CAD-CAM prosthodontic options and gingival zenith position for a rotated maxillary anterior teeth: a case report

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**Aim/Introduction:** Technological advances at CAD-CAM systems created an alternative to conventional laboratory manufactured ceramic restorations. CEREC system is a chairside 3D system and it become more popular day by day by its advantages. Even with beautifully done restorations, an unattractive gingival zenith position, can negatively affect the smile of a person.

**Material and Methods:** Case Report: A 23-year-old patient was referred to the Gazi University Faculty of Dentistry Prosthodontics department for an anterior esthetic rehabilitation. Patient's 12 number tooth was lost, 11 and 21 number teeth had root-canal treatment. to make endocrowns, 11 and 21 number teeth had been prepared and made cavities. Then canal impression that taken with hydrocolloid impression material (Zhermack SpA, Badia Polesine, Italy) had analysed with CAD/CAM system. Cerec ZI block was used for the endocrown, and it was obtained at Cerec milling unit (CAM) and were cemented with self-adhesive resin cement (Relyx Unicem; 3M ESPE). Zenith points and 12 number lost-tooth's section of the gingiva rehabbed with diode laser for the pontic. Intraoral optical imagings were taken again with Omnicam for crown and zircon copings has obtained. Then at the laboratory, veneered with feldspathic porcelain. Restoration were cemented with self-adhesive resin cement (Relyx Unicem; 3M ESPE). After 6 months and 1 year following, no complication was stumbled about the gingiva or aesthetic look.

**Results:** Result: CAD/CAM is entirely a helping instrument against the conservative prosthetic options and gingival zenith position. It helps in patient education and in motivation.

**Conclusion:** Digital imaging provides an immediate treatment option for the patients. Software also provides an interim aid, for the clinician as well as technician, in the form of two-dimensional photographs.

## P0888

### Patient's quality of life and clinician's perception during treatment with a novel hypochlorite-based agent adjunctive to SRP

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**Aim:** To investigate the impact of a novel hypochlorite-based agent on the quality of life of patients and clinician's perception when used in conjunction with nonsurgical periodontal therapy.

**Material and Methods:** 8 participants received nonsurgical periodontal therapy with hand instruments. The patients were treated in two sessions by dental students in a split-mouth-design. Hypochlorite-based agent (PS, Perisolv, REGEDENT AG, Switzerland) was applied to test sites and allowed to penetrate into the pockets for 30s prior to SRP. Control sites were treated by SRP only. The impact of PS, the clinicians and patients completed a comparative questionnaire following treatment. A VAS (1 = improvement, 2 = no difference, and 3 = worsening by PS) evaluated the application procedure, perception of test agent, and compared test and control procedures.

**Results:** Both patients and clinicians noticed a facilitation of SRP in test groups (1.75 each) without prolonging treatment time (1.9 and 2.1, respectively). The application procedure was rated differently among patients and clinicians (1.5 vs. 2.25), whereas the perception regarding the agent was similar (2.1 each). The more negative rating for application among clinicians was most likely due to the plastic applicator tip that came with the device hindering injection into deep pockets containing calculus and granulation tissue.

**Conclusion:** The test product seems to facilitate SRP for patients and clinicians. Application procedure and possibly also the treatment time might be improved by exchanging the plastic applicator tip from the manufacturer. Further controlled studies are needed to evaluate the agent's clinical impact.

## P0889

### Expression of periodontal tissue-specific markers by pdl-derived mscs during osteogenic differentiation

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**Aim:** Periodontal Stem Cells (PDLSCs) are a type of skeletal stem cell but it is unclear whether their phenotype is different from other cell types and particularly if they are different from other mesenchymal stem cells (MSCs). Therefore the aim of study was to investigate the expression of the putative PDL markers PLAP-1, periostin, CEMP-1 and Nestin, by PDLSCs during osteogenic differentiation compared to other cell types.

**Material and Methods:** Primary human PDLSC, gingival fibroblasts (GF), osteoblasts, and Bone marrow-derived MSCs (BMSCs) were cultured for a period of up to 28 days in normal and osteogenic differentiation media. The expression of PDL-associated genes were studied using qRT-PCR.

**Results:** During osteoblastic differentiation ALP expression increased in all samples; osteocalcin was greatly increased in PDLSC at day 21 (up to 302 fold). PLAP-1 expression was detected in PDLSC and increased markedly during time in culture (EG x 120fold at day 21 in normal media). However GF

also showed a similar pattern expression of PLAP-1, although this was not seen in either osteoblasts or BMSCs. Periostin expression was absent in osteoblasts but gradually increased in all other cells. CEMP-1 expression was seen in all cell types. Nestin expression was seen in PDLSC and GF only.

**Conclusion:** The results suggest that these cell types, and particularly PDLSC versus BMSC, are phenotypically distinct. However, PDL-associated markers were also found particularly in GF. These results also question the specificity of these putative PDL markers. Further investigation are required to confirm or refute these findings.

## P0890

### Comparative evaluation of the clinical efficacy of non-surgical and surgical treatment of periodontal disease

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**Aim:** Assessment of efficacy of non-surgical and surgical treatment of periodontal disease.

**Material and Methods:** The 1st group – 144 patients use non-surgical therapy – scaling and root planning (SRP) and the 2nd group – 145 patients use surgical treatment of periodontal disease: closed curettage, open curettage, flap surgery. Periodontal examination including probing pockets depth (DP), gingival recession, clinical attachment level (CAL), PLI (Silness-Löe), bleeding on probing (Mühlemann) before and after treatment in terms of 1.5 and 6 months.

**Results:** The DP: 1.5 months after treatment reduced to 2.1 mm ( $p < 0.001$ ) [1]; after 6 months – 3.0 mm ( $p < 0.001$ ) in the 1st and 2nd groups. The CAL: 1.5 and 6 months after treatment – decreased by 1.2 mm ( $p < 0.001$ ) and 1.4 mm ( $p < 0.001$ ) respectively in the 1st group. 1.5 and 6 months after treatment – decreased by 1.5 mm ( $p < 0.001$ ) and 1.7 mm ( $p < 0.001$ ) respectively in the 2nd group. The PLI: 1.5 and 6 months after treatment – decreased from 2.7 to 0.5 ( $p < 0.001$ ) in the 1st and 2nd group. The Mühlemann index: 1.5 and 6 months after treatment was reduced from 2.0 to 0.2 ( $p < 0.001$ ) in the 1st and 2nd group. [1] Here and below the level of significance Wilcoxon test with Bonferroni correction.

**Conclusion:** The effectiveness of non-surgical therapy corresponds to clinical parameters of surgical periodontal treatment. This allows to recommend SRP at the basic stage of treatment and reduce surgical procedures from 100% to 10%, thereby increasing the availability of periodontal care among patients and dentists.

## P0891

### Correlation between different evaluations of the remaining periodontal ligament

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**Aim:** The aim of this study was to investigate the correlation between different evaluations of the remaining periodontal ligament.

**Material and Methods:** A cross-sectional study was conducted with a sample of 32 teeth that had prior indication of extraction.

Experimental teeth were evaluated for clinical, radiographic and microscopic measurements. The evaluation of clinical attachment level (CAL) at six sites per tooth was used for the measurement of the Periodontal Clinical Residual Insertion (PCRI). Radiographic evaluation was made before the extraction procedures to evaluate the Remaining Bone Insertion (RBI). After the extractions, teeth were stored in 10% ethanol solution and stained with 5% hematoxylin. Then each tooth surface was evaluated by a stereomicroscope and the stained area of the periodontal ligament could be enclosed indicating the Ligament Remaining Insertion (PLRI). The different protocols of evaluation were compared by bivariate tests, and both were compared to microscopic examination. The significance level was 5%.

**Results:** Clinical (IPRC) and radiographic (IOR) evaluations showed moderate to strong correlation with PLRI. The linear regression showed that the highest coefficient of determination for PLRI was found when the IPRC and IOR were analyzed in an bivariate model, regardless of the stratum of CAL.

**Conclusion:** It was concluded that the PCRI and RBI can be correlated to the real measure found on microscopic examination (PLRI), and the association of these two exams is what best explains the diagnosis determination and prognosis in periodontal disease.

## P0892

### Non surgical periodontal treatment in breast cancer patients undergoing chemotherapy

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**Aim:** This study compared the periodontal treatment results in healthy and breast cancer patients undergoing chemotherapy monitoring clinical and systemic conditions.

**Material and Methods:** 28 subjects were allocated in two groups: Chronic Periodontitis patients (PC) ( $n = 18$ ) and Chronic Periodontitis in cancer patients (CAN-PC) ( $n = 10$ ). The clinical parameters: probing depth (PD), clinical attachment level (CAL) and the systemic inflammatory parameter C-reactive protein (CRP) were accessed at baseline and 180 days after non-surgical periodontal therapy. The differences intra (paired T test) and inter groups (Anova, Tukey) were statistically analyzed ( $p < 0.05$ ).

**Results:** Only PC group had a significant reduction in PD and CAL gain 180 days after non surgical periodontal therapy comparing to baseline values ( $p < 0.05$ ). The CAN-PC group exhibited a greater number of residual periodontal pockets ( $p < 0.05$ ) when compared to the PC group at 180 days post-operative ( $7.10 \pm 7.69$  and  $45.73 \pm 29.11$ , respectively). Regarding PCR levels, PC group showed statically significant reduction in PCR levels at 180 days post periodontal treatment comparing to baseline ( $p < 0.05$ ) while in CAN-PC group this reduction was not observed.

**Conclusion:** Patients with breast cancer and undergoing chemotherapy do not respond to non surgical periodontal treatment in the same patterns that patients without cancer and may require additional periodontal treatments.

## P0893

### Accelerated orthodontic treatment by means of piezocision

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**Aim:** There is an increasing number of adult patients looking for orthodontic treatment to improve their aesthetics and function. However, the visual impact of orthodontic devices and treatment time are important factors influencing patient acceptance. Different surgical procedures have been described to accelerate orthodontic treatment; particularly, piezocisions have shown to be less invasive than other alternatives such as corticotomies. To present a case series reporting the treatment of adult patients with different malocclusions through a technique combining microincisions and localized piezoelectric bone surgery.

**Material and Methods:** Adult patients with different malocclusions were treated by means of orthodontic devices. Prior, periodontal therapy was carried out in all cases if needed. The piezocision surgery was performed 1 week after placement of the orthodontic brackets in each arch. Local anesthesia was administered and interproximal incisions were made through the periosteum and below the papillae on the buccal aspect of maxilla and mandible. Bone cuts were made using the piezoelectric knife fitted with a special tip to ensure a 3 mm cutting depth. Microincisions were sutured by means of resorbable sutures.

**Results:** All cases were successfully finished and orthodontic appliances were removed sooner than expected if conventional orthodontics had been used. No adverse or harmful effects were registered.

**Conclusion:** Piezocision overcome some of the disadvantages of other corticotomy techniques, reducing surgical time and postoperative discomfort. This novel technique can be combined with various orthodontic treatment modalities in order to obtain rapid and stable results that satisfy patient requests.

## P0894

### Probing pocket depth changes in response to surgical periodontal therapy: Part II: a retrospective study

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**Aim:** To evaluate probing pocket depth changes (PPD) in response to surgical periodontal treatment and their dependence on teeth location and mobility.

**Material and Methods:** This retrospective study includes 103 patients with periodontal disease diagnosed at a private practice, all systemically healthy. PPD was measured at six points/tooth by the same calibrated/experienced periodontist using a Florida Probe<sup>®</sup> at baseline (previous to treatment), at re-evaluation (6–8 weeks after non-surgical periodontal treatment) and at re-examination (3 months after surgical periodontal therapy). The six point's average was taken as the tooth PPD. Statistical analysis was performed with the SPSS<sup>®</sup> 22.0 program.

**Results:** At baseline, mean PPD was  $3.3 \pm 0.97$  mm and exhibited differences for location and mobility ( $p < 0.05$ ), and no interaction. At re-evaluation, mean PPD decreased

( $1.05 \pm 0.82$  mm,  $p < 0.05$ ), with no location effect. PPD values were reduced again after surgical periodontal therapy decreasing  $0.53 \pm 0.54$  mm ( $p > 0.05$ ) from re-evaluation to re-examination in mean. Maxillary molars were the group that experienced mean higher PPD reductions after surgical periodontal treatment  $0.82 \pm 0.62$  mm. Teeth with initial increased mobility values ( $\geq 1$ ) presented higher baseline PPD values in relation to other teeth ( $p < 0.05$ ) and experienced greater PPD reductions after surgical periodontal treatment ( $p < 0.05$ ).

**Conclusion:** Non-surgical periodontal treatment changed mean PPD values in  $-1.05 \pm 0.82$  mm while surgical periodontal therapy decreased mean PPD values about  $0.53 \pm 0.54$  mm. Although initial PPD depended on location, the PPD reduction after treatment was similar for all locations. Furthermore, surgical periodontal treatment showed greater PPD reductions for teeth with increased mobility.

Topic: Basic implant dentistry

## P0895

### The effect of four different implants designs: histomorphometric and resonance frequency analysis

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**Aim:** Evaluation of the percentage of Bone to implant Contact (BIC) of four different implant macrodesigns with histomorphometric analysis.

**Material and Methods:** Selection of 12 New Zealand Rabbits. 48 implants were placed; 12 of each prototype; 2 implants per leg, with 4 different prototypes randomized. Implant primary stability (ISQ) and Bone to Implant Contact (BIC) were recorded in two periods of sacrifice: 3 weeks and 6 weeks. Implants Designs: · Type A: 4 threads of 0.25 mm in the upper portion of the implant and spread over the entire implant. · Type B: 3 threads of 0.30 mm in the upper portion of the implant and spread over the entire implant. · Type C: 2 threads of 0.35 mm in the upper portion of the implant and spread over the entire implant. · Plane: machine surface in the upper portion of the implant with the remaining implant surface treated as described in the previous designs AFR and histomorphometric analysis was performed.

**Results:** There was no statistically significant difference between the three implant designs regarding the BIC. However, rough surface implants had significantly higher results than machined implants.

**Conclusion:** The v-shaped threads showed to be effective at the percentage of bone contact implant. The macroscopic design showed to mainly have an impact on the primary stability. The geometric features of these implants allowed to assess the primary stability at the time of surgery and was confirmed in the histomorphometric analysis.

**P0896****In vitro comparative analyses between simple adsorption and layer-by-layer films of GDF-5 functionalized, nanostructured titanium surfaces**

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**Aim:** The present study evaluated the response of primary osteoblastic cell cultures grown on growth and differentiation factor-5 (GDF-5) films obtained by Layer by Layer (LbL) method compared to those obtained by simple adsorption (SAD) in terms of the acquisition of the osteogenic phenotype in vitro.

**Material and Methods:** Osteogenic cells were obtained by enzymatic digestion of newborn rat calvarial bone and were grown on the following Ti disc surfaces: (i) Machined; (ii) Machined+GDF-5/SAD; (iii) Machined+GDF-5/LbL; (iv) Nano- nanotopography obtained by etching with a mixture of H<sub>2</sub>SO<sub>4</sub>/H<sub>2</sub>O<sub>2</sub> for 4 h; (v) Nano+GDF-5/SAD and (vi) Nano+GDF-5/LbL. The simple adsorption was performed on the day before primary cell plating. The LbL GDF-5 films were generated by electrostatic interaction between molecules containing opposite charges of ionic groups. The cationic polyelectrolyte and the polyanion used were, respectively, poly (allylamine hydrochloride- PAH) and GDF-5. The growth of GDF-5 films was measured by ultraviolet-visible spectroscopy. At 14 days of culture mineralized bone-like nodule formation was quantified by two methods: morphological analysis and biochemical analysis. Comparisons were performed using a parametric test for independent data (ANOVA). The level of significance was set at 5%.

**Results:** At 14 days, Machined+GDF-5/LbL and Nano+GDF-5/LbL groups significantly decreased the osteogenic potential of cultures when compared with the other groups.

**Conclusion:** The LbL films negatively affected the osteogenic potential of cell cultures grown on machined Ti and Ti with nanotopography. One of the possible explanations for such results is the reduced amounts of GDF-5 obtained by LbL films compared with the ones by SAD.

**P0897****Innovative strategy of pedagogy for proficiency in implantology skills**

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**Aim:** To assess the relative contribution of an haptic simulator for learning and training to accomplish basic acts in implantology

**Material and Methods:** A total of 60 people including 40 third-year dental students without knowledge in implantology and 20 experienced practitioners (experience in implantology >15 implants) participated in this study. A basic exercise drill was proposed to the three groups to assess their gestural abilities (angle, depth, perforation, duration, position). The relative contribution of the simulator was evaluated in eight sessions in the simulator group based on the same endpoints.

**Results:** The test drilling has shown a significant difference in the gestural precision between experienced practitioners and

beginners for all these parameters. The results of the group training with the simulator tended to be significantly close to those of the experienced operators. Two patterns of acquisition in the course of this experiment were revealed: 1 progressive gestural accuracy acquisition in the presence of a digital assistant and 2, a phase of stagnation in its absence.

**Conclusion:** Haptic simulator brings a real benefit in training for implant surgery. Long-term benefit and more complex exercises should be evaluated.

**P0898****The bacterial sealing capacity of Morse taper implant-abutment systems in vitro**

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**Aim:** To investigate in vitro the ability of 4 commercially available Morse Taper implant-abutment units in shielding the implant from outside bacteria.

**Material and Methods:** In a sterile environment, abutments were screwed onto the implants and the units subsequently immersed in *Streptococcus sanguis* bacterial broth for 48 h. The units were then examined by scanning electron microscopy (SEM) under the following 3 conditions: with the implant/abutment components assembled as units to investigate for both the existence of microgaps and the presence of bacteria; with the implants and abutments separated for examination of internal surfaces and; with the implant/abutment components again assembled as units to measure any microgaps detected. The mean size of the microgaps in each unit was determined by measuring, under SEM, their width in 4 equidistant points at x2000. These results were subjected to ANOVA and Bonferroni's multiple comparison's tests to investigate the potential existence of significant differences.

**Results:** Microgaps were detected in all units (range 4.51 – 9.95 µm) with no significant differences in dimension (p > 0.05). Within all units the presence of bacteria was also observed. In three experimental groups they could be seen on the screws, body and internal surfaces of the implant, whereas in the fourth group their extent of penetration was limited to the abutment body.

**Conclusion:** The seals provided by the commercially available Morse Taper implant-abutment units tested were not sufficient to shield the implant from bacterial penetration.

**P0899****Comparison of implant stability associated with presence of cortical bone and residual bone height in maxillary bone mimicked model: an in vitro study**

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**Aim:** Primary stability is an important factor for determining the timing of prosthetic loading. Frequently, the maxillary pos-

terior regions make difficult to ensure the primary stability of dental implants because of low bone density and insufficient bone volume. The purpose of this study was to evaluate the primary stability of dental implants in bone models mimicked posterior maxilla.

**Material and Methods:** The maxillary bone models were made by solid rigid polyurethane blocks. The bone blocks (3, 5, 8 and 12 mm in heights) were imitated bicortical or monocortical maxillary bone (absence of cortical bone in crestal area). Eighty implants (4.3 × 10 mm, Dentium Co Ltd, Seoul, Korea) were inserted into the models. The implants were divided into 8 groups (n = 10). Insertion torque, ISQ value, periosteal value and removal torque were measured to determine the primary stability of each implant.

**Results:** There was a positive correlation between ISQ value and residual bone heights. In monocortical bone model, ISQ value was 51.62 ± 7.28, 55.53 ± 4.43, 62.78 ± 3.37 and 65.53 ± 2.26 in 3, 5, 8 and 12 mm, respectively. In bicortical bone model, ISQ value was 73.97 ± 5.00, 76.92 ± 3.85, 81.03 ± 2.69 and 79.33 ± 1.23 in 3, 5, 8 and 12 mm, respectively.

**Conclusion:** Presence of cortical bone on maxillary sinus floor and alveolar bone crest had a significant effect on primary stability. ISQ value was influenced by cortical bone on the alveolar bone crest rather than on the maxillary sinus floor.

## P0900

### The frequency distribution of potential implant sites in the jaws and available bone height: radiographic data from a cross-sectional epidemiologic study in a Swedish population

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**Aim:** To assess the number of possible sites for screw-shaped oral implants in an epidemiological sample of adult individuals.

**Material and Methods:** The study, performed in 2003 comprised of 40–80 years old subjects from the community of Jönköping, Sweden. Orthopantomograms and full-mouth intra-oral radiographs were analyzed in 413 randomly selected subjects aged 40, 50, 60, 70, and 80 years. The frequency distribution of tooth gaps was assessed and the bone height in these areas was measured from the marginal bone crest to interfering anatomical structures.

**Results:** Edentulousness was found in 1% (both jaws) and in 8% (one jaw) of the subjects. On the subject level, anterior tooth gaps (canines and incisor areas) were found in 10.1% (maxilla) and in 6.9% (mandible) while posterior tooth gaps were found in 38.3% (maxilla) and in 51.8% (mandible). Anteriorly, the average bone height was 24.1 mm (maxilla) and 42.6 mm (mandible). Limited bone height (LBH = <6 mm) was found in 2.4% (maxilla) and in 0% (mandible) of the anterior gaps. In the 1st premolar gaps LBH was found in 9.6% (maxilla) and in 0% (mandible). In the 2nd premolar gaps LBH was found in 29.0% (maxilla) and in 11.1% (mandible). In the molar gaps LBH was found in 67.9–74.2% (maxilla) and in 4.7–5.9% (mandible).

**Conclusion:** Anterior tooth gaps were found in 6.9–10.1% while posteriorly, gaps were found in 38.3–51.8% of the subjects. Limited bone height was frequently found in the 2nd premolar and upper molar areas and to some extent in the upper 1st premolar and lower 2nd premolar areas.

## P0901

### Evaluation of gingival crevicular fluid and peri-implant sulcus fluid levels of periostin

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**Aim:** Periostin is an extracellular matrix protein that expressed in collagen rich fibrous connective tissues encountered with constant mechanical stress. It is also present in the periodontal ligament and has a role in periodontal tissue homeostasis, controls the tissue stability under stress. Evaluation of the potential impact of loading around dental implants may be helpful to understand the events that occur in peri-implant tissues. The aim of the present study was to detect the levels of periostin in gingival crevicular fluid (GCF)/peri-implant sulcus fluid (PISF) and to evaluate the impact of loading time and gingival inflammation on periostin levels.

**Material and Methods:** Twenty dental implants (DI) placed in premolar and molar sites and 20 symmetrical natural teeth (NT) were recruited for the study. Implants supporting fixed bridges and overdentures and implants with signs of peri-implantitis were excluded from the study. Periodontal parameters were recorded and GCF/PISF samples were collected. Periostin levels in GCF/PISF were measured using ELISA.

**Results:** Periostin levels were 14.13 ± 20.5 and 13.9 ± 16.5 in PISF and GCF, respectively. Inflamed (GI > 0) sites have higher periostin levels than healthy (GI = 0) sites. However, this difference was not statistically significant. DI in mandibula have higher periostin levels than DI in maxilla. Correlations were also evaluated. PISF periostin levels were negatively correlated with functioning time.

**Conclusion:** Periostin levels were similar between DI and NT and between healthy and inflamed sites of DI and NT. However, periostin levels were negatively correlated with functioning time of DI, suggesting less bone remodeling around DI in later stages of functioning.

## P0902

### Evaluation of conventional implant treatment in addition with Er, Cr: YSGG laser effects on osseointegration

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**Aim:** Implant treatment with laser is used for implant socket disinfection after extraction, the formation of the implant cavity, removal of soft tissue on implant, immediate implant placement after extraction and treatment of peri-implantitis. The aim of this study is comparing the efficacy of conventional implant treatment in addition with Erbium, chromium: yttrium-Selenium-gallium-garnet (Er, Cr: YSGG) laser and conventional implant treatment.

**Material and Methods:** Sixteen patients were included in this study. Two implants were placed into each of the 16 patients. One of the two implants in every patient, implant cavity opened with conventional methods and implant was placed. Then the other implant was placed when Er, Cr: YSGG laser was applied after opening the implant cavity by conventional methods. ISQ (implant stability quotient) values were measured after the

implant surgery and recorded. After the process of osseointegration is completed ISQ values were measured again and the difference between two implants were compared.

**Results:** Er, Cr:YSGG laser group's mean ISQ value change was  $18 \pm 3$  and the control group's mean ISQ value change was  $13 \pm 1$ . The change of ISQ values in Er, Cr: YSGG laser group was determined significantly higher than the control group.

**Conclusion:** Er, Cr: YSGG laser application in the implant cavity, may provide better osseointegration, may prevent the osseointegration in the cavity from bacteria and maintain forming full osseointegration. Within the limitations of the present study, it was concluded that Er, Cr: YSGG laser may represent a promising tool for helping suitable osseointegration.

## P0903

### Clinico-morphological research of the material Bio-Oss<sup>®</sup> during bone-plastic operations

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**Aim:** To study the clinical and morphological characteristics of materials Bio-Oss<sup>®</sup> and Bio-Gate<sup>®</sup> on the stages of bone-plastic operations, especially bone regeneration in the area of the surgical field.

**Material and Methods:** The material for pathomorphological study was the intravital biopsy material of bone tissue from augmentation areas, which were obtained during the operation of implants placement. Clinical studies included subjective and objective methods, in particular the analysis of X-ray and photo documenting. We investigated material Bio-Oss<sup>®</sup>, membranes Bio-Gide<sup>®</sup>, Bio-Gide<sup>®</sup> Perio, pins Resor-Pin, implant system U-impl. We carried out 231 operation using materials Bio-Oss<sup>®</sup>, Bio-Gate<sup>®</sup>. Out of this number, 38 cases of sinus lifting were done, 145 – bone plasty with simultaneous implantation and 48 cases – periodontal surgery.

**Results:** Usage of bone-plastic materials Bio-OSS<sup>®</sup> and Bio-Gate<sup>®</sup> during various bone-plastic and periodontal operations provides high clinical effect (from 93% to 99%). Morphologically it is found that after usage of bone materials Bio-OSS<sup>®</sup> and Bio-Gate<sup>®</sup> a new osteoid tissue is formed, like bone tissue of the alveolar process, with high levels of mineralization, especially in the first 2 years, due to the simultaneous resorption of the material.

**Conclusion:** Newly formed tissue has a classic design and can fully perform the functions of the jaw bones, particularly favorable to carry loads that are transmitted with teeth or implants.

## P0904

### Surface changes of dental implant systems in sodium fluoride: an *in vitro* study

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**Aim:** Titanium and its alloys are the most commonly used materials in the field of implantology due to its good mechanical

and biological properties. However, some therapeutic solutions widely used in daily general dental practice can lead to corrosion of titanium-based materials. Aim: To evaluate surface changes and degradation of dental implant systems after their immersion in sodium fluoride.

**Material and Methods:** Dental implant systems (implant and abutment) were embedded in epoxy resin and cross-sectioned along the implant vertical axis. Sectioned samples were grinded, polished and then cleaned under an ultrasonic bath to perform optical profilometry and scanning electron microscopy (SEM) of the selected areas. These areas were immersed in 1.23% sodium fluoride gel (FG) for 16 min. After immersion, surfaces were cleaned and analyzed once again by SEM and profilometry.

**Results:** SEM analysis revealed topographic changes in implant systems after immersion in sodium fluoride. Implants showed an appearance of excessive oxidation with loss of material while abutment surfaces revealed intergranular corrosion. An increase of Ra roughness was observed for both implant and abutment after immersion in sodium fluoride 1.23%.

**Conclusion:** Changes caused by sodium fluoride were detected by scanning electron microscopy as localized corrosion of the implant and abutment. A high content of ions of Ti, Al, V was found in solutions containing fluoride after contact with implant systems. Considering the consequences generated by the degradation of titanium-based structures in the oral cavity, professionals should be alerted to the composition of fluoride solutions applied in daily clinical practice.

## P0905

### The antimicrobial effect of photodynamic therapy using methylene blue and diode laser on biofilm attached to sandblasted and acid-etched surface of titanium

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**Aim:** The aim of this study was to evaluate the antimicrobial effect of photodynamic therapy (PDT) on biofilm attached to sandblasted and acid-etched (SLA) surfaces.

**Material and Methods:** The bacterial strains used *Aggregatibacter actinomycetemcomitans*, *Streptococcus sanguinis*. SLA disks were subdivided into five groups including one control group and four test groups (LED only, E0, E60, E120) for PDT examination for each surface. The LED alone group was only irradiated with a diode laser. The E0 group was put into 1 ml of 100 µg/ml of methylene blue for 60 s. The E60, and E120 group were put into 1 ml of 100 µg/ml methylene blue and then irradiated for 60 s, and 120 s respectively. After PDT, survival rate of bacteria was determined by counting the colony-forming units (CFUs) after incubation. Scanning electron microscopy (SEM) and confocal laser scanning microscopy (CLSM) were used to observe the microorganisms on the disk surfaces.

**Results:** There were significant differences between control, LED alone groups and E0, E60, E120 groups. The E60, E120 groups showed a decreasing tendency of log CFU/ml. In the SEM images, control, LED alone, E0 group showed intact bacterial cell walls, however, the bacterial cell walls were changed after PDT. On CLSM images, E60, and E120 groups showed high proportion of dead bacteria with red color.

**Conclusion:** These findings suggest that combination of methylene blue and a LED (Periowave<sup>®</sup>) was effective in reducing the viability of biofilm attached to SLA titanium surface *in vitro*.

## P0906

### Biomechanical effect of implant neck design on peri-implant bone: a three-dimensional finite element analysis

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**Aim:** The purpose of this study was to analyze and compare the effect of different neck designs on implant-bone interface stress and strain.

**Material and Methods:** Four implant models constructed for 3D FEA comprised two implants with a 3 mm long micro-threaded neck (coarse and fine microthread profiles), one implant with main threads of the body continuing to the top and a model with 3 mm smooth neck. A static load of 200 N was applied in two angulations (0° and 30°) relative to the long axis of the implant and the resultant equivalent (EQV) and maximum compressive, tensile and shear stresses and strains were measured. The stress and strain contours in both cortical and cancellous bone were also obtained.

**Results:** Regardless of loading angle, the highest EQV stress was concentrated in cortical bone around the implant model using a smooth neck followed by threaded implant and coarse microthread models. The lowest stresses were observed in the model with fine microthreads. All types of measured stresses in all constructed models were increased with oblique loading. Moreover, the deformation in the cancellous bone was generally more than the cortical bone.

**Conclusion:** Peak stress levels in implant models varied with geometry of implant neck and direction of loading. The fine profile performed more favorably than the coarse microthreads. The smooth neck implant showed consistently higher cortical bone stress than other models.

## P0907

### Histological and histomorphometrical analysis of platelet-rich fibrin associated or not to an anorganic bovine bone xenograft on bone regeneration: a study in rabbits

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**Aim:** The aim of the present study was to investigate the potential use of leukocyte- and platelet rich fibrin (L-PRF), associated or not to a Bio-Oss, as grafting materials on bone regeneration in rabbit's calvarial defects.

**Material and Methods:** Four equal critical-size bone defects were created in frontal and parietal bone of 20 rabbits (New Zealand). The defects were randomly grafted with: L-PRF, L-PRF + Bio-Oss, Bio-Oss and one of them was left serving as a control. The animals were killed after 60 days postoperative procedures and the defects were evaluated by using histological and histomorphometric analysis.

**Results:** A higher percentage of bone formation was found in L-PRF group, which was not statistically different from L-PRF + Bio-Oss and control groups. The Bio-Oss group had presented the lowest bone formation, with statistically significant difference from other groups. In relation to bone filled of the defects it was observed that Bio-Oss had showed a higher mean among the groups, but not statistically significant different from L-PRF + Bio-Oss group.

**Conclusion:** The PRF accelerates the bone formation and it can be stated that its association with Bio-Oss was favorable once they may act as a scaffold by promoting the space maintenance for bone regeneration.

## P0908

### Implant-centered outcomes of guided surgery, a 2-year follow-up: an RCT comparing guided surgery with conventional implant placement

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**Aim:** The assessment of implant outcomes, both clinical and radiological, in a randomized study of guided implant placement at 2-year follow-up, compared to conventional treatment.

**Material and Methods:** A total of 282 Implants were placed in 57 patients, randomly assigned to one of the six treatment groups. Radiographic and clinical parameters were recorded at the time of implant placement, prosthesis installment (baseline), 1-year follow-up and 2-year follow-up.

**Results:** No implants were lost. The mean marginal bone loss after the second year of loading was 0.509 mm (0.862SD) for the guided surgery group and 0.318 mm (0.46SD) for the control group. In the guided surgery groups, the mean number of surfaces with BoP and plaque at 2-year follow-up was 1634 (1463SD) and 1.268 (1501SD), for the control groups this was, respectively 1253 (1,387SD) and 1978 (1.64SD). The mean pocket probing depth was 2906 mm (0.946SD) for the guided, and 2415 mm (0.745SD) for the control groups.

**Conclusion:** Within the limitation of this study, no statistically differences could be found between the guided group and the control group.

## P0909

### Histological evidence demonstrates clinical relevance of a newly developed implant system with tapered wall design: a comparative study in minipigs

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**Aim:** Histological assessment of bone maintenance and osseointegration defines the *in vivo* performance of dental implants. Although bone level tapered (BLT) dental implants are commonplace in the clinic, histological evidence is limited. This study tested a newly designed BLT implant in an intra-oral minipig model, to determine its effect on bone maintenance and osseointegration under loaded and unloaded conditions.

**Material and Methods:** Histomorphometry was performed on 2 implant types: Bone Level Tapered (BLT-test group 1) and Bone Level (BL-control group). The following readouts were obtained: fBIC, BIC and BATA. Implantation time: 4 weeks (unloaded), 8 weeks (loaded). All implants were Roxolid™/SLActive (Straumann).

**Results:** Under loaded conditions, no significant difference in bone preservation in the BL group ( $+0.3 \pm 0.4$  mm) was observed compared to the BLT group ( $0.0 \pm 0.5$  mm). Unloaded implants (both BL and BLT) demonstrated a decrease in bone preservation ( $-0.2 \pm 0.5$  mm &  $-0.3$  mm  $\pm$  0.4 mm, respectively). No statistical significant difference could be observed between the tested BLT and the BL implant (control) after 4 weeks (unloaded) and 8 weeks (loaded) of healing. However, unloaded implants had significantly less osseointegration than loaded implants.

**Conclusion:** Taken together, these results show a similar behavior and performance of BL and BLT implants. Direct loading of implants appears to be beneficial, regardless of the implant type. Overall, this study demonstrates that osseointegration and marginal bone maintenance of new BLT implants are consistent with current BL implant standards, highlighting their relevance as a dental implant for bone level applications.

## P0910

### Impact of dynamic and static load to bone around implant: an experimental study in rat model

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**Aim:** The aim of this study is to evaluate bone reaction around implant under dynamic and static load by rat model.

**Material and Methods:** Two titanium cylindrical implants were placed in the left tibia diaphysis of each thirty-nine rats. They were divided into three groups: static load for 4 weeks (S4), static load for 8 weeks (S8) and static for 4 weeks and after dynamic load for 4 weeks (S4D4). All implants were given mechanical lateral load. After experiments, implants were pulled out to measure attachment strength around implant bone. New bone formation ratio (NBF) and bone implant contact ratio (BIC) were measured by light and polarized microscopy.

**Results:** Histological bone tissue showed good contact between bone and implant. New bone appeared all around implants. Measured mechanical strength test result and BIC and NBF were statistically analyzed by Welch's *t*-test with Holm's correction for multiple comparison. Attachment strength value, (S4D4) shows statistically greater than the others. (S4D4) was demonstrated more complex collagen fiber orientation in new bone tissue compared with the other groups. No statistically significant differences were observed among the three groups (S4, S8, and S4D4) on NBF and BIC.

**Conclusion:** Dynamic and static loads applied to an osseointegrated implant occurred new bone amplification. Attachment strength was statically improved by giving dynamic load for 4 weeks compared with static load.

## P0911

### Chemical conditioning of titanium implant surface for enhancing compatibility

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**Aim:** It is well known that compatibility of Ti implant degrades over time after surface processing. The aim was to examine whether the chemical conditioning of titanium with NaOCl solution would effectively decompose surface contaminations and enhance compatibility.

**Material and Methods:** Commercially pure titanium disk (Ti) was used as a substrate. After polishing, the 8 specimens were cleaned ultrasonically in distilled water for 5 min and then stored under a dark ambient condition for 14 days (As-polished Ti). The surface contaminations of the 4 such disks were decomposed by chemical conditioning in 5% NaOCl solution (NaOCl-treated Ti) for 24 h. The wettability of the Ti surfaces was examined by measuring the contact angle of 4  $\mu$ l water droplet using a contact angle analyzer. Initial cell attachment of human bone marrow mesenchymal stem cell on each Ti was evaluated by hemacytometry and scanning electron microscopy (SEM). After incubation for 4 h, adherent cells were detached using 0.05% trypsin EDTA and the number of cells was measured with a hemacytometer.

**Results:** With the chemical conditioning in 5% NaOCl solution, the contact angle substantially decreased, showing that the hydrophobic surface ( $71.35^\circ$ ) was converted to the superhydrophilic surface ( $<5^\circ$ ). The number of attached cells to the NaOCl-treated Ti was 2.3 times as large as that attached to the as-polished Ti. These results were consistent with observations under SEM in terms of cell density on the two titanium surfaces examined.

**Conclusion:** Bio-functionalization of the Ti surface can be achieved by conditioning with 5% NaOCl.

## P0912

### Implant treatment in periodontally compromised subjects – quality of life and patient satisfaction

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**Aim:** To determine the quality of life of periodontally compromised patients after implant treatment (primary aim) and their satisfaction with the restoration and treatment approach (secondary aim).

**Material and Methods:** 61 adult subjects were evaluated following non-surgical periodontal treatment, under regular maintenance and implant therapy with a fixed restoration. Oral health related quality of life (OHQoL) was assessed using the short form of the Oral Health Impact Profile (OHIP-G14). Patient satisfaction with the restoration and treatment procedure was investigated applying a self-designed questionnaire focusing on social-psychological aspects. Statistical analysis of the collected data was performed using Kruskal-Wallis and Mann-Whitney-U-Test for the relationship between OHIP-score and number of implants, patient age, level of education.

**Results:** The average OHIP-G14 score of the examined study population was 2.78 (SD  $\pm$  4.2), whilst the item "pain" had the

biggest influence. No statistical significance was detected between the relationship between OHIP-G14 score and the number of placed implants ( $p = 0.98$ ). Furthermore, there was no statistically significant correlation between OHIP-G14 score and patient age ( $p = 0.67$ ) or for level of education ( $p = 0.39$ ). The questionnaire focusing on patient satisfaction showed a high level of contentment in this study population. All patients declared that they would repeat the treatment. Furthermore high level of satisfaction with aesthetics, stability, cleanability and speech comprehension was reported.

**Conclusion:** The study population showed a quality of life comparable to a healthy non-restored population after implant therapy. Analysis of the satisfaction with the realized implant-therapy provided consistently positive results.

## P0913

### Clinical comparison between PW-Plus and Ostem implant system supported single crown in the posterior mandible

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**Aim:** The purpose of this study was to compare the success rate between PW-Plus and Ostem implant supported single crown in the posterior mandible by a split-mouth-randomized design for a 1-year follow up.

**Material and Methods:** The study comprised of radiographic records of seventeen patients who were treated with both implant systems which were randomly placed in either left or right jaw sides. The amount of bone loss was chronologically determined i.e., after implant placement 3–4 months, after second stage surgery, 1 week after implant loading and every 3 month until 1 year follow up, compared with the level of bone immediately after implant placement by using Wilcoxon Signed-Rank test.

**Results:** When the fixtures were loaded through the crowns, the amount of bone loss between two implant system at the same period of time were not significant different, compared with before implant loading.

**Conclusion:** The osseointegration of PW-Plus and Ostem implant, after 1 year loading, were similar. Both implant systems can be used successfully.

## P0914

### Early bone apposition to hydrophilic and hydrophobic titanium implant surfaces: a histomorphometric study in minipigs

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**Aim:** The first objective of this pilot study was to evaluate the impact of the hydrophilicity on the early phases of osseointegration. The second objective was to compare two hydrophilic implant surfaces with different geometries, surface roughness, and technologies achieving hydrophilicity.

**Material and Methods:** Twelve weeks after extraction, all four quadrants of nine minipigs received three dental implants, alternating between hydrophilic microrough surfaces (INICELL and SLActive) and a conventional hydrophobic microrough surface. After 5, 10, and 15 days of submerged healing, ground sections were prepared and subjected to histologic and histomorphometric analysis.

**Results:** The histologic analysis revealed a similar healing pattern among the hydrophilic and hydrophobic implant surfaces, with extensive bone formation occurring between day 5 and day 10. With BIC values of greater than 50% after 10 days, all examined surfaces indicated favorable osseointegration at this very early point in healing. At day 15, the mean new bone-to-implant contact (newBIC) of one hydrophilic surface (INICELL;  $55.8 \pm 14.4\%$ ) was slightly greater than that of the hydrophobic microrough surface ( $40.6 \pm 20.2\%$ ). At day 10 and day 15, an overall of 21% of the implants had to be excluded from analysis due to inflammations primarily caused by surgical complications.

**Conclusion:** Substantial bone apposition occurs between day 5 and day 10. The data suggest that the hydrophilic surface can provoke a slight tendency toward increased bone apposition in minipigs after 15 days. A direct comparison of two hydrophilic surfaces with varying geometries is of limited relevance.

## P0915

### SEM analysis of osseointegrated phosphorous rich implants after 52 weeks in sheep pelvis

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**Aim:** The surface of dental implants determines the initial phases of the biological response and affects its ability to integrate into the surrounding tissue. Covalently binding a monolayer of phosphorous rich molecules (SurfLink) to well established surface modifications (sandblasting, acid-etching) offers new dimensions of osseointegration. The aim of this study is to present the surface analysis of SurfLink implants using Scanning Electron Microscopy (SEM) and elemental analysis (EDX).

**Material and Methods:** Machined and roughened dental implants with either SurfLink treatment or no treatment (control) were placed in the pelvis of 24 sheep. Selected implants, retrieved after 52 weeks healing, previously used for removal torque testing, were analysed by SEM and EDX (Phenom ProX SEM, high-sensitivity backscattered electron detector for topographical mode and thermoelectrically cooled Silicon Drift Detector for EDX).

**Results:** SurfLink implants showed increased bone coverage on the machined and roughened surfaces compared to control implants. The presence of mineralised fibrous structures was evidenced by significant Ca and P peaks detected by EDX, with bone cells on the SurfLink implant surface. The machined control implant showed a nearly denuded titanium surface. Fracture lines after torque testing occurred at the bone-implant interface in the control group, while the SurfLink implants showed a fracture line within the bone, indicating the absence of the typical proteoglycan layer.

**Conclusion:** SEM images of SurfLink implants showed fractures within the bone and not at the bone-implant interface. This suggests a significant increase in bone adhesion on SurfLink surfaces. Clinically this results in improved implant stability especially in the early phases of osseointegration.

## P0916

### Anisotropy of the trabecular bone around the human tooth-root

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**Aim:** Structural and mechanical anisotropy of porous materials, like trabecular bone are closely related. The aim of the following research was to determine the orientation of the trabecular bone microstructure inside the jaw-bones.

**Material and Methods:** A new anisotropy measuring technique – based on binary  $\mu$ CT images – has been developed, using inserted ellipsoids. The basic principle is to find the largest ellipsoids about certain points in the material, which contain bone and their surfaces touch the medullary cavity. The method has been applied on trabecular bone samples extracted from the jaw-bones of living humans and the structural anisotropy of the trabecular bone around the tooth root has been determined.

**Results:** The structural anisotropy of the trabecular bone surrounding the tooth root was determined by means of inserted ellipsoids and a fabric tensor was assigned to each bone sample. Comparable results could be achieved by transforming the fabric tensors into a uniform, anatomic coordinate system. From the measurements it can be concluded, that the trabecular bone around the living tooth possesses anisotropic geometrical properties and it is dominantly directed in the axial direction of the tooth. Connection between the trabecular orientations and the direction of the periodontal ligaments was also observable.

**Conclusion:** By the examinations of bone fractions from living humans the anisotropy of the jaw-bones has been proved to be effectively measurable using micro-CT imaging and inserted ellipsoids. In further examinations the mechanical anisotropy is being determined using  $\mu$ FEM analysis and compared to the mean directions of the trabecular structure.

## P0917

### Nanoadhesion of implant-colonising bacteria on Ti surfaces probed by AFM

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**Aim:** In this study, the adhesive interactions between titanium (Ti) implant surfaces and *Streptococcus sanguinis* and *Staphylococcus aureus* bacteria were studied with AFM single-cell force spectroscopy, employing live-bacterium functionalized probes.

**Material and Methods:** Live-bacterial functionalized probes were constructed to evaluate the adhesion of *S. aureus* and *S. sanguinis* to smooth Ti surfaces. Bacterial probes were freshly prepared by immersing a DOPA-coated probe in a suspension of *S. aureus* cells in TRIS buffer. After attachment, a smooth Ti substrate was placed under the probe for measurements, which were carried out submerged in buffer. AFM was employed in force spectroscopy mode with the Nanowizard II system. Thermal resonance calibration yielded spring constants of  $\sim 0.3$  N/m (0.35 N/m nominal for Bruker NP-O10, cantilever A). Probing was performed with loading force of 0.5nN and dwelling times of 0, 1, 15, 30 and 60 s.

**Results:** Differences were found for *S. sanguinis* and *S. aureus* regarding maximum adhesion force, adhesion work and rupture

lengths. Bond strengthening over a 60 s period produced increased values in both maximum adhesion force and work compared to 0 s dwelling times. Single-detachment events were clearly observable at higher dwelling times, and both rupture forces and contour lengths were clearly quantifiable.

**Conclusion:** Nanoadhesive interactions of oral bacteria with smooth Ti surfaces are different for both early and secondary colonisers. Analysis of unbinding events provides insight on the important bacteria-substrate coupling observed in implant bio-film formation.

## P0918

### Histological and biomechanical study of the osseointegration of Trabecular Metal Implant® installed in the rabbit femoral condyle

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**Aim:** The aim is to investigate the effect of the Trabecular Metal (TM) dental implant design, on implant stability and osseointegration after insertion using the rabbit femur model and to compare it to the Screw Vent implant (SV) design.

**Material and Methods:** Thirty two implants (16 TM and 16 TSV) were installed in the femoral condyle of 16 rabbits. Following a randomization protocol, implants were alternately installed. Half of the implants were retrieved after 8 weeks of healing, for histological and histomorphometric analysis. The percentage bone implant contact (BIC) and the percentage of bone volume (BV) at the region of interest was estimated. The remaining implants were used to analyze the removal torque (RTV) and the implant stability (ISQ) using Osstel® device. The results were tabulated and analyzed statistically. Comparison was done between the trabecular implant and the screw vent implant system.

**Results:** ISQ values showed significant difference between the two groups at 0 and 8 weeks healing, where the ISQ values at 0 day indicated high stability for both implants, the values are  $71.0 \pm 2.3$  and  $63.1 \pm 4.6$  respectively for the for the TM and TSV implants. After 8 weeks healing the stability remained significantly higher with the TM implants ( $74.1 \pm 3.8$ ). The RTV showed significantly higher values for the TM ( $35.8 \pm 2.2$ ) compared to the TSV ( $31.1 \pm 1.7$ ) implants. The BIC and BV percentage also showed significantly higher for the trabecular metal implants.

**Conclusion:** Based on the observation it can be concluded that the bone formation around the trabeculae might have promoted the bone ingrowth for secondary implant stability.

## P0919

### Pro-inflammatory response of human macrophages cultures to titanium

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**Aim:** Peri-implantitis is a destructive inflammatory process that activates bone resorption. Inflammasomes are large intracellular multiprotein complexes with a central role in innate immunity. Although inflammasome activation previously has been linked to

periodontal inflammation, yet there is no information on a potential association to peri-implant tissue inflammation. The aims were to examine cytotoxic and pro-inflammatory effects of metals used in dental implants, in an in vitro model and in clinical tissue biopsies.

**Material and Methods:** Human macrophages were exposed to Ti, Co, Cr and Mo in cell culture assays. Cytotoxicity was determined with the neutral red assay. The pro-inflammatory cytokine secretion was quantified with ELISA and the gene expression of inflammasome components with PCR. In addition, the concentrations of IL-1 $\beta$  and titanium (Ti) in mucosal tissue samples taken in vicinity to dental implants were determined by ELISA and ICP-MS, respectively.

**Results:** Ti ions in physiological solutions stimulate inflammasome activation in human macrophages and consequently IL-1 $\beta$  release. The pro-inflammatory activation caused by the Ti ions disappeared after filtration (0.22  $\mu$ m), which indicate an effect of particles. In addition, Ti alone did not stimulate transcription of the inflammasome components. The levels of Ti found in samples from tissues in vicinity to Ti implants showed concentrations at levels that activate a pro-inflammatory response in vitro ( $\geq 40$  mmol/l).

**Conclusion:** Ti ions form particles that act as secondary stimuli in a pro-inflammatory response. The role of Ti as inflammatory stimulus could be dependent on the involvement of other biologically active components, such as endotoxin.

## P0920

### Intrabony piezoelectric stimulation enhance bone growth and density during healing and osseointegration of dlmf surfaces

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**Aim:** Bone is piezoelectric and under the effect of a piezoelectric stimulation bone responds with a change in structural density and longer stimulation induce alveolar changes of medullary bone. The aim of this study was to demonstrate the effect of piezoelectricity on bone healing and osseointegration.

**Material and Methods:** 20 minipigs were treated with two surgical piezoelectric devices to create a conical defect in the cortical and medullary part of the tibia and compared to traditional drilling technique. The defects were shaped to be filled with DLMF implants (Tixos, Leader Italia) and sla implants (MIS, Israel). The implants were screwed with an insertion torque of 35 N/cm and the stability controlled. After 3 months the implants were removed without sacrificing the minipigs. The bone block with implant were studied with Micro-TC and histology. Micro-TC has been performed for all samples and bone density analysis was studied. All samples were then treated for histological analysis and stained with hematoxylin-eosin.

**Results:** All specimens treated with piezoelectric bone device have showed a faster healing and evident changes of the bone microarchitecture. The density of the bone was enhanced. The bone surrounding the implants inserted with piezoelectric device was more dense radiologically than the bone treated with traditional burs.

**Conclusion:** This study show unambiguously that live bone behaves as a piezoelectric material and respond to internal piezoelectric stimuli.

Piezoelectric stimulation modifies bone healing procedure, enhances bone density during osseointegration and lead to a more stable bone during years of functional loading.

## P0921

### Peri-implant soft tissues around a new ceramic implant: clinical and histomorphometric outcomes: a pilot study in minipigs

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**Aim:** The goal was to investigate clinical and histologically peri-implant soft tissues adjacent to a hard machined 3Y-TZP (ZrO<sub>2</sub>) ceramic tissue level implant comparatively to a pure titanium machined collar tissue level implant.

**Material and Methods:** In six minipigs, 3 months after extraction of lower premolars 2, 3, 4 and first molar, 18 implants (test: 9 ZrO<sub>2</sub> and control: 9 Ti implants, Straumann Dental Implants, Basel, Switzerland) were placed into the mandible in each animal according to a pre-defined randomization schedule. Two months later the animals were sacrificed and block biopsies were obtained. The qualitative histological assessment was performed (mesio-distal axis) as linear measurements. Furthermore collagen organization and inflammatory infiltration were quantified.

**Results:** The clinical behavior of both surfaces was similar with no inflammation found at any implant. The histomorphometric analysis revealed that the bone was located on same level at the Ti and ZrO<sub>2</sub> implants, 4.0 mm (0.5) vs. 4.0 mm (0.4). Evaluating the soft tissue it appeared that the total peri-implant mucosa height was similar for the two groups but the aspects of the soft tissue were allocated differently. Whereas the free epithelium (sulcus depth) was significantly reduced (test: 0.8 + 1-0.2 mm, control 1.4 + 1-0.6 mm) the biological width (attached peri-implant mucosa: barrier epithelium and connective tissue contact; test: 2.8 + 10.6 mm, control 2.3 + 1-1.0 mm) was increased in the ceramic group.

**Conclusion:** Within the limits of this pilot study it could be concluded that the behavior of peri-implant soft tissues around Ti or ZrO<sub>2</sub> implants is similar in a large animal model.

## P0922

### Postoperative pain felt with or without preoperative ketorolac administration prior to implant surgery: a prospective, randomized, double-blind, controlled, clinical trial

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**Aim:** To evaluate postoperative pain in implant surgery, comparing preoperative administration of ketorolac or placebo.

**Material and Methods:** From November 2011 to November 2013 100 consecutive patients with dental implant indication were included in the study. Patients were randomly allocated to receive implant placement with ketorolac or placebo 15 min previous to implant placement. 100 patients were included in this randomized controlled double-blind prospective clinical study,

considering each patient as one unit. Radiographical examination showed that all implants were clinically successful. The data were analyzed using the *t*-Student and chi-squared tests.

**Results:** 18 patients drop out of this study, 9 in test group and 9 in control group. Immediate postoperative pain was significantly more intense with the use of placebo. However, no significant results were found afterwards. Likewise, the inflammatory response was similar in both groups.

**Conclusion:** Only immediate postoperative pain improves with ketorolac administration prior to implant surgery.

## P0923

### Parameters for measurement of elastic modulus and Vickers hardness of bone-implant interface using dynamic microindentation

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**Aim:** The present study aimed to evaluate Vickers Hardness (VHN) and elastic modulus (E) of peri-implant bone with dynamic indentation at different implant locations.

**Material and Methods:** A total of ten cylindrical implants (7 × 3.5 mm, L × Ø) with Cone Morse connection (Titamax CM; Neodent, Curitiba, PR, Brazil) were inserted ex-vivo into fresh rabbit tibia. VHN and E was evaluated at the bone cortex between the base and tip of the thread (Bt and Tt, respectively) with a dynamic indenter instrument (CSM Micro-Hardness Tester, CSM Instruments, Peseux, Switzerland). A load of 200 mN, with a penetration time of 7 s, was applied perpendicularly to the bone-implant interface at seven locations 0.08 mm apart. Data were analyzed using Student's *t*-test (*p* < 0.05).

**Results:** The mean values and standard deviation regarding VHN group were 125.6 ± 40.8A and 120.1 ± 43.7A, for Bt and Tt, respectively; the corresponding values regarding E were 16.6 ± 1.7A and 17.0 ± 2.5A, respectively. No significant differences were observed between Bt and Tt for both VHN and E.

**Conclusion:** Lack of significant differences in the mechanical properties of bone among the various locations may suggest that a homogeneous characterization during computational analysis of peri-implant bone may be more appropriate.

## P0924

### The effect of abutment materials on peri-implant tissue integration: a study in minipigs

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**Aim:** The peri-implant soft tissue integration remains a critical aspect for the long-term success of dental implant therapy. The peri-implant biological width (BW) as several factors influence trans-mucosal barrier, such as connection design, the physico-chemical characteristics of the abutments and the prosthodontics procedures. The goal was to evaluate the effect of four types of materials routinely used in implant dentistry on the mucosal

interface between implant abutments and peri-implant soft tissues and bone remodelling in a minipig model.

**Material and Methods:** Four implants and four abutments were randomly placed at each hemi mandible for five minipigs in a single stage surgery. The following types of abutment were used: titanium (control), PMMA, zirconia and veneering ceramic. The mandibles were dissected and each implant was retrieved for histological processing. The peri-implant bone remodelling and soft tissue dimensions were measured mesially and distally for each implant.

**Results:** No statistically significant difference was found between the four studied abutment materials. A long junctional epithelium was observed with all abutments, and the mean connective attachment was inferior by 0.2 mm corresponding to 4% of the BW dimension.

**Conclusion:** In these particular conditions, the findings from the present study demonstrated that the abutment materials tested in this study allowed for soft tissue adhesion. These results are in contrast with other findings demonstrating the decisive importance of transgingival component materials on BW positioning. The BW consisted of a long junctional epithelium and extended close to the bone level with a rather low portion of connective tissue interface.

## P0925

### Marginal bone level at 24 months of primaconnex implants: prospective cohort study

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**Aim:** The aim of this prospective cohort study was to examine the crestal Marginal Bone Level (MBL) of PrimaConnex implants system (Keystone Dental, MA, USA) after 24 months from placement in a partially dentate patients.

**Material and Methods:** Fifty-four patients (20males, 24females; mean-age 54.77 ± 11.73), which encountered inclusion criteria, were enrolled in this study. A total of 122 implants were inserted by one operator. Sixty-two implants were placed in healed-site with a full-thickness flap surgical procedure and sixty implants were placed with a flapless procedure. Intraoral radiographs were taken using paralleling technique before surgery, at impression making and after 3, 6, 12 and 24 months. Metal-ceramic crown was cemented on the abutment of the implants after 3 months. Radiographs were blindly evaluated twice by two experienced examiners. MBL was assessed at mesial and distal levels between the implant shoulder and the first bone-to-implant contact. Periodontal-Index were also evaluated: Bleeding on Probing (BOP) and Pocket Depth (PD)

**Results:** After 24 months, 119 implants were successfully osseointegrated and stable. Three implants were lost at 3 and 6 months after the insertion, (cumulative success rate; 97.54%). The total MBL was 0.33 ± 0.62 mm at 3 months, 0.46 ± 0.72 mm at 6 months, 0.70 ± 0.86 mm at 12 months and 1.05 ± 1.01 mm at 24 months. Figure shows MBL variation of the 2 groups. BOP and PD were stable and not different during the time and between the groups

**Conclusion:** PrimaConnex implants showed a limited reduction of MBL, suggesting that both surgical techniques may preserve the integrity of marginal bone. MBL was within the normal range.

Topic: Bone regeneration therapies

## P0926

### Orthodontic Bone Stretching technique (OBS) for the management of ankylosed teeth and malpositioned implant: preliminary results

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**Aim:** Ankylosed teeth or implant can conduce to infraclusion and aesthetic problems during the alveolar growth. To evaluate the movement type of the ankylosed teeth or implant, in infraclusion or malposition, after treatment by OBS.

**Material and Methods:** This study was approved by the CPP ethics committee. In a cohorte of 12 patients presenting ankylosed teeth (10), or implants in inaesthetic positions (2), a corticotomy followed immediately by orthodontic traction were performed. Measurements were recorded, in reference with adjacent teeth, just after the surgery and every 15 days during the orthodontic treatment. When the tooth or implant were in the occlusal plane, the treatment was considered finished.

**Results:** In all the cases, teeth or implants has been moved to the occlusal plane. Movements have began between 3 and 8 weeks after surgery and were not linear. The time of treatment depended of the axis of the tooth or implant. In three cases, two surgical interventions were necessary. If we treated a group of two ankylosed teeth (3 patients), the results were similar. The procedure is limited at the vestibular or palatal cortical. Corticotomies generate osteoclastogenesis and osteogenesis. The orthodontic traction promote bone stretching around the surgical area: this is the way for the ankylosed tooth or implant to move with all the bone block. This can be interpreted as a vertical bone augmentation. Finally, the corticotomy's design has a importante impact on the ankylosed tooth or implant movement.

**Conclusion:** In the limit of this study, OBS can improve the positioning of ankylosed tooth and implant.

## P0927

### Three dimensional osteosynthesis with special polymer material PDLA

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**Aim:** The aim is to initiate surgical protocol resulting in predictable treatment outcomes of tissue regeneration through adaptation of the grafting materials to the bone surfaces and fixed with ultrasound resorbable pin Osteosynthesis with special polymer material PDLA, which helps to achieve the osseointegration required for completing the treatment desired, to treat totally or partially edentulous jaws, with osseous defects to augment atrophic ridges, to restore the original structure and function, to overcome difficulties caused by the presence of significant Horizontal and vertical bone defects. However, implant placement may prove difficult or impossible in Sites with limited alveolar bone height or width.

**Material and Methods:** Using the Sonic Weld technique method we can obtain Three-dimensional infiltration of the pin

into the osseous structure, forming a load-bearing unit through locking mechanism between the membrane and the Sonic Pin.

**Results:** Prevent membrane and bone grafting material collapse. To avoid the defects heal with fibrous connective tissue instead of bone.

**Conclusion:** Using, the Sonic Weld method has a number of very significant advantages: (i) No second intervention, which would be a considerable physical and psychological trauma for the patient. (ii) Avoid of fractures of the fixation elements. (iii) Higher three dimensional load capacity. (iv) No cellular reaction around the pin. (v) There is neither clinical nor histological evidence of any initial inflammation. (vi) There is sufficient interlinkage of the polymer and the trabecular structures to ensure stability.

## P0928

### Adjusting regenerative techniques to a global era

M.D.M. Costa

Covilhã/Portugal

**Aim:** We are now living in a global era where some of our patients work abroad and have less time available to come to our clinic. In some cases, the best option is to adjust the surgical techniques to this type of patients. And in order to minimize the risk as much as possible and increase the likelihood of a successful outcome, a thorough risk assessment and planning must be done prior to any intervention.

**Material and Methods:** A 35 year old male patient came to our clinic to resolve a failed implant on tooth 21. After radiographic examination we concluded that we were facing a big bone defect but the interproximal height of the bone was intact. The patient was going to stay in Portugal only for 15 days and was only returning after 9 months and, therefore, one of his demands was to complete the treatment in the minimum number of appointments possible. The implant placement and soft and hard tissue regeneration were performed in only one surgery combining several types of materials and techniques.

**Results:** Only two surgeries were needed to complete the case and with a high aesthetic outcome. In this case we could transform a complex treatment that would need several surgeries in a less complicated case. We were aware that the risk of following this kind of treatment was very high and that planning was crucial for a successful end result.

**Conclusion:** In some cases (with the ideal patient and anatomical conditions) it is possible to reduce the number of surgeries and have a predictable outcome combining hard and soft tissue regenerative techniques.

## P0929

### Implanting after bone regeneration via root extrusion

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**Aim:** Bone defects after tooth extraction and soft tissue dehiscence may be treated according to different protocols. Orthodontic extrusion associated with Guided Bone Regeneration (GBR) provides predictable and esthetic results. However, it

requires a multidisciplinary approach and a longer treatment time than immediate root extraction with bone grafting.

**Material and Methods:** A 38 year-old female patient with a lower gummy smile presented with a periapical lesion on tooth 41 and a bad prognosis. Orthodontic extrusion was performed to compensate soft tissue dehiscence and bone defects. After stabilization, the root was extracted. An implant covered by a rigid titanium barrier was placed simultaneously.

**Results:** After root extrusion, soft tissue increased vertically by 2 mm. After GBR and implant placement, the apical lesion was completely filled with new bone. The soft tissue returned to normal following crown placement and was still stable after 7 years. This was better than for the adjacent natural teeth, and showed only 1–2 mm proximal bone loss.

**Conclusion:** GBR associated with root extrusion (even in the presence of a periapical lesion) is a successful method to prevent soft and hard tissue loss after extraction. The titanium membrane was used as a space maintainer only. No grafting material was needed. This good result was still observable after 7 years.

## P0930

### New bone formation after application of recombinant human bone morphogenetic protein-9 with chitosan or collagen carrier in rat calvarial defects

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**Aim:** To accomplish effective bone formation in bone deficiency, various growth factors and their carriers have been extensively investigated. Recently, it has reported that bone morphogenetic protein-9 (BMP-9) is a potent osteoinductive molecule. The aim of this study was to examine the effects of recombinant human BMP-9 (rhBMP-9) with chitosan sponge (ChiS) or absorbable collagen sponge (ACS) on bone formation in rat calvarial defects.

**Material and Methods:** Twenty animals surgically received two calvarial defects (diameter, 5 mm) bilaterally in each parietal bone. The defects were treated by one of the following implantations: ChiS, rhBMP-9/ChiS, ACS, rhBMP-9/ACS and no implantation as a surgical control. The animals were euthanized at 8 weeks after the surgery, and microcomputed tomographic ( $\mu$ CT) analysis and for histological evaluation were performed.

**Results:** The levels of bone volume (BV) in the ChiS, rhBMP-9/ChiS, and rhBMP-9/ACS were comparable and they were higher than in the control group. The percentage of defect closure (DC) in the rhBMP-9/ACS group ( $86.49 \pm 14.03\%$ ) was significantly greater than that in the ACS group ( $54.91 \pm 23.92\%$ ) ( $p < 0.05$ ). Furthermore, the rhBMP-9/ACS group demonstrated the highest level of DC among all the groups. The central bone heights in the ACS-implanted groups were significantly higher than those in the ChiS-implanted groups (ChiS and rhBMP-9/ChiS). The newly formed bone area (NBA) and NBA/total area in the ChiS-implanted groups and in the rhBMP-9/ACS group were significantly greater compared with those in the ACS group.

**Conclusion:** The present results suggest that rhBMP-9/ACS has significant potential to induce bone formation in rat calvarial defects.

## P0931

### Esthetic outcome of an implantation (in site of the upper lateral incisor which had combined endodontic and periodontal lesions) in a patient with history of localized aggressive periodontitis (LAP), 4 years results after the placement of implant- case report

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Esztergom/Hungary

**Aim:** Combined endodontic and periodontal lesions often cause vertical and horizontal bone loss. This presents a challenge for the clinicians especially in patients with history of LAP. Willing to minimise the risk, the solution could be a two stage surgery in such cases.

**Material and Methods:** A 44-year-old woman presented for treatment with an untreatable tooth 22, which was mobile due to a combined endodontic and periodontal lesions.

**Results:** The tooth has been extracted. The temporalisation consisted in all stage of bonding composite bridge.

There have been 4 mm vertical and 3 mm horizontal defect extended to a large area. 6 weeks after the extraction an augmentation has been implemented with xenograft (granules 0.25–1 mm, Bio-Oss, Geistlich). Due to the vertical defect we fixed it with laser perforated titanium membrane ( $17 \times 21$  mm, Frios, Dentsply) and titanium tacks (Frios, Dentsply). 9 months after the healing a bone level implant ( $4.0S \times 15$  mm, Astra Tech, Dentsply) has been placed with closed healing (October, 2010). The healing was unevenfull in all stages.

3 months after, a customized provisional abutment with a temporary crown has been screwed on the implant. 4 weeks later we took impression with open tray technique with individualized impression coping. We have used zircon abutment ( $4.5 \times 1.5$  mm) and a cemented zircon based crown as final crown.

We have followed up this case from October 2009 until October 2014. The peri-implant soft and hard tissues are stable since 2010 (PPD  $\leq 4$  mm, BoP negative).

**Conclusion:** In similar clinical situations this method could give predictable outcome.

## P0932

### Sandwich osteotomy of the atrophic posterior mandible prior to implant placement: case report

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**Aim:** New technique for vertical ridge augmentation in severe atrophic mandible.

**Material and Methods:** A 49 year old female patient was presented with a bilateral atrophic mandible and a need for implant therapy. Con-beam Ro showed mandibular ridges that were not suitable for immediate implant placement in terms of height (6.2 mm on the left side and 7.2 on the right side). Two vertical and one horizontal bone cuts using a piezoelectric instrument were made 2 mm above the mental foramen. The more mesial vertical cut was performed 2 mm away from the adjacent tooth. The bone segment was then raised upward to leave space for

the bone graft. An allogenic bone block was interposed and placed in the middle of the space formerly created without any fixation between the basal segment and the cranial segment. The remaining spaces in both ends were filled with particular bone graft. The wound was then closed primarily. After 3 months endosseous implants were inserted, two into the right side, and three in the left side of the mandible, measuring 4 mm in diameter and 10 mm in length.

**Results:** In this case implants placement of 10 mm in height were made possible with vertical ridge augmentation (6.2 mm on the left side and 7.2 on the right side), using the sandwich osteotomy technique.

**Conclusion:** The technique, which has been recently revisited, permits dental rehabilitation in terms of raising the bone height above the nerve, reshaping the alveolar crest, and normalize the interocclusal distance and the crown-implant ratio.

## P0933

### Isolation of mesenchymal stem cells from gnathic bone marrow by closed system device using nonwoven fabric filter

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**Aim:** Recent advances in tissue engineering have demonstrated the clinical utility of mesenchymal stem cell (MSC) transplantation for both periodontal and peri-implant tissue regeneration. The aim of this study was to evaluate the usefulness of a device with a nonwoven fabric filter, which selectively traps MSC based on affinity, for isolation of MSC from gnathic bone marrow.

**Material and Methods:** A total of 44 bone marrow aspirates were obtained from 35 patients during surgery for dental implant placement. Isolated cells were then seeded onto tissue culture dishes. As a control, without using the device, cells harvested by centrifugation were directly seeded onto dishes. After 14 days of culture, colony formation was confirmed by microscopy. Colony-forming cells were characterized by flow cytometry using MSC-specific cell surface markers.

**Results:** Isolated colony forming cells expressed CD73, CD90 and CD105, but not CD14, CD19, CD34, CD45 or HLA-DR. Colony-forming cells obtained using the device were detected in 10 of 30 samples (33.3%), while colony-forming cells obtained without using the device were detected in 3 of 14 samples (21.4%). Logistic regression analysis for various factors in relation to ex vivo expansion of alveolar MSC showed that odds ratios for use of device and premolar were 4.090 and 6.809, respectively.

**Conclusion:** The present results suggest that use of the device with a nonwoven fabric filter may allow the efficient isolation of MSC from gnathic bone marrow in a closed system.

## P0934

### Ridge augmentation of severe bony defects with advanced platelet rich fibrin and titanium mesh scaffold: a case study

D.Y. Huang

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**Aim:** Dimensional increase and high percentage of vital autogenous bone are the two criteria of success in ridge augmentation procedures. Advanced platelet-rich fibrin (A-PRF), an autologous fibrin platelet preparation containing growth factors and vital cells has shown to enhance augmentation results. This case study presents use of A-PRF with titanium mesh (Ti-mesh) to successfully treat severe bony defects for future implant placement.

**Material and Methods:** Five patients presented with <2 -wall bony defects after tooth or implant loss. Bone augmentation was performed at the site of bony defect. A-PRF plugs and membranes were prepared using the Choukroun method. A-PRF plugs and CaSO<sub>4</sub> was used as graft materials and Ti-mesh as scaffold. A-PRF membranes placed to cover over Ti-mesh. Primary closure achieved. Ti-mesh was removed at 4 month. Bone core was harvested prior to implant placement and sent for histomorphometric analysis.

**Results:** The bone regeneration procedure utilizing PRF maximized attached gingiva and minimal vestibular depth loss, without need for primary closure. A-PRF enhanced bony defect healing and native bone quality healing. Histomorphometric analyses indicated 47–56% new bone and 100% vital bone. Moreover, no fibrotic tissue or bacteria was observed in the samples.

**Conclusion:** The use of A-PRF resulted in excellent healing without the need for a membrane. Moreover, this procedure is minimally invasive, easily performed and cost effective. The use of PRF resulted with enhanced healing and improved soft and hard tissue quality and quantity. We conclude that PRF can be utilized in severe bony defects and allow for ideal future implant placement.

## P0935

### Volumetric analysis of new bone formation and bone substitutes after sinus floor elevation using synchrotron radiation micro-computed tomography

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**Aim:** Maxillary sinus floor elevation has been shown to be the most predictable surgical techniques to enhance bone volume for the placement of dental implants in posterior region of maxilla. The primary purpose of this clinical study was to evaluate 3D volumetric analysis of new bone formation and bone substitutes after sinus floor elevation using synchrotron radiation x-ray micro-computed tomography (SR- $\mu$ CT). The second aim was to analyze the reliability of SR- $\mu$ CT to access bone microstructure of the maxillary sinus graft area.

**Material and Methods:** After 6 months of sinus floor elevation, bone biopsy specimens were collected and 6 specimens were studied. Percentages of bone between 3D volumetric analy-

sis using SR- $\mu$ CT and 2D area analysis using conventional histomorphometry were compared.

**Results:** The mean NB% values were  $24.16 \pm 6.49\%$  for SR- $\mu$ CT and  $23.38 \pm 3.86\%$  for the H&E photomicrographs. The mean fraction of six specimens between new bone and bone substitute is not significant difference. From the analysis of each sample, we found that the estimation from limited center region by using areal based technique could give the biased result.

**Conclusion:** New bone volume of total volume assessed by SR- $\mu$ CT correlates with the percentage of bone assessed by conventional 2D histologic photomicrographs. SR- $\mu$ CT is reliable technique to determine the newly formed bone at the site of maxillary sinus floor.

## P0936

### Immediate loading with temporary implants and allogenic bone blocks in cases of narrow ridges as bone regeneration for permanent implants

B. Retzkin

Herzlia/Israel

**Aim:** The aim of this novel approach is to widen the bone, in narrow ridges cases in which it's not possible to place standard or even narrow diameter implant. The second scope is to temporize the partially or totally edentulous ridge, without disturbing the healing process of the regenerated bone.

**Material and Methods:** 10 cases. 8 fully edentulous 2 partially edentulous, The treatment protocol: placing 6, one piece narrow implants (2.4 mm<sup>3</sup>) in the narrow ridge. the horizontal bone regeneration is done by allogenic bone blocks fixated and a mixer of particulated bone allograft and xenograft and covered with resorbable membrane. After 6 month, regular platform implants were inserted, living the temporary implants to support the temporary bridge. after 6 more month the permanent implants were uncovered and the temporary implants were taken out, the permanent implants were loaded with the temporary restoration, after 2–3 month the final restoration.

**Results:** 10 cases were followed between 2 and 52 month. 32 allogenic bone blocks were fixated in 8 total edentulous and 2 partially edentulous cases. 52 temporary implants were inserted, 48 permanent implants were inserted in 8 out of 10 cases. In one case 2 final implants had to be removed after the uncovering, before loading, and were redone.

**Conclusion:** Temporary implants in combination with allogenic bone graft is used in cases of narrow ridges, in which fixed temporization is needed to avoid uneventful healing. More investigation should be done.

## P0937

### Callus distraction using HA-coated titanium plates

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**Aim:** To evaluate the eligibility of a new distraction technique for vertical bone augmentation, based on the insertion and elevation of a thin HA-coated titanium plate with distance to the

underlying bone and subsequent callus distraction underneath the titanium.

**Material and Methods:** After approval by the local ethics committee six healthy patients revealing a vertical bone defect of the posterior mandible (two bilateral) were consecutively included in the study. HA-coated titanium plates were inserted with 1–2 mm distance to the underlying bone and fixed using an individual bridge. After a callus-forming phase of 7 – 10 days, membranes were elevated 0.70 mm per day until heights of 4–8 mm were reached. After a consolidation time of 4–8 months, titanium plates were removed and bone core biopsies were harvested.

**Results:** Initial healing period was uneventful in all cases. Six of eight augmented areas showed sufficient vertical bone formation. Implants could be placed as planned before, and histological evaluation showed excellent bone formation with physiological microarchitecture of the bone trephines. Complications were an insufficient retention with consecutive height loss and a trauma-related soft tissue perforation 6 weeks following plate application. In the other cases, radiographs taken after a consolidation period of 4 months showed initial mineralisation of the augmented area, increasing its radiodensity up to 8 months. Implants revealed stable bone levels at implant uncovering.

**Conclusion:** The new technique of distraction osteogenesis using HA-coated titanium plates supports vertical bone regeneration in man. It represents a minimal invasive alternative for augmentations of in the severely resorbed jaw.

## P0938

### A 3D printed TCP/HA bone graft as a solution for large vertical augmentation

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Geneva/Switzerland

**Aim:** OsteoFLUX<sup>®</sup> (OF) is a 3D printed porous calcium phosphate block for oral bone augmentation. The mechanically stable scaffold shows a defined interconnecting porosity and can be readily shaped to conform the bone bed's morphology. A case report is shown on the performance and safety of this scaffold to promote vertical growth of cortical bone in a canine mandible model.

**Material and Methods:** One OF block (10 mm length, 5 mm width, 5 mm height) was fixed and covered by a collagen membrane onto the edentulous dog mandible that was previously flattened. A particular attention was paid not to create a too deep defect (0.5 mm depth) in order to evaluate the real potential of OF for driving vertical bone growth on a supra-crestal level. Histomorphometric analyses were performed after 8 weeks.

**Results:** At 8 weeks OF led to substantial vertical bone growth up to 4.5 mm from the bone bed. Between 0 and 1 mm in height, 46% of the surface was filled with new bone, from 1 to 4 mm about 25–30%, up to 4.5 mm about 6%. New bone was evenly distributed along the mesio-distal axis and drew a new crest contour in harmony with the natural mandibular shape.

**Conclusion:** After 2 months healing, OF conducts new bone growth above its natural bed, up to 4.5 mm in a canine mandible model. Furthermore, the new bone is evenly distributed all along the block, in height and density. These results are very

promising and need to be further evaluated by a complete powerful study using the same model.

## P0939

### Alveolar bone augmentation with xenograft and autogenous graft before dental implant placement: a case report

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**Aim:** Alveolar bone resorption occurs following teeth extractions. When the bone is resorbed, this elemental supporting tissue should be re-occured or restored in order to perform an ideal implantation. Several clinical techniques and a variety of biomaterials have been used over the years to restorate the alveolar bone.

**Material and Methods:** Case report: 49 year-old male systemically healthy patient who lost his upper left premolar teeth before referred to our the department of periodontology to get the implant therapy. Implant placement was planned in the left maxillary region following the clinical examination but radiographical and tomographical examinations revealed inadequate bone volume to place an implant depend on the horizontal and vertical alveolar ridge deficient and it was decided to perform a bone augmentation surgery. Following the full thickness flap elevation the flap was loosened and all granulation tissues were removed from the bone surface. Autogenous graft harvested from symphysis area and xenograft (Bio-oss, Geistlich) material was mixed with natural bone and graft materials were placed on to the defect area and was covered by collagen based membrane (Bio-Gide, Geistlich). Collagen membrane was fixed with miniscrews (Pro-fix/1.5mm × 3.0 mm). Than the soft tissue was secured with silk sutures.

**Results:** Autogenous graft can be added to xenograft in different ratios to add osteoinductive properties and subsequently enhance bone formation. Therefore in this case both xenograft and autogenous graft were used together.

**Conclusion:** Following the 6 months of healing period sufficient bone volume was determined by tomographical examination.

## P0940

### The layer technique for sinus floor elevation: a 9 year radiographic follow up

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**Aim:** The aim was to evaluate radiographic stability of SFE procedures using a modified technique in a long-term follow-up

**Material and Methods:** In 2004, 198 SFEs were performed in 118 patients using a modified technique: basal parts of sinus floor were grafted with pure intra-orally harvested autogenous bone particles, cranial parts with pure slowly resorbable biomaterial (Frios<sup>®</sup> Alpipore), before using a titanium membrane (Frios<sup>®</sup> BoneShield) for sinus window coverage. In case of simultaneous implant placement, implant surfaces were covered with autogenous bone particles. In two-stage procedures, implants were inserted 3–4 months post-operative and loaded after a further healing time of 4 months. Panoramic radiographs

taken after each surgical stage, after prosthetic restoration and once a year for 9 years were used to measure the height between the implant shoulder and top of the graft in two different positions considering two most posterior implants.

**Results:** 581 implants (Dentsply<sup>®</sup> Xive) were placed in grafted areas. No severe post-operative complications occurred. At final examination 578 implants were included. After a small decrease of vertical height between grafting surgery and second-stage surgery (average 1.8 mm), there were no changes of the gained bone height. Radiological evaluation after 9 years showed maintenance of vertical height.

**Conclusion:** The layer grafting technique showed radiographic stability of vertical height over a 9 year period. This technique allows early placement of implants in grafted areas and early loading after a time of 4 months. The survival rate obtained with this procedure is similar to those expected for implants placed in non-grafted areas.

## P0941

### Implant site development by orthodontic extrusion for flapless immediate implant placement: results after 4 years

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**Aim:** The aims were to evaluate (i) if implant site development by orthodontic extrusion (ISDOE) can create a keratinised mucosa surplus to compensate mid-vestibular mucosa recession following immediate implant placement (ii) the 4 year stability of the mid-vestibular mucosa and the thickness of these vestibular tissues (iii) 4 years implant survival rate

**Material and Methods:** Orthodontic extrusion of 20 nonrestorable teeth was done in sextant 2 with initial marginal gingiva more apical than the adjacent teeth or at the same level. Flapless immediate implant placement was performed using Straumann SLActive BoneLevel Implant without systematic vestibular bone grafting. Only 2 patients received bone graft. Immediate screw retained resin temporization was performed within 24 h and conventional loading at 3 months with screw retained full-ceramic restoration (Etkon system). The main followed parameters were the width of mid-vestibular keratinized mucosa, the thickness of vestibular crest and the implant survival rate.

**Results:** Orthodontic extrusion increased the width of mid-vestibular keratinized mucosa by  $2.8 \pm 0.7$  mm. Four years later, the mean recession was  $2.0 \pm 0.7$  mm. There was no implant loss, no aesthetical, biological nor technical complication for final restoration. Only one temporary crown veneer fractured. However, there was a mean thickness breakdown of  $0.7 \text{ mm} \pm 0.3$  without any esthetical problem from any individual.

**Conclusion:** ISDOE can create a keratinised mucosa surplus that compensates mid-vestibular recession following immediate implant placement but does not prevent vestibular thickness breakdown. Another study should examine if systematic vestibular bone graft can prevent that.

## P0942

### Tridimensional bone regeneration using the “bone casket” technique

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**Aim:** to investigate the amount of vertical bone regeneration obtained by using a “bone casket” made out of extra-fine cortical blocks (Khoury’s technique) in horizontal and vertical bone defects.

**Material and Methods:** Prospective study. 33 patients. Inclusion criteria: Smoking <5 cigs/day. Partially edentulous. Showing a vertical defect >3 mm, media of 5.5 mm (3–13 mm) at premolar or anterior zone. No systemic diseases that can interfere with the regeneration treatment. A supracrestal incision was made in the defect area. Then a rigid acrylic stent supported by the adjacent teeth was placed and measures were made from the stent to the most apical part of the bone defect (baseline). Then a cortical bone block was obtained from the oblique line of the mandible. The block was sagittally sectioned to obtain blocks that would form the buccal and palatal walls of the casket around the defect. The casket was filled by particulated bone and then another block was placed sealing the casket. Tension-free primary closure was made. After a 4–9 months healing period reentry was made.

**Results:** Healing was uneventful in all cases but two. Measures were made from the stent to the regenerated bone showing a vertical regeneration of 5 mm (counting the 2 failure cases). Astra Tech implants were placed and in 6 random cases bone biopsies were taken using trephine hollow burs. After a 3-month healing period implants were loaded. One year after loading all implants presented proper clinical and radiographic status.

**Conclusion:** The “bone casket” technique is reliable at obtaining vertical bone regeneration.

## P0943

### Influences of age, gender and ovariectomy on early stages of healing of subcritical-sized calvarial defects in rats

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**Aim:** The aim was to evaluate the influences of age, gender and ovariectomy on early stages of healing of calvarial bone defects in rats. Spontaneous healing was compared to the healing enhanced by a collagen membrane with deproteinized bone particles of equine origin.

**Material and Methods:** 28 Wistar rats divided in four groups of 7 animals (n = 7) were used in experiments: male rats aged 20 – 25 months, young (3 – 6 months) male rats, young female rats and young female rats, ovariectomized 2 months before experiments. In each rat, two symmetrical subcritical-sized calvarial defects of 3 mm were drilled. Left-side defects were covered by a collagen DuoTeck<sup>®</sup> membrane containing deproteinized bone particles. After 8 weeks, calvarial specimens were examined by histological, morphometric and densitometric analysis.

**Results:** Histological analysis showed bone fill of different quality in spontaneously healed defects (centripetal growth) and

membrane covered defects (centripetal growth + residual xenograft particles, embedded in connective tissue). Foreign body inflammatory reaction was apparent around xenograft particles eventually covered with a new osteoid. 3/28 of spontaneously healing defects and 4/28 of membrane covered defects showed complete bone closure. Compared to the young female rats, the surface area of residual defect on sites of spontaneous healing were 22%, 91% and 119% greater and optical density of newly formed bone 10%, 18% and 17% lower in young male, old male and ovariectomized rats, respectively (p > 0.05).

**Conclusion:** Our findings indicate on negative effects of ovariectomy and ages on bone fill and mineralization in early stages of bone regeneration.

## P0944

### Porous silicon versus calcium phosphates: what is the best materials for bone tissue engineering?

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F. Cuisinier

Montpellier/France

**Aim:** Bone tissue engineering is the only way to regenerate alveolar bone. The aims of this study was to experiment in vitro and in-vivo the potential of dental pulp stem cells (DPSC) on three different scaffolds to achieve functional bone tissue regeneration.

**Material and Methods:** DPSC were seeded on Bio-oss<sup>®</sup>, Puros<sup>®</sup> and porous Silicon (pSi) particles. Proliferation was measured via quantification of acid phosphatase activity. Then, critical sized bone defects were drilled in 4 caudal vertebrae of ten whistar rats. The four defects (total defects = 40) were filled with pSi, Bio-oss<sup>®</sup>, Puros<sup>®</sup> carrying DPSC or let empty (negative control). The rats were sacrificed 4 weeks after surgery. Rat’s vertebrae were analyzed by mCT to assess newly formed bone density. Histological evaluation was performed after Goldner-Masson staining. The presence of bone markers was assessed by immunostaining with anti-osteocalcin antibody and HNA (human nucleus antidody). New bone formation was calculated with image J, as a percentage of defect filling and osteocalcin activity.

**Results:** The proliferation assay showed higher proliferation of DPSC on pSi particles. The mCT analysis couldn’t be compared because of Bio-oss<sup>®</sup> and Puros<sup>®</sup> radio-opacity. Histology and immunochimistry showed higher bone formation on pSi. DPSC were not detectable after 4 weeks.

**Conclusion:** This study presents in-vivo proof of the efficiency of pSi particles to achieve bone regeneration. This synthetic biomaterial could an effective scaffold for new bone and periodontal regeneration.

## P0945

### Implant site development for enhancing esthetics of soft and hard tissue and simplification of implant surgery using a forced eruption

J. Lee, H. Kim, E. Kim, J.Y. Joo

Yangsan/Korea

**Aim:** Forced eruption of hopeless teeth is a nonsurgical, noninvasive technique by which the ridge at the future implant sites

can be increased. The aim of this presentation is to show an enhancement of esthetics and decrease of morbidity of implant surgery of periodontally compromised tooth via forced eruption and implant placement.

**Material and Methods:** A 46 year-old female presented with mobile upper right canine. Clinical examination revealed discharge of pus from the pocket and grade III mobility. A periapical radiograph showed a large bony defect, which expanded to the apex of the tooth. The tooth was diagnosed with hopeless and the decision was made to place an implant. Because residual ridge has already been compromised, Forced eruption was adopted in order to increase the vertical dimension of the ridge. Scaling, root planning and endodontic treatment were proceeded before the forced eruption. Forced eruption was performed for 8 months with elastic bands. After 8 weeks of retention period, the tooth was extracted gently and a  $\varnothing 4 \times 11.5$  mm implant (MK III Groovy<sup>®</sup>, Nobel Biocare) was placed simultaneously without additional regenerative surgery. After 5 months of surgery, ISQ was 75 and final prosthesis was delivered.

**Results:** This clinical report has described the restoration of nontreatable teeth in aesthetic zone using forced eruption to develop stable peri-implant soft tissue that is in aesthetic harmony with the surrounding tissues.

**Conclusion:** With the Forced eruption, implant could be placed in an ideal and esthetically pleasing position that could ensure the long-term predictability and longevity.

## P0946

### Innovative release incision that enables safe guided bone regeneration without bleeding nor paralysis by using scissors

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Kitami-City/Japan

**Aim:** Failure in GBR is mainly caused by the contamination and following infection after the membrane exposure. Reliable release incision to allow the tension-free suture is essential to prevent troubles. However, conventional release incision may sometimes cause fatal complications of paralysis etc. To have the ideal result in GBR, we developed new release incision.

**Material and Methods:** The effects of several factors were analyzed such as depth, position, angle and direction of the incision for the normal and scarred periosteum with or without adding vertical incisions. Tools used in the experiments are scalpel and scissors. Those who need GBR to place implant are informed and consent to the experimental procedure. We applied scissors technique and observed its efficacy for more than a decade.

**Results:** After investigation we assured the superiority of using scissors. Adequate and repeatable location, angle and direction of the scissors have been proven. This technique is to place scissors between periosteum and mucosal tissue and cut off only the outer part of periosteum by 500  $\mu$ m. This method enables to make precise and reliable release incision even on the thick and hard cicatrix tissue.

**Conclusion:** Anatomically, minor artery plexus and nerves exist in the soft tissue on the outer fibrous periosteum with 500  $\mu$ m thickness. This technique gives incision only on the marginal periosteum by 0.5 mm and never invades soft tissue so that it never hurts blood vessel or nerves. This will be the great help for both patients and oral surgeons.

## P0947

### Dimensional changes following lateral wall sinus augmentation without concomitant implant placement using a composite bone graft

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Haifa/Israel

**Aim:** To evaluate changes in sinus dimensions immediately post-op and 1 year later using a composite bone graft of Xenograft and autogenous bone (90: 10 ratio) for lateral bone augmentation of the maxillary sinus.

**Material and Methods:** Patients which underwent lateral wall sinus augmentation procedure were considered for this retrospective analysis if they had three consecutive panoramic radiographs: pre-treatment (T0), immediately after lateral wall sinus augmentation (T1) and approximately 1 year post-op (T2). 18 subjects age 47–69 were finally included. Digital panoramic radiographs were transferred into measurement software and the following measurement performed: (i) Vertical distance base of the alveolar ridge to the height of the augmented material. (ii) Sagittal area of the grafted area (iii) Vertical distance from the base of the ridge to the roof of the maxillary sinus.

**Results:** The mean overall sinus sagittal area was  $1330 \pm 481$  mm<sup>2</sup> prior to the grafting procedure. Immediately after the augmentation procedure, this unoccupied sinus area had 35% reduction ( $p = 0.0035$ ). The overall area of the grafted material at the time of surgery was  $468.3 \pm 208$  mm<sup>2</sup>. One year later, this area has been somewhat reduced: mean  $422.2 \pm 193$  mm<sup>2</sup>. This decrease (9.8%) was not statistically significant ( $p = 0.5086$ ). The mid-sagittal grafts height immediately after surgery (mean  $20.67 \pm 4.5$  mm) had decreased after the first year (mean  $19.35 \pm 4.9$ ). These slight changes (6.4%) were not statistically significant ( $p = 0.4213$ ).

**Conclusion:** The linear dimension of composite BDX/autogenous bone grafts that were placed in lateral wall sinus augmentation exhibited minimal changes during the 8–12 months healing period.

## P0948

### Bone formation of human demineralized dentin matrix block graft with different demineralization time: in vitro and in vivo study

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Seoul/Korea

**Aim:** The purpose of this study is to evaluate the structural and physicochemical characteristics of human demineralized dentin block with increasing demineralization time and to assess the new bone formation when onlay grafted with different demineralization time in rat calvaria.

**Material and Methods:** The pretreated dentin were demineralized for 10–90 min. Scanning electron microscopy (SEM), X-ray diffraction analysis (XRD), Inductively coupled plasma spectrometry (ICP), Energy dispersive x-ray analysis (EDX) were performed to analyze the surface structure, crystallinity and relative ratio of organic and inorganic substance. Dentin block (DDB) (diameter, 5 mm; height, 2 mm) with different demineralization time (10, 60 min) (DDB/10, DDB/60) were implanted onto the calvaria of male Sprague–Dawley rats

(n = 20 for each carrier). For control, Collagen sponge (CS) was implanted (n = 20). The rats were sacrificed 2 or 8 weeks after surgery, and evaluated radiographically, histologically and histomorphometrically.

**Results:** With increasing demineralization time, surface structure of dentine block showed increased number and size of dentinal tubules. Also, The organic components such as C, N, O were increased whereas inorganic components such as Ca, P were decreased. The crystallinity was decreased sharply between 10 and 30 min. At both time points, animals that implanted DDB showed significantly better bone formation and bone quality than the controls ( $p < 0.05$ ). DDB/60 group showed significantly increased new bone area and bone density than DDB/10 group at 8 weeks, whereas showed significantly decreased total augmented area than DDB/10 group ( $p < 0.05$ ).

**Conclusion:** Demineralized dentin block could maintain the volume and increase the new bone formation and bone density.

## P0949

### The complex of porous carbonate apatite and bFGF for the treatment of peri-implant bone defects

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Mizuho/Japan

**Aim:** We have reported that the use of a complex containing CA and bFGF leads to a higher rate of new bone formation in dogs with bone defects of the femur and periodontal furcation. The aim of this study was to evaluate the complex of CA and bFGF for the treatment of peri-implant bone defects.

**Material and Methods:** Three male beagle dogs were used in this study. Full-thickness flaps were elevated, and mandibular P3 and P4 were extracted. The defects were then expanded and peri-implant bone defects were created in the buccal cavity, and fixtures (3.0 × 8.0 mm, Integra-CP™, Bicon,) were placed. Then three groups of materials were used to fill the peri-implant defects (CA group (+CA, -bFGF), bFGF group (-CA, +bFGF), CA + bFGF group (+CA, +bFGF), and control group (-CA, -bFGF)). The samples were collected and fixed after 8 weeks. The bone mineral density was calculated using micro-CT. The samples were prepared for histological examinations.

**Results:** The amount of new bone formed after the addition of CA + bFGF was significantly higher than other two groups of materials. Furthermore, the residual ratio of the CA granules from the CA + bFGF group was significantly lower than that from the CA group.

**Conclusion:** These results suggest that the complex of CA and bFGF could be efficiently used for the treatment of human peri-implant bone defects.

## P0950

### The application of concentrated growth factor for socket preservation prior to implant placement: clinical and histological observations in a case report

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Ankara/Turkey

**Aim:** Vertical and horizontal dimension changes of the alveolar ridge may occur after tooth extraction. Regeneration or other

surgical procedures appear to restore the alveolar process and prepare the surroundings for esthetic-pleasing prosthetics or implant-supported prosthetics. Concentrated growth factor (CGF) is produced by the centrifugation of venous blood and has been used in regeneration procedures including maxillofacial surgery, periodontal surgery, and implantology.

**Material and Methods:** A 49-year-old female patient registered to Department of Periodontology, Gazi University, complained the mobility of lower left second premolar and lower right first premolar. According to the poor prognosis of the teeth, the extractions were made non-traumatically with periostomes and CGF membranes were applied to the extraction socket of the left premolar while the socket of the right premolar was closed without applying CGF membranes. Flaps were sutured with a primary closure. Three months later, bone biopsies were obtained by trephines for histological analysis before the implant placements. Clinical measurements of gingival index (GI), plaque index (PI), probing depth (PD), bleeding on probing (BOP) and radiographic measurements were made 6, 9, and 12 months after implant placements.

**Results:** Histological specimens showed that a greater amount of immature osteoblasts were detected from the CGF-applied site. Growth factors play a major role to repair or generate tissue. CGF induces faster formation and soft tissue healing.

**Conclusion:** CGF can be used for alveolar ridge preservation and improve the implant success rate.

## P0951

### Evaluation of alveolar bone width, height and density using computerized tomography at extraction sites treated with different graft materials

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**Aim:** This study was designed to evaluate alveolar bone width, height and density changes using computerized tomography (CT) after different socket preservation techniques.

**Material and Methods:** Seventeen individuals with 52 extraction sockets were investigated in four groups; allogenic graft and collagen membrane (Group 1; N: 14), alloplastic graft and collagen membrane (Group 2; N: 14), only collagen membrane (Group 3; N: 13) and empty sockets (Group 4; N: 11). Bone width, height, intrasocket Hounsfield Unit (HU) values were measured and inter- and intragroup comparisons were carried out from the CT scans taken 10 and 120 days postoperatively.

**Results:** Compared to day 10, while bone width values of first three groups showed significant decrease ( $p < 0.05$ ), bone height did not change significantly ( $p < 0.05$ ). HU values of group 2 were significantly higher compared to all other groups at day 10 and 120 ( $p < 0.05$ ).

**Conclusion:** From the results, it can be concluded that allogenic graft, alloplastic graft and collagen membrane did not give additional benefit to alveolar bone width, height and bone density values.

## P0952

### Incidence of intra-operative complications during sinus floor elevation with lateral approach: a systematic review

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*Trieste/Italy*

**Aim:** This systematic review analyzed, following PRISMA statement, the occurrence of intraoperative complications during sinus floor elevation with lateral approach and the correlations with the surgical technique used for the antrostomy.

**Material and Methods:** Electronic and manual searches resulted in 3046 titles on sinus floor elevation. Following restrictive exclusion criteria, 21 RCTs and 13 prospective CCTs were selected and a quantitative analysis of the outcomes has been conducted. Qualitative evaluation of the articles was performed by using a modified Downs & Black quality scoring checklist and Cochrane quality assessment tools.

**Results:** Main complications during lateral sinus floor elevation resulted to be Schneiderian membrane perforation and haemorrhagic events following vascular lesions. Three surgical devices (rotary instruments, piezoelectric osteotomes and bone scrapers) have been associated to different antrostomic approaches, and incidence of intra-operative complications was recorded. Antrostomy performed with ultrasonic devices showed a lower incidence of membrane perforation if compared to rotary instruments (11.3% against 19.8% –  $p < 0.05$ ). Between the different ultrasonic techniques, lateral bone wall erosion results to be the more predictable approach to avoid membrane perforations (4.7%). Haemorrhagic complications are infrequently recorded with any surgical technique (0.45% incidence).

**Conclusion:** The use of ultrasonic instrumentation seems to be an important factor in preventing from Schneiderian membrane perforations during sinus surgery. Further RCTs investigating on the intra-operative complications occurrence are needed.

## P0953

### New technique for reduce maintenance time for all types of implant systems

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*Tehran/Iran*

**Aim:** The new technique will be useful for all clinicians specially implant surgeon, because it is safe, easy, effective and economical without need to change implant system. It is very user-friendly.

**Material and Methods:** The 65 patients were between 45 to 65 years old (38 women and 27 men). They divided randomly to two groups. Group A control and Group B Experimental. In the patients 90 space which selected for implantation. The spaces contain: 30 Central upper jaw –25 first premolar (10 lower jaw and 15 upper jaw) 35 molar (25 lower jaw and 10 upper jaw). 45 places have been implanted with different implant systems with conventional implant insertion model and 45 place have been implanted with new technique insertion. (the places selected with randomizes table and then registered with secret code.) Follow up after insertion and 1 month and 2, 3, 6 and 1 years after surgery and loading with digital Ritter (RVG). We could histological evaluation for 15 places.

**Results:** The experimental group significantly after 1 month has been stabled but after 3 months two groups have been Same Condition  $p$  value was  $<0.05$ . The Histological surveys in the experimental group were significantly better than the control group. In the immune histochemistry staining OCT4 and collagen type I were showed in the experimental group.

**Conclusion:** In this study we could show and description about the new technique for implant insertion in different systems with same result and shortening waiting time for loading. The histological evaluation approved clinical and radiographic outcome.

## P0954

### Sinus lift and immediate implant placement in atrophic maxilla with block graft and platelet rich fibrin (PRF): a case report

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*Ankara/Turkey*

**Aim:** The placement of dental implants needs a sufficient quality and quantity of alveolar bone to support primary stabilization. Furthermore, in maxilla proximity of the sinus cavity often poses a clinical problem for the placement of implants in the posterior area. Sinus augmentation surgery allows the placement of dental implants using simultaneous or staged procedures in sites that were previously considered unsuitable for implant placement because of insufficient bone volume. If the residual bone height in maxilla is less than 4 mm, staged surgical procedure is advised. Using bone block grafts in insufficient sites gives the chance of simultaneous implantation with primary stabilization.

**Material and Methods:** This study reports a case of severely deficient maxillary alveolar bone which has only 3 mm residual bone height at the base of sinus crest and implant site requires a hard tissue augmentation. To fulfill this requirement, sinus lift surgery was performed and maxillary tuber block bone graft had used to improve bone height. Using bone block provide the primary stabilization of the implant that was immediately placed. The residual space around the block graft was filled with only platelet rich fibrin (PRF) and no other graft material was used. Collagen membrane was used to close lateral window of the sinus cavity.

**Results:** After 6 months at computerized tomography scans, new bone formation around the implant was observed and the prosthetic rehabilitation was performed.

**Conclusion:** It can be concluded that, sinus augmentation using block bone grafts with PRF, when installed simultaneously with implant, has shown satisfying results on primer stability.

## P0955

### Single stage treatment of extraction sites in the aesthetic zone to manage buccal soft and hard tissue recession

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**Aim:** Following tooth extraction, tissue loss can create significant aesthetic challenges for implant placement. This is particu-

larly the case where some loss of buccal bone and soft tissue recession has already taken place. Managing these challenging situations typically requires 2 or more surgical procedures over an extended period of time. Here a single stage approach is described to manage the compromised socket and preserve hard and soft tissues.

**Material and Methods:** A periodontally compromised central incisor with grade III mobility was extracted. The extraction site showed buccal bone resorption beyond the apex, and extensive buccal soft tissue recession. Following extraction a particulate bone graft (Allograft+ Xenograft) was placed in the defect and covered with a resorbable bovine collagen membrane. A connective tissue graft was placed over the membrane and fibrin sponges were used to close the open wound; no primary closure was attempted. The need for a coronally positioned flap, which would alter the mucogingival junction, was thus eliminated. Healing occurred uneventfully and preservation of hard and soft tissue form and maintenance of a normal mucogingival junction, was successfully achieved.

**Results:** A number of techniques have been described to improve the aesthetic outcomes of these difficult cases. Most of them are operator sensitive and require multiple surgeries to re-establish the original bone and soft tissue architecture

**Conclusion:** This single stage technique recreates the original soft tissue architecture, limits tissue remodelling and avoids the coronal movement of the mucogingival junction, which will require a second procedure to be repositioned.

## P0956

### A sinus lift technique in presence of adverse otolaryngological conditions: a case report

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Firenze/Italy

**Aim:** The presence of clinical conditions that result in impaired sinus ventilation or abnormal mucociliary clearance may jeopardize the maxillary sinus floor elevation for implant placement.

**Material and Methods:** Case description: A male subject 45 years old seeks dental advice for placement of an implant in the 1.6 position. The patient reports, following a car accident, an anatomical alteration of the right osteomeatal complex accompanying by loss of the right eye. As a result the subject presents with chronic rhinosinusitis and residual bone thickness in the 1.6 position of 2 mm. The goal of the surgical technique is the creation of a separate compartment within the sinus cavity that allows the new bone formation according to the principles of the Guided Tissue Regeneration.

**Results:** The insertion of a 4 × 8 mm implant with a 25Ncm torque without detaching the Schneiderian membrane was decided. Because of the otolaryngological (ORL) conditions determined by the road accident no bone-substitute material was used. We therefore used the thickness and the weight of the Schneiderian membrane as a structure neutralizing the micro-motion of the inserted implant creating a separate compartment between the former, held by the implant pin, and the residual bone. Nine months after surgery the presence of bone around the implant was assessed by CT Scan.

**Conclusion:** A sinus lift according to the abovementioned technique may be a valid alternative in presence of complex ORL conditions.

## P0957

### A case report of a two staged procedure in a resorbed posterior mandible ridge

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Monterrey/Mexico

**Aim:** Bone resorption following tooth loss often interferes with dental implant placement in a desired position, and requires additional bone augmentation procedures. An adequate amount of bone around the implant is essential to obtain long-term stability. Staged approach procedures with previous guided bone regeneration, allows the implant to be inserted in newly mature bone.

**Material and Methods:** A 57 year old female with absence of 45, 46 and 47, with a Seibert Class III deformity and an adequate interocclusal space. Guided bone regeneration was performed using an allograft and a e-PTFE ti-reinforced membrane. Six months later, two SLA-implants were inserted to replace 45 and 46 in the regenerated ridge with a light simultaneous regeneration with a xenograft.

**Results:** Bone deformities often interfere with implant placement in a desired position. To enable acceptable implant placement and positioning, optimizing the residual bone is necessary. Bone augmentation reestablishes the ideal conditions for implant placement, maintaining for a period of 4–6 months the occlusive space to develop osteogenesis and accomplish the maturation of the tissue.

**Conclusion:** Bone augmentation procedures are routinely required in deformed ridges before dental implant placement and in certain cases, simultaneously. Successful osseointegration was achieved using implants with an SLA surface surrounded by bone in a tridimensional aspect.

## P0958

### Long-term results of socket preservation with deproteinized bovine bone mineral and collagen plug

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Seoul/Korea

**Aim:** The aim of this study is to evaluate the effectiveness of socket preservation with deproteinized bovine bone mineral and collagen plug.

**Material and Methods:** Patients who had been treated with socket preservation before implant placement or prosthetic treatment were included in this study. Before extraction, prophylactic antibiotics were prescribed. After extraction, the granulation tissue was debrided thoroughly and irrigated with saline copiously. Extraction sockets which had either one wall or no wall defects were filled with deproteinized bovine bone mineral (Bio-Oss® Collagen, Geistlich) with free gingival graft or collagen plug (Teruplug®, Terumo Corp.). Extraction sockets which had more than two walls were filled with only collagen plug (Teruplug®, Terumo Corp.). After socket preservation, implant placements or conventional fixed crown & bridges were performed. Then, radiographic bone changes were evaluated up to 7 years.

**Results:** Immediately after socket preservation with deproteinized bovine bone mineral (BOC), the gap between the pris-

tine bone and the grafted bone was prominent in the radiographic findings. However, the radiolucent line occupied the gaps became less prominent with age and even in some patients, the area which had socket preservation with BOC showed more opacity in the radiograph. When reentry procedures were performed, grafted BOC sites had hard enough to drill for implant placement even smokers or medically compromised patients.

**Conclusion:** Socket preservation with BOC showed beneficial effects in one or no wall extraction sockets. However, these results have some limitations and further controlled randomized studies are needed to evaluate the efficacy of socket preservation with BOC.

## P0959

### Clinical 6-months follow up of bone defects treated by using L-PRF membranes in implant placement in aesthetic areas: two case reports

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Ancona/Italy

**Aim:** To clinically evaluate the treatment of bone defects by L-PRF membranes during the implant placement in aesthetic areas.

**Material and Methods:** 2 clinical cases are described: (i) post-extraction implant placement in 1.2; (ii) post-extraction implant placement in 1.3. Two kinds of defects are described: 1- vestibular dehiscence; 2-perimplant gap. In case 1, 3 membranes were overlapped; in case 2, 2 membranes were inserted, in the perimplant gap and on the buccal bone. 5 min before the surgery, a blood collection was made and the process of centrifugation was performed at 2700 rpm for 12 min. The extraction was performed atraumatically. After the implant placement, the L-PRF membranes were inserted. The membranes were sutured without any tension under the flap, providing a primary closure. After 3 months the prosthetic restoration was delivered. The following parameters were collected: BOP, mPI, KT, PPD. The collection was repeated at 6 months following the insertion. An aesthetic evaluation was made according Fürhauser et al.<sup>1</sup> considering the following aspects: mesial and distal papilla, soft tissue level and presence of keratinized tissue, bone defects of the alveolar process, color and texture of soft tissue. To each aspect a score from 0 to 2 was assigned according to Merli et al.<sup>2</sup>.

**Results:** No pathological data were observed among the biometric parameters and score 2 was assigned to each parameter in both cases.

**Conclusion:** The use of L-PRF membranes seems to be a good regenerative approach from a clinical point of view. Further RCT studies and histological analysis will be necessary to validate these data.

## P0960

### Effect of bone regeneration with MPM for implant placement in esthetic zone

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Casablanca/Morocco

**Aim:** Placing implants in the esthetic zone frequently presents a challenge due to inadequate bone quantity. Grafting materials

and absorbable membranes, were proposed for post-extractive alveolar ridge maintenance. The introduction of protein therapy in regenerative procedures could overcome the use of barrier membranes in certain cases making grafting procedures easier.

**Material and Methods:** A 34 years old female with the history of aggressive periodontitis were referred for evaluation and treatment. The initial periodontal therapy was done but The right lateral incisor had severe attachment loss and the prognosis of this tooth was considered hopeless. It was extracted. Horizontal and vertical bone loss was seen. The post-extractive site was augmented with graft material (beta-TCP / collagen). After 4 months of healing, the cone beam revealed that the bone dimension was not enough for placing implant, a protein technique using MPM (mineralized plasmatic matrix) was decided for horizontal augmentation and implant was inserted. After 4 months the second surgery was done. The crown was temporarily cemented.

**Results:** The use of MPM in periodontology and implant therapy had a great impact in the outcome of the grafting surgery because it allows the conduction and homogenization of grafting material. This new procedure seems to provide a more predictable rehabilitation of the hard and soft tissues

**Conclusion:** The MPM improve the biomaterial retaining and fit the site. It enhance transport of the material by securing its implementation. In the case presented MPM allowed bone support for implant placement and a very natural aesthetic soft tissue.

## P0961

### Soft and hard tissue augmentation prior to implant placement in the esthetic zone: a case report with 3 years follow-up

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Ankara/Turkey

**Aim:** Three dimensional soft and hard tissue defects in the esthetic zone usually requires both soft and hard tissue augmentation prior to implant placement. Soft tissue parameters are important factors affecting the clinical outcomes in bone grafting procedures. The aim of this case report was to present the treatment of a defect after extraction of a tooth having Miller type 3 gingival recession in the esthetic zone by connective tissue graft (CTG) and symphysis block grafting procedure prior to single implant placement in the esthetic zone.

**Material and Methods:** A 46-years-old woman presented with a Miller type 3 gingival recession at right first incisor tooth. At the time of extraction, CTG + laterally positioning flap procedure were performed to augment the soft tissue prior to bone grafting. After 6 weeks from the soft tissue augmentation, a symphysis autologous block graft was harvested and shaped to fit the defect and stabilized with fixation screw.

**Results:** After 6 months, the bone graft was successfully incorporated into the host tissue without complications and effectively expanded the ridge from 1 to 6 mm. A 3.5 × 9 mm implant was placed in the previously augmented site. After additional 3 months, second stage surgery was performed and implant supported restoration was fabricated by cemented full ceramic crown. No marginal bone loss and stable functional and esthetic results were denoted after 3 years follow-up.

**Conclusion:** This clinical case describes a successful technique which includes both soft and hard tissue reconstruction in the esthetic zone.

## P0962

### Comparison of different bone graft materials combined with growth factor and autogenous bone graft used for bone augmentation in critical size defects

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Istanbul/Turkey

**Aim:** The aim of this study is to compare the new bone regeneration potential of autogenous bone graft and platelet-derived growth factor (PDGF) combined use with xenograft and alloplast.

**Material and Methods:** Eight animal models used in the study were divided into two groups. Group A (4 animals) sacrificed after 1 week and Group B (4 animals) after 4 weeks. The following six type of defects (6 mmx6mm) were prepared on the medial surface of both of tibias: Autogenous bone;  $\beta$ -TCP + rhPDGF-BB;  $\beta$ -TCP; Xenograft; Xenograft+ rhPDGF-BB; Empty.

**Results:** Percentage of new bone formation in Group B is statistically significantly higher than Group A ( $p < 0.01$ ). The mean area of bone regeneration after 1 and 4 weeks was:  $4.36 \pm 3.46\%$  and  $58.62 \pm 5.97\%$  (Autogenous graft),  $0.58 \pm 0.56\%$  and  $6.04 \pm 2.85\%$  (Empty),  $2.23 \pm 1.77\%$  and  $25.36 \pm 6.05\%$  (Xenograft),  $3.74 \pm 2.90\%$  and  $33.29 \pm 5.70\%$  (Xenograft+ PDGF),  $2.40 \pm 1.71\%$  and  $28.26 \pm 5.71\%$  ( $\beta$ -TCP);  $2.19 \pm 1.49\%$  and  $41.67 \pm 7.63\%$  ( $\beta$ -TCP+PDGF).

**Conclusion:** Autogenous bone graft has the highest new bone regeneration after 1 and 4 weeks. After 4 weeks new bone values did not show statistical significant differences when  $\beta$ -TCP and xenograft used alone. In  $\beta$ -TCP+PDGF used defects gained more new bone than Xenograft+PDGF filled defects ( $p < 0.01$ ).

## P0963

### Reconstruction of the atrophic jaws with block grafts: clinical and radiological evaluation of cases

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Ankara/Turkey

**Aim:** Adequate bone quantity and quality is a prerequisite for good esthetic and biomechanical result in implant dentistry. The purpose of this study was to compare the clinical outcome of horizontal ridge augmentation using autogenous ramus block grafts and allogenic block graft (cortical/cancellous) covered with mineralized allogenic particulate bone (MAP-B) and platelet rich fibrine membrane (PRF-M).

**Material and Methods:** In 10 patients with severe horizontal bone atrophy, a staged approach was chosen for implant placement following horizontal ridge augmentation. Patients were randomly divided two groups. Group A ( $n = 5$ ) was treated with a block graft was harvested from the retromolar area, Group B ( $n = 5$ ) was treated with allogenic bone graft, and the grafts were secured to the recipient site with fixation screws in both group. The width of the ridge was measured before and after horizontal ridge augmentation by CBCT scans. Both types of block graft were subsequently covered with MAP-B and PRF-M. After healing period of 6 months, the sites were re-entered, and the crest width was re-assessed prior to implant placement.

**Results:** The mean initial crest width measured 3.56 mm in group A and 3.37 in group B. At re-entry, the mean width of the ridge was 7.66 and 9.87 mm, respectively. The surface resorption of 1.36 and 0.88 mm were observed from augmentation to re-entry in Group A and B.

**Conclusion:** Horizontal ridge augmentation using allogenic block grafts is a predictable way of treatment, for the atrophic alveolar ridge before implant placement as autogenous block grafts.

## P0964

### Is implant placement performed concomitantly with transcresal sinus floor elevation more time consuming and traumatic than implant placement entirely in native bone?

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**Aim:** To compare the outcomes of implant placement performed concomitantly with transcresal sinus floor elevation (tSFE) or entirely in native bone.

**Material and Methods:** Patients candidate to implant placement concomitantly with tSFE (tSFE group,  $n = 14$ ) or entirely in native bone (N group,  $n = 17$ ) at single sites were consecutively included. In tSFE group, sinus lift was performed according to Trombelli (2009). Patient-centered outcomes were assessed using visual rating scales (level of discomfort,  $VRS_{discomfort}$ ; willingness to undergo the same surgery,  $VRS_{willingness}$ ) and 100-mm visual analogue scales (postoperative pain,  $VAS_{pain}$ ). The dose of analgesics was self-recorded.

**Results:** In tSFE group, implants (length:  $10.2 \pm 0.8$  mm) were placed at sites with a bone height of  $5.9 \pm 1.3$  mm. Membrane perforation occurred in 1 tSFE case. In N group, implants with a length of  $10.0 \pm 0.7$  mm were placed. The duration of the procedure was significantly longer in tSFE group compared to N group. No significant inter-group difference in the dose of anesthetics,  $VRS_{discomfort}$ , and  $VRS_{willingness}$  was observed.  $VAS_{pain}$  was low ( $<16$ ) in both groups, with significantly higher scores in tSFE versus N group from day +3 to +7. The dose of analgesics was similarly low between groups.

**Conclusion:** Implant placement with tSFE (Trombelli et al. 2009) or entirely in native bone are associated with limited trauma and both well tolerated. Compared to the latter, tSFE requires additional surgical time, may result in the persistence of low pain levels up to the 7th day post-surgery but is associated with a similar use of analgesics.

## P0965

### GBR using a novel PLGA synthetic membrane before implant placement: a case report

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**Aim:** Guided bone regeneration (GBR) is a surgical procedure used to preserve or increase bone volume, hence permitting optimal placement of dental implants. GBR requires the use of resorbable or non resorbable membrane. Synthetic, Poly (lactic-

co-glycolic acid) (PLGA) membranes have been presented as clinically efficient for periodontal/pre-implant regenerative procedures. We wanted to clinically test a newly commercialized PLGA membrane (Tisseos®) in a GBR procedure before implant placement.

**Material and Methods:** Case report: A 68 years old healthy male consulted for implant supported rehabilitation. Clinical and radiographic examination revealed multiple teeth loss on the upper left quadrant (24,25,26) and insufficient ridge volume. A GBR procedure was decided in the 24 region. After flap elevation and rigorous curettage of granulation tissue, bone substitute (Bio-Oss®) was placed and covered by the PLGA membrane that has distinctive smooth and rough surface sides. The rough one permitted membrane adhesion to bone surface. This facilitated its placement and the maintaining of bone filler granules. After final membrane positioning, it stayed stable during suturing.

**Results:** Healing was satisfactory. At reentry, sufficient bone volume was regained and implants were successfully placed. At that time a small collection of tissue around the mesial implant was removed

**Conclusion:** The tested PLGA membrane was easy to handle during GBR and was adherent to bone surface, contrary to other types of membranes. Hence facilitating surgical procedure. On the other hand, a growing demand for synthetic membranes is expressed from patients. PLGA membranes could present an efficient and alternative to animal origin membranes for GBR.

## P0966

### Efficacy of vestibular split-thickness flap approach in the split-crest osteotomy of the edentulous lateral mandible: a report of 10 cases

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**Aim:** In horizontal-vertical augmentation of edentulous mandible, membrane exposure is a commonly reported complication. The aim of this case analysis was to evaluate the efficacy of a novel flap approach and suturing method to enhance wound stability.

**Material and Methods:** Ten patients presented advanced alveolar bone resorption at lateral mandible. Width of alveolar ridge was insufficient for dental implant placement though the height of the bone remained appropriate. Following local anesthesia a paracrestal incision was made 2 mm-s apically to the buccal mucogingival junction. Periosteal incision was oriented 6 mm apically to the original section. After flap elevation, mandibular buccal wall were split with piezosurgery, expanded and fixed with surgical screws and plates (DePuy Synthes). Gap were filled with bovine bone mineral and covered with a resorbable collagen membrane (BioOss/BioGide, Geistlich®). Continuous resorbable sutures (Coated Vicryl 6/0, Etichon®) were placed to stabilize the periosteum, and the second layer to advance the submucosal connective tissues. Single sutures were applied to unite the epithelial layer and were removed 10 days postoperatively.

**Results:** Following 4 months uneventful healing, sufficient amount of bone were for implant placement. Results were evaluated with CBCT prior and after surgery. Measurements of the horizontal dimension, at planned implant sites, 2 mm-s apically from the top of the alveolar ridge revealed 3.1 mm mean gain of bone width.

**Conclusion:** Authors conclude that vestibular split thickness flap technique combined with the split-crest osteotomy exhibit a predictable method to treat edentulous lateral mandible with a reduced healing time.

## P0967

### Dimensional changes after immediate implant placement with or without simultaneous regenerative procedures: a systematic review and meta-analysis

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**Aim:** To analyze alveolar ridge volume changes after immediate implant placement, with or without a simultaneous regenerative technique.

**Material and Methods:** Studies investigating the effect of immediate implant placement on clinical or radiographic evaluation of ridge dimensionals changes were identified through an electronic search conducted using MEDLINE (PubMed) and EMBASE. A quality assessment of selected articles was performed using Jadad Scale or Newcastle-Ottawa scale according to the design of each study. Weighted mean changes (WMC) between baseline and follow-up time s (WM) were calculated and subgroup analysis was performed according to study design, evaluation method and regenerative strategies.

**Results:** Eleven studies were included in the present review. After immediate implant placement alone WMC of RCTs showed a loss in width and height of 1.1 mm. After flapless immediate implant placement with immediate provisionalization and a graft WMC of cohort studies showed a loss in width and height of 1.02 and 0.79 mm, while after flapped immediate implant placement and a graft WMC of cohort studies showed a gain of 1.79 mm. After immediate implant placement plus a non resorbable membrane WMC of cohort studies showed a loss in height of 0.07 mm. After immediate implant placement plus a resorbable membrane and a graft WMC of cohort studies showed a gain in height of 1.09 mm.

**Conclusion:** Immediate implant placement do not seem to prevent alveolar ridge modelling after tooth extraction. However, immediate implant placement, in association with a regenerative technique, may be useful to prevent the amount of alveolar reduction.

## P0968

### Bone graft combined with concentrated growth factor in maxillary sinus augmentation with one side crestal and the other side lateral window approach

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**Aim:** The purpose of this clinical tip study was to evaluate the success in the maxillary sinus augmentation using bone graft combined with concentrated growth factor, is also one side crestal approach and the other side lateral window approach in sinus floor elevation and evaluation of these approaches.

**Material and Methods:** Patient who came to our clinic with complaints of missing teeth in the posterior maxilla was examined and it observed that alveolar ridges in the posterior maxilla have reduced bone volume. one side of maxillary sinus that 1 mm of residual bone are present was lateral approached and the other side of maxillary sinus that 4 mm of residual bone are present was lateral window approached. Bone graft combined with consantrated growth factor was placed for each of the two sides. While implants were placed simultaneously in the side that have bone volume of 4 mm, implants were placed after 5 months in the other side of posterior maxilla.

**Results:** The clinical and radiological evaluation of patient 8 months after surgical procedure was performed. Bone formation was observed in the radiological examination and also not seen any complications clinical examination. The success of surgical therapy was satisfactory.

**Conclusion:** Bone graft combined with consantrated growth factor can use for bone formation in the maxillary sinus augmentation. Both approaches in the sinus floor elevation can be based on physician preference.

## P0969

### Sinus augmentation using bone biomaterials: a mini-pig model study

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**Aim:** To evaluate the effect of a biphasic ceramic and an allogeneic particulate bone biomaterial on local bone formation and osseointegration following sinus augmentation in a mini-pig model.

**Material and Methods:** The maxillary sinus was accessed using established routines in 9 adult Göttingen mini-pigs (Terheyden et al. 1999/Lee et al. 2012). Following careful elevation of the Schneiderian membrane, implantation of 4 cc HA/ $\beta$ -TCP (15%/85%, particle size 500–1600  $\mu$ m, inner/outer pore size 125/500  $\mu$ m) or allogeneic mineralized bone matrix (particle size 125–4000  $\mu$ m) and sham-surgery (control) were randomized to contralateral sinus sites. Two threaded dental implants ( $\varnothing$ 4.0  $\times$  11.5 mm) were placed into each sinus. Block biopsies of the sinus sites were obtained following an 8-week healing interval (when the animals were euthanized) and processed for incandescent light microscopy. Histometric recordings at site level were used and estimates adjusted for clustering of observations into animals using a robust variance estimator.

**Results:** The HA/ $\beta$ -TCP (mean  $\pm$  SE: 5.18  $\pm$  0.80 mm) and allogeneic bone (4.90  $\pm$  0.67 mm) biomaterials yielded significantly greater bone formation than control (2.62  $\pm$  0.17 mm;  $p = 0.006$ ). Both biomaterials supported significantly greater bone density within ( $p = 0.009$ ) and outside the implant threads ( $p = 0.02$ ) than control. No significant differences were observed with regards to osseointegration and first bone-implant contact. No significant differences were observed between bone biomaterials.

**Conclusion:** Implantation of an HA/ $\beta$ -TCP or allogeneic bone biomaterial enhances the osteogenic potential in the mini-pig maxillary sinus, however, dental implant bone support is incomplete yielding limited osseointegration.

## P0970

### Fresh-freeze bone graft alorreactivity used in human ridge augmentation

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**Aim:** Bone allografts are used without HLA donor-receptor compatibility or immunosuppressor therapy. The aim of this study was to evaluate fresh-freeze bone graft alorreactivity used in ridge augmentation surgery before oral rehabilitation with implants supported bridges.

**Material and Methods:** Anti-HLA antibodies were evaluated by Labscreen<sup>®</sup> Mixed test, at 0, 7, 30, 90 e 180 days after bone transplantation in 15 patients (6 men e 9 women, mean age 58.1, SD = 10.1) treated at the Dental Institute of the Rio de Janeiro Catholic University. The mixed test was considered positive if NBG >4.5 (Normalized Background Ratio).

**Results:** Ten patients did not have positive results at baseline and were considered not sensitized previously; 6 patients of them did not have any sensitization evidence during 6 month follow up, 2 patients had positive reaction for anti-HLA Class I and II at 7 and 30 days after surgery evaluation; 2 were positive for anti-HLA Class I only at 7, 90 and 180 days. Patients sensitized previously (NBG >4.5 at baseline) have higher NBG variation.

**Conclusion:** The results suggest an oscillatory HLA reactivity.

## P0971

### Simvastatin loaded nano hydroxyapatite in bone regeneration: a study in the rabbit femoral condyle

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**Aim:** Simvastatin, an inhibitor of cholesterol synthesis, stimulate bone formation by enhancing the expression of bone morphogenic protein-2 (BMP-2) in osteoblasts. The objective of the study is to evaluate bone regeneration following simvastatin loaded nano hydroxyapatite scaffold in the bone defect created on the femoral condyle of rabbits.

**Material and Methods:** Twelve adult, New Zealand white rabbits were used in the study. Twenty four defects of size 5  $\times$  8 mm were crated on the lateral aspect of the femoral condyle. The defects were filled with either nano HA particles alone and Nano HA with Simvastatin in a randomized method (bilateral condylar defect). The condyles were retrieved after 8 weeks healing and analyzed using micro CT and histology.

**Results:** The bone healing was seen in both defects implanted with Simvastatin+ nano HA and Nano HA alone. A significantly higher bone volume was observed in the defects filled with Simvastatin loaded site compared to the control site. The residual particle were surrounded by areas of newly formed bone tissue. The volume of remaining particles showed considerably lower in defects sites filled with Simvastatin loaded HA compared to hydroxyapatite alone.

**Conclusion:** Based on the results it can be concluded that local application of simvastatin enhanced the bone regeneration.

## P0972

### The use of serum-free cultured adipose-derived stem cells for bone regeneration on titanium devices

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**Aim:** To test whether adipose-derived stem cells (ADSC) grown in serum-free conditions (SFM) have the potential to regenerate bone on titanium devices.

**Material and Methods:** Seven sheep were used in the experiments. Machined and alumina-blasted titanium discs were used in the experiments. Ovine ADSC (oADSC) were cultured using SFM and osteogenic conditions (OM). The in vitro growth and osteogenic behaviour of oADSC were analysed using cell proliferation and extracellular matrix mineralisation. The osteogenic capacity of autologous oADSC to regenerate bone on cylindrical defects containing titanium devices was further evaluated in vivo using a femur epicondyle model. Bone regeneration quality and quantity were evaluated using histology and histomorphometry. The presence of oADSC at bone defect sites was evaluated using PKH26 cell tracking dye.

**Results:** oADSC cultured in SFM showed variability in their in vitro differentiation potential with cells from five out of seven animals differentiating into osteoblast-like cells. There was no statistically significant difference in the in vitro proliferation and mineralisation matrix deposition between oADSC and osteogenically induced oADSC (oOS-ADSC) regardless of surface type ( $p = 0.20$  and  $p = 0.29$  respectively). The in vivo femoral epicondyle model showed that oADSC labelled with PKH26 remained at the defect site after 1 month of healing. However, there was no difference in bone regeneration between the bone defects treated with oADSC and the ones with only blood clot after 1 month ( $p = 0.26$ ).

**Conclusion:** The in vivo use of autologous oADSC did not improve bone regeneration in defects containing titanium discs with different surfaces after a period of 1 month.

## P0973

### Efficacy of bone harvesting device in implant osteotomy site with minimally irrigated drilling at lower speed

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**Aim:** The aim of this study is to compare bone collection of a bone harvesting device and three implant system drills in the implant osteotomy site.

**Material and Methods:** One bone harvesting device and three different implant system drills were used; Group 1(bone harvesting device), Group 2(three sequential 2-flute implant twist drills), Group 3(three sequential 3-flute implant twist drills), Group 4(sequential one 2-flute pilot drill, two straight 5-flute conical drills). Ten drilling sites (1 unit) in each group were prepared on dead bovine ribs with minimal saline irrigation (100 rpm, 30N/cm). Bone particles were divided into three sizes with  $<500 \mu\text{m}$  (SP),  $500\text{--}1000 \mu\text{m}$  (MP), and  $>1000 \mu\text{m}$  (LP).

Total wet volume, fraction wet volume, total dry volume and weight, fraction dry volumes were measured.

**Results:** In LP fractions, wet volume of Group 1 was significantly greater than others. In the intra-group comparison of wet and dry volume, all groups showed that LP fractions were harvested in larger amounts than MP and SP fractions. The dry weight of LP and MP fractions in Group 1 was significantly greater than that in Group 2, 3 ( $p < 0.05$ ). The dry weight of MP fractions in Group 1 was significantly greater than that in Group 4. Group 1 was significantly greater than Group 2, 3 and 4 in total wet and dry volume.

**Conclusion:** Bone harvesting device could be used for autobone harvesting during implant osteotomy. More total wet, LP fractions wet, total dry and LP fractions dry volumes were collected by bone harvesting device than other three implant system drills.

## P0974

### Improvement of cell attachment to hydrophobic poly (epsilon-caprolactone) by Rho-associated kinase inhibition

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**Aim:** Tissue engineering scaffolds such as poly (epsilon-caprolactone) (PCL) is usually hydrophobic. Hydrophobic surfaces do not provide adhesion signaling enough for cells to attach to the substrate. Thus, hydrophobic substrate surfaces used to be modified to provide cells with adhesion signaling using various methods. Previously, we reported that Rho-associated kinase (ROCK) signaling which is well known to control actin-myosin cytoskeleton development is also a molecular switch regulating cell activity depending on adhesion strength. In the present study, ROCK was inhibited to improve cell attachment to the hydrophobic PCL substrates.

**Material and Methods:** Mouse pre-osteoblast MC3T3-E1 cells (clone 4; ATCC) were cultured on PCL or cell culture dish in alpha-MEM supplemented with 10% fetal bovine serum. Specific pharmacological reagents regulating actin-myosin cytoskeleton, Y-27632 and blebbistatin, were used to inhibit ROCK activity. Cell spreading rate and cell number were measured on the microphotograms taken after immuno-staining actin filaments using confocal laser scanning microscopy.

**Results:** Osteoblasts spread poorly on the hydrophobic PCL substrates than on the hydrophilic cell culture dishes. They also less attached to the hydrophobic PCL substrates. ROCK inhibition improved both cell spreading and attachment. Cell spreading and cell attachment increased more than 5 times and approximately 2 times respectively when ROCK was inhibited without any surface modification of PCL substrates. Furthermore, blebbistatin which inhibits actin-myosin cytoskeleton development also increased cell adhesion rates to the hydrophobic PCL substrates.

**Conclusion:** These results indicate that inhibition of actin-myosin cytoskeleton development may improve cell attachment to the hydrophobic scaffolds designed for tissue engineering without surface modification of the scaffolds.

## P0975

### 3-D reconstruction of severely resorbed Jaw's without the use of autogenous bone grafts

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**Aim:** The need for simplified and predictable surgical procedures in cases of severely resorbed jaws urges clinicians to utilize novel techniques and new materials. Non-autogenous bone grafts gain popularity since high morbidity, graft shrinkage and patient discomfort are reduced postoperatively.

**Material and Methods:** Case report: A healthy 55 year old non-smoking female came to the postgraduate clinic for oral rehabilitation with fixed prosthesis. Clinical and radiographic examination revealed severe alveolar bone resorption. A variety of bone grafts and barrier membranes were utilized. Bilateral sinus floor elevations with the lateral window technique were performed in the maxilla using bovine bone grafting along with a long-lasting bovine collagen membrane on the right side and xenograft (large granules) with a porcine derived collagen membrane on the left side. Vertical and horizontal bone augmentation procedures were carried out in the mandible. On the left side an allograft block combined with xenograft granules was stabilized with bone screws and covered by a pericardium membrane. The double flap technique and a mix of cancellous particulate allograft, xenograft (small granules) and a pericardium membrane were applied in the right side. After the healing period, dental implants were installed with the aid of a CT scan and a surgical stent.

**Results:** In this particular case the use of non-autogenous materials resulted in an adequate bone augmentation, making implant installation successful. The heterogeneity of the regenerative materials did not affect the surgical outcome.

**Conclusion:** Grafting materials other than autogenous bone can be considered as a valid option for the reconstruction of atrophic jaws.

## P0976

### Osteoconductivity and volume stability of biphasic calcium phosphates with different compositions in rabbit sinus model

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Seoul/Korea

**Aim:** The aim of this study is to compare long-term stability and bone-forming capacity of biphasic calcium phosphate (BCP) with different ratio of  $\beta$ -TCP and HA in rabbit sinus model.

**Material and Methods:** The sinus windows were prepared bilaterally in five New Zealand white rabbits (2.5–3.5 kg). Each sinus was grafted with one of the following groups; BCP with a HA/  $\beta$ -TCP ratio of 70/30 (TCP30) and BCP with a HA/  $\beta$ -TCP ratio of 30/70 (TCP70). After 4-month of healing, calcein green was injected and the animals were sacrificed 5 days after injection. The specimens were analyzed histologically, histomorphometrically and with micro-computed tomography.

**Results:** Histomorphometrically, the area of total augmentation, new bone and residual material, and the ratio of bone to material contact did not differ significantly. Volumetric analysis

by micro-CT revealed that total augmented volume and new bone did not show statistical difference, but resorption of materials was statistically higher in the TCP70 group than TCP30 group. Trabecular thickness, number and separation did not show statistically significant difference between the two groups. Histologically, the residual material in the TCP70 group was more scattered than the TCP30 group. The fluorochrome labeling with calcein green showed that bone-forming activity of both material was almost over at 4-month of healing.

**Conclusion:** The volumetric stability and bone-forming capacity of BCP with an HA: $\beta$ -TCP ratio of 30:70 and 70:30 was comparable at 4-month of healing, which indicates that both materials are effective for sinus augmentation.

## P0977

### GreenBone - plant-derived nanocoating to improve bone regeneration and to prevent from inflammation in rheumatoid arthritis and periodontitis

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**Aim:** The aim of the study was to evaluate the anti-inflammatory properties and bone stimulation effect of plant-derived molecules, pectin (Rhamnogalacturonan-Is) nanocoating in *P. gingivalis* infected mice osteoblast cell culture.

**Material and Methods:** The effect of the nanocoating with pectin Rhamnogalacturonan-Is (RG-Is) was evaluated with cell adhesion, proliferation, cell viability, cell cycle, mineralization and Real-Time PCR (RUNX-2, ALPL, OC, OP, COL-1, BMP-2, RANKL, IL-1, IL-6, TNF-alpha) in different time points  $-/+$  *P.gingivalis* infection. The in vitro assays were performed using mice osteoblastic cells, MC3T3, primary osteoblast from calvariae of wide type (WT) mice and rheumatoid arthritis (RA) mice model. The nanocoating surfaces with RG-Is were test group and the surfaces without RG-Is were control group.

**Results:** Nanocoating with pectin RG-Is changed the environment for cellular response in response to *P. gingivalis* infection. The study showed that the pectin RG-Is nanocoating increased osteoblast proliferation, cell viability and mineralized matrix formation of osteoblasts (MC3T3 and WT and RA primary calvarial) in vitro. The gene expressions (ALPL, OC, COL-1, BMP-2) were up-regulated in cell culture  $-/+$  *P. gingivalis* on surface coated with pectin RG-Is compare to control surface without the nanocoating. In presence of *P. gingivalis* infection gene expression of IL-1, IL-6 and TNF-alpha were down-regulated in cell culture on surface coated with pectin RG-Is.

**Conclusion:** Pectin RG-Is nanocoating is promising candidate for improvement of bone stimulation and prevention of bacterial infection with *P. gingivalis* (periodontitis). Pectins might play an important role as anti-inflammatory agent in case of compromised patients with rheumatoid arthritis and periodontitis.

**P0978****Horizontal augmentation of narrow alveolar ridge using tenting screw**

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**Aim:** The purpose of this case report was to evaluate the effectiveness and safety of tenting screw to augment narrow alveolar ridge defect for implant placement.

**Material and Methods:** This case report evaluated augmentation in five patients presenting with large horizontal alveolar ridge defects. Titanium miniscrews were placed in the alveolar ridge for supporting membranes in large defect. Particulate bone was grafted to cover screws completely. A resorbable collagen membrane was placed over the recipient sites. After 5–6 months, the titanium miniscrews were removed and implant fixtures were placed. Preoperative and Postoperative defects were evaluated at the adjacent alveolar bone level.

**Results:** Seven sites of five patients were treated in this case report, and the mean alveolar bone augmentation was 6.45 mm. Collagen membrane exposure was shown in one site, but the volume of alveolar bone augmentation was satisfied. Postoperative wound infection was not observed in any patients.

**Conclusion:** Horizontal augmentation of narrow alveolar ridge using tenting screw was successful. Because tenting screw facilitated space maintenance, and it minimized the resorption of bone graft materials. Using tenting screw may be an effective and safe method to augment narrow alveolar ridge.

**P0979****Plasma rich fibrine application on the repair of perforated Schneiderian membran during sinus floor elevation procedure: a case report**

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Ankara/Turkey

**Aim:** Anatomical complications and difficulties such as inadequate vertical bone height, atrophic maxillary sinus and mandibular canal are frequently encountered in dental implant applications. Sinus floor augmentation procedure is a surgically safe technique commonly used for dental implant procedures in the atrophic maxilla. Schneiderian's membrane perforations are one of the most common complications of sinus floor augmentation surgery. The aim of this case report is to present the repair of perforated sinus membrane with plasma rich fibrin during the sinus floor elevation procedure.

**Material and Methods:** A 48-year-old man, who was systemically healthy and non-smoker, was referred to the Periodontology Department for dental implant application at his edentulous right posterior maxilla. Intraoral and radiologic examination revealed inadequate and limited vertical bone height (2–3 mm) for appropriate dental implant placement. Therefore, the lateral wall of the maxillary sinus was opened for sinus floor augmentation and sinus membrane was elevated, but it was perforated largely, approximately in the size of 10 × 10 mm. Plasma rich fibrin was used to close perforation and to facilitate the healing of membrane. Subsequently, sinus floor was augmented with demineralized bone graft covered with collagen membrane.

**Results:** There was no complication during the healing period. Six months later, the healing progress was observed to be well with vertical bone gain (8–10 mm) and sinus floor augmentation, and finally appropriate dental implants were applied.

**Conclusion:** In the repair of perforations in maxillary sinus floor augmentations, in particular in large-sized ones, plasma rich fibrin can be used as a membrane for covering the perforated area.

**P0980****Horizontal augmentation in premaxilla using a xenograft and collagen membrane: a case report**

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I. Godoy Reina

Madrid/Spain

**Aim:** Implant correct placement in an aesthetic and a well-positioned way can be unachieved as long as the intermaxillae relationship is not the optimal. Unfavorable ridge conditions because of atrophy, periodontal disease or traumatism, may lead to an insufficient bone, vertically and horizontally. In the premaxilla, guided bone regeneration should be mandatory in order to achieve an adequate prosthetic outcome.

**Material and Methods:** Case report: A systematically healthy, no-smoking, 63-year old women. After a complete study the surgery was performed with local anesthesia. 2 g of particulate bone BioOss® and two resorbable collagen cross-link membranes were stabilized with fixation screws. After a healing period of 7 months, a new CT was made to verify the augmentation and four Zimmer TSV implants of 3.7 mm diameter were placed.

**Results:** The fundamental principles of guided bone regeneration (adequate preserving space, sufficient blood support, primary tension-free closure and exclusion of epithelial cells) were followed in this case to regenerate the alveolar ridge in a horizontal way obtaining 3–4 mm of bone gain, giving an adequate crest so as to place 3.7 mm implants

**Conclusion:** A great variety of surgical procedures have been described to correct insufficient edentulous alveolar ridges. The rate of success of implants placed in sites under bone regeneration techniques are similar to those placed in natural bone. Given the circumstances that all surgical procedures have their benefits and contras which has to be evaluated before the surgery, the simpler, less risky and invasive treatments has to be chosen and those ones that achieve their objectives in the shortest time.

**P0981****Investigation of early wound healing events and clinical outcomes following implant placement and simultaneous horizontovertical ridge augmentation – a comparative case series**

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Budapest/Hungary

**Aim:** The aim of this comparative case series was to investigate the possible correlation between early wound healing events and the amount of newly formed hard tissues following implant

placement and simultaneous horizontoververtical ridge augmentation utilizing either resorbable or non-resorbable membranes.

**Material and Methods:** 13 patients exhibiting horizontoververtical alveolar defects were treated in two groups by the GBR procedure. Following implant placement locally harvested autogenous bone chips were mixed with a bovine derived xenograft (Bio-Oss, Geistlich, Wolhusen, Switzerland) and stabilised with either a resorbable membrane (Gore Resolut Long Term Adapt, Gore, Flagstaff, USA) or a non-resorbable membrane (Frios Boneshield, Dentsply Implants, Mannheim, Germany). 6 patients were treated with Resolut, 7 patients with Boneshield membranes. Early wound healing characteristics were evaluated at baseline, 7–10 and 14–17 days postoperatively with the Modified Early Wound Healing Score (MEWHS). Gingival erythema, odema, fibrin exsudate and soft tissue integrity were measured. 9 months postoperatively radiographical evaluation and direct measurements were performed during reentry.

**Results:** Mean MEWHS values amounted higher in the Resolut compared to the Boneshield group (Day 0:  $3.33 \pm 0.82$  vs.  $3 \pm 1$ , day 7–10:  $4.5 \pm 1.22$  vs.  $3.14 \pm 1.86$ , day 14–17:  $2.83 \pm 1.84$  vs.  $1.86 \pm 1.57$ , respectively). Mean implant dehiscence coverage was lower in the Resolut compared to the Boneshield group ( $81.83 \pm 21.26\%$  vs.  $89.14 \pm 19.60\%$ ).

**Conclusion:** Early wound healing characteristics were more favourable in the Boneshield group, amount of newly formed hard tissues was higher compared to the Resolut treated cases. Biodegradation of the resorbable membrane may contribute to different early wound healing characteristics, which might influence graft integration and clinical outcomes.

## P0982

### Comparative evaluation of implant placement and simultaneous horizontoververtical ridge augmentation using two different non-resorbable membrane types – a comparative case series

A. Martin, K. Orbán, R. Marton, B. Molnár, P. Windisch  
Budapest/Hungary

**Aim:** The aim of this comparative case series was to evaluate the amount of newly formed hard tissues following simultaneous horizontoververtical ridge augmentation procedures using two different non-resorbable membranes.

**Material and Methods:** 20 patients exhibiting horizontoververtical alveolar defects were treated in two groups by the GBR procedure. Following implant placement locally harvested autogenous bone chips were mixed with a bovine derived xenograft (Bio-Oss, Geistlich, Wolhusen, Switzerland) and stabilised with either an nPTFE membrane (Cytoplast, Osteogenics, Lubbock, USA) or a titanium membrane (Frios Boneshield, Dentsply Implants, Mannheim, Germany) to cover supracrestal implant surfaces. 13 patients were treated with Cytoplast, 7 patients with Boneshield membranes. Membrane exposure was detected on two occasions. In these cases a resorbable collagen membrane (BioGide, Geistlich, Wolhusen, Switzerland) was used to cover maturing hard tissues after removal of the non-resorbable membrane. These cases were excluded from further analysis. 9 months after augmentation procedure radiographical evaluation and direct measurements were performed after membrane removal during reentry to assess new hard tissue formation.

**Results:** Application of both membranes resulted in substantial implant dehiscence coverage and formation of new hard tissues

around supracrestal implant surfaces. Implant dehiscence coverage was lower in the Frios Boneshield group compared to the Cytoplast group ( $89.14 \pm 19.60\%$  vs.  $95.29 \pm 11.94\%$ ). During reentry in the Frios Boneshield group periosteal-like tissues were observed underlining the non-resorbable membrane, this was not observed in the Cytoplast group.

**Conclusion:** New hard tissue formation was slightly in the Cytoplast group, which might influence long term periimplant hard- and soft tissue stability.

## P0983

### Aesthetic reconstruction with soft and hard tissue management in the anterior upper jaw: case report

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**Aim:** The literature provides us with several treatment solutions for the aesthetic zone in the anterior upper jaw. What should be done with bone loss in the aesthetic zone?

**Material and Methods:** A patient introduced herself requesting for a solution due to a vertical fracture in region 21. She desired a treatment with dental implants and high-end aesthetics. A treatment in five steps was planned. The tooth was extracted and socket preservation was performed. After 4.5 months the alveolar crest defect was augmented with an autologous bone graft of the lower jaw and covered by a pediculated tissue graft. To avoid recessions of the teeth an enamel matrix protein was applied. After another 4.5 months of healing the implant was inserted and a second palatal pediculated connective tissue graft was performed and a key to determine the implant position was taken. Therefore it was possible to provide the patient with a provisional crown the day of second stage 3 months later. The final restoration of an all-ceramic crown on an Individual Circunia Abutment was delivered 6 weeks after dynamic healing.

**Results:** The literature describes several successful therapy methods for the implant reconstruction of the anterior region after tooth loss. Nevertheless the gold standard is still the autologous bone block, which is quite invasive for the patient.

**Conclusion:** The presented therapy approach is a very safe method for an aesthetic reconstitution in the anterior jaw region as the final result shows us after a 2-year follow up with a harmonious keratinised gingival margin.

## P0984

### 3 dimensional radiographic evaluation of a novel socket preservation technique

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Budapest/Hungary

**Aim:** Socket preservation procedures aim at reducing bone loss following tooth extraction to establish favourable hard- and soft tissue conditions allowing for implant placement. Our aim was to radiographically evaluate a novel surgical approach for socket preservation.

**Material and Methods:** Radiographic evaluation was performed using the I-CAT Vision (Imaging Sciences International, LLC; Hatfield, USA) software. 61 pre- and postoperative data sets were examined prior to socket preservation following removal of single rooted teeth, and 6–9 months after surgery. For align-

ment of pre- and postoperative data sets the long axis of the adjacent mesial tooth or implant was used. Orthoradial cross-sections were made midbuccally, mesiobuccally and distobuccally at extraction sites. The nearest cortical layer was used as a reference line for linear measurements. Parallel with the reference line, 15 sections in 1 mm distances were determined. Linear measurements were taken to determine horizontal and vertical dimensions of pre- and postoperative alveolar cross-sections.

**Results:** Changes in vertical height of buccal bony walls were measured compared to baseline at test and control sites as follows: Mesiobuccal:  $0.95 \pm 0.34$  mm vs.  $-1.28 \pm 0.34$  mm Midbuccal:  $2.39 \pm 0.99$  mm vs.  $-2.83 \pm 1.47$  mm Distobuccal:  $-0.30 \pm 0.31$  mm. vs.  $-1.08 \pm 0.75$  mm, respectively. In patients treated by socket preservation, 6–9 months postoperatively implant placement was performed in 44%, implant placement with simultaneous ridge augmentation in 33%, ridge augmentation in 9% of the cases, 14% received fixed partial dentures.

**Conclusion:** The applied socket preservation technique successfully minimised postextraction alveolar bone loss reducing overall treatment time and patient morbidity. The presented radiographic evaluation method might be applicable to investigate the efficacy of different socket preservation techniques.

## P0985

### Mucogingival discoloration: an aesthetic impairment potentially related to bone substitutes

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**Aim:** A clinical case is described in order to focus on a little known but relevant aesthetic drawback potentially related to bone substitutes.

**Material and Methods:** Case Report: After a minimally traumatic extraction of a first maxillary right molar, MHA (Sint-Life<sup>®</sup>) particulate was inserted into the socket for bone preservation. Surgical procedure and healing process were uneventful. Two months later, buccal soft tissues displayed an asymptomatic bluish discoloration. Six years later, the pigmentation was still present and the radiographic evaluation showed residual biomaterial particles. In order to comprehend the origin of the mucosal alteration, an histomorphological evaluation of soft and hard tissues was performed. Histological examination confirmed the presence of residual MHA particles, mainly in direct contact with bone tissue, but partly embedded into the subepithelial fibrotic chorion. There was no melanosis or melanocytic hyperplasia in the epithelium. Mild inflammatory infiltrate was observed, without haemosiderin deposits.

**Results:** These findings suggest that MHA represents the source of discoloration. An explanation can be found in the Tyndall effect, which refers to the fact that different wavelengths of light do not scatter depending on size of substances they encounter: longer redder wavelengths can penetrate more deeply into the soft tissues than shorter blue wavelength before reflecting out. So the light reflecting from tissue over the biomaterial contains less red light than blue.

**Conclusion:** The potential appearance of permanent mucosal discoloration represents a relevant drawback for oral cavity, especially for those areas with clear aesthetic demands. More investigations are needed in order to confirm the present observations.

## P0986

### Clinical, radiographic, and histological analyses after transplantation of crest-related palatal-derived ectomesenchymal stem cells (paldSCs) for improving vertical alveolar bone augmentation in critical size alveolar defects

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**Aim:** At present, there is no ideal therapeutic approach to cure loss of vertical alveolar bone height and achieve optimal pre-implantological bone regeneration before dental implant placement. Recently, it has been found that specific populations of stem cells and/or progenitor cells could be isolated from different dental resources, namely the human palate (Widera et al. 2009, Grimm et al. 2011). We have shown, that paldSCs can be differentiated into the osteogenic lineage and that these cells are able to regenerate alveolar bone tissue in vivo in an athymic rat model (6 SOP's, Molthera GmbH: PCT/EP2006/066221).

**Material and Methods:** Using this stem cell therapy, we report the upper jaw reconstruction of a patient who lost teeth in pre-molar and molar regions due to aggressive periodontal diseases. A population of crest-related palatal-derived ecto-mesenchymal stem cells (paldSCs) was seeded onto allogeneic boning, which served as a scaffold to deliver cells directly to the defect. Two oral implants were placed immediately.

**Results:** Four months after cell therapy, cone beam computed tomography and bone biopsy were performed. Radiographic (by using IMAGE J analysis), and histological analyses confirmed that after 4 months, the stem cell therapy regenerated more than 80% of the original jawbone deficiency with vascularized, mineralized bone sufficient to stably place an engineered fixed bridge prosthesis.

**Conclusion:** This proof-of-concept clinical report used an evidence-based approach for the stem cell transplantation protocol used in our on-going clinical- and histological controlled study using stem cell-rich palatal tissues for improving the vertical and the lateral alveolar bone augmentation in critical size alveolar defects.

## P0987

### Tenting screw technique: guided bone regeneration over a resorbed alveolar ridge: a case report

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**Aim:** The purpose of this case was to obtain regeneration of the alveolar ridge in the lower left arch in order to fulfill the principles of three-dimensionality in implant dentistry.

**Material and Methods:** A 54 year old Mexican male. No medical history. Chief complaint: "I want implants". The diagnosis was vertical and horizontal ridge deficiency in the 35 and 37 zone. The treatment plan was ridge augmentation with tenting screws, for subsequent placement of dental implants 4 months later.

**Results:** After 4 months, the increase of the alveolar ridge was 4 mm in a buccolingual direction, allowing the placement of the implants without a bovine bone graft, due to the adequate bone width over the labial aspect that accomplishes the principles of three-dimensionality.

**Conclusion:** These case illustrate the efficacy of guided bone regeneration using tenting screws to obtain alveolar ridge augmentation. The advantages of this technique compared with an autogenous block graft are less procedure time, less morbidity, less cost, and involvement of only one surgical site.

## P0988

### Clinical importance of alveolar preservation in aesthetic zone: a case report

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**Aim:** After a tooth extraction a resorption of soft and hard tissue is expected. The preservation of the facial alveolar bone is necessary for the posterior placement of implants improving the prosthesis aesthetic and functional results. Schropp et al. 2003 reported a reduction of the alveolar crest width of approximately 50% after 12 months of the tooth extraction. It has been demonstrated that sockets treated with guided bone regeneration, loose less than 20% of buccal-lingual width.

**Material and Methods:** A systematically healthy, non-smoking 46-year old woman presents a 7–8 mm probing depths on the left lateral incisor. The residual root is removed and regeneration is performed using a classical alveolar preservation technique. The socket was filled with xenograft Bio-Oss, and covered with a free gingival graft from palatal site. After 6 months of healing a 3.7 × 11.5 mm Zimmer Dental Implant was placed. In the second stage a connective tissue graft was performed to increase the soft tissue volume. 3 months later the final restoration was placed.

**Results:** This case shows how this preservation technique can minimize post extraction bone loss.

**Conclusion:** Because of the aesthetic requirements of the area it is important to maintain the integrity of the vestibular cortical and connective tissue. This technique have accomplished better aesthetic results and a minimal loss of crest volume.

## P0989

### Volumetric changes occurring in particulate bone graft materials subjected to compression forces

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**Aim:** Particulate bone grafts have been successfully used for regenerative procedures and shown to achieve predictable results. Regardless of manufacturing process or material source, no data exists has studied the effect of compression forces on the graft inter-particle space. The aim of this study is to analyze how compression forces and particle size influence graft macro-porosity.

**Material and Methods:** Simulated socket defects (6 × 11 mm) were created in methacrylate blocks. Large (LPG) (1000–2000 μm) and small (SPG) (250–1000 μm) particulate graft

material were placed in defects and 3D microCT scanned under no load, and 7N and 70N compressive load. Volumetric space changes were analyzed via Amira software. A student t-test was used to assess statistical significance between groups.

**Results:** Due to particle-size differences, 40% more SPG was needed to fill the simulated socket, therefore the initial inter-particulate space was significantly less (10%,  $p = 0.02$ ) when compared to the LPG group. Following 70N and 7N compression of LPG, the inter-particulate space decreased by 44 and 7%, respectively. For SPG, 70N compression resulted in 32% decrease of inter-particulate space. LPG underwent significantly more volumetric change than SPG.

**Conclusion:** Graft particle size influenced the amount of material needed to fill a defect and the overall inter-particulate porosity. Graft compression force affected the larger particles more than the smaller particles.

## P0990

### Alveolar reconstruction: alternative for the treatment of root resorption in teeth of pediatric patients

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**Aim:** Extraction of tooth 9 and perform Guided Bone Regeneration in pediatric patient, reconstruction and maintenance of the alveolar process.

**Material and Methods:** Male patient, 12 years old with a history of a traumatic avulsion of tooth 9. The tooth was atraumatically extracted and a collagen sponge was placed for clot stabilization. In a second approach zone, guided bone regeneration was performed by using membrane (Bio Gide and xenograft Bioss). Suture was done (Cytoplast) achieving primary closure. Since the labial frenulum had wide insertion, we proceeded to frenectomy.

**Results:** The buccal-palatal alveolar process augmentation was achieved.

**Conclusion:** The guided bone regeneration is a useful alternative in the treatment of sequelae of root resorption and the proper selection of materials with slow resorption can regenerate and maintain the alveolar ridge in pediatric patients for subsequent implant placement when active growth is completed.

## P0991

### Effect of electrical stimulation on bone formation on titanium implants: study in dogs

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**Aim:** The aim of the present study was to measure the contact area of bone/implant interface on implants submitted to different electric current.

**Material and Methods:** Ninety titanium dental implants (6 × 11.5 mm), with machined surface were used in this study. Six male Beagle dogs approximately 12 months old with weigh

at 15 Kg were divided randomly in two groups for evaluation period: 7 and 15 days (3 animals per time). Also, implants were divided in three groups concerning electrical stimulation: (A) 10  $\mu$ A, (B) 20  $\mu$ A and (C) control.

**Results:** No statistical differences in contact area of the bone/implant interfaces were noticed for 7 days of electrical stimulation. However, a significant higher contact area of bone/implant interface was recorded for (B) 20  $\mu$ A of stimulation than that for (A) 10  $\mu$ A and (C) control group ( $p < 0.01$ ), for 15 days of electrical stimulation. No statistical difference was noticed between group A and C ( $p > 0.05$ ).

**Conclusion:** The electrical stimulation of dental implants can generate higher contact area of bone/implant interface due to bone formation. Factors such as different electrical current intensity and period should be studied in further works, to clarify the potential of this method.

## P0992

### The use of polydioxanone monofilament suture for creating and maintaining space for guided bone regeneration

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**Aim:** The evolution of guided bone regeneration (GBR) has substantially influenced the possibilities for the use of implants in sites that were previously not indicated. For many years, a number of techniques emerged for treating bone defects, traditionally performed with either resorbable or non-resorbable titanium reinforced membranes. This oral clinical communication aims to demonstrate and discuss, with a case report, a possibility of GBR around implants using bent polydioxanone monofilament, synthetic bone-graft substitute and a collagen resorbable membrane.

**Material and Methods:** This case report demonstrates a possibility of GBR around dental implants, using bent polydioxanone monofilament (PDS II<sup>®</sup>), synthetic bone-graft substitute (BoneCeramic<sup>®</sup>) and a collagen resorbable membrane, through which the need for a second surgical procedure to remove the membrane could be avoided.

**Results:** The result was encouraging, since it provided an increase in bone volume and soft tissue quite significant when compared to techniques commonly described, showing a new possibility of treatment. However, regardless of the technique chosen for GBR, flap closure by first intention is indispensable for the adequate osteogenesis. Early exposure of membranes, grafts or bone substitutes can hinder the success of treatment.

**Conclusion:** This case report presents the possibility of GBR around immediately placed implants using bent polydioxanone monofilament (PDS II<sup>®</sup>), synthetic bone-graft substitute (BoneCeramic<sup>®</sup>) and a collagen resorbable membrane. Yet, it is important to note that more studies are needed to elucidate the histological characteristics of the proposed treatment.

## P0993

### The guided bone regeneration in aesthetic area: using bioactive glass to provide predictability and safety for successful longterm outcomes

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Villeurbanne/France

**Aim:** The Guided Bone Regeneration is defined by the use of biomaterials and membrane to lead a new volume of bone before or during the implant placement. Today, the single tooth replacement in esthetic zone is a frequent indication for implant therapy, but patients are asking more than a tooth in the optimal place. They need comfort for eating and cleaning facilitate, all in aesthetic smile line result. The interest of the surgery timing is crucial to obtain the outcome and the compliance of the patient. If the surgical technique provides a predictable outcome for the patient and is following a successful procedure, the only restraint could be the origin and the sort of biomaterial in the tissue.

**Material and Methods:** Implants (Anthogyr<sup>®</sup>, Straumann<sup>®</sup>.) and Activioss<sup>®</sup> by Noraker ©. Ace<sup>®</sup> Membrane or Geistlich © resorbable membranes The Method consists of recreate new bone with a time protocol: extraction and paste a provisionnal teeth wait 4–8 weeks for gingival healing. implant surgery in the right axis for a direct implant screw-retained crown, GBR with autogenous bone in particules on the exposed surface of the implant, cover this bone by bioactive glass particules (Activioss<sup>®</sup>) and finally with an absorbable membrane and stitching.

**Results:** We purpose to show several cases of this treatment, with cone beams and histologicals examinations.

**Conclusion:** The use of a bioactive glass allows to guaranty a safety manufacturing for the customer, a total turn over and substitution of the particules by new bone, and a graft volume stability.

## P0994

### The biocompatibility of a HA/b-TCP deproteinized bovine bone compared with bio-oss

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Beijing/China

**Aim:** Bone regeneration techniques constitute a valid surgical procedure for increasing bone quantity and quality in areas where insufficient bone volume prevents the stabilization of osseointegrated implants. Because of the limited availability of autografts and allogenic biomaterials, the bovine bone substitute is commonly used today. However, HA-based biomaterials are very slowly resorbed in vivo. Therefore, the synthetic HA/b-TCP ceramics manufactured from deproteinized bovine bone (DBB) were produced in this study. The aim is to evaluate the biocompatibility of the novel HA/b-TCP DBB and to compare its bone-regenerative capacity with the commercial Bio-Oss.

**Material and Methods:** Firstly, the monocalcium phosphate was added into bovine bone during a sintering process, afterwards, the physical characteristics were observed by XRD, and SEM, and the proliferation and differentiation of preosteoblastic cell line MC3T3-E1 were estimated. Secondly, to compare with the Bio-Oss, the two biomaterials were implanted in beagle

dogs' legs. The new bone tissue formation was analyzed by 4, 12, 26 weeks after the intervention.

**Results:** The results of XRD indicated that the materials have the both pattern of the HA and  $\beta$ -TCP. The SEM images showed a porous structure and the cells attachment growth. In vitro studies indicated the ability of the materials to support growth and osteogenic differentiation of MC3T3-E1. The X-ray images of the bone density by 4, 12 weeks were similar. The observation of the histological sections showed the material resorption and the new bone tissue formation by 26 weeks were higher in HA/b-TCP DBB.

**Conclusion:** This novel material is a potential candidate for bone regeneration techniques.

## P0995

### The combination of sinus floor elevation and titanium mesh to reconstruct severe absorbed maxillary ridge: a retrospective study

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Tainan/Taiwan

**Aim:** This retrospective study was to investigate the clinical outcome and the influencing factors of the cases combined sinus floor elevation and titanium mesh to reconstruct severe absorbed maxillary ridge.

**Material and Methods:** The patients received sinus floor elevation and titanium mesh for guided bone regeneration during the period between September 2009 and May 2013 were included in this retrospective clinical study. The computed tomographic images before and after implant surgery were examined. Software was utilized to measure the alveolar bone height and width. Correlation with the existence of fixation screw, age, gender were analyzed with paired *t*-test and Mann-Whitney *U*-test.

**Results:** A total of 7 patients with a mean age of  $56.3 \pm 5.8$  years including 11 surgical sites were examined. The mean follow-up period was  $5.9 \pm 0.7$  months. 3 surgical sites were excluded. The mean alveolar bone height was  $6.5 \pm 4.1$  mm before implant surgery and  $14.2 \pm 3.5$  mm after implant surgery. The mean increase in alveolar bone height was  $7.5 \pm 4.7$  mm. The alveolar bone width was  $2.2 \pm 2.6$  mm and  $7.4 \pm 1.9$  mm before and after implant surgery. The mean increase in alveolar bone height was  $5.2 \pm 3.4$  mm. A significant difference was found compared the alveolar bone height and width before and after implant surgery. And there is no significant correlation with the existence of fixation screw, age, gender.

**Conclusion:** Within the limitation of this retrospective clinical study, the combination of sinus floor elevation and titanium mesh to reconstruct severe absorbed maxillary ridge has significant increase in alveolar bone height and width. And the utilization of fixation screw, age, and gender have no significant correlation.

## P0996

### Dimensional alterations of the grafted area at sites undergone transcresal sinus floor elevation in combination with deproteinized bovine bone mineral or a synthetic hydroxyapatite in a collagen matrix: a 24-month radiographic evaluation

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**Aim:** To radiographically evaluate the dimensional alterations of the grafted area at 24 months following transcresal sinus floor elevation (tSFE) with a bovine-derived xenograft (DBBM) or a synthetic hydroxyapatite in a collagen matrix (S-HA).

**Material and Methods:** 19 implant sites in 19 patients consecutively undergone tSFE with a minimally invasive technique (namely, Smart Lift) in combination with DBBM (n = 10) or S-HA (n = 9) were included. On digitized radiographs related to post-surgery and 24-month visit, the extent of sinus lift (SL), the height of the graft apical to the implant apex (aGH) and the radiopaque area over the sinus floor (AREA) were measured.

**Results:** Immediately after surgery, SL and aGH were  $6.3 \pm 1.6$  mm and  $2.3 \pm 1.0$  mm, respectively, in DBBM group, while were  $6.8 \pm 1.8$  mm and  $2.6 \pm 1.3$  mm, respectively, in S-HA group. No significant differences in post-surgery SL, aGH and AREA were observed between groups. At 24 months, both groups showed a significant reduction in AREA ( $p < 0.01$ ) and a slight, non-significant reduction in aGH (DBBM group:  $-0.7 \pm 0.9$  mm; S-HA group:  $-0.4 \pm 1.0$  mm) compared to post-surgery, without inter-group differences.

**Conclusion:** Over a 24-month follow-up period following tSFE with the Smart Lift technique, sites grafted with DBBM and S-HA similarly showed a significant reduction in the grafted area. This reduction was partly explained by a reduction in graft height over the implant apex.

## P0997

### Sinus floor elevation using a bioactive glass: a clinical and histomorphometric approach

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**Aim:** Rehabilitation of the edentulous posterior maxilla with dental implants often represents a clinical challenge because of the insufficient bone volume resulting from pneumatization of the maxillary sinus and alveolar bone resorption. The aim of this study was a retrospective clinical evaluation of maxillary sinus augmentation using 100% bioactive glass (GlassBone, Noraker).

**Material and Methods:** Ten healthy patients with a noncontributory medical history were included in this study. All patients were scheduled for sinus augmentation procedures with bioactive glass. After a 4- to 6-month healing period, twenty-three sandblasted and acid-etched implants were inserted. Meanwhile, bone cores were trephined for histomorphometric analysis.

**Results:** All grafted sinuses healed without major complications. Newly formed immature bone around residual particles of bioactive glass was found in all seventeen biopsies. The histomorphometry of the amount of bone, osteoid, and residual graft returned a mean  $\pm$  SD value of  $33.83 \pm 9.73\%$ ,  $3.82 \pm 3.04\%$ , and  $18.94 \pm 10.9$ , respectively, 6 months after surgical procedure.

**Conclusion:** Within the limitations of this study, a bioactive glass (GlassBone™, Noraker) can be used with success in sinus augmentation procedures.

## P0998

### Combination of allograft blocks and putty in the inlay technique: clinical and histological observations

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**Aim:** In case of atrophic posterior mandibles, the inlay bone graft technique showed remarkable results in terms of vertical bone augmentation and the use of allografts seems to be able to accelerate graft integration and therefore implant rehabilitation.

**Material and Methods:** This case reports clinical and histological evaluations of an the inlay augmentation procedure performed with two different forms of allograft. Two cancellous blocks were used at the sides of the grafted area in order to support the coronally-positioned bony segment, whereas putty was placed between the blocks. Three months later, a CT scan demonstrated good graft integration with sufficient bone vertical increase and density. At implants placement, bone core biopsies were taken and histologically processed. During implant placement, the block was stable with good clinical osteointegration. Histological analysis showed presence of compact bone revealing areas of demarcation between grafted bone, newly formed bone and bone regeneration areas.

**Results:** The simultaneous use of both blocks and putty cancellous grafts increased clinical and histological outcomes. The presence of the blocks gave stability to the osteotomized bony segment assuring an adequate bony vertical increase, whereas the putty increased and accelerated the graft integration. Moreover, the bony segment was clinically stable and no bone plates were used to fix it to the basal bone.

**Conclusion:** In this case, after only 3 months from grafting, allografts showed to be effective materials for the reconstruction of the posterior mandible with inlay technique. According to the preliminary results, this material represent a good clinical alternative to autologous and inorganic bovine bone.

## P0999

### Compensation of soft tissue biotype by connective tissue graft after guided bone regeneration

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Istanbul/Turkey

**Aim:** This case report presents consecutive procedures used for treating an anterior incisor with horizontal fracture in a 29-year-old, systemically healthy, non-smoker male patient.

**Material and Methods:** The first examination revealed that the maxillary left central incisor had deep horizontal subgingival fracture, increased probing depth, grad III mobility and pathologic migration with pus involvement because of a periodontal problem. The first treatment step was the careful extraction of the tooth under local anesthesia. After 6 weeks, a full thickness flap was raised in the edentulous area. Implantation procedure was performed according to the standard protocol by obtaining an appropriate three-dimensional position. Following implant insertion, small autogenous bone chips obtained during drilling were placed directly on the exposed implant surface. This was followed by the placement of deproteinized bovine bone mineral which was mixed with blood on the autogenous layer of augmentation area. The augmentation material was covered with a non-resorbable e-PTFE membrane. The membrane was fixed with non-resorbable pins in the apical area and a healing cap in the crestal area. The wound was sutured with primary closure. After 4 months, the operation area was uncovered with a mucoperiosteal flap. After membrane and fixation pin removal, free connective tissue graft was placed into the augmented area. Following 2 months of healing period, a ceramic crown was prepared and delivered.

**Results:** The patient was satisfied with the treatment results.

**Conclusion:** Connective tissue graft procedure is an effective method in obtaining satisfactory results for implant therapy especially in the anterior area.

### Effect of platelet lysates on osteoblastic cell proliferation and differentiation: a review of in vitro studies

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**Aim:** Platelet lysates (PL) have been proposed as a method to introduce concentrated amount of growth factors to the wound site in bone regeneration procedures, with varying and controversial results in clinical studies. This might be due to the differences in the behavior of bone cells in presence of PL. This review aims to review the reported effects in in vitro studies of different PL on osteoblasts, in order to shed more light on the effects reported in clinical studies and to understand the behavior of bone cells in presence of PL.

**Material and Methods:** A systematic literature search was performed from January 2000 to September 2014 in Pubmed, Web of Knowledge and Google Scholar for in vitro studies evaluating the effects of PL on osteoblasts. The effect of different factors used in cultures were analyzed; time, presence of fetal bovine serum, different concentrations of lysates, and the use of dexamethasone.

**Results:** Most studies showed that PL stimulate the proliferation of osteoblastic cells from different origins. The reported effects of PL on osteoblastic differentiation are more variable compared to proliferation. The differences in the results regarding the differentiation might be attributed to the differences in the culture conditions used in different studies.

**Conclusion:** The use of PL in clinical practice requires more research because the reported clinical results are not in concordance with the observed in vitro effects. Their use might be more beneficial in the development of tissue engineering constructs for the use in periodontal and implant surgery.

## P1001

### Collagen barrier membranes absorb growth factors released from cortical bone chips in vitro

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D. Buser, R. Gruber

Bern/Switzerland

**Aim:** Collagen membranes serve as barriers to exclude the invasion of fibroblasts from augmented sites. Within this scenario, collagen can, at least theoretically, adsorb and autologous bone can release growth factors. Here we resized the hypothesis that growth factors released from bone grafts adsorb to collagen membranes and maintain their capacity to activate fibroblasts in vitro.

**Material and Methods:** To test the hypothesis, non-cross-linked porcine type I/III collagen membranes were soaked in conditioned medium from fresh or demineralized cortical bone chips. Recombinant hTGF- $\beta$ 1 served as control. Collagen membranes underwent vigorously washing before being exposed to oral fibroblasts. A gene panel was analyzed by RT-PCR. Cell viability and morphology was determined following green/red and phalloidin staining, respectively.

**Results:** One minute of soaking was enough for the collagen membranes to considerably change the gene expression of the oral fibroblasts, with decreasing adrenomedullin and pentraxin 3, and increasing interleukin 11 and proteoglycan 4. Collagen membranes that were pre-wetted with saline, UV-light exposed, or dried and stored for 1 week at room temperature also provoked significant changes in gene expression. Conditioned medium of demineralized freeze-dried bone matrix also caused the respective changes in gene expression by oral fibroblasts. Changes of gene expression required the intimate contact of the fibroblasts with the collagen membranes, the TGF- $\beta$  receptor type I kinase, but not protease activity.

**Conclusion:** In support of the original hypothesis, these findings demonstrate that collagen membranes effectively absorb TGF- $\beta$ -related growth factors released from bone grafts, a process that may support graft consolidation.

## P1002

### Treatment of vertical bone defects with autogenous block grafts from different donor sites

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Heidelberg/Germany

**Aim:** Different techniques have been described to vertically reconstruct deficient alveolar ridge for proper implant placement. The different procedures are often associated with high complication rates, showing limitations with respect to vertical bone dimension gain, limitations in terms of defect size and occurrence of soft tissue dehiscences. The aim of this study was to evaluate the clinical and radiographical outcome of vertical alveolar ridge reconstructions using different autogenous block grafts and subsequent implant rehabilitation

**Material and Methods:** All patients were treated applying the same method, a vertical onlay graft technique using autogenous bone only. A continuous outer cortical border of the graft and sufficient soft tissue mobilization were essential. Depending upon the particular bone deficit, different donor sites were used.

Patients were either partially or totally edentulous. All patients were followed-up clinically and radiographically.

**Results:** A total of 74 patients with Cawood classes 5&6 were treated for vertical bone augmentation. Depending upon defect size, different donor sites for the cortical bone were chosen (32 calvaria, 35 iliac crest, 7 retromolar region). Postoperative complications occurred in 2 cases (1 calvaria, 1 retromolar region). After 4 months of graft healing, patients received 374 implants (211 calvaria, 145 iliac crest, 18 retromolar bone). 7 Implants were lost during early implant healing. A mean radiographic bone gain of 8.75 mm was achieved. The mean follow-up was 30.65 months

**Conclusion:** The presented technique, using different donor sites, allows the placement of implants in patients with severe bone loss and shows reliable outcomes. All patients could successfully be treated with dental implants.

## P1003

### Spontaneous alveolar bone growth in ankylosed, infra-occluded teeth in adolescents after elective decoronation – A clinical case-series

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London/United Kingdom

**Aim:** Ankylosis of a permanent incisor in children and adolescents results in infra-occlusion of the tooth with consequential localised arrest of alveolar bone growth. This causes significant aesthetic and orthodontic complications as the remaining arch continues to develop. The aim of this case series is to present three cases in which infra-occluded maxillary central incisors were treated successfully with de-coronation achieving vertical alveolar growth without any need for hard or soft tissue augmentation.

**Material and Methods:** In this case series, decoronation with complete removal of enamel was performed, root canals instrumented and socket seal achieved using a free gingival graft from palate or porcine collagen matrix (Mucograft®). Once the patients reached skeletal maturity, dental implants were placed with simultaneous guided bone regeneration (GBR) using de-proteinised bovine bone and porcine collagen membrane. The implants were restored after 8 weeks of submerged healing.

**Results:** The age of three male patients at decoronation was 15, 16 and 17 years. The gingival level discrepancy between the two central incisors at baseline prior to decoronation was 5, 8 and 3 mms. The discrepancy immediately prior to implant placement reduced to 3, 1 and 0 mm. The vertical deficit was reduced further after provision of definitive implant restoration to 0 mm's. None of the patients required staged augmentation and any horizontal alveolar deficiency was managed with simultaneous GBR.

**Conclusion:** Decoronation of ankylosed, infra-occluded teeth seem to stimulate spontaneous vertical alveolar bone growth and consequently reduce the vertical soft tissue deficiency and facilitate implant placement in an ideal position to optimise the aesthetic outcome.

Topic: Diagnosis and risk factors in implant therapy

## P1004

### Validity and reliability of periodontal and peri-implant bone defect characterization by cone beam computed tomography in different acquisition protocols

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**Aim:** To verify the validity and reliability of CBCT description of periodontal and peri-implant infra-bony defects with different acquisition protocols,

**Material and Methods:** One, two and three walls infra-bony defects were made in dry human mandibles with natural teeth and two kinds of dental implants. Acquisitions with three different voxel size and three different mA values were made. Two calibrated examiners performed the image evaluations in different combination of mA and voxel related to linear measures and infra-bony remaining wall defect classification. Statistical analysis was made with inter-class correlation coefficient (ICC), looking for agreement among both examiners and the real measures from digital calliper (gold standard).

**Results:** Validity of mA and voxel in periodontal evaluation revealed median agreement for height, high for length and remaining wall and low for depth and width. EC implants mA validity showed low agreement for depth, height and remaining wall; median for height, length and width. Voxel validity evaluation showed low agreement for depth, median for height, length and remaining wall and high for width. CM mA validity evaluation showed low agreement for width, height and depth and length; median for height and depth and high for length and remaining wall. Voxel evaluation revealed low for height and width, median for depth and high for length and remaining wall. Reliability was high for almost all evaluation.

**Conclusion:** Voxel variations did not modified validity/reliability results from gold-standard for both periodontal and peri-implant defect evaluations. Lower mA revealed an improvement in peri-implant bone defect evaluation, and did not affected periodontal bone defect evaluation.

## P1005

### Effect of different genes polymorphisms upon late dental implant biological complications: a literature review

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Kaunas/Lithuania

**Aim:** To review the literature published in the last 10 years in relation to the possible association between the different gene polymorphisms and late dental implant biological complications.

**Material and Methods:** The database on PubMed was searched from January 1, 2004 to September 1, 2014. The keywords for the search were “dental implants”, “peri-implantitis” and “genetics”. Studies reporting on peri-implantitis/late marginal bone loss in association with genetic polymorphism were considered for inclusion. The search was restricted to English language.

**Results:** The search provided 213 potentially relevant titles and abstracts. After screening the titles and abstracts, and full-text reading of 21 papers, finally, 10 articles were included and divided into 4 groups: (i) evaluating possible association between peri-implantitis and IL-1 polymorphism, (ii) peri-implantitis and TNF- $\alpha$  polymorphism, (iii) peri-implantitis and IL-6, (iv) peri-implantitis and IL-10. In 2 studies out of 5 indicated an association between the IL-1, IL-1RN gene polymorphism and peri-implantitis. One study documented that IL-1 polymorphism just in combination with smoking is closely associated with late peri-implant bone loss. The rest 2 studies did not find any association. No association between IL-6, IL-10, TNF- $\alpha$  and peri-implantitis was documented in the studies included.

**Conclusion:** From this systemic literature review, it can be concluded that there is little support in the literature for a specific genotype that could be reliably used as an indicator of susceptibility to peri-implant diseases. Well designed and adequately powered prospective cohort studies are needed to provide further information.

## P1006

### Peri-implantitis as a warning sign of zoledronic acid-induced osteonecrosis of the jaw (ONJ): resolution of a case

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Granada/Spain

**Aim:** To resolve a case of zoledronic acid-induced ONJ in the area surrounding a dental implant.

**Material and Methods:** A woman in the sixth decade of life came to the Oral and Maxillofacial Surgery Clinic with an intraoral lesion that had developed over several months. The patient had suffered breast cancer in 1993, relapsed in 2005. In 2010, she had presented bone metastasis and had been prescribed zoledronic acid (1 injection per month for 14 months). She received dental implant treatment in the same maxillary region 2 years before the oral lesion she now presented; she had also been treated for peri-implantitis. An extensive left maxillary ulcer exposing necrotic alveolar bone was observed around the implant at 24 (CT revealed that the ulcer extended from 21 to 25, but bone exposure only around the implant), compatible with ONJ secondary to bisphosphonate therapy; an intraoral fistula and purulent discharge were observed (indicating ONJ stage 3). Orthopantomography and face CT confirmed diagnosis of ONJ.

**Results:** After being hospitalized and receiving intravenous antibiotic treatment (Augmentin 1 g/8 h), radical surgery of the necrotic area was performed; left subtotal maxillectomy was carried out under general anaesthetic that included part of the nasal fossa floor and nasal mucosa and anterior maxillary sinus wall. Reconstruction of the defect was performed with direct closure by gingiva and vestibular mucosa. Anatomical pathology of the extracted piece confirmed the diagnosis of ONJ. After 10 months the patient was in clinical and radiographic remission.

**Conclusion:** Peri-implantitis may be a first warning sign of ONJ.

**P1007****Drilling- and withdrawing-related thermal changes during implant site osteotomies**

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Vienna/Austria

**Aim:** Intrabony temperature increase is not only dependent on shearing energy and mechanical friction but is also related to heat capacity and thermal conductivity. The aim of this study was to evaluate temperature changes during the shearing and withdrawing processes during osteotomies.

**Material and Methods:** An overall 160 automated intermittent osteotomies (10/16 mm drilling depth) with 2 mm diameter twist drills and 3.5 mm diameter conical drills and different irrigation methods (without/external/internal/combined) were performed on standardized bone specimens. The drilling cycles were operated by a computer-controlled surgical system, while a linear motion potentiometer and multichannel temperature sensors in various intrabony levels ensured the real-time documentation of temperature changes during the shearing and withdrawing processes.

**Results:** The highest temperature changes were invariably recorded during the process of withdrawal. Significantly lower temperature changes ( $p < 0.02$ ) could be recorded at maximum drilling depths during the shearing process regardless of drilling depth, diameter or irrigation method. During coolant supply, 2 mm diameter twist drills showed higher temperatures (10 mm,  $p < 0.01/16$  mm,  $p < 0.03$ ) compared with 3.5 mm diameter conical implant drills. Internal (10 mm,  $p < 0.01$ ) or combined irrigation (16 mm,  $p < 0.01$ ) was associated with significantly lower temperatures compared with external irrigation by the use of conical implant drills.

**Conclusion:** Considering that heat generation during osteotomies is a multifactorial scenario, this study could demonstrate that the highest temperature rise during implant osteotomies occurs during the withdrawing process and that the time of occurrence is influenced by predominant factors such as osteotomy depth and mode of irrigation.

**P1008****Periodontal disease status versus bleeding on probing around dental implants**

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**Aim:** Bleeding on gentle probing ( $<0.25N$ ) is commonly a sign of inflammation of peri-implant soft tissues. Thus, the aim of the study was to identify the relationship between previous or active periodontal disease (PD) with bleeding on probing (BOP) around dental implants.

**Material and Methods:** There were examined 183 patients – 916 implants (Implacil De Bortoli, Sao Paulo, Brazil). placed at the University of Sao Paulo (USP). Implants' time in function varied from 1 to 14 years. Patients were divided into 2 groups: G1 (without BOP) and G2 (at least one site with BOP). For statistical analysis, Generalized Estimating Equation (GEE) was applied.

**Results:** G1 and G2 showed 11 (36.7%) and 19 (63.3%) implants with active PD, respectively. Regarding the historic of PD, G1 presented 65 (38.5%) implants with BOP, whereas G2 displayed 104 (61.5%). There was no statistical significance between groups when analysing both parameters ( $p > 0.05$ ).

**Conclusion:** It was found that neither previous history nor active periodontal disease have an influence on bleeding on probing around implants.

**P1009****Oral rehabilitation of severe periodontitis with mucous membrane pemphigoid: 13 years followup case report**

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Beirut/Lebanon

**Aim:** Suspicion of a bullous disease was established during the initial phase of therapy in a 60 year old lady presenting a severe to terminal generalized subacute periodontitis. The biopsy confirmed the diagnosis of a mucous membrane pemphigoid. In collaboration with a dermatologist, the treatment included corticosteroids, bacterial decontamination, maxillary and mandibular reconstructions consisting in temporary long term metallic bridges, extractions with immediate implants placement, periodontal surgery on remaining abutment teeth and final restorations on teeth and implants. The patient was monitored after recovery of health, comfortable function and aesthetic amelioration with regular maintenance visits. The periodontal and implant literature did not disclose any case report or study about extensive implant treatment and bullous disease

**Material and Methods:** 60 year old lady with generalized subacute severe to terminal periodontitis in presence of a bullous disease. nonsurgical therapy-biopsy-corticosteroids medication-extraction and immediate implants-periodontal surgery-full mouth restorative rehabilitation

**Results:** Treat Mucous Membrane Pemphigoid -Treat Terminal Periodontitis -Achieve a Full Oral Rehabilitation with specific objectives: Maintain 8 teeth that would have been most probably extracted. Insure comfortable function during the course of active therapy with fixed prosthesis

**Conclusion:** It has been possible to treat a 60 year old lady with severe to terminal sub acute periodontitis in presence of bullous disease with periodontal and implant therapy and provide her a good quality of life with 13 year follow-up.

**P1010****Impact of facial growth in the long term aesthetic result implant**

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Montpellier/France

**Aim:** To review the literature in order to analyse consequences of cranio-facial and residual alveolar growth, after implant placement and to suggest a new approach to integrate it in our daily treatment planning.

**Material and Methods:** A search of the PubMed database was performed. Additional hand searching and a search for literature

were also conducted. The selected articles were published in English. 137 Titles were obtained, 31 full text articles were selected for further evaluation.

**Results:** A total of 21 studies were included in the systematic review. All studies agree that implant placement in the young patient, with a residual potential growth, is challenging. It is therefore necessary to wait for the end of puberty, to measure growth through assessment of bone age (different techniques). Concerning the growth after implant placement, various factors were analysed in order to qualify and quantify it: Growth of jawbones, continuous tooth eruption, mesial drift of the teeth, deviating facial types (short and long face syndromes), difference between sexes, just to name a few. Therefore a surgical and prosthetic strategy, taking into account growth, is proposed to prevent any disharmonious results after implant placement specifically in the aesthetic zone.

**Conclusion:** Before an implant placement, each patient after the age of 20 should undergo a detailed analysis of the alveolar process development. Other studies in this field are needed.

## P1011

### Platform switching and bone marker levels in peri-implant sulcular fluid

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**Aim:** The concept of platform switching has been introduced to implant therapy, however long-term data are sparse. The aim of this study was to biochemically investigate the RANKL and OPG response to platform switching and conventional implants after 1 year of loading, in order to understand the long-term effect of implant/abutment mismatching on peri-implant health.

**Material and Methods:** In this clinical study 27 patients have received 94 (46 control, 48 test group) dental implants. 12 months after prosthetic rehabilitation, peri-implant sulcular fluid samples were taken from two aspects of all implants.

**Results:** Samples were processed in a conventional ELISA using monoclonal antibodies recognizing the active entity of RANKL and OPG. The results of the present study indicate that 12 months after restoration the peri-implant bone tissue around test and control sites had similar RANKL and OPG characteristics.

**Conclusion:** This study suggested that crestal bone resorption may be reduced by platform switching. However, to find the perfect platform switching design comparative studies to the different designs and level of placement are needed.

## P1012

### Dental implant placement in a patient with Hajdu-Cheney syndrome

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*Athens/Greece*

**Aim:** To report a case of dental implant placement in a patient with Hajdu-Cheney Syndrome. Hajdu-Cheney Syndrome is a rare hereditary bone metabolism disorder characterized by acroosteolysis of the distal phalanges, short stature, craniofacial and skull changes, periodontitis and premature tooth loss. Search of

the current literature revealed no reports of implant placement in patients with Hajdu-Cheney Syndrome.

**Material and Methods:** A 29-year old woman with osteoporosis, generalized advanced chronic periodontitis, increased tooth mobility and premature tooth loss was referred to the Postgraduate Clinic of Periodontology, University of Athens-Greece for oral rehabilitation of the edentulous posterior upper and lower region. The patient was diagnosed 8 years ago with Hajdu-Cheney Syndrome after clinical, radiographic and histological examination. Five years after placement and successful osseointegration of a dental implant in the upper right first premolar region, four dental implants were placed in the upper and lower posterior regions. Prosthetic rehabilitation followed 6 months after implant placement. Bone mineral density appeared physiological (Bone Type III).

**Results:** Clinical and radiographic examination of the patient during the periodontal maintenance program in 3 months interval after implant placement revealed no abnormalities in the implant region.

**Conclusion:** Clinical and radiographic examination of the patient during the periodontal maintenance program in 3 months interval after implant placement revealed no abnormalities in the implant region.

## P1013

### IL1 genotype and success of dental implant rehabilitation preceded by GTR

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**Aim:** The present study intended to analyse the relation between the outcomes (success or no success) of oral rehabilitations with dental implants preceded by guided tissue regeneration (GTR) and the combined IL1 positive genotype (IL1A-889allele2, IL1B+3953allele2) in a Portuguese Caucasian population.

**Material and Methods:** Seventy unrelated Caucasian individuals with successful and unsuccessful dental implant rehabilitations preceded by GTR, were randomly selected. Two groups were created according to the result – success and no success. To perceive IL1 genotype combination, oral swabs were performed to obtain DNA from the epithelial buccal cells of each patient (TGP<sup>®</sup>, CGC Genetics). The data were analysed with R version 3.1.1 and the statistical analysis included the independence chi-square test and Fisher's exact test.

**Results:** The estimated prevalence of the combined IL1 positive genotype (TGP<sup>®</sup> positive result, presence of both allele2 on IL1A-889 and IL1B+3953 genes) on a Portuguese Caucasian population was 34.3% [23.6%;46.7%] (CI 95%).

The results show that successful outcomes of dental implant rehabilitations preceded by GTR were more related to the presence of allele1 of IL1A and IL1B genes. The positive combined IL1 genotype did not show a statistically significant association with the success or no success of implant rehabilitations preceded by GTR (p = 0.386).

**Conclusion:** Success of dental implant rehabilitations preceded by GTR was more related to the presence of allele1 of IL1A and IL1B genes. However, the combined IL1 genotype had no association with the success or no success of implant rehabilitations preceded by GTR.

## P1014

### Influence of diabetes on implant survival and complication rate

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Seoul/Korea

**Aim:** The aim of this study is to evaluate the influence of diabetes mellitus on the implant survival and complication rate.

**Material and Methods:** A retrospective chart review of patients who had been treated with dental implant therapy and also had their glycated hemoglobin (HbA1c) data within 3 months before or after the placement of implants from the years 2007 to 2013 was performed. Patients were divided into two groups according to their baseline HbA1c levels (HbA1c <7% named well-controlled group or HbA1c 7–9% named fairly well-controlled group). The influence of HbA1c levels on the implant survival and complication rate for each HbA1c group were evaluated with a statistical method using Kaplan–Meier analysis and  $\chi^2$  test.

**Results:** The study population consisted of 128 patients, followed for 1–4 years, mean age 57.2 years and mean HbA1c  $6.5 \pm 1.0\%$ . A total of 347 implants were placed with a follow-up ranging from 4 to 69 months (average  $27.7 \pm 16.0$  months for the well-controlled group,  $28.2 \pm 19.3$  months for the fairly well-controlled group) after the placement. The cumulative Implant survival rate was not statistically different between the well-controlled group and the fairly well-controlled group ( $p = 0.850$ ). When HbA1c values were related to the complications, significant more soft tissue complications were observed in the fairly well-controlled group than the well-controlled group ( $p = 0.003$ ), but no statistically significant difference was seen for technical complications.

**Conclusion:** Implant survival rate was not associated with the perioperative baseline HbA1 levels. However, more soft tissue complications occurred when HbA1c increased.

## P1015

### Analyses of bone resorption biomarkers on adequate/inadequate keratinized mucosa

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Trabzon/Turkey

**Aim:** The study aimed to investigate the effects of keratinized mucosa width (KMW) on peri-implant tissues by evaluating peri-implant clinical and bone resorption parameters.

**Material and Methods:** Fifty one dental implants (DI) were classified into 4 groups according to adequate/inadequate (KMW  $\geq 2$  mm/KMW  $< 2$  mm) peri-implant KMW. DI's with KMW  $< 2$  mm were free gingival graft (FGG), free periosteal graft (FPG) and the maintenance groups, whereas DI's with KMW  $\geq 2$  mm were control group. Following clinical measurements, RANKL and OPG levels in peri-implant crevicular fluid (PICF) were determined by ELISA at baseline (1 month after Phase 2 surgery) and 6th month (after prosthesis).

**Results:** Clinical parameters were lower in control group than in inadequate KMW groups at baseline, while there were no differences among groups at 6th month. Furthermore, KMW was higher in the FGG group than FPG group at 6th month.

RANKL levels were higher in the control and maintenance groups compared to FGG/FPG groups, but no difference was determined between them in their OPG levels at baseline and 6th month. Clinical parameters of all groups showed improvements at 6th month; RANKL levels decreased in all groups compared to baseline, while OPG levels increased in the FPG group and decreased in other groups. RANKL/OPG ratio displayed a general decrease in all groups, most notably in the FPG group.

**Conclusion:** The results of the study demonstrate that adequate KMW and peri-implant plastic surgery techniques have beneficial effects on clinical peri-implant parameters and bone resorption biomarkers.

## P1016

### Development of an instrument to assess patients' expectations of dental implants

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**Aim:** To develop an instrument to assess patients' expectations of dental implants. In addition, to assess the instruments' face and content validity.

**Material and Methods:** The underlying conceptual/theoretical framework was Bowling's Model Of Patients' Expectation for Health Care: PEHC. An item pool was generated from a review of the literature of PEHC and covered six domains: (i) Personal Characteristics, (ii) Previous Experiences (iii) Physiological Feedback (iv) Psycho-social Cognition (v) Role Model and (vi) Expectations. Items were adapted for assessing PEHC for dental implants. An expert panel of lay people, general dentists and specialists rated the items for clarity and relevance using the Content Validity Index (CVI-clarity and CVI-relevance); and for comprehensiveness.

**Results:** The initial item pool consisted of 128 items and 49 items were tested for face and content validity. CVI-clarity ratings ranged from 0.6 to 1.0 with a mean of 0.8. CVI-relevant ranged from 0.6 to 1.0 with a mean of 0.9. The comprehensiveness of the instrument was "good" to "excellent". Further modifications were suggested through qualitative feedback. An instrument to assess PEHC relating to dental implants was developed consisting of 34 items: Personal Characteristics (4 items), Physiological Feedback (3 items), Psycho-social Cognition (14 items), Encouragement (4 item) and Expectations (9 items). Further psychometric testing is required.

**Conclusion:** An instrument to assess patients' expectations of dental implants was developed based on Bowling's Model of PEHC. Initial testing confirmed good-to-excellent face and content validity. Further psychometric testing of the instrument (validity and reliability) is planned.

## P1017

### The evaluation of clinical and microbiological changes around platform-switched and -matched implants

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**Aim:** Platform switching for maintaining peri-implant bone levels has gained popularity among the implant designs in terms

of implant-abutment connections over the last few years. The aim of this study was to compare bacterial accumulation around dental implants after loading functionally that placed equicrestally and subcrestally.

**Material and Methods:** A total of 45 ( $n = 23$  subcrestally,  $n = 22$  equicrestally) dental implants (Ankylos C/X, Manheim, German) were placed with sub-merge technique. Three months following placement, definitive prosthetic rehabilitation was performed. Peri-implant crevicular fluid was collected with six perio-papers at the day of functional loading, and repeated at 1st, 3rd, 6th months follow-up. The probing depth, plaque index, gingival index, bleeding on probing, clinical attachment level, gingival recession, crestal bone level is measured at the day of crevicular fluid collections. *Agregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia*, *Tannerella Forsythia* and total bacteria amounts were analyzed by using Q-PCR technique.

**Results:** According to statistical results, the difference of mean PI, GI, BOP, PPD, and clinical attachment level change from loading to 6th month was no significant between groups ( $p > 0.05$ ). There were no significant differences between the groups for specific bacterial accumulation. The sixth month data of total bacterial amounts was statistically significant between the groups ( $p = 0.022$ ). No bone loss from loading was noted for 97.1% of platform-switching and 92.6% of the platform-matching implants. Implant survival rates was 100%.

**Conclusion:** Within the same implant system, the platform-switching concept showed very limited bone level alterations and microbiological changes according to total bacteria amounts when compared with platform matching.

## P1018

### Biomechanical analysis of a zirconia dental implant by using a meshless technique

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**Aim:** This preliminary study aims to numerically simulate and validate the behaviour of zirconia dental implants using an elasto-static meshless technique analysis.

**Material and Methods:** An advanced meshless discretization technique –Natural Neighbour Radial Point Interpolation Method – was used to numerically analyse a zirconia one-piece dental implant (Ceraroot® Barcelona, Spain; premolar type, 12 mm height) inserted in a block of bone (2 mm cortical layer and different simulations on the density of trabecular bone). By resembling the cellulae natural behaviour, the major advantages of this technique over the finite elements method are the remeshing flexibility and the higher accuracy. Several loading conditions were applied in the implant's abutment, ranging from the vertical load (90°) to the shear load (0°).

**Results:** The results obtained indicate that zirconia one-piece dental implant induces a smooth stress field in the bone. Assuming a full occlusal load with 500N of magnitude (extreme load), highest stresses are located in the bone's cortical layer (250 MPa). In the trabecular bone tissue the maximum stress does not exceed 50 MPa. Additionally, the results show that for the same occlusal load the stress field in the zirconia implant could reach between 350 and 500 MPa in the interface between the thin cortical layer with the trabecular tissue.

**Conclusion:** Meshless method is suitable to analyse stress distribution on dental implants simulations. The ceramic implant studied presents an adequate biomechanical behaviour. The stress field induced in the bone tissue is within the remodelling stress range.

## P1019

### Full mouth rehabilitation of a systemic sclerosis patient with dental implants: 5 years follow-up

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**Aim:** Scleroderma is thought to be an autoimmune multisystem rheumatic condition that affects connective tissues. Hardening of the skin is usually the initial manifestation of the disease process, which may be better described as progressive systemic sclerosis (PSS). The oral manifestations include microstomia, xerostomia, trigeminal neuropathy, idiopathic resorption of tooth and bone, mandibular fracture. The radiographic findings include uniform widening of the periodontal ligament space, especially around the posterior teeth. At present there is limited data regarding long term success rates of implants in such patients. The clinician and patient are challenged when making a decision to transition from teeth to implant supported restorations.

**Material and Methods:** A 56-year-old patient with systemic sclerosis presented with severe periodontal disease and complained of tooth mobility. After initial periodontal treatment teeth were splinted and patient was kept on a maintenance programme. After 6 years follow-up it was decided to extract the teeth because of increased mobility and transition to implant-supported fixed prosthesis was performed. 5 implants were placed in the maxilla and 4 implants in the mandibula.

**Results:** After 5 years follow-up there was no pocket formation or other radiographic abnormalities around the implants.

**Conclusion:** In our case report we would like to present a successful full mouth rehabilitation with dental implants of a systemic sclerosis patient. Dental implant procedures in these patients are not well documented and the background is not sufficient to propose a standardized approach. Only few case reports are present in the literature at the moment (Level of Evidence 5).

## P1020

### MMP-8 and TIMP-1 levels in periimplant crevicular fluid of platform switching implants

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**Aim:** The purpose of this study is to provide an assessment of MMP-8 and TIMP-1 levels 1 year after loading in platform switching versus conventional dental implants.

**Material and Methods:** In this study 27 patients have received 94 (46 control, 48 test group) dental implants. Peri-implant crevicular fluid was sampled with sterile paper strips from two aspects of all dental implants 12 months after prosthetic rehabilitation.

**Results:** Samples were processed in a conventional ELISA using monoclonal antibodies recognizing the active entity of MMP-8 and TIMP-1 levels. The results of this study show that

1 year after prosthetic restoration the periimplant soft tissue around platform switching and conventional dental implants had similar MMP-8 and TIMP-1 characteristics.

**Conclusion:** The presence of an platform switching concept is compatible with long-term peri-implant health as demonstrated by analysis of a sensitive biomarker of the peri-implant inflammatory response.

## P1021

### Prospective, multicenter study of implants with highly porous midsections placed in an uncontrolled population: 2-year follow-up in smokers

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**Aim:** An ongoing prospective, multicenter study is aimed at evaluating long term survival and success of porous tantalum Trabecular Metal (PTTM) dental implants in an uncontrolled population. This report focuses on the interim results in smokers at 24–48 months post implantation.

**Material and Methods:** The investigators placed implants per the instructions for use (IFU) and clinical judgment. Many enrolled subjects presented with higher risk of implant failure and/or marginal bone loss.

**Results:** Of 97 implants initially placed in 69 smokers, 16 implants in 12 patients were excluded for IFU violations: heavy smokers (>140 cigarettes per week), alcoholics with significant mental instabilities, and non-submerged placement without primary stability. The final study group included 29 males and 28 females with a mean age of 47.47 years. The reported average number of cigarettes smoked is 63/week. A total of 81 implants were included in this analysis. Within this group, 13 implants were placed in patients with Type IV bone, myocardial infarction, osteoporosis, current infections, bruxism, periodontitis or a combination of these conditions. Seven implants in 4 patients were lost to follow up at 2 years; of these, 3 implants in 2 patients were associated with one or more of the above mentioned risk factors. Four implants (3 maxillary, 1 mandibular) failed as a result of infection (n = 2) or loss of integration after loading (n = 2). Cumulative implant survival in smokers was 94.59% (n = 70/74).

**Conclusion:** Within the limitations of this sub-group analysis, PTTM implants exhibited predictable (94.59%) survival rates.

## P1022

### The clinical outcomes of 700 machined surface Branemark system dental implants at 5 to 16 years post-insertion

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**Aim:** Studies of implant failure and survival involve many parameters. The aim of the present retrospective study was to evaluate the clinical outcome of 700 machined surface implants over a 16 year period in relation to gender, age, arcade, site and follow-up time.

**Material and Methods:** This retrospective study evaluated 136 consecutive patients who were treated in a periodontal clinic. A

total of 700 implants were inserted by one periodontist from 1991 to 2007 according to the original protocol suggested by Branemark in 1977.

**Results:** Ninety-four (94%) of the 700 implants were functional in 98.5% of patients with a follow-up period of 5–16 years. The average age of patients was 63.1 years. The number of females treated (n = 97 and 482 implants) was greater than the number of males (n = 39 and 218 implants). The average number of implants placed was 5.9 in males versus 5 in females. Failures increased with age for women, particularly for those over 65 years of age. Failures were more in maxillary posterior sites than in mandibular posterior sites or in the anterior maxilla.

**Conclusion:** A low failure rate with machined surface implants, placed with 2-stage surgical protocol, was seen in this study at 5 – 16 year post-insertion. The implant failure rate was higher among females over 65 years, while the age of male patients did not seem to influence the failure rate. Maxillary posterior sites showed more implant failures than other sites.

## P1023

### Oral implant rehabilitation after failure of root canal treatment in esthetic zone

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**Aim:** The oral implant rehabilitation after failure of root canal treatment in esthetic zone is reported.

**Material and Methods:** A 44-year-old man without medical history and no complained revealed after oral examination mobility of upper left central incisor and corresponding fistula. Periapical radiological examination show a crown-root fracture in upper left central incisor and a periapical radiolucency on apical third and inadequate obturation of root canal treatment in upper left lateral incisor. A cone beam radiological observation was performed in order to evaluate treatment plan possibilities. Treatment plan included immediate implant placement with posterior supported prostheses. Surgical treatment was performed under local anesthesia. After careful debridement of the extraction socket, an immediate placement of implants were located. In the upper left central incisor was placed a Straumann Roxolid SLA active Bone level implant Ø 3.3 mm – length 12 mm and in upper left lateral incisor Straumann Roxolid SLA active Bone level implant Ø 3.3 mm – length 10 mm. The residual gap between the implant and the socket walls were covered with equine xenogeneic bone graft (Biogen<sup>®</sup> Normon) and equine type I collagenous membrane (Biocollagen<sup>®</sup> Normon). After a 3 month period of osseointegration, the prosthesis was placed.

**Results:** Implants placed immediately after tooth extraction offer several advantages. Some authors concluded that immediate implant placement in chronic periapical lesions may be indicated.

**Conclusion:** Although in this case the treatment proved successful, we need long-term prospective studies to evaluate the immediate placement implant success rate into sites with periapical pathologies.

## P1024

### Dimensions of interradicular septum in posterior teeth using cone beam computed tomography

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**Aim:** Alveolar bone dimensions prior to extraction may be a significant prognostic factor in immediate implants. The use of CBCT is preferred to analyze the buccal and lingual dimensions. The interradicular septum is an anatomic accident that can be used to achieve primary stability in postextraction posterior sockets. The purpose of this retrospective study is to analyze the septum dimensions in the dentate posterior mandible based on CBCT images.

The null hypothesis was that posterior locations are not adequate sites for immediate implants.

**Material and Methods:** 200 CBCT scans were taken using confidential image acquisition from patients of the Faculty of Dentistry, University of Seville. Cross sections were performed to measure. The data was stored in DICOM format and analyzed with Romexis Viewer (Planmeca Dentsply).

Parameters: Thickness of interradicular septum of upper molars: 2 measurements were made, the buccal palatal distance from one root to another (DV-MV to P). Thickness of interradicular septum of lower molars: mesial to the distal root distance (M to D). All measurements performed in a coronal section at 4 mm from the crest level.

**Results:** Waiting for the final statistical result, the preliminary values from the septum of upper and lower molars are  $3.54 \pm 0.54$  mm and  $3.65 \pm 0.89$  mm respectively.

**Conclusion:** The use of CBCT has a prognosis value to decide the most suitable treatment approach. In order to use the interradicular septum, an implant could be placed too axially and would have to be restored with an angled abutment.

## P1025

### Comparative evaluation of two methods of microbiological testing in periimplantitis patients

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**Aim:** To compare informativeness of PCR-based diagnosis and mass-spectrometry in providing clinicians with maximum information about bacterial load of periimplant tissues.

**Material and Methods:** 35 patients without severe somatic disorder, aged 35–68, were assessed (mean age  $51.5 \pm 16.5$ ). Peri-implant pocket microflora was studied with PCR (polymerase chain reaction) and mass-spectrometry. Samples were taken with sterile paper points introduced into pockets for 10 s and then put in tubes with Brain Heart Infusion Broth and after in anaerobic jar.

**Results:** PCR-based diagnosis detected main periodontal pathogens in the evaluated pockets (A.a. in 31%, P.g. in 50%, P.i. in 25%, F.n. in 31%, P.e. in 19%), *Treponema denticola* was not detected. P.g. and P.i. were most often found in partially edentulous patients and P.g. and F.n. – in fully edentulous patients. Mass-spectrometry revealed pathogens that were not in

PCR primer kit but are responsible for inflammation in oral cavity and in other organs and systems: *Staph. aureus* spp., *Staph. epidermidis*, *Esherichia coli*, *Enteros faecalis*, etc.

**Conclusion:** Combination of both methods allows to test more profoundly periodontal pocket microorganisms in periimplantitis patients. Mass-spectrometry may be considered as an additional method to PCR-based diagnosis to receive complete information necessary to select the most efficient antimicrobial therapy.

## P1026

### Prospective Controlled Clinical Study of titanium-zirconium alloyed diameter-reduced implants (Roxolid®) in type 2 diabetic patients. A preliminary study

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**Aim:** This preliminary study aims to clinically evaluate the use of Straumann-Roxolid implants with a reduced diameter of 3.3 mm and a hydrophilic surface (SLActive) for the treatment of single-tooth restorations in type-II-diabetes patients.

**Material and Methods:** Study design: Prospective, controlled clinical trial. 23 patients were treated with a single implant to replace maxillary and mandibular incisors, canines or bicuspsids. The test group included 8 patients with controlled type-II-diabetes and the control group included 15 healthy patients. The implants were placed in healed extraction sockets, subjected to transgingival healing and were loaded two months post-surgery. Six months after restoration hemoglobin HbA1c levels were determined and standardized radiographs were measured to assess vertical bone level changes. The statistical methods used were ANOVA and ANCOVA (age as covariate),  $p < 0.05$ .

**Results:** Significant bone level changes were detected between the second and third visit, and for the group of diabetic patients. The diabetic group showed less bone loss than the control group ( $p < 0.05$ ). The age had less influence on the results than membership of either group. However, it could be seen that between implant placement and the second visit, that patients under 55 showed significantly lower bone level changes ( $p < 0.05$ ).

**Conclusion:** Straumann Roxolid dental implants with a reduced diameter and a hydrophilic surface can be clinically recommended in type-II-diabetes patients within the limited patient number and follow-up period of this study.

## P1027

### Factors associated with dental implant survival: a 38-month retrospective analysis

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**Aim:** The aim of this study is to determine whether implant survival rates are affected by known risk factors that may contribute to implant failure and potential risk indicators associated with implant failure.

**Material and Methods:** Data were collected from 206 patients who received a total of 561 single or multiple dental implants. Data were recorded regarding the success and survival rates of the implants. Implant failure was defined according to implant

mobility on clinical examination, persistent pain, signs of infection, presence of peri-implant radiolucency, progressive bone loss, or the implant could not be used for prosthetic rehabilitation any more.

**Results:** Overall, 17 of the 561 sand-blasted surfaced implants failed (96.97% survival rate) in 12 patients during the follow-up period (ranged from 3 to 38 months) after implant placement. Implant failures were concentrated during the healing phase (8 implants) and after loading phase (9 implants). Eight of 9 loaded implants were restored with overdentures, whereas the remaining 1 was restored with fixed partial denture. One implant failed due to the abutment-implant disharmony. Eight, 3, and 6 out of 17 failed implants were placed in Type 1, Type 3, and Type 4 bone, respectively, according to the bone type classification described by Lekholm and Zarb.

**Conclusion:** Bone quality is significant when considering an implant placement site, and secondly there appears to be other factors in the success rates of implants, including smoking habits, periodontal and systemic (particularly diabetes mellitus) health of patients, appropriate prosthodontic planning, as well as the length of osseointegration of implants with the surrounding bone before loading.

## P1028

### Clinical outcome of dental implants in patients with type 2 diabetes mellitus

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**Aim:** Diabetes is a serious illness that affects many people. It is often accompanied with systemic adverse sequelae, such as wound healing which may also affect the osseointegration of dental implants. There is a high demand of dental implants and it is inevitable to meet diabetic patients who request implant treatment. The purpose of this study is to evaluate the clinical outcomes of dental implants placed in patients with well controlled type 2 diabetes mellitus.

**Material and Methods:** Sixty-two implants in 38 patients were evaluated with a follow-up time up to 5 years with a mean of 30 months placed both the upper and lower jaws. Two different types of prostheses, cement retained fixed dental prostheses or overdentures, were delivered to patients. Both the clinical and the radiographical status of the implants have been compared between the baseline and the most recent control of the patients.

**Results:** One-implant was lost in one patient 3 weeks after surgery due to infection who had 3 implants in the lower jaw. However implant was replaced after the treatment of the infection and the healing of the wound. No implants were lost after loading. No implant had marginal bone loss  $\geq 1$  mm. Whenever a marginal bone loss was detected, it was  $< 1$  mm. No periapical radiolucencies, no bleeding on probing, or pathological probing depth were recorded.

**Conclusion:** Success of dental implant in well controlled diabetic patients with proper treatment planning, and adequate maintenance appears as good as normal individuals.

## P1029

### The influence of keratinized mucosa around implant on brushing discomfort and peri-implant health

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**Aim:** The aim of this study was to compare the degree of brushing discomfort (BD) during oral hygiene and peri-implant clinical variables in patients presenting implant sites with  $\geq 2$  mm or  $< 2$  mm of keratinized mucosa (KM).

**Material and Methods:** Patients were recruited during maintenance recall from January to October, 2013. Based on the presence of KM, the patients were divided into 2 groups: presence of implant sites with  $\geq 2$  mm of KM (Wide Group) and presence of implant sites with  $< 2$  mm of KM (Narrow Group). At the beginning of the experiment, clinical measurements of plaque index (PI), probing pocket depth (PPD), clinical attachment level (CAL) and bleeding on probing (BoP) were performed in 3 sites at buccal aspect of the implants. Immediately after oral hygiene instructions, the patients were asked to perform brushing of the experimental implant sites. Subsequently, the patients reported on the corresponding brushing discomfort using the Visual Analog Scale (VAS). Non-paired student-t test, Wilcoxon and chi-squared tests were performed to analyze the outcome variables. Level of significance was established in 5%.

**Results:** Eighty patients with a total of 270 implant sites were included. The results showed that the implant sites in Narrow Group exhibited more BD ( $p < 0.001$ ), PI ( $p = 0.0021$ ) and BoP ( $p = 0.017$ ) than the implant sites from Wide Group.

**Conclusion:** It was demonstrated that implant sites with  $< 2$  mm of KM were more prone to brushing discomfort, plaque accumulation and peri-implant inflammation.

## P1030

### Effect of the history of periodontitis on implant success – long-term outcomes during supportive periodontal therapy

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**Aim:** Dental implant insertion seems to have a limited long-term stability and higher rate of peri-implantitis in patients treated for periodontitis. The aim of this study was to analyse the implant loss during periodontal supportive therapy (SPT) in patients with moderate to severe periodontitis compared to periodontally-healthy patients.

**Material and Methods:** 31 patients with history of periodontitis and dental implants (test) and 30 patients with dental implants, without a past history of periodontitis (control) were consecutively recruited. Subjects in the test group were examined after active periodontal therapy (T0) and treated with 80 implants (control group: 92 implants). The observation time ended with temporally end of SPT or implant maintenance, respectively (T1). To determine the dental implant success the implant survival rate, mean marginal bone loss (MBL), the incidence of peri-implantitis and pocket probing depths (PPD) were assessed.

**Results:** In the test group 95.0% of dental implants survived over 9.8 years (control: 94.6% in 6.9 years). The MBL in the

test group was higher ( $16.3 \pm 24.6\%$ ) compared to the control group ( $9.8 \pm 25.5\%$ ), but without statistical significance ( $p = 0.095$ ). The incidence of peri-implantitis was similar in test ( $25.8\%$ ) and control group ( $30.0\%$ ;  $p = 0.523$ ). The mean PPDs reached a pathological level at T1 in the test group (T0:  $3.3 \pm 1.1$  mm; T1:  $4.1 \pm 1.7$  mm; control: T0:  $0.9 \pm 1.2$  mm; T1:  $2.7 \pm 1.0$  mm;  $p < 0.001$  between groups).

**Conclusion:** There is no difference, in terms of implant survival rate, between periodontitis and non-periodontitis patients. However, patients with history of periodontitis showed a higher MBL and PPDs when compared with non-periodontitis patients.

## P1031

### Estimation of interleukin-6 as a biomarker of peri-implantitis

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**Aim:** To evaluate interleukin-6 (IL-6) profile in peri-implant tissues hence to estimate its potential as a biomarker of peri-implantitis.

**Material and Methods:** 32 patients suffering peri-implantitis, 37 patients with healthy peri-implant tissues and 15 patients with severe chronic periodontitis were recruited for the study. Full-mouth and experimental site related periodontal measurements were recorded in the first visit and the participants were scheduled for the peri-implant crevicular fluid (PICF) retrieval in the 24–72 h following examination. PICF volume was evaluated using device for the impedance measurement (Periotron<sup>®</sup>) while the levels of IL-6 were estimated using flow cytometry method. The biopsies of granulation tissue were collected from the patients with peri-implantitis and severe chronic periodontitis during surgical treatment stage for evaluation of tissue IL-6 using immunohistochemical method.

**Results:** IL-6 levels were significantly higher in PICF samples of patients suffering peri-implantitis when compared to the participants with healthy peri-implant tissues. Immunohistochemical analysis of granulation tissue demonstrated that both peri-implantitis and periodontitis cell infiltrates were positive for IL-6, while IL-6 was significantly more expressed in peri-implantitis derived granulations when compared to periodontitis. Analysis of correlation between IL-6 and clinical periodontal parameters did not reveal any significant association.

**Conclusion:** These results suggest IL-6 as candidate for biomarker of peri-implantitis, however the further optimization of this diagnostic tool is needed.

## P1032

### Anatomical characteristics of the lingual vascular canals and morphology of the mandibular jaw bone observed on cone beam computed tomography

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**Aim:** To evaluate the presence and location of the lingual foramina and lingual vascular canals in the anterior mandible,

and to evaluate the mandibular morphology using cone beam computed tomography (CBCT).

**Material and Methods:** A total of 278 CBCT were randomly selected from the archives of the Latin American Institute for Research and Dental Education (Curitiba, Brazil). The images were obtained using a cone beam computed tomograph, Galileos (Sirona, Bensheim, Germany). All tomographic analyzes were performed with the use of Galaxis version 1.7 (Sirona, Bensheim, Germany). The presence, amount, location and size of lingual foramina and vascular canals were assessed in the interforaminal region. The morphology of the mandibular jaw bone in the midline and in the region of the teeth 33 and 43 was rated by visual analysis.

**Results:** Considering 278 CBCT, 408 lingual foramina were identified in 246 patients (88%). Lingual vascular canals were found in 210 patients (75%). In midline, 267 patients (96%) showed the base of the mandible wider than the bone crest. In the region of teeth 33 and 43, the base of the mandible and the bone crest were parallel in 161 (57%) and 165 patients (59%), respectively. There was a significant correlation ( $r = -0.149$ ;  $p = 0.013$ ) between the presence of vascular canals and lingual foramina.

**Conclusion:** There was a high prevalence of lingual foramina and vascular canals in the anterior mandible. Accordingly, a careful evaluation of this region is critical to reducing the incidence of intraoperative complications in the placement of implants in the anterior mandible.

## P1033

### Five to sixteen years retrospective long-term study of the evolution in the peri-implant bone resorption on 700 machined surface implants (Brånemark System<sup>®</sup>)

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**Aim:** Bone resorption is one of the main implant complications. It can lead to partial or total loss of osseointegration. The purpose of our study is to observe the long-term evaluation of the peri-implant bone resorption, according to the following parameters: follow-up, gender, age, arcade, site.

**Material and Methods:** Our study focuses on 700 machined implants in 136 patients selected in a dental-office of Periodontology – Implantology exclusive. All implants, MK2 and MK3 Brånemark system, were machined surface and had been placed in 2 surgical stages in the periodontal healthy or periodontal treated patients. Ninety four per cent of placed implants were in survival with a long-term follow-up (5–16 years). Radiographic examination of the bone resorption was performed.

**Results:** In patients over 65, bone resorption is more frequent in women than in men. Implants without bone resorption (<1 mm) were more present in the mandible and posteriors sites. However bone resorption superior to 2 mm depended neither of the arcade or of the site. The implants failures were not significantly associated with resorption. Bone resorption around the implant is influenced by grafting technique. Non resorbable membrane combined with autogenous bone provides the same results as in the cases do not require reconstruction. More implants without resorption are observed with the greatest follow-up (10–16 years).

**Conclusion:** Low bone resorption and high implant survival (94%) with an important follow-up (16 years) reinforce us in our 2 surgical stages protocol with machined surface implants.

## P1034

### Impact of smoking as a risk factor for dental implant failure: a critical review

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**Aim:** The aim of the present study was to conduct a critical review to evaluate the effects of a dose dependent impact of smoking on the success or failure of dental implants.

**Material and Methods:** A systematic search of the electronic databases and subsequent hand searching of the relevant articles published in English was performed.

**Results:** Of the 60 papers identified by this process, only 8 studies were included in the review, based on the inclusion and exclusion criteria. The included studies compared the effects of smoking on both marginal bone loss and implant failure. 4 out of 5 studies reported a strong correlation between smoking and an increased risk of implant failure. However, only 2 of the 4 studies reported on whether the risk of implant failure was affected by the quantity of daily cigarette consumption. Furthermore, of the 3 studies that analysed the effect of smoking on marginal bone loss, only 2 studies reported an increase in bone loss in smokers. None of the included studies demonstrated any correlation between smoking dose and increased marginal bone loss around a dental implant. The results from the review suggest that there are limited evidenced-based data with regard to establishing a relationship between quantity of cigarette consumption (in terms of smoking dose) and its effect on dental implant failure.

**Conclusion:** There appears to be limited data on clinical dental implant protocols in regard to the acceptance of smokers in terms of a dose-related risk when considered patient suitability for implant placement.

## P1035

### Clinical and microbiological findings of polished collar implants and natural teeth in patients with chronic periodontitis history

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**Aim:** The comparison of clinical and microbiological findings of dental implants (DI) and neighboring teeth (NT) in patients treated for chronic periodontitis (CP) was presented.

**Material and Methods:** Clinical parameters including plaque index (PI), probing depth (PD) and bleeding on probing (BOP) of 16 implants (Nobel Replace Select™) and neighboring 32 teeth were recorded at -1st, 40th, 60th, 90th and 180th days. The gingival crevicular fluid (GCF) and subgingival microbiological samples from DI and NT were collected at baseline and days 10, 40, 90, 180 after surgery and evaluated for GCF volume with Periotron 8000™ and for the proportions of obligate anaerobic microorganisms (OAM) in total flora by culture method.

**Results:** The mean values of all clinical parameters were within normal limits throughout the study for both groups. PI scores did not differ between the groups at all time points ( $p > 0.05$ ). BOP scores at day 60, GCF volume at day 90 and PD values for all time points were significantly higher in DI than those of NT ( $p < 0.05$ ). The proportion of OAM around NT at day 10 was higher than that of DI ( $p < 0.05$ ) with no differences in other time points ( $p > 0.05$ ). There was no correlation between clinical parameters and the proportion of OAM ( $p > 0.05$ ).

**Conclusion:** Within the following period of 6 months, no clinical and microbiological differences were detected around polished collar implants and neighboring teeth in patients treated for CP.

## P1036

### Survival rate and osseointegration failure of dental implants from Implacil De Bortoli system with up to 15 years in function

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**Aim:** Implants system quality and their restorative components may have a direct relationship with the implant survival rate. Still, the failure of osseointegration can be related to specific reasons and present multifactorial causes. The objective of this study was to analyze the survival rates and failure causes of osseointegration in dental implants of Implacil De Bortoli system.

**Material and Methods:** Data collection was performed in 183 patients treated with 938 Implacil De Bortoli (Sao Paulo, Brazil) titanium implants at FUNDECTO-USP, in function for up to 15 years. The following factors were evaluated: heart problems, high blood pressure, smoking, alcoholism, liver problems, hepatitis, gastrointestinal problems, diabetes mellitus I and II, hyperthyroidism or hypothyroidism, radiotherapy, chemotherapy, menopause, osteoporosis and history of periodontal disease (PD). Factors related to implants included: location in the arch, implant diameter, length, connection, shape and region of bone block graft collection.

**Results:** Implants survival rate was 98.29%. Sixteen implants were lost.

**Conclusion:** It was concluded that Implacil De Bortoli implants followed for up to 15 years had a high survival rate. It was not possible to draw conclusions about the systemic or local factors related to the lost implants due to the small sample size of lost implants.

## P1037

### Zigomatic peri-implant biological complications – individual susceptibility?

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**Aim:** This work aimed to present a case of delayed dermal biologic response in a patient with atrophied maxilla rehabilitation by zygomatic implants and immediate fixed restoration. The

authors also hypothesized that IL1RN gene polymorphism may be related with dermal individual response.

**Material and Methods:** In a female patient with 37 years old, completely edentulous, with severe atrophied maxillae, a complete pre-operative evaluation and fixed provisional prosthesis were performed. The latter was carried out by four zygomatic implants and four mandible implants (Nobelbiocare™). After 6 months, the patient developed a rare dermal response, without any complaint or any intraoral symptom. Systemic corticosteroid and antibiotic therapy was instituted for two weeks and local corticosteroid was adopted for three months. 12 months after the therapeutic approach, no signs of inflammation were evident. A genetic test for detection of IL1A, IL1B and IL1RN genes polymorphisms was performed and a positive result for IL1RN gene was obtained.

**Results:** IL-1 polymorphisms were often related with noninfectious periimplant bone loss and in particular the IL1RN gene has been connected with periimplantitis and with several inflammatory and autoimmune diseases. Therefore, it could be hypothesized that IL1RN polymorphism may be related with dermal individual response.

**Conclusion:** Results of rehabilitations performed on patients with completely edentulous, severely atrophic maxillae supported by immediately loaded zygomatic implants are mostly satisfactory and reliable. Despite this, in some cases biological complications related with the patient response may arise. More studies are needed to evaluate the genetic role on zygomatic biological complications.

## P1038

### Significance of keratinized tissues for peri-implant health: a clinical and immunological study

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**Aim:** In this study, the effects of keratinized tissue width (KTW) on peri-implant tissues were investigated by evaluating peri-implant clinical and inflammatory parameters.

**Material and Methods:** Sixty seven dental implants (DIs) were included in this study. DIs with KTW <2 mm were the free gingival graft (FGG) group and the group without FGG (maintenance group), while DIs with KTW ≥2 mm were the control group. Clinical and immunologic parameters (TNF-α levels) were measured at baseline (one month after Phase 2 surgery), and 6 months following surgery.

**Results:** Clinical parameters were significantly higher in the FGG group compared to other groups [except for pocket depth (PD)] at baseline. In the FGG group, clinical improvements were more evident than in the maintenance group, although no significant differences were found from controls at the 6th month. All clinical parameters decreased in the FGG group, while PD decreased in other groups at the 6th month. Furthermore, 6th month KTW was higher in the FGG group than in the other groups. Peri-implant crevicular fluid TNF-α levels were higher in the FGG group than in the other groups and there were no differences between controls and the maintenance group at baseline. Moreover, significant differences were not obtained among groups at the 6th month.

**Conclusion:** Although the need for KTW remains controversial in the long-term success of dental implants, results of this study

indicated that FGG is an ideal treatment approach and that adequate KTW has beneficial effects on peri-implant health.

## P1039

### Iatrogenic dental implant: the importance of diagnosis and treatment planning

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**Aim:** Therapy with dental implants is very common on these days. Dental implant success rate is very high, but it is needed a correct diagnose and treatment planning to achieve good results.

**Material and Methods:** In this poster we present a few curious cases of "iatrogenic" dental implants. Case 1. Dental implant into the sinus floor. Case 2. Dental implant migration into nasal cavity. Case 3. Dental implants affecting the inferior alveolar nerve Case 4. Dental implant in the adjacent root tooth.

**Results:** We show repercussion of the absence of planning.

**Conclusion:** Implant therapy requires strict planning and execution to prevent failure and complications.

## P1040

### Which age is the time for dental implants – patient with cardiovascular comorbidities?

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**Aim:** Supplement missing teeth in maxilla – prosthesis and mandibula – prosthesis on the beam Dolder/two implants.

**Material and Methods:** Two single stage implants were performed under local anesthesia, antibiotics sheath, as well as using NSAIDs. The wound was closed with sutures and healing was uneventful. After a period of four months the implants were exposed prosthetic impressions taken appropriate and based on prosthetic reconstruction of the mandible was performed. Also new prosthesis in maxilla was performed

**Results:** In 2014 years have passed since the beginning of five years implanto-prosthetic treatment, and the patient has completed 83 years of age. Treatments performed significantly influenced the quality of life.

**Conclusion:** In older patients issues, dental implants treatment should be carried out as early as possible and necessary, however, as evidenced by the advanced age of the patient presented and associated cardiovascular diseases are not a contraindication and should not constitute an obstacle to the dental implants.

## P1041

### Management of a fractured dental implant, SEM (scanning electron microscopy) and histomorphometric analysis: a case report

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**Aim:** Implant fracture is one of the important biomechanical complications that results in ultimate failure of the dental

implant. The aim of this case report is to describe the management of a fractured endosseous dental implant in molar region and microscopic evaluation of the fractured implant segment using scanning electron microscopy.

**Material and Methods:** A sistematically healthy, 30-year-old female patient, applied to our clinic with loss of coronal part of implant-supported prosthesis at upper right molar region.

**Results:** High gingival index scores and bleeding on probing observed in the patient. And fractured segment diameter was 3.8 mm. The fractured implant segment removed by trephines successfully. Bone loss is noted around fractured dental implant and histological and histomorphometrical characteristics of the peri-implant bone responses were carried out. The retrieved part of implant fixture was sent for SEM analysis for the probable cause of the fracture. Scanning electron micrograph of fractured implant surface shows an extent evidence of intergranular fracture.

**Conclusion:** It was concluded metal fatigue is responsible for implant fracture due to using small diameter of implants. The results of this study indicate that proper implant design is crucial to ensure long-term fatigue performance for dental implants.

## P1042

### Use of the epithelialized palatal graft for increasing keratinized tissue around dental implants: a case report

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**Aim:** There are studies which suggest that the presence of an adequate band of keratinized mucosa around dental implant reduced inflammation, hyperplasia and recession of marginal peri-implant soft tissues. Various techniques have been employed for increasing the width of keratinized mucosa. The Free Gingival Graft (FGG) is a surgical procedure frequently used in periodontics to increase the amount of keratinized tissue surrounding a tooth or a dental implant. The aim of this case was to assess recession of marginal peri-implant soft tissue on  $\neq 13$  caused by unadequate keratinized mucosa.

**Material and Methods:** The patient was a 64-year-old male patient, sistematically healthy, who applied to with a chief complaint of esthetic dissatisfaction in the exposed implant of the maxillary right canine region. Treatment was planned the use of a epithelialized gingival graft to increase the width of keratinized mucosa.

**Results:** The proposed technique is a simple and time-effective technique for preserving and providing keratinized tissue around dental implants. 18 months after treatment there was significant increasing in keratinized and attached gingival tissues and reduction of height and width of recession.

**Conclusion:** The keratinized tissue plays a major role around teeth and dental implants, helping in maintaining and facilitating oral hygiene. The epithelialized gingival graft can be used to increase the width of keratinized mucosa around dental implants.

## P1043

### Prospective assessment of reduced diameter implants in Type 2 Diabetes and healthy patient – preliminary observations

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**Aim:** For elective treatments in diabetic patients minimizing surgical risks represents beneficial approach. Prospective data on implant performance in Diabetics are missing. Reduced diameter implants placed for supporting FPDs in posterior edentulous but compromised by volume areas avoid bone augmentation procedures. Preliminary results are presented.

**Material and Methods:** Adults diagnosed with D. mellitus type 2 (HbA1C >6.5%) and healthy controls (HbA1C  $\leq$ 6.5%); both missing one or more teeth received one to two Reduced Diameter Roxolid (3.3 mm; RN TL, Institute Straumann AG, CH) implants in areas with diminished dimensions of alveolar bone. Treatment according to standard surgical protocol was carried out under local anaesthesia. Transmucosal healing was allowed and early healing progress monitored at day 3; 7; 4 weeks by assessing ISQ (Osstell) and Laser Doppler Flowmetry (LDF, Periflux 5000, Perimed, Sweden) before loading implants at 3 months (V3-V6). Perfusion of full-thickness flap during surgery was recorded by LDF.

**Results:** Preliminary data are based on 9 patients each group. All implants were inserted into residual priscine bone achieving primary stability. All study implants showed non-significant differences in ISQ values at V3 and V5. One implant in Diabetic group failed declining therefore survival rate to 89%. In controls survival during integration period equaled 100%. Differences between median values assessed by LDF in each group were statistically non-significant for any time point from V2 (implant surgery) to V5.

**Conclusion:** Early tissue reactions after implant installation were non-significantly different between groups. Placing dental implants in Diabetic patients was associated with impaired survival rate during integration. Study is continued to obtain sound data.

## P1044

### Periimplant bone resorbtion in smokers and non-smokers during the first year of loading

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**Aim:** to evaluate the influence of smoking on the periimplant bone resorbtion rate at 6 months and after one year of loading.

**Material and Methods:** 32 patients (15 smokers – mean 19 cigarettes/day – and 17 healthy non-smokers), received 76 bone-level implants in total. Each group of implants – smokers (S) and non-smokers (NS) included 38 implants. The periimplant crestal bone level was directly measured at uncovering (baseline) with a periodontal probe, and after 6 and 12 months of loaded functioning, using panoramic digital radiographs (Cranex Novus-Soredex and the Scanora Software). The t-test for indepen-

dent samples was used to compare the resorption values between the study groups at subsequent timepoints.

**Results:** in the S group, there was a significantly higher mean bone resorption at all timepoints, when compared with the NS group: mean  $\Delta = 0.47$  mm ( $p < 0.01$ ) at baseline, mean  $\Delta = 0.54$  mm ( $p < 0.01$ ) at 6 months and mean  $\Delta = 0.57$  mm ( $p < 0.01$ ) at 12 months. Between baseline and 6 months, and between baseline and 12 months, statistically significant differences between the changes favoring the NS group were noted:  $\Delta = 0.11$  mm,  $p < 0.05$  and  $\Delta = 0.14$  mm,  $p < 0.05$ , respectively.

**Conclusion:** smokers display a higher periimplant crestal bone resorption rate than non-smokers even at the uncovering moment – a tendency that persists after 6 months and after one year of loading. Smoking remains a constant risk factor for periimplant bone loss, even when the changes are minute.

## P1045

### Ridge dimensions of the edentulous mandible in posterior sextants: an observational study on cone beam CT analysis

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**Aim:** to evaluate the ridge dimensions of edentulous mandibular posterior sextants by the use of CBCT radiographs.

**Material and Methods:** cone beam computerized tomography (CBCT) scans of totally edentulous mandibles from 136 patients (69 males; mean age: 67.4 years, range 27 ÷ 92 years) were retrospectively included for analysis. At sites corresponding to the second premolar (site a) and the mesial and distal root of first molar (sites b and c, respectively), bone height (BH) was measured as the distance between the alveolar canal and the bone crest, and bucco-lingual bone width (BW) was measured at 1, 3, and 5 mm from the most coronal point of the bone crest.

**Results:** Bone height (BH) decreased from site a ( $11.2 \pm 4.0$ ) to site c ( $10.3 \pm 3.3$ ) ( $p < 0.001$ ). Males showed a significantly higher BH compared to females at all sites ( $p < 0.001$ ), the mean difference being 2.79 mm. No significant impact of age on BH was found. BW increased from coronal to apical at all points ( $BW_{5\text{ mm}} > BW_{3\text{ mm}} > BW_{1\text{ mm}}$ ). At all height levels (1, 3 and 5 mm), BW increased from mesial to distal ( $BW_c > BW_b > BW_a$ ). No significant impact of age and gender on BW was found.

**Conclusion:** In the posterior sextant of edentulous mandibles, BH decreased from mesial to distal, while BW showed an increase. Gender had a significant impact on BH, with males showing greater BH values compared to females.

## P1046

### Evaluation of the content of an information-booklet for patients undergoing dental implant treatment

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**Aim:** Patients often seek implant treatment without a clear understanding of the associated potentials and limitations. As a

consequence, clinicians need to offer concise and evidence based information and correct these misconceptions and false expectations. A patient information booklet, focusing on basic and essential information related to implant procedures, and addressing common misconceptions has been developed in simple language (English and Chinese). The aim of this pilot-study was to assess the clarity, relevance and importance of the information provided by this booklet as perceived by implant patients (P) and implant practitioners (D).

**Material and Methods:** The booklet was distributed to patients ( $n = 28$ ) and implant practitioners ( $n = 30$ ). Subsequently, a questionnaire consisting of 4-point Likert scale on clarity, relevance and importance for each topic, and open-ended questions, was filled. The results from the two groups were analysed and compared.

**Results:** The overall content of the information booklet was found to be clear by patients (92.54%) and practitioners (95.79%). On grouping together “mostly” and “very much” scores each question was found to be relevant ( $P \geq 75\%$ ,  $D \geq 86.21\%$ ) and important ( $P \geq 82.14\%$ ,  $D \geq 86.21\%$ ) (Mann-Whitney U test found no significant difference). The overall relevance score was 3 by patients and 4 by dentists. The overall importance score by both was 4.

**Conclusion:** The result showed the information booklet to have good face and content validity. The information was clear, relevant and important to both the groups. However, the feedback of pointed towards certain areas of improvement.

## P1047

### 5 year follow up of dental implants in two siblings with Ligneous periodontitis: a risk for periimplantitis?

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**Aim:** Ligneous conjunctivitis, a genetic disorder with an autosomal recessive inheritance, is characterized with plasminogen deficiency and conjunctival pseudomembraneous lesions. As the mucosal sites being affected, oral manifestations and “ligneous periodontitis” may also be present. Periodontal status, treatment and prosthetic rehabilitation with dental implant supported prosthesis of two siblings with ligneous periodontitis and clinical evaluation up to 8 years and histopathological findings are presented.

**Material and Methods:** Younger sibling presented severe periodontitis and gingival enlargement as well as systemic signs of ligneous conjunctivitis. All teeth were extracted before the age of 30 due to ligneous periodontitis and she was treated with implant supported total dentures. The older sibling presented with severe periodontitis in the mandible without notable gingival enlargement. Maxillary teeth showed moderate periodontitis that could be maintained. 5 implants were placed in the edentulous mandible and fixed restoration was fabricated.

**Results:** Follow-up period for the younger patient was 8 years. Two implants in the mandible presented periimplantitis with 50% bone loss and mild mucosal enlargement like gingival enlargements seen on natural teeth affected by ligneous periodontitis. Histopathological evaluation showed lymphocyte infiltration and hyaline deposition in perimucosal tissues. Follow-up time for the older sister was 5 years. After implant surgery, soft tissue healing was notably delayed. Dental implants in the

mandible were healthy during the follow-up period, except 1 implant presenting mild periimplantitis without mucosal enlargement.

**Conclusion:** Rehabilitation of edentate patients with severe periodontitis due to systemic diseases with dental implants may present increased risk for periimplantitis. Maintenance intervals can be shorter for such patients.

## P1048

### The peri-implant mucosa fenestration: a case report

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**Aim:** The peri-implant mucosa fenestration is an uncommon clinical lesion of unclear etiology. Often associated with a deep peri-implant sulcus, taking place at the junction between the prosthesis and the implant platform. The objective of this study is to identify what circumstances are associated to their occurrence and to prevent these risks, that may compromise the stability of the peri-implant tissues.

**Material and Methods:** It is characterized by an asymptomatic lesion that appears at the buccal gingiva in patients with thick gingival phenotype and unhygienic prosthetic designs. Clinically, it may appear simply as an erythematous gingiva without volume increase or purulent discharge. Radiographically, it may not necessarily be accompanied by interproximal bone loss. Probably, not only the bacterial flora of the peri-implant sulcus is involved in the etiopathology, but also the contamination of the implant-prosthesis gap.

**Results:** As a preventive measure, we propose the placement of supra-osseous or palatally tilted implants in order to obtain a shallower peri-implant sulcus that will hinder bacterial growth. In addition, the prosthetic design should enable efficient submucosa hygiene, taught by the clinician. The interventional treatment should be focused on removing the prosthesis, decontaminating the implant surface, and eliminating possible remains of submucosal cement. Furthermore the prosthesis should be replaced and palatal gingivectomies may be proposed.

**Conclusion:** As a corrective treatment of the sequela, a resolved case is presented using minimally invasive mucogingival techniques.

## P1049

### Prognostic factors for early (1 year) and late (5 year) implant failure. A longitudinal clinical study

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Murcia/Spain

**Aim:** The study aims to identify prognostic factors of early and late implant success.

**Material and Methods:** 151 patients (83 women, 68 men) in need of a implant-supported rehabilitation were consecutively treated. 120 patients were nonsmokers. 127 implants were placed in posterior areas whereas 24 were placed in the anterior region (canine to canine). Patients were invited for a clinical and radiographic examination after completing 1 and 5 years of function. Implant survival was considered the dependent

variable. Multivariate analyses were adopted to identify predictors of early and late failures.

**Results:** In total, 151 patients were examined. Two patients dropped out at second surgery (2 month later) and 4 were failures. The success rate at second surgery was a 97.3%. After 1 year of function there was an overall survival rate of 97.2%, 7 patients dropped out. After 5 years of follow-up the success rate was 92.1% with 18 dropouts out and 6 deceased. The thin biotype was a significant predictor of early peri-implant bone loss (1 year) ( $p < 0.05$ ), whereas smoking ( $p = 0.000$ ) and history of periodontitis ( $p < 0.05$ ) affected late peri-implant success (5 year).

**Conclusion:** Within the limits of this study, it can be concluded that initial bone remodeling is affected by soft tissue thickness, whereas smoking and history of periodontitis affects long-term peri-implant success.

Topic: Implant therapy (surgical and restorative protocols)

## P1050

### Immediately implant and immediate loading with the socket-shield technique in the esthetic zone (single crown) Case Report

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**Aim:** Introduction: It is highly important to preserve the vestibular bone in sectors of great aesthetic involvement of peri-implant structures. Guided Bone Regeneration (GBR) allows a non-acceptable percentage to maintain the peri-implant structures. The main purpose of this report is to use socket shield technique in order to avoid up to 100% these post-extraction reabsorption processes.

**Material and Methods:** Case Report: A 50-year-old patient was referred for the replacement of one maxillary central incisor. Clinical and radiographic images showed root fracture. The root was sectioned and only the vestibular part was preserved. The implant (Federa Implante Switch, FIS) was placed according to the manufacturer's recommendation and was situated at the height of the buccal root segment and immediately loaded with a provisional crown without any pressure on the root fragment but with a slight support to the soft tissues. Immediate controls occurred one month later and after three months of healing. Final impressions were taken for the preparation of a prosthetic superstructure with controls after 6 and 12 months.

**Results:** Discussion: The use of socket shield technique disclosed clinical and radiological absence of bone loss and soft-tissues, as Markus Hürzeler has reported it, as well as up to 100% of success and survival rate.

**Conclusion:** Conclusion: The use of socket shield technique in highly aesthetical involvement patients showed results that improve to 100% the preservation of peri-implant tissues in relation to other techniques seeking to recover tissue by post-extraction reabsorption described in scientific bibliography.

## P1051

### Tilted Implants – Positioning, suprastructure materials and prosthetic solutions

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**Aim:** Tilted implants, All on Four, All on Six, Secure on Four, Fast&Fixed, are all names describing Paul Malo's implant insertion and loading protocol. After almost 20 years, this implantation technique seems to be accepted as a very secure and at the same time a relatively economic solution for fixed restorations. Critics are coming from the ones who say that such a solution is almost not acceptable from the hygiene point of view: Plaque accumulation under the prosthetic restoration will lead to periimplantitis. Can different suprastructure materials solve or reduce this problem? How is the influence of suprastructure extensions over the most distal implant on bone structure?

**Material and Methods:** Different suprastructure materials were used, like zirconium dioxide, metal structure covered by feldspathic ceramics, poly acrylic, poly ether ether ketones (PEEK) and poly ether ketone ketone (PEKK). 1–2 extensions were standard. **Methods:** 12 month recall and movement of the suprastructure, control of gum situation (Inflammatory or not), x-ray control (periimplantitis or not)

**Results:** Best results achieved with zirconium dioxide suprastructure regarding inflammatory processes and periimplantitis. New materials like PEEK and PEKK have to be monitored for the next years. Extensions have to be seen positive for bone apposition

**Conclusion:** From the suprastructure point of view, zirconium dioxide seems to be the best material to prevent soft and hard tissue complications. The other materials need to be monitored for the next years relating to their soft tissue behavior. Extensions are positive for bone remodeling and bone growth.

## P1052

### Immediate implant placement into fresh first maxillary molar extraction sockets

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Lisboa/Portugal

**Aim:** The aim of this present study was to assess the predictability of immediate placement of implants into first maxillary molar fresh extraction sockets, using a modified insertion technique in addition with regenerative procedures.

**Material and Methods:** Eighty patients with a total of 80 maxillary first molar scheduled for extraction and immediate implant placement, smokers and non-smokers, were included in this study. Following tooth extraction, applying a minimum amount of mechanical trauma to the surrounding bone, were immediately placed tapered implants with external connection into the sockets at the inter-radicular septum. The implant platform was kept 1.5 mm apical to the buccal ridge. In accordance with the principles of the guided bone regeneration (GBR) a xenograft was used to fill the periimplant horizontal defects. Was also used a bioresorbable collagen membrane to stabilize the clot and the biomaterial. After 4 months of healing period, implants were restored with single crown fixed prostheses.

**Results:** All implants were monitored for 12-months and only 3 implants failed during osseointegration. The implant survival rate was 96.25%.

**Conclusion:** The findings of this 1-year prospective study showed that the combination of atraumatic extraction of the first maxillary molar with root separation and the use of appropriate regenerative materials at the time of implant placement represents a predictable long-term treatment with favorable outcomes.

## P1053

### Peri-implant bone loss in implants with different implant-abutment connections: clinical, radiographic, microbiological and immunological outcomes

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**Aim:** The aim of this study was to evaluate the effect of the type of implant-abutment connection on peri-implant bone resorption by comparing different types of implant-abutment connections with clinical, radiographic, microbiological and immunological criteria.

**Material and Methods:** Forty-three patients received 68 implants with different types of implant-abutment connections following a two-stage protocol. The patients were randomly assigned into three groups: group A with 22 implants with external hexagon connection, group B with 23 implants with internal hexagon connection and group C with 23 implants with Morse-taper connection. Controls Group D<sub>A</sub>, D<sub>B</sub>, D<sub>C</sub> comprised of 22, 23 and 23 uncrowned teeth respectively. Follow-up examinations were carried out 2, 6 weeks after second stage-surgery and 1 and 6 months after prosthetic placement. Clinical recordings, sulcular fluid sampling, microbiological analysis and digital subtraction radiography were used to compare crestal bone resorption in the groups.

**Results:** Peri-implant sulcus depth was significantly greater in groups A and B, six weeks after second stage-surgery ( $p < 0.05$ ). Group A showed greater peri-implant bone loss than groups B and C at most timepoints ( $p < 0.05$ ). In group A, the presence of *Porphyromonas gingivalis* was significantly higher than group C six weeks after second stage surgery ( $p < 0.05$ ). Counts of *Treponema denticola* were significantly higher in group A than group B six months after prosthetic placement ( $p < 0.05$ ). Matrix metalloproteinase-8 values were significantly higher in group C compared to groups A, B, six months after prosthetic placement.

**Conclusion:** Implants with Morse-taper connection showed improved clinical, radiographic and microbiological outcomes compared with implants with external connection during implant healing and loading.

## P1054

### A five year retrospective and prospective volumetric tomographic evaluation of hard and soft tissues of periodontally compromised sites restored by flapless immediate extraction implant restorations

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**Aim:** The immediate extraction-socket implant placement and provisionalisation accomplished by one-stage flapless approach has been successfully applied clinically, both in intact and compromised sites (Tripodakis 2001, 2002). The positive biologic and aesthetic outcome has also been evaluated microbiologically (Tripodakis 2011). The aim of the present retrospective and prospective study (case-series) was the long-term tomographic evaluation of the distance of the labial hard and soft tissue margins from the implant/abutment interface, in periodontally compromised sites that were restored by this method.

**Material and Methods:** 24 periodontally involved anterior teeth (class II-III defects) were thus successfully restored, combining also the insertion of inorganic filler sealing the socket. In the retrospective group (12) volumetric analysis followed five years postoperatively by localized cone-beam tomography, after covering the labial surface of the restored crown and the labial soft tissues with radiopaque foil. The sagittal orientation of the tomograms was digitally 3D oriented, parallel to the long central axis of the implant. Thus the absolute distances of the soft and hard tissue coronal margins from the implant-abutment interface were measured. In the prospective group (12) preoperative evaluation was also included.

**Results:** In the prospective group, a labial radio-opaque plate was apparent five years postoperatively that was preoperatively missing. In all 24 cases its coronal margin was located 2–4 mm above the implant-abutment interface, supporting the soft tissue margin that was located 3–4 mm above this level.

**Conclusion:** The flapless one-stage immediate implant/restoration approach combined with inorganic filler in restoring compromised sites results to long-term vertical stability of the labial soft tissues embracing the implant-restoration.

## P1055

### Rationale for restrictive antibiotic prophylaxis to counteract development of antibiotic resistance

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**Aim:** Antibiotic resistance is a growing health problem on a global scale and is strongly correlated to the consumption of these agents. The potential negative effect of antibiotic prophylaxis has not previously been studied. The aim of this study is to determine the changes in antibiotic susceptibility among oral commensal microflora following a single dose administration of amoxicillin.

**Material and Methods:** 33 healthy volunteers were included. The participants were given a single dose of 2 g amoxicillin. Saliva was collected before administration of antibiotics (day 1) and on day 2, 5, 10, 17 and 24. The saliva samples were subjected to microbiological culturing and minimum inhibitory concentration toward amoxicillin was determined.

**Results:** There was significant reduction in the number of viridans streptococci, such as *Streptococcus salivarius*, and *Streptococcus sanguis*, on day 2 and day 5. The levels of streptococci returned to base line during the subsequent study period. On the other hand, there was significant increase in the number of *Neisseria* species in day 2, thereafter returning to base-line values. Some strains seemed to have reduced susceptibility shortly after administration. No significant changes on the anaerobic microflora were observed except for *Prevotella* species, which showed a significant reduction in day 5 to day 17 but returning to normal on day 24.

**Conclusion:** A single dose of amoxicillin seems to have the potential to significantly alter parts of the normal oral microflora and select for resistant strain.

## P1056

### Different dental lasers vs conventional technique for second stage surgery

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Zagreb/Croatia

**Aim:** was to compare diode, Er, Cr:YSGG and Er:YAG lasers and conventional scalpel surgery for dental implants exposure with regard to oedema, haematoma, postoperative pain and patients' satisfaction.

**Material and Methods:** Study consisted of 49 implants inserted in the lateral mandible, 36 in the study groups (12 per each laser group) and 13 in the control group. Three different dental lasers were used (high power diode laser, Er, Cr:YSGG and Er:YAG lasers) for implant recovery following manufacturer's instructions. Control group was treated using scalpel for crestal incision technique with silk sutures. Three days after surgery oedema, haematoma, postoperative pain and patient's satisfaction rate were assessed by a single examiner using VAS for patient's evaluation. After 3 weeks delayed postoperative complications were evaluated. Statistical analysis was performed with  $\chi^2$  test and Mann-Whitney test. *p*-values lower than 0.05 were considered as significant.

**Results:** No significant differences regarding age and gender were observed between the groups. Patients in laser groups had significantly lower oedema and haematoma scores compared to the patients in the control group (*p* < 0.05). Also reported (VAS) significantly lower pain and higher satisfaction rate compared to the patients in control group (*p* < 0.05), with slightly better results for Er, Cr:YSGG and Er:YAG lasers. There was no statistically significant difference between three examined lasers. After three weeks follow-up no postoperative complications or healing complications were found in both study or control groups.

**Conclusion:** Dental lasers minimize postoperative complications for second stage surgery and can be used as an effective modality for implants exposure, due to precise incision, reduced bleeding and postoperative discomfort.

## P1057

### Marginal bone and soft tissue behavior following platform switching abutment connection/disconnection – a dog model study

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**Aim:** The effect on the marginal peri-implant tissues following repeated platform switching abutment removal and subsequent reconnection was studied.

**Material and Methods:** Six adult female Beagle dogs were selected, and in both left and right sides, Pm3 and Pm4 teeth were extracted. After 3 months healing period, 24 bone level (BL) (Straumann, Basel, Switzerland) Ø 3.3/8 mm implants were placed, 2 in each side. On control group, 12 bone level conical Ø 3.6 mm healing abutments and on test group, 12 Narrow CrossFit (NC) multibase abutments were connected at time of implant surgery. On test group, all prosthetic procedures were carried out direct to multibase abutment without disconnecting it. On control group, multibase abutment were connected/disconnected five times during prosthetic procedures. The animals were sacrificed at 9 months of the study. Primary histomorphometric parameter S-BIC (distance from multibase abutment shoulder to the first bone implant contact) was defined.

**Results:** Mean values found for buccal S-BIC (test group = 0.53 mm; control group = 0.52 mm) and lingual S-BIC (test group = 0.13 mm; control group = 0.11 mm) were very similar. Wilcoxon comparison paired test (n = 6) for S-BIC found no statistically significant differences (buccal p = 0.917; Lingual p = 0.463) between test and control groups.

**Conclusion:** Within the limits of this animal study, we concluded that the connection/disconnection of platform switching abutments during prosthetic phase of implant treatment does not induce bone marginal absorption.

## P1058

### Bispectral Index Guided Target Controlled Midazolam Sedation: a new advanced technique for dental procedures

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**Aim:** To assess the efficacy and safety of Bispectral Index (BIS) guided Target Controlled Infusion (TCI) with midazolam for anxiolysis and light sedation during extensive oral surgery in a single operator/sedationist model.

**Material and Methods:** Thirty adult ASA 1 or ASA 2 patients undergoing periodontal surgery or dental implant surgery under local anesthesia were included. The calculated effect site concentration (Ce) of midazolam applied by TCI, bispectral index (BIS), peripheral oxygen saturation (SpO<sub>2</sub>), non-invasive blood pressure (NIBP), mean arterial pressure (MAP), and heart rate were recorded every 10 min. All patients were interviewed 1 week after the procedure to explore experience of sedation and the oral surgery procedure.

**Results:** Extensive oral surgery treatment in all 30 patients was completed in a mean time of 120 min (range 50–180 min). The

mean effect site concentration was 50 ng/ml (range 24–80). The mean BIS was 85 (74–100) during induction and was maintained between 80 and 90 by adjusting TCI Ce. There were no clinical significant cardiopulmonary changes with regard to SpO<sub>2</sub>, NIBP, MAP and heart rate. Patients experienced profound retrograde amnesia and were very satisfied with the sedation.

**Conclusion:** BIS guided TCI sedation with midazolam facilitates predictable minimal sedation enabling a long oral surgery procedure by a single operator/sedationist within safe physiological limits.

## P1059

### The severe teeth aplasia solved by interdisciplinary treatment

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Olomouc/Czech Republic

**Aim:** Introduction The state where there is not based one or more teeth may occur in cases of congenital or gained aplasia. Agenesis is classified when teeth are not based due to genetic factors, whereas aplasia is classified in cases when there is an impact of external influences. In our case, we were dealing with the extensive aplasia caused by surgical and radiological therapy of retinosarcoma in a young person.

**Material and Methods:** Case report A 14-year-old patient, who had been undergoing a treatment of retinosarcoma during childhood with a combination of surgery revision and radiotherapy, came to our clinic. Aplasia of 10 permanent teeth of the upper dental arch was a result of the treatment. The treatment plan was determined according to the diagnosis and was based on the cooperation between the orthodontist, periodontologist – implantologist and prosthodontist. The final remediation, lasting two years, included auto transplantation, an orthodontic treatment, implantations and final prosthetic reconstruction.

**Results:** Discussion Reconstruction of extensive loss of dentition in patients with incomplete growth of jaw is mainly complicated by timing of each particular step of the treatment. Application of dental implants in case of ectodermal dysplasia is discussed and advocated when the growth has not been finished yet. Nevertheless, the situation was very similar in our case – the impossibility of efficient teeth replacement without the use of dental implants.

**Conclusion:** Conclusion This case clearly demonstrates the need for mutual cooperation of specialists from various fields of dentistry without which it would not be possible to solve the situation satisfactorily.

## P1060

### Determining an average distance from the external mandibular cortex to the inferior alveolar canal (IAC) using cone beam computed tomographic (CBCT) imaging: an aid to harvesting mandibular ramus autogenous grafts

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**Aim:** To provide average measurements relating the external mandibular cortex (EMC) to the IAC using CBCT imaging in the dentate and edentulous mandibular molar region.

**Material and Methods:** CBCT images of 100 consecutive patients from Tygerberg Dental Hospital were analysed using Newtom VGi Image works Corps CBCT software, QR-NNT. The distance from the IAC to the (1) EMC and (2) alveolar ridge crest (edentulous mandibles) or buccal cortical plate crest (dentate mandibles) were recorded at four standardised points along the IAC. Left and right side variance was determined by the paired t-test and the results were combined for each subject. Summary statistics of the pairwise means was calculated. A linear model examined the influence of variables such as edentulous/dentate and male/female, using combined mean width and height as the dependent variable.

**Results:** A mean width of 5.891 mm ( $\pm 1.09$ ) and mean height of 13.068 mm ( $\pm 2.963$ ) from the external mandibular cortex to the IAC was demonstrated. The mean height value was lower in edentulous mandibles (11.142 mm in females and 13.490 mm in males) than in dentate mandibles (12.916 mm in females and 14.102 in males). There was no significant difference with width values. The heights were greater in males (14.102 mm) than in females (12.916 mm), being marginally significant (p-value of 0.00948:  $p < 0.05$ ).

**Conclusion:** The IAC has a mean width of 5.891 mm ( $\pm 1.09$ ) and mean height of 13.068 mm ( $\pm 2.963$ ) from the EMC. Lower mean height values were recorded in edentulous mandibles and in females. The safest zone when harvesting autogenous block grafts is 20 mm and 30 mm anterior to the mandibular foramen.

## P1061

### Implant supported reconstruction of a single central incisor, with missing buccal wall

L. Parkanyi, D.B. Hangyasi, P. Valyi, K. Nagy

Szeged/Hungary

**Aim:** To provide function and acceptable esthetics at a central incisor site, with the complete absence of the buccal bony wall, due to persistent periapical inflammation with pus formation.

**Material and Methods:** Socket preservation was applied after the minimal invasive extraction of the central incisor (modification of Dennis Tarnows: ice cream cone technique). After healing, bone level implant (Straumann) was placed with a buccal contour augmentation. In a later surgery, soft tissue augmentation was performed to compensate for insufficient buccal tissue volume. Crown lengthening was performed before the prosthetic phase to achieve gingival symmetry. Individual ceramic covered abutment was placed after individual impression taking to aim esthetical outcome. The final prosthetic solution was pressed ceramic crown on implant, and pressed ceramic veneers on adjacent teeth for final soft tissue shaping, and improvement of white esthetics.

**Results:** The vertical dimension of the previously reduced mesial papilla has been reconstructed to adjacent papillae level. Buccal mucosal zenith stabilized at a more apical level, than adjacent lateral incisor, but stayed symmetric with contralateral central incisor. White esthetics is according to patient expectations, all over esthetics is acceptable, due to low smile line.

**Conclusion:** The fact of completely missing buccal wall, lead to an apical reposition of the mucosal line at implant site even after augmentation procedures, but appears to be stable, symmetric, and acceptable for the patient.

## P1062

### Fixed implant reconstruction of partially edentulous patient with diameter- and length-reduced implants of TiZr alloy

L. Parkanyi, D.B. Hangyasi, P. Valyi, K. Nagy

Szeged/Hungary

**Aim:** To provide fixed, single implant supported restorations at every possible site for a patient with reduced alveolar bone dimensions, without major bone grafting procedures.

**Material and Methods:** After extraction of hopeless tooth, and cause related periodontal therapy, standard, and diameter reduced implants (9 implants in total) have been placed in the upper and lower jaws to replace missing teeth. Fixed reconstructions (single crowns and bridges) were applied to restore function and esthetics.

**Results:** Patient was rehabilitated with ceramo-metal fixed restorations, which provided appropriate function and acceptable esthetics. Results appear to be stable at 6 month after final prosthetic work.

**Conclusion:** Length- and diameter-reduced implants seem to be a good alternative of standard sized implants, with the possibility to reduce surgical trauma and expenses of major bone augmentation procedures for the patient.

## P1063

### Full maxillar rehabilitation with 4 implants and EASYLINK: the future of prosthodontics

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**Aim:** We present a new prosthetic protocol on 4 implants with EASYLINK by Eckermann. We show the possibility to restore fixed without screws, eliminating holes and increasing resin surface and ensures integrity of the hybrid prosthesis. It also shows advantages such as ease and speed while we're making prostheses and in a revision. We also get maintain the integrity of the biological width. I'll try to resume 4 implants protocols we knew till now and compare with the new ones. Thus end up with major problems that accompany these hybrid prostheses. We are facing a new and ultimate of the biggest challenges we have in our clinical practice solution.

**Material and Methods:** For this case we show and compare to others protocols, we've used 4 Implants Eckermann. Two anterior implants were putted straight. Two posterior were tilted 30°, crossing the sockets. Case needed a sinus elevation to anchor the implant. We use Cerasorb and PRGF (Bti) and a membrane CollAT. After took impressions with EASYLINK abutments (Eckermann) our patient went home in only 4 h with a fixed rehabilitation immediate loaded. Hybrid was the final restoration.

**Results:** Success in aesthetics and function with a new easy and quick protocol.

**Conclusion:** As a result of our new prosthodontic protocol using EASYLINK by Eckermann we get an hybrid prostheses without holes, completely fixed but not screwed. This going to make the prostheses stronger and more aesthetic and the different

tests we do while we are making it are also easier (just put on-put off). So do next times the patient come to our office for a revision.

## P1064

### Immediate implantation and immediate non-functional loading in maxillary anterior region: a case report

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İzmir/Turkey

**Aim:** Hard and soft tissue loss frequently occurs in short term after a tooth is lost. This situation results in esthetic problems when late implantation is performed especially in anterior region. It was the aim of this case report to show the effect of immediate implantation followed by immediate non-functional loading on hard and soft tissues.

**Material and Methods:** Immediate implantation and immediate non-functional loading was planned to be undertaken to the patient with hopeless maxillary right central tooth. A flapless atraumatic extraction technique was used and the implant socket was prepared. After placement of the implant (Bone level, 4.1 × 12 mm, Straumann, Basel, Switzerland), periosteal values were measured for evaluating the stability. Xenograft (Bio-Oss, Geistlich, Osteohealth Biomaterials, Bern, Switzerland) were used to fill the space between extraction socket and implant. Appropriate zirconia abutment was checked and when it was necessary the preparation of the abutments were made outside the mouth. Acrylic tooth was used as temporary prosthetic restoration. Permanent restoration was fabricated after 3th month. Hard and soft tissue dimensional changes was evaluated using radiographic and photographic images.

**Results:** The technique was easily tolerated by the patient and the esthetic result was found to be satisfying

**Conclusion:** Immediate implantation and immediate non-functional loading seems to be an effective method for preventing or minimizing of hard and soft tissue loss in maxillary anterior region with satisfying esthetic outcome.

## P1065

### The socket-shield technique: clinical and volumetric data after 5 years

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**Aim:** Implant placement after tooth extraction is accompanied by resorption of surrounding tissues. Clinicians are inevitably challenged by subsequent soft tissue shrinkage. Loss of bundle bone plays a major role in this resorption process. To preserve the bundle bone, a technique remaining the buccal part of the root was developed. After animal studies showing the potential to preserve buccal tissues with this technique, clinical application is evaluated to gain information about safety and effectiveness.

**Material and Methods:** In 10 consecutive patients with implant replacement between the upper first premolars, impressions were taken before extraction (t1) and 5 years later (t2). 3D-scans from casts were digitally superimposed for quantitative evaluation of alterations of the labial peri-implant tissue contour

and gingival recessions. Additionally, clinical data were collected (PPD, BOP, x-ray, photographs).

**Results:** All implants healed without adverse events. Pocket probing depths showed healthy periodontal tissues. Height of keratinized gingiva amounted to 3–5 mm. Comparison of radiographic pictures showed physiologic bone remodeling at implant shoulders. Mean loss of buccal surfaces in bucco-oral direction was  $-0.15 \pm 0.3$  mm (range  $-0.9$  to  $0.65$  mm, volume loss  $4.84\text{--}21.18$  mm<sup>3</sup>). Average recession at implants was  $-0.01 \pm 0.45$  mm and at neighbouring teeth  $-0.19 \pm 0.40$  mm. Gingival esthetic evaluation from photographs showed positive results in all cases.

**Conclusion:** Volumetric analysis showed a low degree of tissue change after five years. Recession at implants was comparable to neighboring teeth. Within limitations of the observation, a high esthetic outcome with effective preservation of buccal tissues and reduced invasiveness can be achieved by use of the socket-shield technique.

## P1066

### Surgery all at once™: socket preservation and immediate implant placement in anterior extraction sites – a case report

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**Aim:** Case report: Introduction The traditional implantology of the 1980s has now given rise to modern implantology techniques that focus on shortening surgical times, limiting costs, and providing immediate esthetics. The combination of a socket preservation technique with immediate placement of a novel porous tantalum trabecular metal (PTTM) enhanced titanium implant might help to resist buccal wall resorption.

**Material and Methods:** A 42-year old woman presented with recent loss of the maxillary right lateral incisor and a periapical lesion on the maxillary right central incisor. The patient chose to have a fixed two-unit bridge supported by one implant placed in the right central incisor location, and a cantilevered pontic to replace the right lateral incisor. After extraction of the right central incisor and thorough debridement of the socket, Puros® cortical particulate allograft was used for ridge preservation before the placement of a PTTM enhanced titanium implant (Trabecular Metal™ Dental Implant). The final restoration was delivered after three months. No recession of soft tissues occurred from the surgery to the placement of final prosthesis. Optimal mesial and distal marginal bone stability was observed from the time of the surgery until the two-year post-loading check-up, without apparent remodeling.

**Results:** Discussion Since it was impossible to create adequate initial stability, immediate loading of the implant was not indicated. The whole treatment took only three months.

**Conclusion:** Conclusion Surgery All at Once™ with a novel PTTM enhanced titanium implant resulted in almost complete maintenance of hard and soft tissues two year after final restoration.

**P1067****A novel approach for a volumetric variation assessment after immediate implants using Socket Shield Technique. A report of a serie of cases**

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**Aim:** Scientific literature suggests that retained roots fragments combined with immediate implants (Socket Shield Technique) may preserve soft and hard tissue architecture. The aim is to quantify soft tissue variation after immediate implant placement and immediate provisionalization with CAD/CAM prosthesis using Socket Shield Technique by means of digital technology (intraoral scanner).

**Material and Methods:** Four individual patients were treated with immediate implants using socket shield technique. At the day 0 (surgery day) a digital impression using a digital scanner was performed to design and manufacture a PMMA CAD/CAM provisional. After 4 months another digital impressions was performed to register the definitive emergence profile and to design and manufacture the definitive restoration. Both digital files resulting from the digital impressions were assessed to obtain the volumetric variation between day 0 and 4 months after the surgery.

**Results:** All the cases healed uneventfully and the mean variation of the soft tissue volume was below the 0.3 mm in the 98% on the total volume at the buccal aspect. On the other side the volume variation at the palatal aspect where the fragment is completely removed, the mean variation was significantly higher than in the buccal aspect (over the 0.7 mm in the 98% of the total measured volume).

**Conclusion:** Immediate implants placed with socket shield technique immediately restored reported a volumetric variation inferior to that reported in the literature for immediate implants immediately restored using classical protocol. At the palatal aspect variation was in accordance with the data reported at the literature for the conventional immediate implant placement.

**P1068****Intra-operative measurement of the distance from the bottom of osteotomy to the mandibular canal using a novel ultrasonic device**

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Haifa/Israel

**Aim:** In our previous study, we found that a novel US device may serve as a useful intraoperative tool to measure the distance from osteotomy to the mandibular canal. The aim of this study was to validate our previous results in a larger group of osteotomies in the posterior mandible.

**Material and Methods:** Patients scheduled for dental implant placement in the posterior mandible were recruited. Mucoperiosteal flaps were elevated, and osteotomies were created using a standardized 2-mm-diameter pilot drill. The distance from the bottom of the osteotome to the Inferior alveolar canal (IAC) was assessed using an ultrasonic device and compared to a standard panoramic radiograph used to measure the same residual

distance. The total distance from the crestal bone to the IAC was measured on a preoperative CT and compared to total US measurements by summing the drill depth with the residual depth measurements.

**Results:** Seventeen dental implant osteotomies were measured. Mean radiographic and ultrasound residual distance was  $5.19 \pm 1.95$  mm  $5.01 \pm 1.82$  mm,  $p = 0.79$  respectively. These measurements presented strong positive correlations ( $r = 0.61$ ,  $p = 0.01$ ). Mean total CT distance was  $13.48 \pm 2.66$  mm; mean total US calculation was  $13.69 \pm 2.51$  mm. No significant difference was found ( $p > 0.05$ ), moreover a very strong positive correlation was found between total CT and total US ( $r = 0.95$ ,  $p = 0.00$ )

**Conclusion:** The results of the current study support our previous pilot study and confirm that the tested US device is able to identify the IAC and to measure the distance from the osteotomy to the roof of the mandibular canal.

**P1069****Preservation of marginal bone support and soft tissue esthetics at immediately provisionalized OsseoSpeed Profile implants inserted into extraction sockets: 3-year results**

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**Aim:** In the anterior zone of the maxilla, the main problem in modern implant dentistry to overcome is the height difference between oral, inter-proximal and facial bone levels. To solve this problem a sloped implant has been developed with a height difference of the implant shoulder of approximately 1.5 mm to support peri-implant structures circumferentially. This study evaluates the 3-year clinical and radiological outcome of OsseoSpeed™ Profile implants inserted into extraction sockets with immediate provisionalization in the anterior maxilla.

**Material and Methods:** A total of 21 OsseoSpeed™ Profile implants (DENTSPLY Implants, Mölndal, Sweden) were inserted in 16 patients. All implants were inserted flaplessly into extraction sites with and without facial bone deficiencies. The implants were immediately provisionalized. Facial gaps were grafted with autogenous bone chips. Interproximal bone levels, thickness of the facial bony wall, implant success rate and PES were evaluated.

**Results:** Of the total 21 implants, 19 implants were still functional at final examination (survival rate: 95%). One patient with 1 implant dropped out, one implant was lost. The mean follow-up period was 43 months. Inter-proximal marginal bone levels averaged  $-0.16 \pm 0.43$  mm in relation to the implant shoulder. The mean PES ratings were  $11.8 \pm 1.4$  at final examination. 74% of implants had their PES preserved or even improved.

**Conclusion:** Survival rates, marginal bone levels, and esthetic results of the 3-year clinical evaluation offer evidence that sloped implants preserve the marginal bone circumferentially and maintain or improve soft tissue esthetics when inserted and provisionally immediately.

## P1070

### Immediate insertion and provisionalization of osseospeed implants in the anterior dental arch – 5-year data

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**Aim:** Since the first results for implants placed in extraction sockets and immediately loaded via provisional crowns have been reported, it remained an open issue, whether the initially high success rates and the esthetic outcome remain stable for longer observation periods. Therefore, this study examines the clinical and radiographic performance of immediately inserted and provisionalized OsseoSpeed implants in the anterior maxilla within a follow-up of up to 76 months.

**Material and Methods:** Twenty patients received a total of 37 OsseoSpeed implants (DENTSPLY Implants, Mölndal, Sweden) which were immediately inserted flaplessly into extraction sockets with and without facial bone deficiencies of various dimensions. The implants were provisionalized immediately. Facial gaps were grafted with autogenous bone chips. Interproximal marginal bone levels, thickness of the facial bony wall, implant success rate and PES were assessed per implant.

**Results:** One patient with three implants dropped out, the remaining 34 implants were still in function at the final follow-up (survival rate: 100%). The mean follow-up period was 62 months. Marginal bone height at the level of the implant shoulder averaged  $-0.04 \pm 0.65$  mm. The mean PES ratings were  $11.7 \pm 2.0$  (range, 6–14) in the final follow-up. In 76% of the patients the PES was preserved or even improved.

**Conclusion:** Survival rates and esthetic results suggest stability for OsseoSpeed implants used in an immediate function concept. Marginal bone levels show only small adaptive changes within a mean follow-up of 5 years and PES ratings remained largely stable or even improved in the vast majority of patients.

## P1071

### Survival rates of 778 dental implants following immediate and late placement: a 2-year retrospective study

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**Aim:** The aim of this retrospective study was to evaluate the survival rates (SRs) of implants following immediate and late placement procedures.

**Material and Methods:** A total of 778 dental implants (Tapered Screw Vent, Zimmer, Carlsbad, CA, USA) were placed in 214 patients between November 2012 and April 2014. 135 immediate and 643 late implant placements were performed. Immediate implants were placed at the time of tooth extraction, while late implants were placed at 6 months or longer after tooth extraction.

**Results:** Of 135 immediate placements, 41 (30%) were in maxillary anterior, 43 (32%) were in maxillary posterior, 19 (14%) were in mandibular anterior and 32 (24%) were in mandibular posterior region. Those values in late placement group were 68 (11%), 260 (40%), 26 (4%) and 289 (45%), respectively. The

overall survival rate of 778 implants was determined to be 97.3% at 2 years with 21 failures. The SR for immediate placement group was 98.5% (2 failure) and in the late placement group the SR was 97.0% (19 failure). Mean follow-up period was 13.3 months (range 8–23 months) in immediate placement group and 17.4 months (range 7–24 months) in late placement group.

**Conclusion:** The SR of immediately placed implants higher than late placed implants although the number of implants and mean follow-up period in immediate placement group were lower than those in late placement group. Immediate implant placement, which has advantages such as the requirement for only one operation and reduced overall treatment time, is a safe and reliable procedure with a considerably high survival rate.

## P1072

### Benefits and limits of soft tissue augmentation around dental implants

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**Aim:** This study addressed the focused question of what is the need, the efficacy and the predictability of soft tissue augmentation procedures around dental implants with soft tissue deficiencies. Moreover so as to point out these interventions indications and limits, this search purpose to identify the diagnosis decision factors.

**Material and Methods:** A computerized literature search was performed using medline. 2080 titles were obtained, 59 full text articles were selected for further evaluation.

**Results:** A total of 16 studies were included in the systematic review. Implant placement protocol, tissue defect, soft tissue augmentation timing and procedure were considered. Data extraction was based on the following quantitative and qualitative outcomes: Implant Soft Tissue Coverage, Soft Tissue Thickness and Aesthetics Parameters improvement. Several factors including buccal plate thickness, implant position, tissue thickness and width of keratinized mucosa were found to condition the need and the outcome of soft tissue augmentation procedures.

**Conclusion:** In case of mild or moderate defects associated to thin gingival phenotype, soft tissue augmentation procedures seem to be efficient in increasing soft tissue thickness and improving aesthetics. However, for the concept of gain of soft tissue volume for balance a severe defect related to poor implant spatial positioning or buccal plate thickness insufficiency, there is a lack of studies to support the use and the long term stability of these techniques.

## P1073

### Immediate implant placement combined with titanium granules – 4 years of clinical experience

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**Aim:** The immediate implant placement in the esthetic zone is an often performed procedure. The position of the implant is closed to the palatal wall. There are different concepts for the

management of the remaining gap between the implant and the buccal bone plate. In this study, the gap was filled up with titanium granules.

**Material and Methods:** 35 implants were placed in the region of the upper incisors, canines and of one bicuspid. After the placement, a healing abutment in the same diameter as the implant was connected. The granules were mixed with blood and pushed with gentle pressure into the gap. The healing abutment was removed and replaced by an abutment in a diameter corresponding to the replaced tooth. A temporary crown was fixed to the abutment and adhered to the adjacent teeth. After a healing time of 3 months, the abutments and temporary crowns were replaced by definite reconstruction. To evaluate the stability of the alveolar process, clinical pictures were taken before extraction and after the delivery of the final crown. In addition measuring was made using the planning model and the master cast.

**Results:** The healing period was uneventful in all cases. The restorations showed a healthy gingival margin and no discoloration of the soft tissue. All patients were satisfied with the clinical results. The minimal collapse of the alveolar process doesn't compromise the clinical situation.

**Conclusion:** These early results justify further use for this indication.

## P1074

### 3D-navigated minimally invasive implantation in toothless patients after Radiochemotherapy with Camlog Guide System

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**Aim:** In modern dentistry, implant-supported restorations are considered to be the usual and best-care options. However, particularly in patients with malignancies of the oral cavity, it comes through the extensive surgical procedures and adjuvant-radiotherapy to fundamental changes in the anatomy of the oral cavity. In the pre-irradiated jaw is purely mucosa-supported-prosthesis due to xerostomia and necrosis-risk of irradiated bone contraindicated. In order to prevent the load of the mucosa the only practical way is the insertion of dental-implants with subsequent incorporation of an implant-supported fixed-denture. A virtual planning provides the conditions for an exact implant placement and following the prosthetic restoration of masticatory function. Furthermore, with the navigated implantation is an unnecessary bone-exposure avoided. **CASE REPORT:** Aim of the study is to present a clinical case for prosthetic rehabilitation of both jaws with a fully-navigated-implantation using Camlog-guide-system.

**Material and Methods:** The study was conducted in the department of Oral-and Maxillofacial-Surgery, St.-Lukas-Hospital in Solingen. The patient concerned introduced himself after surgical resection and adjuvant-radiotherapy for implant-planning in our department. The insertion of a total of 12 implants was performed by making a dental-CT's and planning of implantation using CTV-software.

**Results:** The modern 3D-diagnostic enables detailed surgical planning of the implantation taking into account prosthetic considerations. This is mainly possible via the steady improvement of the specific implant planning programs such as CTV-software. By using these systems is achieved extremely light traumatization of the tissue.

**Conclusion:** Full-Guided-Implantations are far more precise in implant-placement, it doesn't occur any dispositions or angle-deviations and the risk of postoperative-complications is significantly reduced.

## P1075

### A combined peri-implant plastic surgery approach for implants in the esthetic zone: a case series

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**Aim:** In this study, the long-term clinical results of a combined peri-implant plastic surgery approach for hard and soft tissue augmentation in implant rehabilitation in the esthetic zone are presented.

**Material and Methods:** Ten individuals who required extraction due to severe periodontal destruction in the maxillary and mandibular area were included in the study. Implant surgery was performed in the same session as the combined peri-implant plastic surgeries, which involved guided bone regeneration (GBR) and free periosteal grafts. Prosthetic treatment was administered in the 6th month following the surgeries.

**Results:** Hard and soft tissue augmentation with sufficient keratinized mucosa width ( $\geq 2$  mm) was achieved with the combined surgical approaches. Pleasing esthetic results were obtained by careful positioning of the implants.

**Conclusion:** In implant rehabilitation, in cases where there are insufficient hard and soft tissues in the esthetic zone, a combined peri-implant plastic surgery approach not only enables the ideal implant position where both function and esthetics are ensured but also provides effective protection of peri-implant tissue health.

## P1076

### Clinical and immunological comparisons of free periosteal grafts with free gingival grafts in the augmentation of peri-implant keratinized mucosa

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**Aim:** The objective of this study was to compare the clinical and immunologic efficacy of two techniques for increasing keratinized mucosa width (KMW) around implants: free gingival grafts versus free periosteal grafts.

**Material and Methods:** Twenty two implants presenting KMW  $< 2$  mm were randomly assigned to two groups. Eleven implants received free gingival grafts (FGG group) while 11 implants were treated with free periosteal grafts (FPG group). Peri-implant crevicular fluid (PICF) connective tissue growth factor (CTGF) and TNF- $\alpha$  levels were determined by ELISA. Clinical and immunologic parameters were measured at baseline and 6 months following surgery.

**Results:** While there was no difference in baseline and 6th month clinical parameters between the two groups ( $p > 0.05$ ), clinical parameters at 6th month significantly decreased compared to baseline in intra-group comparisons ( $p < 0.05$ ). KMW

increased in both groups at 6th month compared to baseline, while KMW in FGG group were significantly higher than KMW in FPG group ( $p < 0.05$ ). PICF CTGF and TNF- $\alpha$  levels did not display a significant difference between both groups ( $p > 0.05$ ). CTGF levels increased in the 6th month in both surgical groups whereas TNF- $\alpha$  levels decreased ( $p > 0.05$ ). Strong positive correlations were observed between the clinical and immunologic parameters.

**Conclusion:** Connective tissue growth factor plays an important role in wound healing and angiogenesis, while TNF- $\alpha$ 's are proinflammatory cytokines that stimulate a number of events including alveolar bone loss. The results of this study reveal that both surgical techniques show similar clinical and immunologic efficacy in peri-implant tissue health.

## P1077

### Conometric retention for complete fixed prosthesis supported by four implants: 2-years prospective study

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**Aim:** To verify the reliability of a conometric system for a fixed retention of complete prostheses on four implants followed for 2 years.

**Material and Methods:** Twenty-five patients received 4 implants and only one complete prosthesis (CPs) for a total of 100 implants followed. Each prosthesis was supported by 4 implants. An immediate loading surgical protocol was used. The CPs were provided to be fixed to conometric abutments without prostheses removal by the patients, to test this retention for a fixed instead of a removable rehabilitation. Clinical and radiographical parameters were assessed at the yearly follow-up visit. Changes over time of clinical and radiographic parameters were analyzed as well as the satisfaction degree for each patient.

**Results:** No patient was classified as "drop-out". All the implants supporting the 25 CPs completed the follow-up examination. No implant, reconstruction, and abutment failure were recorded. No significant differences in biological indexes were observed when compared to the baseline. No significant change of the mean marginal bone level (MBL) was found between the baseline and the last follow-up. No loss of retention was recorded for the CPs. No technical complications referred to abutments and frameworks were observed. Mucositis was recorded for 2 implants and successfully treated with interceptive supportive therapy.

No significant differences ( $p < 0.05$ ) were found between PI, PPD and MBi parameters at baseline and after 2 years of function.

**Conclusion:** The present implant-supported conometric retention system can be used to give a fixed retention to a complete prosthesis supported by four implants immediately loaded.

## P1078

### CAD-CAM vs. Stock Abutments: a prospective evaluation on prognosis and soft tissue stability after 2 years of follow-up

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**Aim:** To compare the prognosis and peri-implant soft tissues stability of CAD-CAM abutments to that of Stock abutments after 2 years of function.

**Material and Methods:** Patients with single gap in maxillary and mandibular anterior areas (from first premolar forward) were recruited. Surgical re-entry was performed 3 months after the implant placement. The provisional restoration was screwed into position. For the definitive restoration the two main sample groups were created: if the fixture inclination was  $>10^\circ$  exceeding the ideal three-dimensional axis, the patient was assigned to the CAD-CAM (CC) group; if it was  $\leq 10^\circ$  the patient was assigned to the Stock (ST) group. Furthermore, if the buccal soft tissue thickness was  $>$  or  $\leq 2$  mm (assessments were made by using a specific caliper on the master cast in order to standardize the measurements) titanium or zirconia were selected as abutment materials.

**Results:** 13 and 23 CAD-CAM zirconia and titanium abutments were selected, respectively. Furthermore 16 and 20 Stock zirconia and titanium abutments were selected, respectively. REC index for the CC and ST groups was significantly different ( $p = 0.03$ ); conversely, no significant differences were observed for titanium versus zirconia abutments in the CC ( $p = 0.3$ ) and ST ( $p = 0.9$ ) groups both. Radiographic indexes of Marginal Bone Loss (MBL) were not significantly different for the CC e ST groups ( $p = 0.9$ ).

**Conclusion:** The use of CAD-CAM abutments resulted as safe as Stock abutments after a follow-up of 2 years. Furthermore, CAD-CAM abutments showed a significantly more stable buccal peri-implant soft tissues if compares to Stock abutments after 2 years of follow-up.

## P1079

### Customized pick-up technique and reproducibility of periimplant soft tissues architecture in anterior area: a 2-years prospective study

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**Aim:** To evaluate the efficacy of the impression pick-up customization technique providing an accurate reproduction of the provisional restoration emergence profile for the final restoration

**Material and Methods:** Eleven implants were placed with standard technique to restore single gap in 11 patients. Three months after the implant placement, a fixed provisional crown was screwed to the fixture, regularly checked and adjusted until an aesthetic result was achieved. After 12 weeks, a second fixture impression was made. A standardized technique was used for the implant pick-up customization in order to transfer the clinical aspect of the peri-implant soft tissues to the master cast, and reproduce the soft tissues morphology on the definitive restoration emergence profile.

The gingival zenith (GZ) of the provisional and definitive prostheses at baseline (T0), after 1 (T1) and two years (T2) of function were measured. So that, the recession index (REC) was calculated by comparing the clinical aspect of the buccal soft tissues before the definitive restoration (provisional) with that at baseline, after 1 and two years after definitive prostheses function.

**Results:** All the implants were restored: a 100% of implant survival rate was observed after 2 years. The REC index at baseline (final restoration installation) was  $-0.3 \pm 0.43$ ; it was of  $0.025 \pm 0.33$  after 12 months of follow-up; it was of  $0.032 \pm 0.41$  after 2 years.

**Conclusion:** A natural emergency profile of aesthetic implant prosthetic rehabilitations could be easily reproduced from the provisional to the definitive restoration by modifying the standard impression pick-up; such a result is also stable over a 2 years of follow-up.

## P1080

### Oral rehabilitation of a patient with systemic lupus erythematosus using implant-supported fixed dentures: a case report

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Belgrade/Serbia

**Aim:** Systemic lupus erythematosus (SLE) is a chronic inflammatory disease with variety of oral manifestations, as well as possible far-reaching systemic implications. Involvement of salivary glands often alters the composition and amount of saliva, compromising the use of removable prosthesis. In addition, bilateral red and white oral lesions are often painful, which may cause difficulties in oral hygiene maintaining. The purpose of present report is to describe the oral rehabilitation of a patient with SLE using dental implants and fixed dentures in both jaws.

**Material and Methods:** A 66-year-old female diabetic patient with SLE presented, demonstrating characteristic bilateral discoid and pigmented lesions, reddened tongue with atrophy of the filiform papilla and sore mouth. The patient complained of the existing partial dentures in both jaws. A proposal of oral rehabilitation with fixed dentures supported by six dental implants in the maxilla and four in the mandible was accepted from the patient. Definitive implant-supported metal-ceramic fixed partial dentures were delivered one year after implant placement, and six-months follow up shows patient is fully satisfied with no complications observed.

**Results:** Oral rehabilitation of patients with SLE might be very demanding for clinicians, regarding local and systemic implications of disease. However, even risk patients of ASA III group can be candidates for rehabilitation using implant-supported fixed dentures which provide more comfort and can improve their quality of life.

**Conclusion:** Dental implants could be considered as possible treatment in oral rehabilitation of patients with SLE.

## P1081

### Multidisciplinary care & implant outcomes: hypodontia versus other indications

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**Aim:** To examine the journey of hypodontia and non-hypodontia patients receiving implant treatment, through the multi-disciplinary service. To compare their treatment requirements and evaluate the outcomes of the implant treatment.

**Material and Methods:** Patients in the Unit of Periodontology, Glasgow Dental Hospital & School who had implant placement carried out after October 2010 and restoration completed by May 2013 were included. Insufficient information in clinical notes was the only exclusion criteria. 32 hypodontia and 59 non-hypodontia patient records were studied. 77 implants were placed in the hypodontia group and 90 implants in the non-hypodontia group. A standardised data collection form was used.

**Results:** In non-hypodontia patients most common reason for tooth loss was dental trauma (39%). Most commonly replaced tooth was maxillary central incisor (36%). In hypodontia group most frequently replaced tooth was maxillary lateral incisor (36%).

Orthodontic treatment was required by 17% non-hypodontia and 75% hypodontia patients.

56% non-hypodontia and 49% hypodontia patients required grafting; most commonly deproteinised bovine bone matrix in non-hypodontia (38%) and iliac crest in hypodontia (47%).

140 implants were reviewed with survival 99% in non-hypodontia and 95% in hypodontia. Bone loss (>2 mm) was noted around 3% of non-hypodontia, and no hypodontia implants. 8% of hypodontia and 21% of non-hypodontia implants displayed peri-implant mucositis. PES scores were "Acceptable" or "Favourable" for 63% non-hypodontia and 83% hypodontia patients.

**Conclusion:** Clear differences exist in the treatment requirements of hypodontia versus non-hypodontia patients. These have important implications in the planning of service and treatment. Implant survival and success rates were high in both groups.

## P1082

### An open, prospective, multi-center study assessing the DENTSPLY implants, OsseoSpeed™ TX, length 6 mm in the posterior maxilla and mandible. A 1-year follow-up study

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Beijing/China

**Aim:** The aim of this multi-center study was to prospectively assess clinical and radiographic outcomes of short implants (length 6-mm) in the posterior region and early-loading with splinted fixed dental prostheses.

**Material and Methods:** 45 subjects (77.8% with chronic periodontitis) were enrolled at three study sites. In total, 95 implants (OsseoSpeed™ 4.0 S; DENTSPLY Implants; Mölndal, Sweden) were placed, two or three implants per subject, using one-stage surgery and loaded with a screw-retained splinted

fixed prosthesis 6 weeks later. Clinical and radiographic examinations were performed preoperatively, postsurgery, at loading, and 6 and 12 months after prosthesis placement.

**Results:** Four implants failed before loading; all other implants showed favorable clinical and radiographic findings throughout the observation period (1-year survival and success rate: 95.8%). Postoperative pain and swelling were negligible. Mean changes in marginal bone levels measured from loading were minimal ( $0.01 \pm 0.37$  and  $-0.13 \pm 0.46$  mm after 6 months and 1 year, respectively). Bone loss  $<1.00$  mm was found in 77.5% implants and bone gain was found in 15.5% implants. Probing depth change  $<2$  mm was found in 98.7% of the implants between loading and 1-year follow-up. Prosthetic complications included one ceramic veneer chipping.

**Conclusion:** One-year data indicate that the use of 6-mm-long implants is a predictable treatment. This provides a good treatment option in situations with limited bone height in posterior regions.

## P1083

### Natural tooth and the maxillary tuberosity for provisionalization and soft tissue augmentation in immediate implantation: case series

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**Aim:** Buccal bone and soft tissue volume may affect the esthetic results of immediate implantation. In this case series, we use the maxillary tuberosity as the donor site for peri-implant soft tissue augmentation and the extracted teeth for provisionalization.

**Material and Methods:** Four patients received immediate single implants in the esthetic zone and the gap between the implant and bony socket was filled with xenogenic bone substitutes. Temporary titanium abutments and the extracted teeth were used for provisionalization. A tunnel was prepared on the buccal aspect and the connective tissue graft harvested from the maxillary tuberosity was sutured to the recipient area. Standardized periapical radiographs and clinical photographs were taken at baseline and third months postoperatively. Dimensional changes in the crestal bone and papilla height at proximal sites, and soft tissue recession and thickness changes at mid-buccal site were evaluated.

**Results:** Standardized periapical radiographs revealed crestal bone loss at proximal sites ranging between 0.25–0.50 mm, and clinical photographs demonstrated papilla loss ranging between 0.25–0.50 mm, buccal soft tissue thickness ranging between 2.25–2.90 mm and mid-buccal soft tissue recession between 0.0–0.5 mm.

**Conclusion:** The maxillary tuberosity can be the donor site for connective tissue graft in immediate implantation and the extracted natural tooth may help to maintain both the pink and white esthetics.

## P1084

### Resolution of implant failure in the esthetic zone: a clinical case report

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*Montijo/Portugal*

**Aim:** This case report exemplifies the aesthetic complications of one immediately placed implant in the maxillary right lateral incisor region of a patient with a high smile line and the challenges associated with its correction.

**Material and Methods:** A 48-year-old female patient presented with aesthetic complaints associated with the implant #12. The patient fractured the tooth 2 years before, which had to be extracted. At the moment, the patient was offered a fixed solution by the placement of an implant immediately after tooth extraction, with immediate aesthetic function. The implant was placed too far facially and the soft tissue on the buccal aspect presented a huge recession with almost no keratinized tissue. The negative gingival architecture prompted the patient to seek alternative treatment opinions. The treatment plan chosen included the removal of the implant and a guided bone regeneration procedure initially and the placement of a new implant in a correct 3-D position with countour augmentation after 5 months during which the patient used a removable prosthesis. After second stage surgery the patient used a provisional crown for 3 months, after which was delivered the final metal-ceramic crown.

**Results:** Immediate implants have shown less predictability and greater aesthetic risk compared to a staged approach which is well described in the literature with excellent long-term results. Risk indicators for recession with immediate placement include thin tissue biotype, facial malposition of the implant, and a thin or damaged facial bone wall.

**Conclusion:** The procedure was satisfactory on an aesthetic level returning the patient's confidence in her smile.

## P1085

### The accuracy of Cone-beam computerised tomography (CBCT) to determine healing around bone grafts placed into maxillary sinuses: a pilot study in sheep

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**Aim:** To assess the effectiveness of CBCT for quantifying tissue development around grafted sinus sites, using an animal model.

**Material and Methods:** Sinus grafting in eight sheep with bovine xenograft was evaluated after a 16 week healing period. Specimens from each animal were analysed histomorphometrically using three techniques: 3-D computerised tomography (CBCT), high-resolution research radiography ( $\mu$ CT) and resin-embedded histological sections as a "gold standard". Two-dimensional "virtual" CBCT sections were matched with corresponding 2-D  $\mu$ CT sections and digitised histological sections.  $\mu$ CT and CBCT images were calibrated using known-density radiographic phantoms. Using image analysis software (Image J), % new bone, % residual graft and % connective tissue were

measured for a matched area of interest for each imaging techniques and compared statistically.

**Results:**  $\mu$ CT and histological measurements for % residual graft were similar (presented as %[SD]: 31.08[2.02] versus 33.15[4.05],  $p < 0.05$ ), whereas  $\mu$ CT measurement for % bone was significantly higher than histology (23.46[2.30] versus 14.14[3.25],  $p < 0.05$ ). CBCT produced a significantly higher value for both % graft and % bone compared both to  $\mu$ CT (73.79[10.14] versus 31.08[2.02], 62.85[7.61] versus 23.46[2.30], respectively,  $p < 0.05$ ) and histology (73.79[10.14] versus 33.15[4.05], 62.85[7.61] versus 14.14[3.25], respectively,  $p < 0.05$ ).

**Conclusion:** Histology and  $\mu$ CT measurements were consistent in their determination of residual graft but  $\mu$ CT overestimated the quantity of newly-formed bone compared to histology. CBCT markedly overestimated both new bone and residual graft. Cone-beam computerised tomography lacks the resolution to accurately determine osseous healing after maxillary sinus grafting, an important step before definitive implant restoration.

## P1086

### Factors associated with the survival and marginal bone loss of dental implants: a 5-year retrospective study

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**Aim:** The purpose of this study was to compare the long-term survival rate and peri-implant marginal bone loss related to multiple risk factors including the clinician's experience.

**Material and Methods:** Four hundred twenty implants in 146 patients, who had involved a supportive periodontal therapy (SPT) program every 3 to 6 months and had follow up data for at least 5 years, were selected as the study group. Peri-implant marginal bone loss, data of demographic, implant and surgical characteristics were collected from peri-apical radiographs and chart review. Implant survival was regarded as the remaining with radiographic marginal bone level in excess of 50% of the fixture length for any reason.

**Results:** The cumulative survival rate after 5 years of loading was 94.9%. In binary logistic regression analysis, smoking status ( $p = 0.033$ ) and presence of spontaneous cover screw exposure ( $p < 0.001$ ) were significantly related to 5-year survival of implants. In stepwise multiple regression analysis, smoking status ( $p < 0.001$ ), type of abutment connection ( $p < 0.001$ ) and implant surface ( $p = 0.033$ ) were significantly related to peri-implant marginal bone level. And the year of resident was not statistically related to 5-year implant survival in simple logistic regression analysis ( $p = 0.171$ ).

**Conclusion:** Smoking status, spontaneous cover screw exposure, type of abutment connection and implant surface might influence the implant success. There was no significant correlation between the year of resident and implant failure.

## P1087

### A novel ridge preservation technique with an nPTFE membrane following extraction of hopeless teeth presenting advanced horizonto-vertical bony defects

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**Aim:** The alveolar process is a tooth-dependent structure. After tooth removal an inevitable hard and soft tissue shrinkage will occur. In case of an advanced horizonto-vertical bony defect involving the buccal bony plate the situation is even more challenging especially in the front region. Different ridge preservation techniques have been introduced to eliminate this unfavourable process and to reduce the need for later augmentative treatments.

**Material and Methods:** Five patients with advanced horizonto-vertical bony defects at least on one tooth were treated by a step-by-step surgical technique. After cause-related periodontal treatment each patient presented good oral hygiene. Following atraumatic tooth extraction alveolar sockets were meticulously debrided. Two remote vertical incisions were made mesially and distally from the extraction site without flap elevation and a tunnel was prepared. A nPTFE (Cytoplast<sup>®</sup>, Osteogenics Biomedical) was fixed on the buccal aspect with titanium pins (Ti-pins, Dentsply Friadent). Alveolar sockets were closed with sutures or with free gingival graft. After 9 months healing the membrane was removed and implant insertion was performed with simultaneous hard and soft tissue augmentation if needed.

**Results:** Patients healed uneventfully after surgeries. Following membrane removal implants were placed in a prosthetically correct 3D position, in 3 of the cases minor hard- and/or soft tissue contour augmentation was needed, in 2 cases implants were placed without any further augmentation.

**Conclusion:** With the applied alveolar ridge preservation technique advanced alveolar defects were reconstructed with minimal surgical trauma without the need of excessive augmentations, resulting in optimal periimplant hard- and soft tissue conditions and minimal patient morbidity.

## P1088

### Horizontal stability of connective tissue graft at the buccal aspect of single implants: a one-year prospective study

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Jette/Belgium

**Aim:** To clinically evaluate the amount of soft tissue gain at the buccal aspect of single implants by means of connective tissue graft (CTG) on one hand and to assess its horizontal stability over a one-year period on the other.

**Material and Methods:** Periodontally healthy non-smoking patients with a single implant in the anterior maxilla (15–25) were selected for a prospective case series. All were in need of contour augmentation by means of CTG for aesthetic reasons. Patients were enrolled 3 months after implant surgery and had been provided with a provisional screw-retained crown. CTG was inserted in the buccal mucosa via the envelope technique using only one intrasulcular incision. An ultrasonic device was

used to evaluate mucosal thickness (MT) at the buccal aspect at different time points.

**Results:** Thirty-seven patients (19 men, 18 women; mean age 38) met the selection criteria and consented to the treatment. The mean soft tissue gain immediately after CTG was on average 1.07 mm (SD 0.49). What remained of this tissue gain after one year was on average 0.97 mm (SD 0.48; 90.7%). Hence, soft tissue loss was on average 0.10 mm (SD 0.23; 9.3%;  $p = 0.015$ ).

**Conclusion:** CTG substantially thickens the peri-implant mucosa with acceptable stability over a 1-year period.

## P1089

### Are tilted implants and immediate loading a reliable and predictable treatment option? Bone level and oral health related quality of life after 2 years

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**Aim:** The aim of this retrospective case collection was to assess marginal bone level around tilted implants and to evaluate Oral Health Related Quality of Life (OHRQoL) improvement

**Material and Methods:** 20 patients were included, 11 females and 9 males. A total of 37 implants (ELEMENT RC INICELL, Thommen Medical AG, Grenchen, Switzerland) were placed: 32 (86%) in the maxilla and 5 (14%) in the mandible. The patients were followed up for an average time of 2 years (4–50 months). At the follow up appointment a periapical X-ray was carried out and the bone-to-implant distance (DIB) evaluated quantitatively. Each patient filled in the GOHAI (Global Oral Health Assessment Index) questionnaire before and after treatment

**Results:** At 2 years follow up period, 1 implant was lost due to a sinusitis. The bone level stabilized slightly above the machined – rough implant interface. The mean mesial and distal DIB were 0.8 mm/0.82 mm (SD = 0.47/0.43 mm), respectively. No DIB was below the first implant thread. Regarding the subjects' GOHAI score, it was at mean 58 (54–60) corresponding to a good level of OHRQoL.

**Conclusion:** Tilted implants and immediate loading may be considered as a reliable option for the rehabilitation of edentulous patients, and it suggests this procedure have an excellent cost-effectiveness ratio.

## P1090

### Long-term aesthetic outcome of implant restorations

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Ankara/Turkey

**Aim:** The success of the implant restoration depends not only on restoring clinical function, but also on integrating the restoration harmoniously into the patient's overall appearance. The aim of this study was to evaluate the aesthetic outcome of implant-supported prosthesis, by means of the Pink Aesthetic Score and White Aesthetic Score (PES/WES) index.

**Material and Methods:** One hundred ninety-five implants were re-evaluated in this study. The anatomical localization, size, type of implants and demographic data of the patients were recorded. The aesthetic outcome was assessed at least 2 years after implant loading using the Pink Aesthetic Score (PES) and White Aesthetic Score (WES). The probing depth, plaque index, gingival index, bleeding on probing, clinical attachment level, gingival recession, and marginal bone level is measured during follow-up sessions.

**Results:** 195 implants in smile line were placed. Three year follow-up results of the cumulative survival rate were 100%. The implant shoulder and the observed distance between alveolar ridges were determined as  $0.19 \pm 0.28$  mm. The mean total PES/WES was 14.1 (range: 10–16). The mean total PES of 9.9 (range: 2 to 12) documents favorable overall peri-implant soft tissue conditions. A mean value 7.01 (range: 1 to 10) was calculated for WES.

**Conclusion:** In this retrospectively long term study, both bone level and tissue level implants were respectively good in terms of survival rates and marginal bone level. The PES/WES is a valid tool in rating the aesthetics of implants supported prosthesis and adjacent soft tissues.

## P1091

### A long-term retrospective analysis of osteotome sinus elevation and simultaneous implant placement

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Aachen/Germany

**Aim:** The aim of this study is to retrospectively evaluate 45 screw type implants with simultaneous sinus augmentation placed between 2002 and 2008.

**Material and Methods:** 45 implants were placed in molar sites with reduced bone height utilizing the osteotome technique with simultaneous augmentation with deproteinized bovine bone mineral (DBBM). After a healing time of minimum 12 weeks implants were loaded with single cemented [porcelain-fused-to-metal] crowns. All patients were followed up clinically and radiographically for more than 5 years.

**Results:** Of the 45 implants, 3 (6.6%) were lost, while 37 (82.2%) were in "optimum functional and esthetic condition". 100% of the implant sites with functioning fixtures showed complete radiographic opacity in the formerly augmented sinus areas. Bone height increased significantly ( $p < 0.05$ ). Implant failure was associated to lack of initial stability at time of placement.

**Conclusion:** Transalveolar Sinus Floor Elevation utilizing grafting material [TSEG] has shown successful functional and esthetic long-term outcome.

## P1092

### Longitudinal study of dental implants supporting overdentures

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Madrid/Spain

**Aim:** The aim of this study is to present clinical results of dental implants supporting overdentures in edentulous patients

attending to Master of Oral Surgery, implantology and periodontics of Alfonso X El Sabio University. Implant-supported overdentures offer many practical advantages over conventional complete dentures. These include decreased bone resorption; reduced or eliminated prosthesis movement; better esthetics; improved tooth position; better occlusion, including improved occlusal load direction, increased occlusal function and maintenance of the occlusal vertical dimension. In addition, implant-supported overdentures improve phonetics, the patient's psychological outlook and quality of life. Conventional implant fixed prosthesis may not be possible in certain cases namely in patients of low incomes. In such cases, an overdenture can be made and connected to osseo-integrated implants.

**Material and Methods:** 282 dental implants were placed in 72 patients. 95 overdentures were placed, (35 in the maxillae, 60 in the mandible). 4 dental implants were placed in all the maxillae cases and 5 of the mandible cases. 55 mandible overdentures were supported by 2 dental implants. Locator was the most used type of attachment system (in 82 overdentures).

**Results:** The implant survival rate was 98%. 4 dental implants failed. (2 before loading (were replaced) 2 after one month of loading).

**Conclusion:** Overdentures are a predictable treatment alternative to both conventional dentures and complete fixed implant supported dentures in the rehabilitation of edentulous patient. Reviewed studies suggest that Locator attachment can solve many of the complications inherent to other restraints. However more clinical studies are required to confirm long-term efficacy of this system.

## P1093

### Six-year clinical follow-up of a single tooth replacement with plateau design short implant

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**Aim:** Osseointegrated dental implants are an effective alternative in the rehabilitation of partial or total edentulous patients. The aim of this clinical case is to present the replacement of a single tooth with limited prosthetic space using a plateau design short implant.

**Material and Methods:** A 65 years-old female searched for a single tooth replacement at the 25 region (FDI notation) at the Federal University of Bahia-Brazil Dental School. She remained with an edentulous space during approximately one year. Due to the limited prosthetic space a 4 × 8 mm (HA coated) locking taper (LT), plateau design (PD) and sloping shoulder (SS) implant has been selected (Bicon Dental Implants, Boston, USA). The implant has been placed 2.0 mm below the bone crest during surgical stage, following manufacturer's protocol. An Integrated Abutment Crown™ was taped in six months after implant placement. The occlusion has been checked and adjusted.

**Results:** A six-year follow-up periapical radiographic image revealed no marginal bone loss. Clinically, the presences of aesthetically acceptable tooth-implant papillae and soft tissue contour were evident. The patient agreed in participating in the clinical case by means of a written consent.

**Conclusion:** Properties as the bacterial seal of the LT and particularly, the lamellar bone formation at a supra-implant level as a consequence of the PD and the SS of the neck of the implant might have contributed to the bone quality at the supra-implant

area. Thus, allowing sufficient space for papillae formation, in this clinical case.

## P1094

### Clinical, biochemical and radiographic evaluation of different placement times of intrasosseous implants

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**Aim:** According to original protocol, before implant placement 6–8 months of long healing period is required. Therefore studies evaluating early implant placements also took place. The aim of our study was to compare the clinical, biochemical and radiographic data of early and late placement methods.

**Material and Methods:** Following periodontal treatments and tooth extractions, a total of 25 implants were placed at 4–6 weeks (Group 1) and at minimum 6 months (Group 2) to 13 patients. Plaque index (PI), gingival index (GI), probing depth (PD) and bleeding on probing (BOP) scores were recorded at baseline, after periodontal treatment and at 0, 1, 3, 6, 12 months after loading. Radiographic examination were performed at 0, 6 and 12 months after loading and at the same time period, peri-implant crevicular fluid samples were obtained, OPG and RANKL levels were assessed with ELISA method.

**Results:** For Groups 1 and 2, mean scores of PI, GI, PD and BOP did not show any statistically significant differences at 0–12 months. Radiographic bone loss was observed as 0.6 mm for Group 1 and 0.48 mm for Group 2 after 12 months and no statistically significant differences were observed between groups. Statistically significant decrease with regard to concentration and total amount of OPG was observed in Group 2 at 0 to 12 month period. OPG and RANKL concentration, OPG total amount levels did not show any significant difference between groups.

**Conclusion:** Our results showed that both early and late implant placement protocols metted success criteria after 12 months.

## P1095

### Comparative ultrasound assessment of keratinized gingiva thickness around implants after the augmentation treatment in esthetic zone- preliminary results

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**Aim:** Comparative, ultrasound evaluation of the thickness of keratinized gingiva around implants before and 3 mths after augmentation gingiva by means of connective tissue graft and collagen matrix Mucograft® (Geistlich®).

**Material and Methods:** 57 patients, 34 women with – 75 Conelog® (Camlog®) were implanted in 61 cases- single and in 7 cases a double missing teeth. 3 groups: Control group I – without augmentation gingiva, II group of thickened gingiva three months before implantation and III group of thickened gingiva three months after implantation. Groups II and III were divided into two subgroups: a) connective tissue graft, b) collagen matrix Mucograft®. Patients underwent clinical examination

before and 3 months after augmentation gingiva and ultrasonography evaluating the thickness of keratinized gingiva at 3 points in place of a missing tooth using a device Pirop® (ECHO-SON®, Poland): 1. in the middle of the line connecting CEJ's the adjacent teeth, 2. on the MGJ, 3. on the alveolar ridge.

**Results:** The highest value of increasing thickness of gingiva in 3 measurement points was in IIIb group –with connective tissue graft 3-month after implantation. The differences were at a point 1–0.74, 2–0.75, 3–1.05. The greatest thickness of gingiva in 1 measurement point was in IIb (0.89). In Mucografts group the higher increase was in IIIa group at point 1–0.63.

**Conclusion:** Both CTG and Mucograft® have the effect of increasing gingiva thickness, but higher values was recorded after augmentation surgery CTG. In thin biotype when keratinized gingiva is thinner than 2 mm, implant surgery of keratinized gingiva is required.

## P1096

### Significance of primary stability for successful osseointegration of dental implants: a systematic review

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London/United Kingdom

**Aim:** To evaluate the significance of primary stability on the success/survival of dental implants.

**Material and Methods:** Research question was formulated based on the PICO principle. Electronic databases were searched from 1993 up to and including May 2014 using variations of key terms. Review findings regarding study results and quality were summarized in tables by topic, using the PRISMA Statement for reporting and the Cochrane bias assessment tool for quality assessment, respectively. Studies included were: randomised control clinical trials, controlled clinical trials, case studies of series with at least 10 cases, case-control and prospective cohort studies, published in the English language from 1993, which assess the significance of primary stability for successful osseointegration.

**Results:** From the 942 titles (1018 before removing duplicates) obtained after the database search, 76 publications were identified as potentially relevant to the PICO question. The evaluation of abstracts yielded 8 studies eligible for full-text analysis. Five publications met the inclusion criteria and were included in this systematic review. Most of the included studies claim, in some way, that a high level of primary stability in delayed-loaded implants raises the probability of success of an implant while a low level does the reverse. However, none of the studies have correlated the primary stability values to the success or failure of implants.

**Conclusion:** The results of the 5 included studies limit any definitive conclusion as none of them compare the success or survival between implants with high or low primary stability. Specific studies comparing implants placed with high and low primary stability are necessary to determine its significance as a success indicator for delayed-loaded implants.

## P1097

### The effects of anatomical provisional restorations and healing abutments placed immediately in molar extraction sites on peri-implant hard and soft tissues. A comparative study

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**Aim:** The aim of this study was to compare the effects of fabricated and customized healing abutments on changes to soft tissues and crestal bone levels around implants immediately placed into extraction sockets in molar area.

**Material and Methods:** A total of 58 patients were recruited and randomized into treatment groups. Group A had a molar tooth removed, with immediate socket grafting, implant placement and healing abutment. Group B, following molar extraction, immediate implant placement, socket grafting and provisionalization. At 12 weeks (baseline), definitive screw-retained crowns were placed in occlusion. Survival rates, prosthodontic complications, probing pocket depths, marginal bone levels measured on radiographs, buccal mucosal changes, soft tissue appearance (papilla dimensions and clinical crown height), and patient satisfaction were evaluated during an observation period of 1 year.

**Results:** Only one implant in the group A failed before occlusal loading. The mean probing pocket depths varied from 2.3 to 3.5 mm in group A and from 0.6 to 2.2 mm in group B 1 years after implant placement. During the 1-year period, an annual marginal bone loss of <0.4 mm was found in both groups. Although the early group B performed better than the group A as to soft tissue appearance after seating of the implant restoration. Furthermore, patients in both groups were satisfied with the outcome of their implant treatment.

**Conclusion:** The results of this study suggest that favorable implant success rates, peri-implant tissue responses, and esthetic outcomes can be achieved with immediately placed and provisionalized single implants in molar area.

## P1098

### 3-year results from a prospective clinical study to evaluate the success and survival of PTTM dental implants when definitively restored within 2 weeks

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**Aim:** An ongoing prospective, multicenter study is aimed at evaluating the long-term survival and success of immediately loaded PTTM dental implants. This report analyzes the 3-year interim results.

**Material and Methods:** Healthy, partially edentulous subjects with sufficient bone volume and whose implants achieved an insertion torque value of 35 Ncm or greater were included in the study. Smokers and sites with type 4 bone density were excluded. Implants were provisionalized out of occlusion within 48 h and definitively restored within 2 weeks of implant placement. Standardized radiographs were taken for each implant to measure marginal bone level changes.

**Results:** Thirty subjects with 37 implants were treated per protocol in the study; of these, one subject with a single implant was lost to follow-up and one implant failed to osseointegrate at 6 months. The cumulative survival rate was reported as 97.2% ( $n = 35/36$ ). The study was extended to a 3-year follow up; 22 subjects with 29 implants consented to participate. One patient with 2 implants was lost to follow-up and 1 patient with 1 implant missed the visit. Hence, 20 subjects with 26 implants completed the 3-year follow-up. No further failures were reported with 100% survival ( $n = 26/26$ ) in this group. The marginal bone level change from provisional restoration to 3-year follow up was  $0.46 \pm 0.52$  mm.

**Conclusion:** 3-year clinical results indicate that restoring PTTM dental implants with definitive restorations within 2 weeks was safe and effective in a controlled study.

## P1099

### Dental implant rehabilitation of a patient with ligneous periodontitis: a case report with 1-year follow-up

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**Aim:** Destructive membranous periodontal disease is a rare and poorly defined entity that is a part of systemic disease due to accumulation of fibrin and amyloid-like material. It is caused by the same process as ligneous conjunctivitis, and most of the oral lesions were observed at the same time with ligneous eyelid lesions. The disease is characterized by gingival enlargement and periodontal tissue destruction that leads to rapid bone loss despite treatment efforts. In this case report, implant treatment of a patient with ligneous periodontitis after extraction of maxillary premolar teeth due to excessive bone loss is presented.

**Material and Methods:** A 22-years-old female patient complaining with gingival enlargement was referred to our clinic. After clinical and radiological examination, non painful and nodular fragile ulceration affecting both maxillary and mandibular gingiva and periodontal bone loss was denoted. The lesions were white-yellowish membranes covering the teeth, with a tendency to bleed. Biochemical tests including serum proteins and liver function tests were within normal limits. A gingival biopsy was performed before the treatment plan. The histopatologic examination confirmed the diagnosis as ligneous periodontitis. Teeth with excessive bone loss were extracted. Two-stage implant surgery after extraction of 24 and 25 was decided.

**Results:** After 3 months from implant surgery no sign of inflammation and gingival enlargement was observed and fixed prosthesis was delivered. During follow-up appointments, clinically no gingival enlargement and radiologically no marginal bone loss was denoted around the implants.

**Conclusion:** Implant supported fixed prosthesis may be a treatment alternative for prosthetic rehabilitation of patients with ligneous periodontitis.

## P1100

### One and five year results of implant success after sinus augmentation with deproteinized bovine bone mineral and platelet rich plasma: a clinical controlled study

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 Istanbul/Turkey

**Aim:** The purpose of the present clinical study was to assess the implant survival in the resorbed maxilla after sinus augmentation with platelet rich plasma (PRP)/deproteinized bovine bone mineral (DBBM) versus DBBM/collagen membrane.

**Material and Methods:** Using a split mouth design, 10 patients, with  $\leq 5$  mm of residual alveolar bone in the vertical direction, were treated with PRP/DBBM or DBBM/collagen membrane. After 8 months, a total of 22 and 21 implants (Osseospeed™, Astra Tech AB, Sweden) were inserted in PRP and non-PRP sites, respectively. Implant success and survival rate, modified plaque and bleeding indices, probing depth and bone level alterations were evaluated. Primary outcome of the study was implant success rate at 1 and 5 years after functioning.

**Results:** Only 1 implant was lost before the prosthetic rehabilitation at the PRP side. The remaining 42 implants showed favorable clinical and radiographic findings at 1 and 5 years examination in both groups. There were no statistically significant differences in all evaluated parameters at 1 and 5 years follow-up, respectively in both groups ( $p > 0.05$ ). After 5 years of loading no further implants were lost, giving the overall success rate of 83%.

**Conclusion:** The present clinical study showed that high implant success and survival rate can be achieved at 1-year and maintained up to five years following DBBM grafting whether or not PRP is used.

## P1101

### Soft tissue management at implant sites

C. Martinho, A.R. Soares, C. Silva, J. Gomes, M. Santos, S. Noronha  
 Lisbon/Portugal

**Aim:** This presentation aims to provide a narrative review of the literature concerning soft tissue management at implant sites. Illustrative clinical cases, performed by graduates' students of Periodontology, School of Dental Medicine, University of Lisbon will be presented.

**Material and Methods:** A literature search in PubMed, Embase and Cochrane Library was performed in order to identify relevant articles on the subject, published between 1999–2014, using the key-words: "aesthetics", "dental implants", "keratinized tissue", "soft tissue management" in different combinations. Three topics were considered in this review: the significance of keratinized tissue (KT) at implant sites, the surgical techniques to increase KT and the soft tissue stability around implants.

**Results:** The literature analysis showed that the width of KT does not influence the survival rate of dental implants, however, some authors defend that a KT band around implant restorations reduce the incidence of plaque-related peri-implantitis. Different techniques are proposed to augment peri-implant-ker-

atinized mucosa, but there is no sufficient evidence to recommend a specific technique to augment KT. The soft tissue stability around implants seems to be influenced by some factors, such as the width of KT, bone level and implant features.

**Conclusion:** Although the lack of KT may not influence implant survival, the careful management of soft tissue around implants is crucial to achieve aesthetic success. Moreover, the soft tissue augmentation at implant sites may need to be considered in some clinical situations, such as to facilitate restorative procedures, to improve aesthetics and to provide a better plaque control during oral hygiene.

## P1102

### Marginal bone loss in implants with different heights machined-collar

M. Segura-Sánchez, A. Lucena-Bello, C.M. Díaz-Castro, M. Herrero-Climent, J. Rios-Santos, P. Bullon

Sevilla/Spain

**Aim:** To evaluate human changes to the level of crestal bone radiographically over a period of 12 months in implants with a machined-collar 0.7 mm (A) against type B with 1.5-mm machined-collar.

**Material and Methods:** Twenty patients with multiple absences teeth in later sections were randomly assigned to one of two groups. We assessed changes in peak bone level, measuring the distance shoulder-crest (SCD) in the mesial and distal aspects of each implant. Periapical radiographs were taken the day of surgery, 3, 6, and 12 months after surgery.

**Results:** Eighty-one implants were included in the study. SCD average was  $0.54 \pm 0.53$  mm  $1.49 \pm 0.40$  baseline and after 12 months mm. 0.7 mm implant neck SCD have a mean of  $1.40 \pm 0.39$  mm, while the 1.5 mm implant neck was  $1.56 \pm 0.40$  mm, with statistically significant differences. Only differences between the two types of implants in distal measurements at 3 and 12 months after placement were found.

**Conclusion:** Changes in the levels of peri-implant bone crest are similar for both types of implants and are unlikely to present alterations from a clinical point of view. The SCD may depend more on the location of the implant-abutment interface that height machined collar. Both implants of 0.7 and 1.5 mm machined collar can be used with predictable results.

## P1103

### Rehabilitation of an atrophic posterior mandible with 4-mm short implants: a 3-year post-loading case report

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<sup>1</sup>Bologna/Italy, <sup>2</sup>Rome/Italy

**Aim:** We describe a successful implant-prosthetic rehabilitation of an atrophic posterior mandible with 4 mm long implants.

**Material and Methods:** The patient refused to undergo any reconstructive surgery and, because the available bone up to the inferior alveolar nerve was only 4.5 and 5 mm, the patient received 4 implants of 4 mm length.

**Results:** Four months after implant positioning, a temporary prosthesis was put in place which was then replaced by a perma-

nent prosthesis after another four months. The follow-up time is at three years after implants loading.

**Conclusion:** With the limits of this case report the use of such short implants can allow a fixed prosthetic solution without the need for vertically augmenting of the mandibular bone. This procedure considerably reduces intra and postoperative patient discomfort compared to reconstructive surgery for the placing of longer implants.

## P1104

### Is it worth to do alveolar socket preservation?

J. Gomes, A.R. Soares, C. Martinho, C. Silva, M. Santos, H. Rebelo

Lisbon/Portugal

**Aim:** The aim of this poster is to review the available literature concerning ridge preservation procedures and its benefits on the bone volume outcome.

**Material and Methods:** The papers were obtained by search in PubMed and Cochrane library, until November 2014, using search terms relevant to this subject such as "socket preservation" and "alveolar ridge preservation". Literature screening, paper selection and data extraction were conducted by 1 independent reviewer. Randomized controlled trials (RCT), controlled clinical trials (CCT) and prospective cohort studies were eligible. The procedures evaluated were: barrier membrane alone, bone graft alone and both together (bone graft plus barrier membrane). Outcome measures were mean horizontal ridge changes and mean vertical ridge changes.

**Results:** The papers showed great variability concerning the bone volume outcome. Alveolar ridge preservation with barrier membrane alone seems to be the most effective procedure in limiting physiologic ridge reduction as compared with tooth extraction alone.

**Conclusion:** Alveolar socket preservation seems to be effective in maintaining ridge dimensions after tooth extraction.

## P1105

### Split papilla flap – incision modification for implant placement

F. Haenssler

Goepingen/Germany

**Aim:** Introduction Tissue height has a tremendous effect on the esthetic outcome of implant treatment. Therefore, all efforts have to be made to preserve the surrounding tissue. It is known that bone denudation results in bone resorption and soft tissue collapse. The new approach combines tissue preservation by limited flap design with the opportunity to augment by wide flap design.

**Material and Methods:** Case report The incision is made from the mesio-buccal line angle to the mesio-palatal line angle of the adjacent tooth without bone contact, using a micro-blade. Curvilinear, the incision is connected palatal to the distal adjacent tooth. Subsequently, the incision is continued from disto-palatal to disto-buccal without bone contact. A vertical releasing incision is made on the distal area in a c-form style. Before reflecting the flap the most important part takes place, i.e. in the area of the papillae a split flap and in the area in between a full thickness flap is performed.

**Results:** Discussion Gomez has shown that by limited flap design the interproximal crestal bone loss was significant less than by a widely mobilized flap (0.29 mm versus 0.79 mm). But most of the time it is necessary to augment bone and soft tissue. Therefore a wider flap is necessary. Also non-appealing scars can be seen after limited flap design due to the incisions in the esthetic area.

**Conclusion:** Conclusion The flap combines the preservation of tissue in the area of the papillae while also obtaining the possibility to augment bone and soft tissue and no scars can be detected later.

## P1106

### Two appointments scenario (TAS) for replacing a single tooth: an immediate implantation and provisionalization with non functional loading and a final ceramic restoration with Cerec technology. A case series

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**Aim:** The aim of this study is describing a new two appointments scenario (TAS) for replacing single tooth: one for the immediate implantation and provisionalization without loading, and one for the final ceramic restoration with CEREC technology

**Material and Methods:** Ten cases were selected for a single immediate implant with non functional loading All cases presented at least 4 mm over the extraction sockets in order to reach a good primary stability, thick biotype, absence of infections, no defects extending to the buccal crest, insertion torque >35 Ncm and average ISQ value of at least 75. Immediately after implant placement, temporary prosthetic reconstruction with non functional loading was performed. Six months after surgery definitive restorations were manufactured and screwed in one appointment with Cerec technology. Follow up visits were performed for the assessment of clinical parameters and radiographic evaluations up to 18 months after surgery. Chairside consuming time and patient satisfaction evaluations were also performed.

**Results:** After 18 months all implants remained osseointegrated with a 100% of survival and success rate. No technical or biological complications were recorded. Interdental papilla levels seem predictable following immediate implantation and provisionalization and midfacial mucosal recessions occurred with an average of 0.24 mm. A mean of 4 h were needed to perform all the procedure, and patients acceptance was high.

**Conclusion:** Within the limits of this clinical study, the results indicate that this surgical and restorative protocol, performed in only two appointments, can be carried out successfully.

## P1107

### A 3-year evaluation of the peri-implant parameters of immediate implants placed in fresh extraction sockets

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**Aim:** The aim of the present study is to consider the correlation between the keratinized mucosa and the long-term maintenance of endosseous dental implants placed immediately after tooth extractions.

**Material and Methods:** Forty-two patients requiring extraction of one/more teeth and implant placement immediately after extraction were enrolled in this study. A total of 65 dental implants were placed. Based on the amounts of keratinized mucosa (KM), implants were categorized as follows: KM  $\geq 2$  mm (group I) and KM < 2 mm (group II). Clinical parameters (probing depth and gingival index) and marginal bone levels were followed at 3 years after implant placement. Bone type, implant length and width, type of prosthodontic restorations, as well as site of implants placed were also recorded.

**Results:** The average interval between implant insertion and abutment connection was  $4.07 \pm 1.35$  months. At 3-year follow-up, a survival rate of 100% was reported for all implants. The mean values of group II were significantly higher ( $p < 0.05$ ) than group I for the peri-implant gingival index parameters (group I:  $0.29 \pm 0.06$ ; group II:  $0.33 \pm 0.11$ ). No statistically significant difference was recorded according to the mean probing depth values between groups ( $p > 0.05$ ). Similarly, for mean bone loss values, statistically non-significant differences were reported between groups.

**Conclusion:** At 3-year follow-up, the results suggested that the presence of mid-buccal KM is not a critical factor either in the maintenance of radiographic bone level or probing depth parameters around immediately placed implants into fresh extraction sockets. Conversely, less width of keratinized mucosa is significantly associated with more gingival inflammation.

## P1108

### Image guided surgery in implantology using a new navigation system: in-vitro and first clinical studies with ImplaNavi™

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**Aim:** Literature studies report that Computer-assisted Surgery (CAS) using drill guides does not guarantee enough safety in the treatment of atrophic jaws and/or in posterior sites. The use of Image Guided Surgery (IGS) may solve some of these problems and widen the use of CAS in dental implantology. The scope of this work is to evaluate the accuracy that ImplaNavi™ (BresMedical, Australia) hardware and software tools offer IGS.

**Material and Methods:** Trials simulated the drilling procedure on polyamide mandible replicas. A 3D model is generated from a pre-operative CBCT scan of the replicas with attached radiopaque reference structure. Virtual surgery planning is used to guide the implant placement in optical tracking mode while deviation from the planned surgery is evaluated via a post-operative scan. Applying the ImplaNavi™ protocol for pre-clinical study, has served the

purpose of assessing the clinical feasibility of this procedure. Clinical trials approved from the Ethical Committee have started and their preliminary results are presented.

**Results:** The accuracy of the system measured from a statistical analysis of the first in-vivo cases is in line with literature results of clinical cases performed using dental drill guides.

**Conclusion:** The ImplaNav™ is destined to improve and widen the use of CAS. It will revolutionize difficult clinical cases. For this to happen the interface used for IGS must be intuitive and the clinical tools easy to use. This is the strength of the ImplaNav™ and the direction of its further developments.

## P1109

### Immediate anterior implant placement with hard and soft tissue enhancement: a single stage procedure

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Monterrey/Mexico

**Aim:** Post-extraction alveolar remodeling results in horizontal and vertical bone loss even after immediate implant placement, reflecting onto soft tissues and requiring additional mucogingival surgeries to reestablish esthetic gingival anatomy.

**Material and Methods:** A 42 year-old female patient with non-contributory medical history presented with a radicular remnant of tooth 21 due to failing of anterior restoration. CBCT scan revealed presence of vestibular and palatal cortical plates and adequate crestal height. Upon surgical intervention, atraumatic extraction was followed by the drilling protocol and placement of a 3.5 x 13 mm tapered implant (NobelReplace Tapered Groovy). A slanted incision was made at the base of the labial frenum to create a pouch for placement of a connective tissue graft, which was fixed to gingiva facial to implant site with 6-0 nylon suture. A bovine bone graft (Bio-Oss Collagen) was placed beneath the CTG and in marginal gaps between implant and alveolar walls. The temporary abutment was personalized with acrylic resin applied subgingivally to capture the emergence profile and crown was finished extraorally.

**Results:** Vestibular placement of connective tissue and bone grafts was done to prevent midfacial recession and compensate for bone resorption expected on the buccal cortical plate. In this case, CTG placement was done through an apical approach so as not to disturb the gingival margin and it also served as a barrier for the bone graft.

**Conclusion:** The advantages of this procedure were single stage immediate anterior implant placement and provisionalization with soft and hard tissue enhancement resulting in shorter treatment time and less patient morbidity.

## P1110

### Immediate restoration of dental implants in patients with treated periodontal disease: 5 years follow-up

E. Gabay, J. Horwitz  
Haifa/Israel

**Aim:** To evaluate implant and patient characteristics in a long-term follow-up study involving immediate fixed restoration of dental implants.

**Material and Methods:** The current study serves as a follow-up on treated generalized chronic periodontitis patients, who received immediate restorations on dental implants, as part of previous study. The patients were examined clinically and parallel technique radiographs were taken at four time points: Implant placement (T0), 6 months (T6), 1 year (T12) and 4–7 years (T60). Dental hygienist appointments (SPT) and bone level measurements around implants were documented. Patients were divided into 3 groups according to their annual SPT rate: none (SPT0), less than twice a year (SPT1), twice a year and more (SPT2).

**Results:** Twelve patients, with 26 implants, were recruited. The mean follow-up period was  $67 \pm 13.5$  months, (range: 48.3 to 92.5 months). All implants were successful. The mean bone loss at T60 was  $1.19 \pm 0.64$  mm. A significant bone loss was found between T0 and T6, in all SPT groups, SPT0  $0.49 \pm 0.50$  mm, SPT1  $0.70 \pm 0.59$  mm and SPT2  $0.42 \pm 0.25$  mm ( $p < 0.02$ ). There was no significant difference between groups. Only in the SPT0 group a marked crestal bone loss was found between T6 and T12  $0.58 \pm 0.44$  mm ( $p = 0.01$ ) and between T6 and T60  $0.49 \pm 0.43$  mm ( $p = 0.008$ ). The bone loss found between T6 and T12 in the SPT2 group was significantly lower than in SPT0 group ( $0.14 \pm 0.19$  mm and  $0.58 \pm 0.44$  mm respectively,  $p = 0.015$ ).

**Conclusion:** According to our findings, supportive periodontal treatment in patients with treated periodontal disease may attenuate crestal bone loss around dental implants with immediate restorations.

## P1111

### How and how much space could be gained with clear aligner before insertion of implants

R. Rossi, M. Balli, M. Baldini  
Rho/Italy

**Aim:** this work has been designed in order to know how orthodontic treatment could help the implantologist into the treatment plan

**Material and Methods:** we analyzed over the plaster cast how much space we needed for placing a single implant. We projected, together with the orthodontist, the right position into the rendering sent by the industry for the evaluation. We selected 10 cases for this work. we measured the space before and after the treatment on the plaster cast and on the rendering, after that we compared how much space we have gained

**Results:** for the implantologist to gain space for placing an implant into a prostodontic guided position is very important and to get the parallelism of the roots could give a better maintenance and an easier insertion of the implant. Clear aligners are an efficient system for the uprighting of the molars and for opening space after migration of teeth into edentulous sites

**Conclusion:** for the implantologist who need to place implant into a single space, clear aligner could give a great help to prevent any angular defect and to allow a better maintenance of the hygiene. With clear aligners if there is a specific indication and if the collaboration with the specialist is optimal, we should replace the missing tooth in the better condition.

## P1112

### Maxillary vestibuloplasty with 3D porcine collagen matrix (Mucograft) to aid oro-dental rehabilitation following resection of squamous cell carcinoma

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**Aim:** Oral rehabilitation of a 54 year old male following resection of a squamous cell carcinoma (SCC) from the left maxilla is described. The defect was a Brown Class 1 alveolar defect (Brown et al. 2000) which was closed by primary intention. This soft tissue distortion occluded the prosthodontic space available for dental rehabilitation.

**Material and Methods:** Oncological resection of a T1 SCC of the left maxillary alveolus and primary wound closure was performed. No adjunctive radiotherapy was necessary. On examination hyper-mobile, non-keratinised, free buccal mucosa was overlying the healed left maxillary alveolus with a vertical bony defect present from the upper left canine region extending posteriorly. Following extraction of the remaining maxillary teeth, prosthodontically guided maxillary implant placement was performed to standard protocol with no hard or soft tissue augmentation. Secondly, a maxillary vestibuloplasty procedure was performed, suturing a 3D porcine collagen matrix (Mucograft, Geistlich, Switzerland) to the attached connective tissue. The membrane was stabilised by a screw-retained implant-borne dressing plate, avoiding tissue compression.

**Results:** Substantial shrinkage of the grafted collagen matrix was seen as has been reported in the literature for both autogenous and Xenogenous soft tissue grafts. The patient developed a suture abscess as a complication to healing. The surgical techniques employed and suggested modifications to the technique to simplify the procedure are discussed.

**Conclusion:** The clinical case is illustrated and the relative advantages and disadvantages of this treatment strategy are discussed, in comparison to conventional autogenous soft tissue grafting techniques. The available evidence base is summarised and considered.

## P1113

### Achieving optimal aesthetics in a case with missing upper lateral incisors and small bone volume without onlay bone grafting – a challenging implant restoration

M. Santos, S. Smith

London/United Kingdom

**Aim:** Bone volume deficiency is a common occurrence in patients with Hypodontia and it often requires complex bone grafting procedures to allow for implant placement at an optimal angle for a good result in the aesthetic area.

**Material and Methods:** Two implants (3i Biomet®) were placed to restore two missing upper lateral incisors. A previous CT scan of the area revealed a very thin bone ridge in the area. A small flap preserving the papillas was retracted to expose the bone ridge. To circumvent the need for complex grafting, a spe-

cial technique aimed at increasing the bone ridge width atraumatically was performed using osteotomes to compact the bone in a buccal direction. An optimal implant angle was then achieved with minimal trauma. To reduce the concavity present in the buccal area above the implant site, a supraosseous subperiosteal pocket was created and filled with autologous bone captured during the implant preparation and mixed with Bi-Oss®. Soft tissue conformation was done using the provisional crowns.

**Results:** Achieving optimal results in the anterior area is a challenge to periodontists and prosthodontists alike. Complex bone grafting techniques demand large flap retractions, long healing times and multiple procedures that can compromise the final result in the aesthetic area. Alternatives to onlay bone grafting are very useful in restoring these cases since they minimise the trauma to soft tissues and increase the odds of good predictable healing.

**Conclusion:** This minimally invasive approach allowed for implant placement with minor trauma, one surgical session only and good aesthetic results.

## P1114

### Clinical outcomes of short implants versus sinus lift. Sistematic review.

A. Fatou, C. Salas, M. Herrero Climent, V. Rios-Santos, P. Bullon, G. Tello Gonzalez

Seville/Spain

**Aim:** To compare long term results reported in the literature on the use of short implants versus trascrestal lifting technique.

**Material and Methods:** Electronic search of major databases (pub Med; and Cochrane) and manual search of references and leading journals in the field, between the years 2004–2014. The search was performed by two independent investigators and their results agreed. Keywords used: “short maxillary implants”; “dental implants AND sinus lift”; “sinus augmentation”; “osteotome technique”. Inclusion criteria: implants under 8 mm in the maxilla without bone regeneration techniques; implants longer than 8 mm placed through trascrestal technique of sinus elevation. Analysis of results and follow up for at least 1 year. Published in English, well-designed trials in humans and RCT. Access to the results.

**Results:** An extensive review of the literature that is available for short implants indicates that they are commonly used and they can be successfully loaded in maxillary bone. Elevating the sinus lining by osteotome technique without the addition of a bone graft may be sufficient to regenerate new bone to allow rehabilitation with implant-supported prosthesis. Both treatments have similar results. More well-designed clinical trials with long follow up are needed to establish a treatment recommendation.

**Conclusion:** This review of the literature will provide the reader an in-depth view of the evidence in using short implants or sinus lift for replacing missing teeth for the maxillary molar region.

## P1115

### Biomechanical analysis of abutments and prosthetic screws in full-arch implant-supported rehabilitations

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**Aim:** The aim of this research was to do a biomechanical analysis of abutments and prosthetic screws in full-arch screw-retained implant-supported restorations, under different load applications, cantilever extension and abutments angulation.

**Material and Methods:** Using a computer-aided-design software (Solidworks2014<sup>®</sup>), tridimensional models of a mandibular arch with seven variations of an implant-supported rehabilitations were developed (I – all-on-six rehabilitation with no cantilever; II – all-on-four rehabilitation with straight implants and 3 cantilever variations; III – all-on-four rehabilitation with straight and tilted implants and 3 cantilever variations). In every model, it was designed a simplified prosthetic framework, to allow the simulation of masticatory loads, vertical and oblique. All models were exported to a finite element software (AnsysV15<sup>®</sup>) in order to analyse stress and strain distribution over prosthetic abutments and screws.

**Results:** It was observed that model III (3), with distal tilted implants under oblique forces on the 10 mm cantilever had higher values of stress and strain on the abutment. It was found that prosthetic screws were areas of less stress and strain concentration. The most favourable condition was the all-on-six rehabilitation.

**Conclusion:** Considering the biomechanical analysis performed, we can conclude that longer cantilevers supported by tilted implants should be avoided in order to prevent mechanical and biological complications.

## P1116

### Implant-supported removable partial denture: a systematic review

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Rabat/Morocco

**Aim:** The aim of this systematic review is to assess the predictability of the IARPD as a therapeutic of partially edentulous arches, as well as to investigate implants survival rate, patient satisfaction and prosthetic complications.

**Material and Methods:** A systematic literature review was conducted by two independent reviewers. The review includes articles published up to 23 November 2014, and cited in PubMed, EBSCO and Cochrane Library electronic databases. A hand searching of reference of those articles plus articles from other journals was also performed. A total of 443 articles was screened. Only 9 articles matched with inclusion criteria.

**Results:** Studies revealed that implant survival rates ranged from 90 to 100%. Patient satisfaction ranged from 4.59 to 5 on a scale of 5 grades. Few complications (framework and acrylic denture base damages, screw loosening, hyperplastic tissue, implant failure) were reported with the ISRPD.

**Conclusion:** ISRPD may be considered as an effective, simple, economical and less invasive treatment modality. However, to assess predictability of such approach in the management of partially edentulous patient, well-designed comparative studies

namely with a focus on long-term randomized clinical trials are needed.

## P1117

### Survival and success rate of Essential Cone implants. 2-year prospective study

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**Aim:** To establish the success rate of implants Essential Cone two years after placement. Secondary objectives are: 1) distribution of implants; 2) evolution of stability; 3) radiographic bone loss; 4) patient satisfaction.

**Material and Methods:** A multicenter, non-interventionist with 2-year follow-up prospective observational study. It had the participation 12 centers, placing a minimum of 10 and a maximum of 40 patients, >18 years of age collected needing placement of at least one implant in the maxilla or mandible. Intraoral, resonance frequency analysis, probing, bleeding on probing, implant success, mobility, patient satisfaction was recorded.

**Results:** Ninety-two patients received hundred ninety six Klockner Essential Cone implants between May 2010 and September 2010. The success rate was 98.82% at two years (two failed). The difference in mean ISQ (resonance frequency analysis) value at the time of surgery (68.6) compared to the average value measured at 2 months (70.6) is not statistically significant. The distance from the implant platform to the bone crest was initially higher in distal than mesial but equals 8 weeks, not varying in time. The satisfaction survey achieved excellent results in terms of comfort and aesthetics.

**Conclusion:** Klockner Implants Essential Cone had good results in success and implant survival. There was an initial bone loss in the first few weeks is maintained over time.

## P1118

### Soft tissue augmentation to improve simultaneous implant placement and bone grafting in esthetic site

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Bucharest/Romania

**Aim:** Today, the real challenge for clinicians is to achieve a predictable esthetic results, especially at the soft tissue level, while being less traumatic and more time-efficient. 38 years-old female with compromised mandibular incisors due to trauma. The teeth were rotated, with intrinsic stains and mobility. She had excellent oral hygiene, no periodontal disease. The treatment plan: implant supported fixed prosthesis.

**Material and Methods:** 42/41/31/32 extractions, with 2 simultaneous implant placement. The bone graft was Bond Bone mixed in with Botiss-xenograft. A collagen membrane was placed over the graft and secured with the healing cap of the implant. The mucosal autograft was placed within the envelope flap and collagen membrane. The aim: to increase the width of keratinized gingiva. After 6 months, a new surgical procedure was necessary to achieve implant coverage; it was recorded a slightly buccally dehiscence. The aim of second surgery was to

increase the high of gingiva. We used Mucoderm hydrated with PRF serum, placed in the partial thickness flap covering the buccal and crestal aspect around the implant. 4 months later, the patient received the final restorations.

**Results:** The result of this case suggests that the gingival level can be maintained around post extraction simultaneous implants with GBR and GTR when the proper implant position is obtained and the bone graft is placed and stabilized into the defect gap.

**Conclusion:** In conclusion, the aim of this case was achieved. We managed to obtain an optimal esthetic result after 10 months, while maintaining the gingival level after simultaneous implant placement with GBR.

## P1119

### Comparisons of two different soft tissue grafts for increasing keratinized tissue around dental implants

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**Aim:** The aim of this study is to compare the clinical outcomes of free gingival graft and subepithelial connective tissue graft for increasing the keratinized peri-implant tissues.

**Material and Methods:** A total of 13 patients with 27 implants with <2 mm keratinized tissues around implants were included in this study. 17 patients received free gingival graft and 10 patients received subepithelial connective graft to augment the keratinized tissues. The width of the keratinized tissue of buccal site of implants were measured by periodontal probe at different timelines: before surgery (T0), right after surgery (T1), and crown delivery (T2). Mann-Whitney test was used to compare the difference of these two groups.

**Results:** In the group of FGG, the average width of keratinized tissue was  $0.38 + 0.6$  mm,  $5.09 + 1.95$  mm,  $4.88 + 2.06$  mm at T0, T1, and T2 respectively. In the group of SCTG, the average width of keratinized tissue was  $1.3 + 0.35$  mm,  $5.3 + 1.27$  mm,  $3.5 + 1.03$  mm at T0, T1, and T2 respectively. The amount of increased width was  $4.22 + 2.24$  mm for FGG and  $2.2 + 0.79$  mm for SCTG. The difference was statistically significant ( $p < 0.05$ ).

**Conclusion:** Both FGG and SCTG achieved at increasing the width of keratinized peri-implant soft tissues. However, the amount of augmentation was greater in the FGG group.

## P1120

### Role of peri-implant soft tissue reconstruction performed simultaneously with uncovering of submerged dental implants: a series of 5 cases with a 2 years follow-up period

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Budapest/Hungary

**Aim:** The aim of this retrospective case series was to evaluate the efficacy of a surgical technique combining vestibuloplasty and free gingival graft (FGG) placement at the time of second stage surgery of submerged dental implants.

**Material and Methods:** 5 patients exhibited inadequate soft tissue conditions at buccal aspects of submerged dental implants. 3 months after implant insertion shallow vestibular fold and <1 mm unstable keratinized mucosa (KM) were present. Crestal incision was made above submerged implants continued in a paramarginal incision at the neighboring dentition. Split thickness flap was elevated and fixed with continuous resorbable sutures to the underlying periosteum 5–7 mm apically from the incision line. Healing abutments were connected. FGG was harvested from the palate adjusted to cover the exposed periosteal layer and fixed with resorbable sutures (Coated Vicryl 6/0 – Etichon®) to the underlying periosteum and to the surrounding KM. Palatal donor site was covered with an absorbable collagen fleece (Lyostypt® – B.Braun Melsungen AG). Sutures were removed 14 days postoperatively. 3 months postoperatively, final fixed partial dentures were delivered.

**Results:** 3 months postoperatively 2–4 mm keratinized mucosa was observed at the buccal aspect of treated dental implants with no signs of inflammation. Reestablished soft tissue conditions helped to prevent bacterial irritation, resulting from masticatory movements, and oral hygiene maintenance. Results remained stable 2 years postoperatively.

**Conclusion:** The presented surgical approach resulted in a stable inflammation-free soft tissue environment around dental implants in the presented cases during a 2 years observation period.

## P1121

### Clinical evaluation of bone induction on implant surface associated to PRP – rehabilitation in short term

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**Aim:** The aim of this study was to verify if the use of Platelet Rich in Plasm on different implants surfaces induces the bone formation, reducing the time for oral rehabilitation.

**Material and Methods:** Nineteen patients were selected and divided in three groups: G1.SLActive®(4) Control Group, G2.Conexão®-Porous®(10) and G3.Conexão®-Porous® + PRP (5). There was many criteria to enter in this study, as specific torque installation and health condition. In the group3, firstly, a blood sampling was harvested, followed by two centrifugations to obtain the PRP (according protocol established). Then, the implant surface was left in contact to PRP before to install the implant. In the surgical step, all groups followed the same sequence. After 15 days, the patients were molded and the time-out to put the crown in function was 45 days after surgical date. The participants were evaluated clinically, using a Osstell® equipment (implants stability's mensuration), radiographical analysis, gingival bleeding/perimplantitis and mobility/loss of implants.

**Results:** All patients (teeth 4, 20, 30, 19), G1 and G3 (only in posterior region of mandible), they had absolute success, no bone loss and no bleeding around of the implant. Osstell results ranged between 70–83 and 67–76, respectively. It was observed in group 3, an implant turned slightly to screw torque. G2 had more patients (5 in maxilla and 5 in mandible) due to patients' acceptance. There was three implants loss (regions 4, 14, 19). Osstell results ranged between 44–77.

**Conclusion:** Thus, we concluded G1 presented the best results and the use of PRP improved the contact bone-implant compared to G2, permitting rehabilitation in 45 days.

## P1122

### Modified free gingival graft application on increasing periimplant posterior mandibular attached gingiva width: a case report

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**Aim:** It is suggested that the presence approximately 2 mm of attached and keratinized gingiva at supporting periodontal tissues is critical for the maintenance of periodontal health. Lack of attached and keratinized gingiva have been related as a risk factor for periimplant diseases. Various applications including free gingival graft, connective tissue graft and apically positioned flaps have been applied for increasing keratinized and attached gingiva width. The aim of this case report is to present the clinical results of a free gingival graft application on buccal aspect of mandibular dental implants for increasing attached gingiva width.

**Material and Methods:** A 50-year-old male patient was referred to Periodontology Department due to the loss of attached soft tissue at buccal aspect of three dental implant localized at posterior left mandibula. He was systemically and periodontally healthy. Intra-oral examination revealed that an unappropriate gingiva and alveolar mucosa relationship due to lack of keratinized gingiva for prosthetic restoration. In treatment, half thickness flap prepared buccal aspects of three dental implants at posterior mandibula, then a long strip like free tissue graft that harvested from palatal gingiva stabilized over recipient site with 5/0 polypropylen sutures.

**Results:** Ten days later, sutures were taken. Six weeks later, prosthetic restorations completed.

**Conclusion:** It is important the presence of keratinized and attached gingiva on the success of dental implant applications, especially after prosthetic restorations are completed. In addition, inadequate soft tissues could complicate prosthetic phases. FGG can be an easy procedure to avoid these complications.

## P1123

### Implant placement with a 3D printed surgical guide after sinus elevation and horizontal ridge augmentation: a case report

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**Aim:** Predictable placement of fixtures is considered as a common expectation in the field of implant dentistry. Preoperative digital backward prosthetic planning and the fabrication of 3D printed surgical guides enable clinicians to achieve optimal treatment outcomes.

**Material and Methods:** A 49 year old female patient presented with good general health and chronic periodontitis. She complained about the mobility and sensitivity of tooth Nr. 22, which was judged to be hopeless. The patient requested fixed prosthodontic rehabilitation of the upper left quadrant exhibit-

ing Applegate-Kennedy class V. edentulousism. To reconstruct severe maxillary atrophy, simultaneous sinus lift and horizontal ridge augmentation procedure was performed. After 9 months of uneventful healing reconstruction of lost hard tissues was confirmed by CBCT analysis. Guided insertion of three dental implants (Straumann BoneLevel, Basel, Switzerland) was planned utilising the CoDiagnostix software (Dental Wings, Montreal, Canada) with a 3D printed drill guide based on backward prosthetic planning. Implants were successfully inserted in optimal prosthetic positions with transmucosal healing. After 3 months of osseointegration period a definitive screw retained fixed partial denture was delivered.

**Results:** Digitally assisted backward planning ensured optimal implant positions and prosthetic outcomes. The use of a surgical drill guide resulted in reduced duration of surgery and minimal postoperative complaints.

**Conclusion:** The use of a 3D printed surgical guide makes implant placement accurate and predictable. By preoperative computer based visualization of optimal implant positions prosthetic procedures may be optimised, which may lead to the delivery of final prosthodontic restorations presenting optimal function and esthetics.

## P1124

### Consequence of postoperative healing: oral surgeon vs periodontist

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**Aim:** The aim of this study was to evaluate the consequence of the surgical approach of dental specialists who perform implant surgery on similar cases.

**Material and Methods:** 10 edentulous healthy patients who were included in a research project about implant supported overdentures divided into two randomized group. 5 patients referred to the oral surgeon and the other 5 patients referred to the periodontist for implant placement (4.3 × 13 mm Nobel Biocare Replace) by the prosthodontist. The treatment planning was made by the prosthodontist and surgical technique was decided by the operator. Both operators did not have a knowledge about the assessment of their choices and the evaluation of the post operative healing.

**Results:** Both dental surgeons placed dental implants in the region of teeth number 33–43. Implants were placed over 50 Ncm insertion torque by the two operators and immediate loading was performed by the prosthodontist. Flap desing, selection of blade size and suturing material, post operative prescription, post operative swelling and pain and keratinized tissue width were evaluated. Even statistically there is no difference between the surgeon's treatment approaches, clinically a better healing period was observed after the operations which were performed by the periodontist.

**Conclusion:** This study was a poor one and needed to be improved due to being an offshoot, subjective findings and limited number of treated patients. 15c blade, 4-0 monofilament polypropylene suture, separated horizontal incisions in each quadrant preferred by the periodontist. Additionally, extra soft surgical tooth brush was prescribed by the periodontist for the maintenance of oral hygiene.

**P1125****Double-lobed maxillary sinus lift and dental implant treatment: a case report**F. Karaaslan<sup>1</sup>, M. Terzi<sup>2</sup>, G. Uyanık<sup>1</sup>, K. Karaçam<sup>1</sup>, C.F. Çanalıcı<sup>1</sup><sup>1</sup>Erzurum/Turkey, <sup>2</sup>Afyon/Turkey

**Aim:** Bone resorption and sinus pneumatization after tooth extraction in maxillary posterior region causes reduction in vertical height of the alveolar bone. Maxillary sinus is grafted to increase the vertical bone height in order to apply dental implant. In this case, we aimed to present double-lobed maxillary sinus grafting and dental implant application.

**Material and Methods:** 48 year-old-female patient was admitted to our clinic for implant treatment at left maxillary region. In the radiographic examination, insufficient vertical bone height and double-lobed maxillary sinus were found. Maxillary sinus lifting procedure was performed separately for both lobes. Formation of sufficient vertical bone height was lasted about 6 months for dental implant application. After this period, dental implant was performed. Osseointegration has occurred and prosthetic treatment was performed.

**Results:** Sinus lift procedures depend on fragile structures and anatomical variations. Conditions such as sinus floor convolutions, sinus septum and narrow sinus can be a contra-indication for sinus floor elevation. In this case we show that sinus septum is not a contra-indication for sinus augmentation.

**Conclusion:** As a result, sinus lifting procedure is needed because of sinus pneumatization at the posterior edentulous maxilla for implant treatment. Knowledge of variation is important for the success of operation in the maxillary sinuses.

**P1126****Evaluation of long term hard and soft tissue stability around individualised implant abutments: a report of three cases**

P. Szatmári, P. Windisch, B. Molnár

Budapest/Hungary

**Aim:** The aim of this case report was to evaluate long term crestal bone stability and periimplant soft tissue health around individualised CAD-CAM implant abutments fabricated of three different materials.

**Material and Methods:** This case report presents the treatment of 2 patients who received 4 dental implants (Astra Tech, Denstply Implants, Mannheim, Germany). Fixed partial dentures were delivered in each patient (two cement retained single crowns and one cement retained two-unit bridge) used for single tooth restoration to replace missing teeth in the partially edentulous maxilla. After establishing the emergence profile, impressions were taken with individually fabricated impression copings. The three different implant abutments placed were the following: 1. porcelain individually fused to a prefabricated zirconia stock abutment, 2. Individualised zirconia abutment, 3. Individualised titanium abutments. Clinical photographs were taken at 3 years, probing pocket depth (PPD) and bleeding on probing (BOP) were also measured. To assess crestal bone changes mesially and distally, intraoral radiographs were taken at baseline (abutment connection) and 3 years later.

**Results:** At 3 years, PPD did not exceed 4 mm in any of the cases, all implants presented healthy peri-implant soft tissue conditions without BOP. Marginal bone levels were stable. Recorded clinical parameters did not show clinically relevant differences around porcelain fused to zirconia, individual zirconia and individual titanium abutments. Pink esthetics of periimplant soft tissues was comparable to neighbouring teeth.

**Conclusion:** All individual implant abutments showed favourable esthetic outcomes. Long term treatment success might not be influenced by abutment fabrication technologies only but also by periimplant hard- and soft tissue conditions.

**P1127****Le Fort I osteotomy and zygomatic implant rehabilitation – a multidisciplinary approach**L. Rau<sup>1</sup>, L. Tovim<sup>2</sup>, R. Lima<sup>1</sup>, P. Vaz<sup>2</sup>, J.D. Lopes<sup>2</sup><sup>1</sup>Florianópolis/Brazil, <sup>2</sup>Porto/Portugal

**Aim:** Nowadays oral rehabilitation with osteointegrated implants as become almost a routine procedure. However, some cases require several surgical steps. One of the solutions to overcome this limitation is the techniques association for immediate rehabilitation. The authors present an atrophied maxilla rehabilitation through one step procedure: Le Fort I type osteotomy with maxilla advancement and simultaneous zygomatic implant placement.

**Material and Methods:** Pre-operative measurements, model surgery, leaks and a provisional prosthesis were performed in a male patient with 45 years old, exhibiting atrophied maxilla and edentulous for 20 years. Cephalometric prediction tracing was accomplished according to Arnett's protocol. The LeFort I osteotomy was done and once finished, a "down-fracture" was induced. A 2.0 mm Paulus miniplates were placed, the dental elements used to reference the final position and, through leaks, reposition of the maxilla was accomplished. Finally, the extractions, the zygomatic protocol for immediate load and the immediate prosthesis were performed.

**Results:** A multidisciplinary approach is presented, bringing together techniques described by Branemark with zygomatic implants alongside with procedures without bone grafts for immediate prosthetic rehabilitation. The anchoring of zygomatic implants allows immediate loading and reduces time of rehabilitation. However, this technique requires a minimum edentation and a reverse multidisciplinary planning. The authors recognize the improvement technique and the follow-up studies with long-term analysis requirement. However, the latter may represent a single-step total rehabilitation of the maxilla option.

**Conclusion:** A 12 mm maxilla advance with zygomatic implants anchorage allowed an immediate aesthetic and functional rehabilitation.

**P1128****Immediate implant loading with provisional fixed full-arch restoration, assisted by computed guided surgery**J. Ramalhão<sup>1</sup>, L. Tovim<sup>2</sup>, P. Vaz<sup>2</sup>, C. Falcão<sup>2</sup>, C. Pollmann<sup>2</sup><sup>1</sup>Guimarães/Portugal, <sup>2</sup>Porto/Portugal

**Aim:** Currently full arch implant prosthetic rehabilitation tends to be a multidisciplinary team decision. A single implant posi-

tioning error may jeopardize an entire rehabilitation. The authors present an immediate implant loading case through provisional full-arch restoration. The surgical procedures were assisted by NobelGuide™. The aim this paper is to present results of this case and its 12 months follow-up.

**Material and Methods:** A 51 years old female patient, with aesthetic and functional complaints related to her upper fixed prosthesis. A complete clinical evaluation by multidisciplinary team was performed, including several diagnostic aids specifically set-up and a radiographic guide. Final decision was the extraction of remaining maxillary teeth followed by implant placement and immediate full-arch fixed rehabilitation. The radiographic guide was kept in place during surgery for (CB) CT scan to consent the use of NobelClinician™ software assistance in implant positions definition. Two custom-manufactured surgical templates were constructed for the implants insertion. A preoperatively fabricated provisional full-arch fixed superstructure for immediate loading was placed. The patient followed the control protocols and was re-evaluated 12 months after rehabilitation.

**Results:** Complications may occur during guided surgery, such as primary implant instability or provisional misfit, which may affect immediate loading and requires superstructure adjustments. Computer assisted implant surgery may minimize error in implant placement. In edentulous cases may positively expedite the rehabilitation procedures namely in implant loading with provisional fixed full-arch cases.

**Conclusion:** NobelClinician™ Software is a significant tool in full arch rehabilitation with high aesthetic commitment cases.

## P1129

### Influence of abutment height as a condition for maintenance of peri-implant bone at "Bone Level" implants. A 3-year retrospective study

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**Aim:** The aim of this study was to evaluate the peri-implant bone loss at "Bone Level" implants comparing two definitive abutments heights: 1 mm versus 2.5 mm.

**Material and Methods:** Retrospective cohort study by selecting a sample of periodontal patients who attend to a private periodontal clinic where the implants were placed by the same operator between 2007 and 2011, according to the following criteria: "Bone Level" implant with multi-base abutment of 1 mm or 2.5 mm height (Straumann Dental Implant System, Basel, Switzerland) without immediate loading, age over 18 years, without systemic diseases or condition that may influence the outcome variable. The primary outcome variable, the peri-implant bone loss, was determined as the distance between the implant shoulder and the first bone-implant contact from time of loading up to 12 and 36 months follow-up, estimated by periapical radiographs. In the data analysis was determined the difference in the peri-implant bone loss at implants with final multi-base abutment of 1 mm versus 2.5 mm height at 12 and 36 months by comparison of means (Wilcoxon-Mann-Whitney test), considering the implant as the unit of analysis.

**Results:** Fifty-four implants were selected. The results of bone loss at 36 months follow-up have shown a statistically significant lower bone loss when the multi-base abutment of 2.5 mm was placed, with a mean difference of 1.02 mm; 95% CI (0.58; 1.45);  $p < 0.001$ .

**Conclusion:** The placement of a multi-base abutment with an adequate height to the biological width, may reduce the peri-implant bone loss.

## P1130

### Use of temporary anchorage devices to create interocclusal space for implant rehabilitation in the multidisciplinary management of a late presentation of severe hypodontia

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**Aim:** Introduction, Severe hypodontia or oligodontia defined as patients missing six or more teeth affects 0.14% of the population (Polder et al, 2004). This case illustrates the fact that multidisciplinary management and a flexible and innovative approach to treatment planning is required (Nunn et al, 2003).

**Material and Methods:** Case report, An adult male presented to the hypodontia management clinic at Glasgow dental hospital complaining of his poor dental appearance. He was missing multiple adult teeth and had multiple retained deciduous teeth. He had had no definitive treatment for his missing teeth. Total lack of lower incisors resulted in complete overeruption of the upper central incisors. This resulted in a complete lack of inter-arch space for an implant retained prosthesis. Placement of temporary anchorage devices allowed intrusion of the central incisors and orthodontic space localization in the maxilla allowed for optimum implant placement and implant retained prosthodontic rehabilitation.

**Results:** Discussion This case highlights the problems that can occur due to late presentation and inadequate management of cases of oligodontia. The previous lack of comprehensive and holistic treatment planning and the patients late presentation resulted in some unique occlusal challenges. Early management and a multidisciplinary approach may have reduced the need for such prolonged and complicated treatment in adulthood.

**Conclusion:** This case highlights some of the challenges facing clinicians managing oligodontia. This case demonstrates that temporary anchorage devices are well tolerated by patients and provided a novel solution to allow orthodontic intrusion of the central incisors in case with reduced anchorage due to severe hypodontia.

## P1131

### Less invasive surgical procedures using narrow diameter implants: 4 years Follow-up

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**Aim:** Narrow diameter implants (NDIs) are increasingly used in implant dentistry, especially since the introduction of more resistant materials. However, long-term follow-up is still needed. The aim of this study was to evaluate the 4 years follow-up clinical behavior of NDIs (3.3 mm) placed in thin alveolar ridges.

**Material and Methods:** A series of 20 consecutive patients presenting an alveolar crest  $\leq 6$  mm thick were treated with a total

of 39 NDIs and immediately loaded when primary stability was reached. Patients were followed for a follow-up period of 3–4 years. Implant osseointegration, mucosal health and plaque index were evaluated and peri-implant bone remodeling were measured at baseline, 1 and 4 years.

**Results:** Out of the 18 patients, 30 implants were evaluated after a mean follow-up period of 4 years (IQR: 3.57 – 4.30 years). No implant mobility was observed, the peri-implant mucosa was healthy in implants and no adverse events were reported. The mean peri-implant bone remodeling after a follow-up period of 1 and 4 years was respectively ( $-0.43 \pm -0.40$  mm) and ( $-0.60 \pm -0.86$  mm) at the implant level. No significant loss was observed from 1 year and 4 years follow-up ( $p = 0.25$ ).

**Conclusion:** The use of NDIs to restore partial edentation in sites with limited horizontal bone thickness seems to be effective after a follow-up period up to 4 years.

## P1132

### Immediate loading of a full-arch restoration using the SimPlant and the WeldOne techniques

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**Aim:** The aim of this case report is to present a full-arch rehabilitation in which the surgery and the implant position were planned with the SimPlant software and the immediate prosthesis was made with the WeldOne technique.

**Material and Methods:** The Cone Beam tomography and the template of the patient denture were used to plan a prosthetically driven insertion of the implants. The surgical template was used to prepare a plaster model on which index free, telescopically retained abutments were selected in order to the best gingival height and prosthetic angulation; the abutments were rotated until the parallelism was achieved. The titanium bar was shaped according to the final abutment distribution. After the computer guided surgery was performed, the reshaped bar was welded to the selected abutments directly in the mouth of the patient using the WeldOne technique. The restoration shell was then relined over the bar, trimmed, polished and placed the same day of the surgery.

**Results:** The surgeon can place the implants with a precise and predictable approach thanks to the software planning. The ideal profile and shape of the restoration can be tested on the stereolithographic master of the simulated surgery before implant insertion. The passive and cost-effective immediate prosthesis manufactured with the WeldOne approach is enhanced by the planning of the best, prosthetically-guided implant position and abutment emergency profile.

**Conclusion:** The clinician can easily provide to his patient a precise and passive immediate restoration placed over prosthetically planned implants using the synergy between the SimPlant software and the WeldOne technique.

## P1133

### Three ceramic implants placement to a titanium intolerated patient with a limited bone thickness-a case report with 1 year follow-up

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Rome/Italy

**Aim:** The aim of this study is to give information about the basic properties of ceramic dental implants with metal free crowns to a titanium intolerant patient on thin mandibular posterior area.

**Material and Methods:** A patient without systemic disease who has allergy to titanium was treated with ceramic implants (Straumann PURE Ceramic Implants<sup>®</sup>) on mandibular posterior area. Three-piece ceramic dental implants, 4.0 mm diameter and 10 mm, 10 mm, 8 mm in length, were inserted into mandibular premolar and molar region. After placing implants there were 0.3 mm vestibular bone thickness around the implants on the mandible. The implants left for 6 months to osseointegrate. Panoramic and periapical radiographs were obtained and examined for bone-implant osseointegration. However the transparency of implants was checked on the vestibular gingival margin of implant areas. After 6 months the metal-free 3 crowns were loaded by single crowns.

**Results:** Although the thickness of bone around the implants was <1.5 mm any transparency around the implants was noted. During the follow-up period the patient was esthetically and functionally satisfied with her prosthesis and no complication was observed in 1 year follow-up.

**Conclusion:** Within the short follow-up results this study showed that placing ceramic implants may function well with thin vestibular bone around implants.

## P1134

### Immediate loading of 2-unsplinted-implant mandibular overdentures: disease-oriented and patient-oriented outcomes

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**Aim:** To assess clinical and patient-centered outcomes of immediately loaded implants in individuals wearing a 2-unsplinted-implant mandibular overdenture for up to two years.

**Material and Methods:** In this clinical trial, 18 individuals ( $62.4 \pm 7.7$  years) were treated by means of maxillary denture, 2 immediately loaded implants, 2 Locator<sup>®</sup> attachments (Zest Anchors LLC, Escondido, USA) and a mandibular overdenture. Three implants (OsseoSpeed TX<sup>™</sup>, DENTSPLY Implants, Mölndal, Sweden) were placed in the interforaminal mandibular area and locators were inserted on the right and left side implants. The unloaded midline implant served as a control. The immediate loading was done within 24 h of surgery. Clinical and radiographic data, patients' satisfaction and quality of life were collected at baseline (T<sub>0</sub>), 12 (T<sub>1</sub>) and 24 (T<sub>2</sub>) months after immediate loading. Brunner-Langer approach was used for statistical analysis.

**Results:** Implant failure rate was 11.1% (per patient). None of the non-loaded implants failed over 2 years. The median change of radiographic and direct marginal bone loss were 0.19 mm (IQR = 0.48,  $p = 0.003$ ), and 0.45 mm (IQR = 0.97,  $p < 0.0001$ ) from  $T_0$  to  $T_1$ , and 0.09 mm (IQR = 0.36,  $p > 0.05$ ) and 0.14 mm (IQR = 0.55,  $p > 0.05$ ) from  $T_0$  to  $T_2$ , respectively. The implant stability quotient increased from  $T_0$  to  $T_2$  ( $p < 0.0001$ ). There was no clinical outcome difference between the non-loaded and loaded implants. Patient-centered outcome improved ( $p < 0.0001$ ) over 2 years.

**Conclusion:** No statistically significant differences regarding annual failure rates, marginal bone-loss and implant stability was found between loaded and non loaded implants up to two years. Furthermore, patient-reported outcomes improved over 2 years.

## P1135

### Comparison of bone loss around bone platform shift and non-bone platform shift implants after 12 months

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**Aim:** The aim of the present randomized clinical trial was to evaluate marginal bone loss around two types of implants which had been modified at the neck area. The implants which were compared are Nobel Active and Nobel Replace Groovy, both manufactured by Nobel Biocare

**Material and Methods:** A total of 25 Nobel Active and 21 Nobel Replace Groovy implants were included in the present study. The implants were placed based on the relevant protocol and patient inclusion and exclusion criteria. The amount of bone loss around implants was compared at 12-month intervals by using digital preapical radiographs.

**Results:** The means of bone loss in the Nobel Active and Nobel Replace Groovy groups were 0.682 mm and 0.645 mm, respectively, with no statistically significant differences based on the results of independent t-test ( $p = 0.802$ ).

**Conclusion:** Use of both implant types yielded favorable results, with high durability. The two implant types exhibited no superiority over each other in terms of bone loss.

## P1136

### Periodontal destruction & osseointegration in fanconi's anaemia: a case report

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**Aim:** Fanconi's anemia is an autosomal recessive disease associated with pancytopenia, skin pigmentation, renal hypoplasia, cardiac defects, microcephaly, congenital malformations of the skeleton, hypogonadism, and increased risk of leukemia. Intra-oral presentations of the disease have not been widely reported but often involves destruction of connective tissues.

**Material and Methods:** The present report describes the periodontal condition, treatment and rehabilitation of an 16-year old female having Fanconi's anemia. The patient suffered from

generalized advanced periodontal destruction, with all teeth except the second molars displaying hopeless prognoses. Treatment consisted of extractions of all teeth except all second molars and rehabilitation with an upper partial acrylic denture and lower implant supported overdenture.

**Results:** The oral manifestations reported in the literature were gingivitis (41.5%), periodontitis (22.3%). Therefore it can be speculated that the severity of the periodontal destruction seen in this case is the result of poor oral hygiene coupled with a compromised immune system. She is a high risk candidate for implant therapy. Nevertheless, improving her quality of life was of high priority given her age. Although there has been no published evidence regarding osseointegration in a Fanconi's anemia patient, implant retained overdentures in general are successful. In this case, osseointegration and delivery of the final prostheses was very successful.

**Conclusion:** The heightened susceptibility to advanced periodontal destruction in Fanconi's anemia is likely due to an underlying host defense impairment issue. After more than a year in function, the successfully integrated dental implants coupled with the overlying prostheses has greatly improved the patient's quality of life.

## P1137

### In vitro evaluation of the fit accuracy of implant level, multi-unit, screw-retained frameworks, supported by internal conical implant connections

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**Aim:** Vertical implant fracture is suggested to be one of the causes of marginal bone loss. Misfitting, implant-level multi-unit, screw-retained restorations with internal conical implant connections, induce high level of stresses. In this study, a deliberate misfit was induced to a framework. The aim was to evaluate the occurrence of implant vertical fracture under load cycling.

**Material and Methods:** 12 frameworks were constructed on a master jig with two parallel placed implants (OsseoSpeed TX 3.5S, DENTSPLY Implants). Horizontal misfit (200 mm) was generated by placing the implants into a misfit jig. Two types of frameworks were tested: casted gold alloy and CAD/CAM milled Titanium titanium (Atlantis ISUS, DENTSPLY Implants). Three groups were tested: 1: ISUS-Ti placed in the master jig, 2: ISUS-Ti placed in the misfit jig, 3: Gold-alloy placed in the misfit jig. Before loading, the degree of misfit was examined using x-ray. All samples were vertically loaded between 1600 and 160 N for 1 000 000 cycles and thereafter examined microscopically.

**Results:** Before loading, the restorations using the misfit jig presented a visible misfit. During the test, none of the mechanical components tested presented distortion or fracture. No micro fractures were detected for the prosthetic screws. The internal area of the implants presented some scratches. However, no macro cracks were detected.

**Conclusion:** From the limitation of the study, it is suggested that if the implants are placed perfectly parallel, the impact of misfit seems insignificant. The impact of diverse angulated implant however, might be an aggravating factor when a misfit.

## P1138

### Multidisciplinary management of a missing maxillary central incisor: a case report

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**Aim:** Introduction Prosthetic implant rehabilitation of single missing maxillary incisors constitutes a clinical challenge in esthetic dentistry. Thus, multiple clinical parameters should be considered such as bone volume, periodontal tissues quality, esthetic outcome of definitive crown, and most importantly patient satisfaction. This poster describes the case of a multidisciplinary management of a missing 11, in a context of insufficient bone/gingival volumes.

**Material and Methods:** Case Report A 42 years old healthy Caucasian female consulted for implant supported rehabilitation of missing 11. Clinical and radiographic examination revealed the need of a bone augmentation prior to implant placement. A ramus bone graft was harvested and placed in the buccal region of 11. Four months later, the implant was successfully placed. After 3 months of healing period, provisional abutment and resin crown were placed and a connective tissue graft was carried at the same time in order to enhance the peri-implant mucosal contour. Afterwards, the contact surfaces were modified as well as the mesial surface of the 21 using an esthetic composite. Six months later, satisfactory gingival contour maturation could be noticed. The final ceramic crown was delivered and the occlusion was checked.

**Results:** Conclusion The patient showed full esthetic and functional satisfaction. She was enrolled in periodontal/implant supportive therapy program.

**Conclusion:** Discussion In this case report, a multidisciplinary approach combined techniques from oral surgery, periodontology, implantology and prosthetics in order to esthetically and functionally rehabilitate a single maxillary incisor. Mastering these competences or team work is necessary in order to succeed the treatment of such complex clinical situations.

## P1139

### Immediate implant placement with Immediate provisional loading a case report

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**Aim:** Esthetics has become an inseparable part of oral rehabilitation as patients not only expect implant-supported restorations to be functional long-term, but also to be esthetic, especially in regions of the oral cavity that are visible when the patient smiles. The esthetic quality of implant-supported restorations should not differ from that of restorations supported by teeth. They should be in harmony with perioral facial structures, be associated with a healthy surrounding dentition and represent a successful imitation of the missing tooth or teeth with regard to color, form, texture, size, and optical properties

**Material and Methods:** 34-year-old female patient was referred to the clinic for the management of teeth 21, 11 with radicular resorption. Periapical radiograph was taken and presents a periapical lesion in both teeth. Diagnostic impressions were made using irreversible hydrocolloid (Alginate) and study models were

obtained on the first appointment. Treatment plan was discussed and decided the permanent central incisor right and left would be extracted and immediate placement of 2 implants the defect will be filled with bone grafts and a immediate provisional will be loading. After a period of three months of osseointegration decided to be restored with a definitive crown.

**Results:** 3 months after the finale restoration, implants achieved osseointegration and the management of the soft tissue provide us a satisfactory esthetic

**Conclusion:** The management of soft tissues is important in Immediate placement of implants, because with or without provisional restorations, may lead to buccal bone loss and gingival recession, which could be esthetically significant in some patients.

## P1140

### Virtual treatment planning and flapless single-tooth implants in the esthetic zone following socket augmentation: proof of concept

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**Aim:** The aim of the present study was to demonstrate the effectiveness of socket grafting followed by guided implant placement in the esthetic zone of the maxilla in terms of esthetic outcome and preservation of periimplant papillae.

**Material and Methods:** In a total of 25 patients the buccal bony lamella was not intact after extraction of anterior maxillary teeth (13–23) and thus they did not qualify for immediate implant placement. Socket augmentation surgery using a collagen sponge (Bio-Oss Collagen®, Geistlich, Wolhusen, Switzerland) was performed and flapless implants were placed after 4 months of healing using virtual treatment planning (Nobel-Guide™, Nobel Biocare, Gothenborg, Sweden). Marginal bone resorption and implant esthetics were assessed using the Pink Esthetic Score 1 year after crown delivery.

**Results:** Satisfactory implant esthetics (Pink Esthetic Score of 10 or higher) could be achieved in the majority of patients (71% compared to 56% after bone augmentation procedures involving mucoperiosteal flaps). Papillae could be preserved to their full extent in 77% of cases – compared to only 13% after conventional two-stage surgery.

**Conclusion:** The present study proves that the concept of flapless augmentation at the time of tooth extraction (socket grafting) followed by flapless implant placement by the use of virtual treatment planning software and stereolithographic templates carries the potential to significantly increase the esthetic outcome of single-tooth implants by 15% and decrease loss of periimplant papillae by 64%.

## P1141

### 5 Year follow up of a papillon le fevre patient treated with dental implants: a case report

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**Aim:** Papillon Le Fevre (PLS) is an autosomal recessive disorder which is characterised by palmoplantar hyperkeratosis and severe

periodontitis. PLS patients lose their teeth approximately at age 20 and prosthodontic rehabilitation of these patients is very complicated due to severe alveolar bone loss. In this case report, five-year follow up of a PLS patient was presented

**Material and Methods:** 19 years old female edentulous patient who has PLS syndrome, was treated by implant supported dental prosthesis. 6 implants were placed ( $3.3 \times 10$  mm Straumann Roxolid), 4 implants in the maxilla and 2 implants in the mandible, and bar retained overdentures were loaded 3 months after the implant surgery

**Results:** According to recall examinations which were performed at 1st and 5th year, (clinical and radiographic) inflammation findings around dental implants was not observed. Bleeding, probing and plaque scores were in the range of healthy scores

**Conclusion:** In this case presentation after 5 years of treatment, implants are still in function without a problem. On behalf of this case dental implant supported prosthesis may be a treatment option for PLS patients

## P1142

### Tomographic evaluation of immediate implants placed in compromised sockets

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**Aim:** To topographically evaluate the outcome of immediate implants placed in compromised sockets (no buccal bone) in association with tissue reconstruction and immediate temporization

**Material and Methods:** 15 non-smoking healthy patients without contraindications for dental surgeries were selected. Inclusion criteria was that each patient must have one hopeless upper central incisor with sufficient palatal/apical bone to engage the immediate implant, with wide/deep buccal bone loss, and without gingival recession bigger than 3.0 mm in comparison to the other central incisor. CBCT was obtained immediately before surgery, to confirm site eligibility, and repeated immediately after the surgery and one year. After flapless extraction and socket debridement, the immediate implants were placed according to prosthetic demands. Implant diameter was selected in such a way that the gap was always  $>2.0$  mm that was filled with Bio oss Collagen. A connective tissue graft was also placed when tissue biotype was considered not thick. A provisional restoration was immediately delivered. Tomographic thickness of the newly formed bone was evaluated at 2 different points (2 and 5 mm apical to implant shoulder at the buccal aspect)

**Results:** in all sites, the gingival margin level was matching or coronal to the adjacent central incisor, and a mean of 2.87 mm of newly formed bone was present

**Conclusion:** the suggested regenerative protocol was effective to reconstruct the missing buccal wall and support the soft tissues

## P1143

### Relationship between labial bone thickness of single tooth implants and aesthetic outcomes after at least one year in function

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**Aim:** To investigate the association between labial bone thickness (LBT) and aesthetics outcomes in single-tooth implant restorations after at least one year in function.

**Material and Methods:** All patients treated with a single-tooth implant crown in the aesthetic zone at The Royal London Dental Hospital since 2006 with at least 12 months post-loading were invited to enter this study. Hydrophilic implants were placed with or without simultaneous guided bone regeneration using deproteinized bovine bone and porcine collagen membrane. Two radiologists measured the LBT on CBCT scans at three different points along the implant length (i) L0 – identified as the shoulder in a bone level and the SLA junction in a tissue level implant; (ii) L25 – 25% and; (iii) L50 – 50% of the implant length. Aesthetic outcomes included the Pink Esthetic Index score (PES), the White Esthetic Score (WES) and thirteen formulated questions on patient satisfaction. Mann-Whitney test was used and the 95% CI considered.

**Results:** Data was available for 60 implants. Time from loading to CBCT ranged from 13 to 90 months (median = 43 months). The mean age of patients was 33 y (SD = 10.8). LBT around single tooth implants was significantly associated with higher PES scores ( $p = 0.035$ ) but it had no impact on WES scores ( $p = 0.950$ ). In addition, the thicker the labial bone at L0, the greater patients were satisfied with the shape of their implant tooth ( $p = 0.039$ ).

**Conclusion:** Crestal LBT has a significant influence on PES and a positive influence on patients' perception of better aesthetics.

## P1144

### A case-series of implant placement using the minimally-invasive free-hand flapless technique

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**Aim:** To evaluate the clinical outcomes of a minimally-invasive free-hand flapless (FHF) technique for implant-placement in a large patient-series.

**Material and Methods:** In this retrospective case-series, clinical and radiographic patient-records for the FHF technique were evaluated. No surgical-guides were used to reduce treatment-costs. Case-selection included only patients with sites showing sufficient bone-volume and quality along with adequate attached-gingiva. In all cases either pre-operative ridge-mapping or cone-beam-CT was performed. Implant-diameter was selected to ensure at least 1 mm of bone on either side. The technique involves the use of a tissue-punch to remove a small circular piece of tissue from the crestal ridge. Conventional osteotomy is performed as per recommended drilling sequence, with radiographs being taken at the pilot-drill stage and following placement. Primary implant stability is assessed using an inser-

tion-torque device (>35 Ncm) and a healing-abutment is placed to allow transcrestal healing. All implants were loaded after 8–12 weeks.

**Results:** Between 2006–2013, 447 implants were placed in 243 patients using this technique. Five implants failed yielding a survival-rate of 98.88%. All 5 failures were related to prosthetic-factors and not surgical-technique. Average follow-up period was 44-months (range: 12–101-months). Most patients were recalled at 6-month intervals. No significant marginal bone loss was observed. Comparable survival-rates were observed in a cohort of patients who underwent conventional flapped surgery during the same time-period. Qualitative subjective assessment of post-surgical morbidity favoured the flapless technique.

**Conclusion:** The FHF technique represents a feasible, cost-effective and less-invasive alternative to conventional flapped-surgery in sites with adequate bone volume, provided appropriate pre-operative planning and surgical caution is observed.

## P1145

### 3D Printed surgical guide for the lateral window in sinus augmentation

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**Aim:** The purpose of this study is to create a 3D printed cutting guide that facilitates precise osteotomy cuts when creating the lateral window for sinus augmentation.

**Material and Methods:** We examined 3 cadaver heads (6 maxillary sinuses) obtained from the collection of the Department of Anatomy, “Gr.T.Popa” University of Medicine and Pharmacy. Cone-Beam CT of the skull was performed using Planmeca ProMax 3D cone-beam computerized tomography (CBCT). The DICOM data are then formatted to a 3D computer software program (Planmeca Romexis Viewer 3.0.1) to create STL models of 3D reconstructions of the maxilla. The 3D reconstruction is then loaded in AutoCAD to create the drilling guide. The lateral boundaries of the maxillary sinus, the adjacent roots, the maxillary sinus septa and the intra-osseous anastomosis between the AAA (alveolar antral artery) and the IOA (infraorbital artery) will be outlined. Using UP Plus 2 – Easy 3D plastic printer, we will create the plastic bone supported cutting guide. To assess the accuracy of the surgical guide, the 3D arm was used to perform specific measurements.

**Results:** The cutting guide defines the precise location of the desired superior cutting path as outlined using the software, as well as the inferior, mesial, and distal boundaries of the previously outlined lateral window using the preoperative plan.

**Conclusion:** The 3D printed cutting guide offers us the precise lateral boundaries of the maxillary sinus, helps us to avoid the adjacent roots, the maxillary sinus septa and the intra-osseous anastomosis between the AAA and the IOA will be outlined.

## P1146

### Long term evaluation of esthetic outcomes around dental implants and neighbouring teeth following socket preservation and implant placement with simultaneous hard tissue augmentation – a retrospective case series

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**Aim:** Introduction: Loss of buccal bone following tooth extraction might represent clinically demanding situations not feasible for dental implant placement. Postextraction changes of the alveolar socket mostly occur in horizontal dimension and might compromise soft tissue conditions at neighbouring teeth, especially if advanced periodontal defects are present. This novel stepwise surgical approach aims at reconstructing hard- and soft tissues around dental implants and neighbouring teeth resulting in long term functional and esthetic outcomes.

**Material and Methods:** Case report: 16 healthy patients with a hopeless tooth and periodontally effected neighbouring teeth were treated by a three stage surgical approach as follows. Stage I: Tooth extraction and socket preservation utilising a tunnelling approach. Stage II: Implant insertion with simultaneous hard tissue augmentation after 6–9 months of healing. Stage III: Soft tissue augmentation by connective tissue grafting after 6–9 months of healing. Following soft tissue maturation, single crowns were delivered on implants. Pink Esthetic Score (PES), White Esthetic Score (WES) and Probing Pocket Depth (PPD) were measured at implants and neighbouring teeth at baseline and 2–5 years later. Intraoral radiographs were taken to assess crestal bone remodelling.

**Results:** Discussion: PPD did not exceed 4 mm at implants and adjacent teeth over the follow-up period. PES and WES values indicated soft tissue conditions comparable to neighbouring teeth regardless of extent of baseline periodontal defects. Crestal bone levels were stable around teeth and implants.

**Conclusion:** Conclusion: The presented three-stage surgical approach resulted in hard and soft- tissue stability around implants and neighbouring teeth, allowing for long term functional and esthetic outcomes.

## P1147

### Immediate placement of four upper incisors with single crowns restoration: a four years clinical and radiographic follow up

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**Aim:** In aesthetic areas, complications of implant therapy such as the appearance of subgingival graywash transparency or abutment/implant exposure may have serious implications for the patient's social life. The aim of this study was to achieve aesthetically satisfying soft tissue contours in severely compromised teeth in the anterior region of the maxilla.

**Material and Methods:** For a 37-years-old woman with localized advanced aggressive periodontitis at the four upper incisors, teeth extraction and immediate implant placement was proposed

and accepted by the patient. Atraumatic surgery without flap elevation was performed and four plateau formed tapered implants with locking-taper connection were placed (Bicon LLC®, Boston, MA, USA). The immediate non-functional provisional restorations remained in situ for 6 months, and were then substituted by a segmented provisional restoration after complete maturation of peri-implant soft tissues. Bilateral connective tissue grafts were then performed to allow the insertion of four definitive single-crowns with an aesthetically natural looking emergence profile.

**Results:** The patient underwent a 4 years follow-up examination. Morse taper connection implants in upper anterior immediate placement cases were effective to create a long lasting excellent clinical aesthetic result. All the implants showed good osseointegration, a good health of peri-implant soft-tissues with a pleasant aesthetic result.

**Conclusion:** The sloping shoulder implant design at crest level provided more space for interproximal bone growth, allowing to place four implants in close position and then to restore them with single crown to improve the hygiene and maintenance.

## P1148

### Peri-implant soft tissue management in the esthetic zone using large tuberosity connective tissue graft by punch technique: report of a case with 3 year follow-up

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**Aim:** Introduction: The establishment of peri-implant soft tissue contour is a major concern. It is challenging to achieve esthetic results with dental implants in the anterior maxilla especially in patients having thin soft tissue phenotype.

**Material and Methods:** This case report describes the management of peri-implant soft tissue esthetic using a large tuberosity connective tissue graft by punch technique.

**Results:** Case report: A 50 year-old female patient presented to our clinic for evaluation of the maxillary anterior region. Clinical and radiographical examination indicated horizontally fractured right maxillary incisor with unfavourable diagnosis. Treatment with immediate implant placement with hard and soft tissue augmentation was planned. The fractured incisor was removed carefully. Following intrasulcular and vertical releasing incisions, a 4.2 × 13 mm implant was placed. Bone augmentation procedure was first performed with autogenous bone, which were placed directly on the exposed implant surface. This was followed by a second layer of deproteinized bovine bone on the facial aspect. The augmentation material was then covered with collagen membrane using double-layer technique. A large connective tissue graft was harvested from the tuberosity area by Punch technique. The harvested graft material was de-epithelised and sutured into buccal peri-implant mucosa. At the end of surgery, tension-free primary wound closure was achieved.

**Conclusion:** Discussion and Conclusion: The faciolingual thickness of the supracrestal soft tissue may be closely related to remodeling of the peri-implant soft tissue margin. The large tuberosity connective tissue graft by punch technique achieve a favorable and durable prognosis of peri-implant soft tissue contour in the esthetic zone.

## P1149

### A modified socket-shield technique to preserve inter-implants papilla: a case report

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**Aim:** Teeth removal may lead to a tissue collapse, resulting in unaesthetic implant restoration. Several techniques have been developed to prevent such collapses, like the socket shield technique, maintaining the buccal root fragment of an extracted tooth in combination with immediate implant placement. This case report presents a modified socket shield technique with retention of proximal root fragments to preserve a scalloped papilla between two implants in the anterior maxilla region.

**Material and Methods:** A 40-year-old patient, smoker, had the two maxillary central incisors removed. Roots were sectioned, and only the mesial fragments were maintained without the apices. Two conical implants were immediately placed. Gaps buccal to the implants were filled with deproteinized bovine bone mineral. After packing a collagen sponge, provisional crowns were placed with respect to the root fragments. After 4 months of healing, zirconia abutments were made, and definitive crowns were sealed. After 4 years, the scalloped anatomy of the papilla was aesthetically maintained and there were no sign of inflammation nor infection.

**Results:** The long term prognosis is unknown. Evidence shows that the retention of root fragments is possible to maintain the periodontal tissues, including implant-supported restorations studies. Identification of potential risk factors and prognostic factors is necessary, as well as long term evaluation.

**Conclusion:** This case report indicates the feasibility to maintain inter-implants papilla with the interproximal socket shield technique. Long term studies are necessary to assess the predictability of such technique.

## P1150

### Platform switching versus platform matching: three-year results from a prospective randomized-controlled multicenter study

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**Aim:** The purpose of this ongoing prospective randomized multicenter study was to assess the differences in bone level changes and success rates between implants supporting single crowns in the posterior mandible restored either with platform matching or platform switching (PS) abutments. This paper presents interim results obtained up to three years.

**Material and Methods:** Adult patients missing two or more adjacent teeth in the posterior mandible and with a natural tooth mesially to the most proximal implant site were enrolled. Free end situations were allowed and opposing dentition must be natural teeth or fixed restorations. Following implant placement patients were randomized either in the group for PS or for platform matching restorations. Sixty-eight patients with 163 implants were randomized to the study. To time 59 patients with 123 implants could be followed-up to three-year post-load-

ing and were included in this interim report. Bone level was measured in standardized periapical radiographs as the distance from implant shoulder to first bone contact (DIB) at the mesial and distal sides and then averaged per implant. Bone level changes were estimated by the difference between DIB values at loading and at subsequent evaluations.

**Results:** Between prosthesis placement and 36-month post-loading follow-up, the PS group showed a mean bone gain of  $0.24 \pm 0.44$  mm while a bone loss of  $0.20 \pm 0.85$  mm was recorded for the Matching group. The difference between the two groups at 3-year post-loading was statistically significant.

**Conclusion:** At 3-year post-loading the implants restored with PS abutments appear to preserve the crestal bone more predictably than the implants restored with standard abutments.

## P1151

### Platform switching in implants with internal conical abutment connection: two-year results of a two-center prospective study

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**Aim:** This study aims to assess bone level changes around implants with internal conical connection and platform switch abutments in the posterior mandible. This paper presents interim results obtained up to two years.

**Material and Methods:** Adult patients missing at least two consecutive teeth in the posterior mandible and with a natural tooth mesially to the most proximal implant site were enrolled. Free end situations were allowed and opposing dentition must be natural teeth or implant supported fixed restorations. Individual crowns were cemented after a minimum transmucosal healing period of 8 weeks. Changes in marginal bone level from loading (baseline) to 24-month post-loading were measured in periapical radiographs and reported descriptively.

**Results:** Twenty-four patients received 52 implants. There was a mean bone gain of  $0.25 \pm 0.51$  mm from loading up to 24 months. 72.7% of all implants presented bone preservation or gain. One implant failure was recorded after 16.5 months of loading. The overall satisfaction of the patients was reported high to very high.

**Conclusion:** Internal conical connection with inherent platform switch implants showed mainly a positive effect in marginal bone level preservation and high success rate at two-year post loading.

Topic: Peri-implant diseases

## P1152

### Comparative evaluation of antimicrobial effects of different wavelengths of diode lasers with and without the adjunctive use of photodynamic therapy on rough and smooth implant surfaces: an ex vivo study

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Buffalo/United States of America

**Aim:** To assess the surface decontamination potential of diode laser, with different wavelengths, with or without the aid of photodynamic therapy (PDT) on two different implant surfaces.

**Material and Methods:** Fresh porcine ribs were cut in blocks and sterilized. Eleven sterile implants per group were placed into the blocks. A standardized circumferential bony defect was created around the implant body. Defects were inoculated with 3  $\mu$ l of *S. sanguinis*. Blocks were incubated in a 5% CO<sub>2</sub>, 37°C atmosphere for 24 h, then the implants were subjected to different treatment protocols: 810 nm or 980 nm diode laser with or without PDT plus 3 control groups, one per surface characteristics and a mixed one coated with PDT dye (indocyanine green), were not treated, for a total of 11 groups. The laser tip was placed into the defects for 30 s set at 1.0 W continuous in an up-and-down motion. The defects were rinsed with TSB and fluid plated. Implants were retrieved and acquired media plated. Colony forming units (CFU) were counted 48 h after incubation.

**Results:** There is a clear evidence that both laser's wavelength minimize the CFU counts in both type of surfaces, with the difference being statistically significant. The use of PDT gives contradicting results with a wide range of CFUs total count. However when plating derived from vortexing the implants there is a remarkable effect of the use of cardiogreen.

**Conclusion:** The use of diode lasers in treatment of peri-implantitis is efficacious in this ex-vivo study regardless of the surface roughness.

## P1153

### A combined treatment for a peri-implant bisphosphonates related osteonecrosis of the jaw. A case report

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Buffalo/United States of America

**Aim:** Bisphosphonate-related osteonecrosis of the jaws (BRONJ) is rarely reported as a complication after implants placement. Moreover, the oral intake of bisphosphonates is not considered as influencing the short term implants survival rates.

**Material and Methods:** A 71-years-old female patient presented for follow-up of a  $4.3 \times 13$  mm implant placed on first upper-left premolar position 3-years prior. She was complaining of soreness of the area and bleeding when brushing. She had breast cancer removed 7-years prior for which she was taking anastrozole 1 mg/day, causing decrease in mineral-bone-density as side effect for which she was prescribed a side-therapy with

oral risedronate 35 mg/day taken for 4 years until 2 years prior. A 9 mm deep pocket was detected. At the first visit local mynocyline-microspheres delivery was performed aiming at antibacterial and antiinflammatory effect. The patient was seen 10 weeks later with presence of a bone sequestrum on the mesial-palatal aspect of the implant. A surgical minimally-invasive single-flap-approach was done to minimize periosteal elevation. Decontamination with EDTA-gel followed by delivery of rh-PDGF with  $\beta$ TCP stabilized with a  $\text{CaSO}_4$  barrier. A cycle of 4 consecutive 810 nm diode-laser-biostimulation visits was performed to promote fibroblasts growth. 18-months post-surgical follow-up showed 3 mm residual PD and absence of gingival inflammation with no symptoms reported by the patient.

**Results:** Antimicrobial, regenerative and biostimulation therapies were implemented to successfully treat BRONJ around an osteointegrated implant. The results showed noticeable PD reduction and radiographic bone regeneration at 18-months recall.

**Conclusion:** A combined therapy aiming at regenerate bone and soft tissues around osteointegrated implants was successful for treatment of implant-associated BRONJ.

## P1154

### Ultra-Sonic and Air-Polishing Procedures for Removing Glass Ionomer Cement Layers from Zirconia and Titanium Surfaces

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Regensburg/Germany

**Aim:** Cement remnants may cause peri-implantitis. This study investigates the efficiency of ultra-sonic and air-polishing procedures for removing glass ionomer cement layers from titanium and zirconia surfaces.

**Material and Methods:** Titanium and zirconia cylinders were cleaned either with an ultra-sonic device using polymer tips or by air-polishing with PROPHY Powder (sodium hydrogencarbonate) and Clinpro Powder (glycine) for 20, 40, and 60 s each. Cylinders treated with blast cleaning served as controls. Surface roughness ( $R_a$ -value) was measured with an electronic surface profiler. Then, we removed a distinct layer of glass ionomer cement by ultra-sonic cleaning or air-polishing procedures lasting 20, 40, or 60 s each. Statistics: 3-unit ANOVA, Tukey post-hoc tests.

**Results:** The best result with regard to surface roughness and efficient cement layer removal in the shortest application time was achieved by air-polishing in combination with Clinpro Powder followed by ultra-sonic cleaning with polymer tips. Air-polishing in combination with PROPHY Powder showed the highest values for surface roughness and the least effective cement removal with 40% of the layer remaining. In contrast, ultra-sonic cleaning removed cement on 80% of zirconia surfaces and 90% of titanium surfaces. Clinpro Powder showed a success rate of more than 95% without any statistical difference between zirconia and titanium surfaces.

**Conclusion:** For glass ionomer cements, air-polishing in combination with Clinpro Powder was the most efficient method for removing glass ionomer cement layers. This method also required the shortest application time and showed the lowest values for residual roughness.

## P1155

### Effect of air-polishing on titanium surfaces, biofilm removal and biocompatibility

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**Aim:** Objectives: The aims of this study were to evaluate morphological changes induced by glycine powder air-polishing on titanium surfaces, and its effect on biofilm removal and biocompatibility.

**Material and Methods:** Material and methods: Titanium grade IV discs (7.5 mm diameter, 2 mm thick) were allocated into two groups: (1) no biofilm; (2) *Streptococcus mutans* biofilm. Discs in each group were further sub-divided: (a) no treatment; (b) air-polishing treatment with glycine powder. Discs were characterized by scanning electron microscopy (SEM), electron-dispersive spectroscopy (EDS) and confocal laser scanning microscopy before and after treatment. Bacterial biofilms were quantified using a crystal violet assay. Biocompatibility was evaluated by measuring the coverage and viability of L929 fibroblast cells cultured on the discs.

**Results:** Results: Air-polishing increased the roughness of treated discs compared to untreated discs ( $p < 0.05$ , ANOVA) and topographical changes were visible under SEM. EDS analysis did not show significant differences in the chemical composition of treated and non-treated discs. The amount of residual biofilm on treated discs was 8.6-fold lower compared to untreated controls ( $p < 0.05$ , Mann-Whitney test). Coverage of treated discs by fibroblasts was half that of untreated discs ( $p < 0.05$ , ANOVA). However, both groups had the same cell viability.

**Conclusion:** Conclusions: Air-polishing removed a significant amount of biofilm from titanium surfaces. It appears that the "polishing" is accompanied by increase in surface roughness, but there were no apparent changes in chemical and elemental compositions. The reduced fibroblast cell coverage on treated discs could have been caused by interference with the adhesion and proliferation of cells on the disc surfaces.

## P1156

### Water jet with adjunct chlorhexidine gel for non-surgical treatment of peri-implantitis

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E.E. Machtei  
Haifa/Israel

**Aim:** The aim of this study was to evaluate the adjunctive effect of a dental water jet rinse mixed with Chlorhexidine to the non-surgical treatment for peri-implantitis.

**Material and Methods:** A prospective interventional cohort study was conducted. Forty consecutive patients presenting with peri-implantitis were recruited and randomly assigned into two treatment groups. Initial all patients received Scaling/surface debridement and oral hygiene instructions. Next, patients in the study group received a water jet device containing chlorhexidine gel (Silonit<sup>®</sup>) for home use twice daily while the control group performed the recommended oral hygiene measures with no water jet usage. Three months following baseline visit, patients were re-evaluated clinically and radiographically.

**Results:** Overall 39 patients completed the study and were available for final examination. Three months following baseline visit the test group exhibited greater mean probing depth reduction (0.75 vs. 0.27 mm;  $p = 0.029$ ) as well as greater reduction in number of sites presenting with bleeding on probing (2.26 vs. 0.45 sites;  $p = 0.011$ ). No significant change in bone level was observed at three months (mean bone gain was 0.18 mm).

**Conclusion:** Water Jet mixed with Chlorhexidine gel might supplement the response to non-surgical treatment for peri-implantitis lesions. Further, larger-cohort studies are warranted.

## P1157

### Cement-associated peri-implant complications in patients with periodontitis

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Gwangju/Korea

**Aim:** Recently peri-implant mucositis or peri-implantitis was frequently shown in functioning dental implants, as the periodontal disease is prevalent in adult population. This presentation aimed to evaluate the biologic complication associated with the location of implant-cement interface in cement-retained restoration, retrospectively and to observe whether the subgingival cement removal could improve the peri-implant tissue health.

**Material and Methods:** Among implant prostheses restored between 1995 and 2013 in our department, more than 600 implant restorations were identified on the implant-restoration connection type to evaluate the distribution of the screw- or cement- retained type and the location related to the gingival crest level. We evaluated the presence of pain and swelling or suppuration or bone loss around the implant-supported restorations.

**Results:** In some of the cemented cases, the patients presented after a period of one month to two years and complained about pain and swelling at the site of the implant-supported restoration with bone loss depending on the duration and patients susceptibility. In our retrospective samples, suppuration was observed in 17% of subgingival cement-retained implant restorations. The patients' condition improved considerably within a few days or weeks after the cement residues were removed. The long-term peri-implant soft tissue health and stable peri-implant bone level was maintained thereafter under regular follow-up.

**Conclusion:** From this study, we suggest that in the cement-retained implant restoration, the excess cement should be completely removed to avoid iatrogenic peri-implantitis and the abutment shoulder should be placed epigingivally. The screw-retained connection should be preferred, if deep subgingival restorations cannot be avoided.

## P1158

### Open flap debridement: old school perio or new school peri-implantitis?

R. Chauhan, L. Rasaratnam, A. Alani

London/United Kingdom

**Aim:** Introduction The successful management of periodontal disease around teeth has involved the disruption of biofilm through surgical and non-surgical means. Open flap debridement (OFD) around teeth has been shown to result in more

CAL gain than scaling and root planing alone in deep pockets ( $>6$  mm)<sup>1</sup> and is an established treatment protocol in the management of periodontal disease. Inflammatory bone loss around dental implants is an emerging problem and there is therefore a paucity of evidence supporting a particular treatment approach on the successful management of this new disease process.

**Material and Methods:** Case Report This poster describes challenges of surgical management of several patients suffering with peri-implantitis utilising a traditional method of open flap debridement. The literature will be discussed.

**Results:** Discussion Various approaches have been proposed for the management of peri-implantitis including non-surgical and surgical methods utilising curettes, ultrasonic devices, air-abrasion devices and/or lasers but the evidence supporting one method over another is still very limited<sup>2</sup>. From the presented results it seems, although OFD is considered an old fashioned technique, it may provide a predictable option for a contemporary problem.

**Conclusion:** Due to the lack of evidence on the best treatment approach for peri-implantitis, this long-established technique may well be the best option to manage this condition at present. 1. Heitz-Mayfield et al. A systematic review of the effect of surgical debridement vs. Non-surgical debridement for the treatment of chronic periodontitis. *J Clin Periodontol* 2002; 29 (Suppl. 3): 92–102. 2. Figuero et al. Management of peri-implant mucositis and peri-implantitis. *Periodontology* 2000, Vol. 66, 2014, 255–273.

## P1159

### Peri-implant parameters in patients with type 2 diabetes mellitus receiving immediately loaded implants

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**Aim:** The aim of this work was to evaluate (after one year) peri-implant stability parameters in diabetic patients with different glycosylated hemoglobin A1c levels (HbA1c) who received immediate placement and provisionalization of implant-supported, single-tooth restorations.

**Material and Methods:** Sixty-four patients were divided into three groups according to their HbA1c levels: 25 in Group 1 ( $<6$ ); 23 in Group 2 (6.1–8); 23 patients in Group 3 ( $>8$ ). All patients received a single one-piece implant in the upper maxillary anterior zone. Variables were evaluated to determine the general state of peri-implant health: pocket probing depth and bleeding on probing.

**Results:** Peri-implant pocket depth increased in relation to higher HbA1c levels but without reaching statistically significant differences between groups (Group 1:  $2.62 \pm 0.23$ ; Group 3:  $3.51 \pm 0.34$ ). Bleeding on probing data did produce statistically significant differences between the three groups after one year: Group 1 =  $0.41 \pm 0.03$ ; Group 2 =  $0.47 \pm 0.06$ ; Group 3 =  $0.61 \pm 0.08$ .

**Conclusion:** Diabetic patients can receive dental implant-based treatments with immediate loading safely providing that the diabetes is kept under control and presents normal HbA1c values.

## P1160

### Efficacy of different implant decontamination methods in peri-implantitis treatment: A literature review

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**Aim:** The aim of the present review was to overview the literature analyzing different implant surface decontamination methods.

**Material and Methods:** The database on PubMed was searched from January 1, 2004 to September 1, 2014. The keywords were “implant surface decontamination”, “peri-implantitis treatment”. In vivo and in vitro studies reporting on various implant surface decontamination methods were considered for inclusion. The search was restricted to English language.

**Results:** The search provided 921 potentially relevant titles and abstracts. After screening, 27 full papers were selected for full text reading. Finally, 18 articles fulfilled the selection criteria. Chemical decontamination methods were reviewed in 5 studies (2 in vivo, 3 in vitro). In vivo studies did not reveal any chemical agent superior to others, in vitro studies suggest the use of hydrogen peroxide and citric acid. 5 studies (4 in vivo, 1 in vitro) reported on mechanical decontamination methods. In vivo no method seemed to be superior. In vitro airflow devices show efficient therapeutic option. 7 studies (5 in vivo, 2 in vitro) evaluated laser decontamination. Most frequently used Er:YAG, CO<sub>2</sub> and diode lasers achieve complete or almost complete elimination of bacteria. Photodynamic therapy was analyzed in 1 in vitro study and could be proposed as a coadjuvant treatment method.

**Conclusion:** From this systemic literature review it can be concluded that there is no superior implant surface decontamination method. Further randomized controlled clinical trials comparing different implant surface decontamination methods are needed.

## P1161

### Multidisciplinary approach of the problem of unesthetic implants in the maxillary anterior dentition. Case report

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Yangsan City/Korea

**Aim:** Introduction Periodontal tissue destroyed by inflammation is difficult to achieve regeneration of the tissue and esthetic restorations only by surgical methods. Even if the tissue can be recovered, there are limits. In particular, improvement of esthetics is more difficult if the problem is related to the implant. The aim of this study is to present a case of the esthetic rehabilitation of non esthetic implant prosthetics in the maxillary anterior dentition by a combination of surgical and prosthetic approaches.

**Material and Methods:** Case report A 23 year old woman suffered from unesthetic anterior implant prosthesis. According to the her dental history, a repeated bone graft and soft tissue graft surgery failed at a local dental clinic. It was diagnosed as peri-implantitis and need to resolve the inflammation and to improve the esthetics. To resolve this problem, a free gingival graft and ridge augmentation accompanied by guided bone regeneration and a vascularized interpositional periosteal connective tissue

graft was performed. Instead of an implant prosthesis, a conventional fixed bridge was adopted for better esthetic result.

**Results:** Discussion After free gingival graft, the gingival inflammation was resolved and an attachment of the implant and the soft tissue was promoted. A peri-implant bony defect could be restored with guided bone regeneration. Vascularized interpositional periosteal connective tissue graft could be used to correct an aesthetic deficiency to establish stable new peri-implant soft tissue contours. So called “sleeping” implants can simplify difficult prosthetic management.

**Conclusion:** A multidisciplinary approach would be a better choice for solving the problems of unaesthetic implant restoration.

## P1162

### The effective combination of oral care devices to clean the subgingival abutment area of dental implants by dental hygienist –in vitro study

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**Aim:** The aim of this study was to evaluate which combination of oral care devices was effective to remove artificial plaque on the subgingival abutment surface in vitro setting.

**Material and Methods:** A screw-retained fixed implant placed in 46 position on the model was used. The model carrying the implant was mounted on the manikin simulator in order to mimic clinical settings. 8 experienced dental hygienists attended this study voluntarily and cleaned the implant, where the artificial plaque was attached to the subgingival abutment surface using the 5 combinations of oral care devices in 1 min in a randomized order (A.Toothbrush only B.Toothbrush + Interdental brush C.Toothbrush + Floss D.Toothbrush + Floss with threader E. Toothbrush + Interdental brush + Floss with threader). After cleaning, the superstructure was removed and the remained artificial plaque on the surface of the abutment was photographed and the removal percentage of the artificial plaque was calculated by computer digital image analysis. Statistical analysis of the results was performed using the one-way analysis of variance (ANOVA) and Tukey HSD test for pair-wise comparisons.

**Results:** C, D and E showed statistically significant decrease of the remained artificial plaque on the abutment bottom compared to A and B ( $p < 0.01$ ). However, there was no statistically significant difference among C, D and E in the percentage of the remained artificial plaque.

**Conclusion:** These results may suggest that the use of floss or floss with threader is effective to remove the artificial plaque on the subgingival abutment surface by the experienced dental hygienists in this vitro setting.

## P1163

### Evaluation of success of failed implants replanted after CO<sub>2</sub> laser therapy in the maxilla of dogs

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**Aim:** Eventhough it is nowadays possible to predict the long-term success of dental implants, biologic, technical and esthetic

problems may still occur in a small percentage of patients. Treatment of preimplant diseases have become an important field of research. It is believed at present that lasers can be applied to implant surfaces as a means of decontamination without any changes on the implant surface. The aim of the present study was to evaluate the success of the re-placement of failed implants, after laser therapy of the implant surface with CO<sub>2</sub> laser.

**Material and Methods:** Ten dental implants failed for different reasons, other than fracture or surface abrasion, were randomly placed in the upper jaws of three dogs after laser therapy of the implant surfaces with CO<sub>2</sub>, 10.6 laser. In addition, 3 failed implants were placed as the negative control in the dogs' maxilla after irrigation with normal saline without laser therapy. The stability of the implants was evaluated by Periotest values (PTVs) at surgery and at 1-, 3-, and 6-month post-operative intervals.

**Results:** The mean PTVs increased at 1-month compared to baseline, indicating a decrease in implant stability due to inflammation, followed by healing of the injured tissue during the first month. At 3-month and 6-month intervals the mean PTVs decreased compared to the 1-month, indicating an increase in implant stability. However the mean PTVs showed an increase in the control group.

**Conclusion:** Based on Periotest values in this study, re-placement of failed implants after CO<sub>2</sub> laser can result in high success rates in terms of implant stability.

## P1164

### Antimicrobial photodynamic therapy in peri-implantitis treatment – a systematic review

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**Aim:** To review the literature of adjunctive antimicrobial photodynamic therapy (aPDT) in patients with peri-implantitis.

**Material and Methods:** A systematic review of the literature was conducted according to statement of Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) and Cochrane Collaboration recommendations. An extensive literature search and a manual search were performed on eight databases and various journals using MeSH terms, keywords, and title words (9th september 2014). Studies were evaluated and summarized in a narrative review. Risk of bias was assessed for each included trial. Cochrane risk bias tool was used to assess each trial on five criteria: sequence generation, allocation concealment, blinding, incomplete outcome data and selective outcome reporting.

**Results:** From 123 citations identified and available abstracts screened, 27 full-text reports were assessed and 23 were included in the review. These included 12 over- and review articles and 11 clinical trials (5 prospective trials, 4 RCTs and 2 case studies). Two of the 4 RCTs were identified as continuation of 2 previous RCTs. No meta-analysis could be conducted because of the small number of RCTs with a great heterogeneity. There is insufficient evidence regarding the efficacy of aPDT in peri-implant management due to the small amount of RCTs. No statement can yet be made for additional clinical benefits.

**Conclusion:** According to the present analysis aPDT cannot be recommended for periimplantitis treatment. Further high-quality RCTs are needed to investigate the influence of potential con-

founders on the efficacy of (adjunctive) aPDT in peri-implantitis treatment.

## P1165

### Immediate vs delayed single implant treatment: a retrospective aesthetic evaluation using the PES/WES score

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**Aim:** The single restoration in the anterior maxilla is the most challenging treatment for the clinician due to the high aesthetic impact of the area. As there is some evidence that implant placement in fresh sockets might lead to better aesthetic results, we compared the immediate and delayed procedures by means of the pink and white aesthetic score (PES/WES).

**Material and Methods:** Our sample population consisted of 103 patients treated with the delayed and immediate procedure in five different centres and a 2 year observational period. Notably, only sites with the presence of both mesial and distal natural teeth were evaluated and an important exclusion criteria was the presence of a very thin gingival biotype. Two independent calibrated examiners applied the PES/WES index.

**Results:** Our results can be summarized as follows: no implant failures were registered and no prosthetic complication has been observed for an overall success rate of 100%. The mean value for PES was 7.8 (SD 1.8) and 7.4 (SD 1.8) while for WES 8.6 (SD 1.7) and 7.8 (SD 2.1) for immediate and conventional implants, respectively. 33 single implants showed optimal aesthetic results with a PES/WES value  $\geq 18$  while 16 implants reported insufficient results with a PES/WES value  $\leq 12$ .

**Conclusion:** We can conclude that both the immediate and conventional single implant procedures can attain satisfactory results. In younger patients (<30 year), however, as well as in patients that underwent the bone contouring and connective tissue graft technique, the immediate procedure seems to be strongly correlated to a superior aesthetic outcome.

## P1166

### Biofilm growth and distribution in exposed dental implants surfaces: An In vivo experimental model

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**Aim:** To describe biofilm growth pattern, distribution and coverage over an experimental abutment that mimics the surface of a dental implant.

**Material and Methods:** Five periodontally healthy patients and 5 patients with history of periodontitis were selected. Experimental abutments with microthreads and a RBM modified surface were screwed in healthy dental implants with external connection. Patients were instructed not to clean the abutments for 14 days, so that a mature biofilm could be formed. Exclusion criteria included use of chlorhexidine or antibiotics on the previous month or during the study. After 14 days the abutments were removed, stained with a Live and Dead Kit (Invitrogen)

and analysed with confocal laser scanning microscopy. Afterwards, biofilms were dehydrated and examined using a scanning electron microscope.

**Results:** A thick biofilm covering the entire abutment was seen in all cases. No major differences were observed between the supragingival and subgingival sections. There were no differences between the 2 groups of patients. The scanning electron microscope analysis showed a thick biofilm over the abutment surface with the presence of some epithelial cells.

**Conclusion:** This in vivo experimental model allows to study the growth pattern and features of biofilm in patients with dental implants, and therefore, might be of great interest to investigate the etiopathogenesis of peri-implant diseases.

## P1167

### Mechanical and chemical treatment of periimplantitis. A controlled randomized preclinical study in vivo

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**Aim:** The aim of this study was to evaluate clinical and histological changes at ligature-induced peri-implantitis defects in terms of re-osseointegration following access surgery and non-submerged healing using either an ultrasonic device or Ti-Brush™ with or without the concomitant use of chemical agents in the beagle dog.

**Material and Methods:** Periimplantitis was induced by ligature placement in 48 implants in eight dogs. Four weeks after ligature removal the defects were randomly allocated in 4 treatment groups: a) Ti-Brush + 2 cleaning agents (NaClO and Clorhexidine), b) Ti-Brush + 1 cleaning agent (Clorhexidine), c) ultrasonic device + 1 cleaning agent (Clorhexidine) or d) control (don't do anything). After three months of healing the dogs were euthanized and clinical and histological measurements were assessed.

**Results:** All treatment procedures (a, b and c) resulted in statistically significant improvements of all clinical parameters compared with control (d). Histomorphometrical analysis revealed that there were no statistical significant differences in terms of reosseointegration between the Ti-Brush™ groups with or without chemical agents (groups a and b) and the ultrasonic group (group c). In the buccal area these measurements were 0.55 (0.33), 0.76 (0.5), 0.59 (0.48) and 0.18 (0.25) for a, b, c and d group respectively and 0.68 (0.4), 0.83 (0.5), 0.85 (0.6) and 0.28 (0.3) in the lingual area.

**Conclusion:** Within the limits of the present study it was concluded that Ti-Brush™ with or without the concomitant use of chemical agents seemed to be a suitable tool in the treatment of experimental periimplantitis

## P1168

### Differences in cellular and molecular mechanisms of bone resorption between peri-implantitis and periodontitis

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**Aim:** Peri-implantitis and periodontitis are both inflammatory diseases leading to oral bone resorption. In human, a larger proportion of granulocytes and macrophages and differences in cytokine release (ex: IL-1, TNFa) are found in peri-implantitis when compared to periodontitis. These factors may lead to differences in the recruitment and activation of osteoclasts. Aim: to compare the cellular and molecular events of the inflammatory process and the subsequent bone resorption occurring in periodontitis and peri-implantitis.

**Material and Methods:** 15 soft tissues were harvested from healthy (n = 3) or periodontitis (n = 8) or peri-implantitis (n = 4) patients during surgical treatments. (*Inclusion are in progress to reach 10 patients by arm*) (ethical agreement: 13914-Collection). Patients have received non-surgical treatment, were in general good health and were non smokers. Explants tissues were weighted, rinsed and incubated in cell media culture for 24 h. Cell media were then collected and cytokine (27-plex cytokines panel), TIMP (4-plex cytokines panel) and MMP (9-plex cytokines panel) release analyzed using Bioplex®. Harvested samples were paraffin embed.

**Results:** Both Periodontitis and Peri-implantitis samples released more GM-CSF, MIP1b and MMP-7 compared to Healthy samples. Periodontitis samples released more MIP1b (1991 +/-204 pg/ml vs 1080 +/-192 pg/ml), GM-CSF (5303 +/-282 vs 2849 +/-592), MCP-1 (6962 +/-420 pg/ml vs 3185 +/-814 pg/ml), Eotaxin (93 +/-1.6 pg/ml vs 58 +/-7.7 pg/ml) and IL-13 (48 +/-2.2 pg/ml vs 26 +/-1.7 pg/ml) compared to Peri-implantitis samples. At the opposite, Peri-implantitis patients released more IL-10 (87 +/-45.1 pg/ml vs 268 +/-134 pg/ml, p < 0.05) compared to Periodontitis.

**Conclusion:** The first results of this study suggest that periodontitis tissues contain more pro-inflammatory cytokines and chemokines than peri-implantitis tissues, except for IL-10. Further analysis are in progress.

## P1169

### Influence of experimental periimplantitis on porous tantalum implants and threaded implants in dogs

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**Aim:** To investigate the influence of ligature-induced periimplantitis on porous tantalum-based Trabecular Metal™ implants (TM) and threaded Tapered Screw-Vent® implants (TSV) in dogs.

**Material and Methods:** TM and TSV were bilaterally placed in mandibular fresh extraction sockets (32 TM and 32 TSV in 8 dogs). After 12 weeks of healing, 4 dogs in the treatment groups were subjected to cotton ligature-induced periimplantitis for an additional 12 and 26 weeks while 4 dogs in the control groups received regular oral prophylaxis for the respective time

period. Clinical observation, bone level changes (IS-B: most coronal point of crestal bone, IS-C: most coronal aspect of osseointegration), and histopathologic assessment were conducted after 12 and 26 weeks.

**Results:** Both TM and TSV in the treatment groups showed a significant loss of periimplant tissue from periimplantitis as compared to the control groups. TM showed higher crestal bone levels than TSV in the treatment group at both 12 and 26 weeks (IS-B:  $-3.031$  and  $-6.206$  mm, IS-C:  $-2.769$  and  $-5.212$  mm for TM, IS-B:  $-3.382$  and  $-6.128$  mm, IS-C:  $-3.008$  and  $-5.576$  mm for TSV) although the differences were not statistically significant ( $p > 0.05$ ). The treatment groups showed minimal to mild incidence of acute and chronic inflammation but did not reveal any evidence of bacterial infection within periimplant tissues or inside TM pores.

**Conclusion:** TM and TSV were affected by experimental periimplantitis similarly. The histopathological assessment showed that the porous tantalum implant did not increase the risk of infection.

## P1170

### Factors influencing the degree of satisfaction after dental implant treatment

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**Aim:** To identify background factors with impact on satisfaction after implant treatment.

**Material and Methods:** Four-hundred patients receiving dental implant treatment 8–12 years ago had answered a questionnaire. One question concerning the degree of satisfaction after implant treatment was designed with a visual analogue scale where participants marked their answers on a straight line. Background variables from baseline and the follow-up period were registered from the dental records. Ordinal regression analysis was adopted in order to identify variables with a significant impact on degree of satisfaction after implant treatment.

**Results:** The mean age of the patients was 66 years at follow-up and 55% were females. A great majority of the patients were satisfied with the treatment. Biological and technical complications were registered for 31% and 20%, respectively. Bivariate correlation analyses showed that a significantly increased satisfaction with implant treatment was found for younger patients, males and for those with few implants and cement-retained implant abutments. Subjects with experience of biological complications during the follow-up period were significantly less satisfied after implant treatment, while the degree of satisfaction was increased if the prosthetic treatment was performed by a specialist. In the final step of the multiple ordinal regression analyses, biological complications, number of implants and prosthetic treatment performed by a specialist remained as significant variables with impact on degree of satisfaction with implant treatment.

**Conclusion:** Occurrence of biological complications during the follow-up period was the most significant factor with impact on the degree of satisfaction after implant treatment.

## P1171

### Maintenance of implant-supported bar overdentures

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Porto/Portugal

**Aim:** Authors present a retrospective study aimed to evaluate the prevalence of clinical complications associated with implant-supported bar overdentures in a Portuguese population, and to compare maxillary and mandibular overdentures.

**Material and Methods:** Twenty-six implant overdentures (17 maxillary and 9 mandibular) with at least 2 years in function, were evaluated. Each prosthesis was initially planned to be supported by 3 or 4 implants splinted with a bar attachment system. At the examination, dental implants and removable prosthesis were assessed and data related to implant complications or prosthetic maintenance were collected.

**Results:** Ninety-eight (65 maxilla, 33 mandible) out of 106 implants were examined, due to the implant loss (9.7% maxilla, 2.9% mandible). The hyperplasia (26.9%) and the replacement of clips (77%) were the soft tissue and prosthetic complications more frequent, with no significant differences between maxillary and mandibular bar overdentures. The substitution and the relining of the prosthesis occurred in 30% and 54% of cases, respectively, and these maintenance requirements increased in accordance with time in function.

**Conclusion:** Despite the high complication of implant-supported bar overdentures, the survival rate of the prosthesis and the implant retaining system evidenced high values. Therefore, a bar-retained overdenture seems to be a predictable treatment option in edentulous patients, but a maintenance care program with frequent control appointments is essential to prevent complications.

## P1172

### Prevalence of periimplant mucositis and periimplantitis two to five years after implantation of Straumann dental implants

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**Aim:** In this cross-sectional study we aimed to evaluate frequencies of periimplant mucositis (PM) and periimplantitis (PI) in patients whom dental implants were inserted and fixed suprastructures cemented two to five years before examination, and to estimate how these frequencies are influenced by history of periodontitis, smoking and the absence of keratinized mucosa.

**Material and Methods:** In 71 patients, 128 Straumann dental implants with SLA or SLActive surfaces were inserted in healed bone sites. Suprastructures were cemented at least three months after implantation. Before implantation, 45 patients (future carries of 88 implants) were treated for periodontitis and maintained for at least one year. 17 patients with 38 implants were smokers.

**Results:** PM was found in 75% of patients (70% implants) and PI in 7% of patients (6% implants). PI was exclusively found in patients treated for periodontitis (11%). The frequency of PI in smokers (8%) was twice as high as in non-smokers (4%) (Chi-square test;  $p > 0.05$ ). The frequencies of PM in non-smokers (67%) or smokers (73%) and patients without periodontitis (69%) or treated for periodontitis (78%) were similar. There

were no differences in frequencies of PM and PI in relation to the lack/presence of keratinized mucosa.

**Conclusion:** Two to five years after implantation the expected frequencies of PM and PI with classical implantation protocols are 70% and 6% of implants, respectively. PI should be more frequently expected in patients treated for periodontitis and in smokers. The frequencies of PM and PI are seemingly not related to the lack of keratinized mucosa.

## P1173

### Attachment and proliferation of human osteoblast-like cells (MG-63) on TiO<sub>2</sub>-Ag nanohybrid coated titanium implant material

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Szeged/Hungary

**Aim:** The failure of dental implants is caused mainly by peri-implant infections resulting in loss of supporting bone. We developed a new nanoscale surface treatment of titanium implant to prevent infections. Our previous studies showed promising antibacterial characteristic of this coating.

**Material and Methods:** Commercially pure (CP4) sand blasted, acid etched titanium sample discs (Denti® System Ltd., Hungary) 1.5 mm thick and 9 mm in diameter were used as control surface (A). Two copolymer based nanohybrid layers were developed: B) 60% TiO<sub>2</sub>/40% copolymer and C) 60% Ag-TiO<sub>2</sub>/40% copolymer ([Ag] = 0.001 m/m%). Surfaces were visualized by SEM. In vitro attachment (24 h) and proliferation (72 and 168 h) of MG-63 osteoblast like cells were investigated via MTT, alamarBlue and fluorescence microscope.

**Results:** SEM revealed significant changes in surface morphology and roughness of the nanohybrid layers compared to the control surface. MTT test and alamarBlue showed that MG-63 cells were viable on the coated Ti discs. MTT results demonstrated that the attachment (24 h) and the proliferation (72 h, 168 h) of the cells on the control surfaces were significantly higher than on the two coated samples (B and C). We observed the least amount of cells on surface C and the fluorescence images confirmed these results.

**Conclusion:** Potential antibacterial effect of the silver containing nanohybrid layer could ensure an appropriate compensation for the healing period, which makes it a promising surface coating. Further studies of other cell lines and also increasing the investigation time are required.

## P1174

### The use of air powder abrasive device for removing biofilm from machined and rough titanium surfaces

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**Aim:** The objective of this study was to investigate the efficacy of a glycine powder abrasive device on the removal of salivary bacteria biofilm from machined (M), resorbable blast material (R), and sand-blasted and acid-etched (S) titanium surfaces.

**Material and Methods:** Nine discs each of M, R and S surfaces were used. These were divided into three groups of three

discs each; 20s and 40s treatment groups with air powder abrasive device utilizing glycine powder and no treatment control group. The discs were incubated with salivary bacteria for 48 h and the device was used to remove the biofilm and remaining bacteria was quantified by crystal violet assay. Surface changes after treatment was measured by confocal microscopy.

**Results:** Removal of bacteria was easiest on the M discs and the S surface had more bacteria left compared to all other groups. The average absorbance values of 20s treatment group of M, R, S group were 0.109, 0.113, 0.348, and that of the 40s group were 0.055, 0.082, 0.159 respectively ( $p < 0.05$ ). The average roughness of profile (Ra) of S and R surface was not significantly changed after treatment but the Ra value of the M surface showed slight decrease ( $p < 0.05$ ).

**Conclusion:** Treatment with air powder abrasive device significantly decreased the amount of bacteria adhering on the surfaces of all discs but there were more bacteria left on rough surfaces.

## P1175

### Clinical evaluation of the effects of different instrumentation modalities on titanium implant healing caps

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**Aim:** To evaluate parameters before and after instrumentation with different implant treatment modalities on titanium healing caps (HCs).

**Material and Methods:** 18 participants each had 4 specially fabricated HCs attached to 4 newly inserted titanium implants (CAMLLOG, Wimsheim, Germany). After two months of healing each of the 4 HCs was randomly assigned to be instrumented for 2 min with: (1) titanium curettes (TC; AESCULAP, Tuttlingen, Germany); (2) stainless steel tip (PS; EMS, Nyon, Switzerland) using an ultrasonic device or (3) erythritol PLUS powder (EP) using an air-flow (EMS, Nyon, Switzerland). All instrumented HCs were rinsed with 5 ml 0.2% chlorhexidine (CHXmed forte, GSK, Bühl). (4) The control was polished and subgingivally rinsed with 5 ml 0.9% NaCl (CON). The following parameters were collected before (T1) and 3 months following instrumentation (T2): peri-implant probing depths (PD) and bleeding on probing (BOP) using a pressure-sensitive probe (UNC 15, AESCULAP, Germany) as well as MMP 8 (test-kit by Bioscientia, Ingelheim, Germany).

**Results:** Overall, no significant differences were evident before and after instrumentation with respect to PD (except TC resulting in significant decrease;  $p = 0.049$ ) and BOP ( $p > 0.05$ ). CON showed no significant differences in PD ( $p > 0.05$ ), but concerning BOP a significant improvement ( $p = 0.024$ ), which was not significant compared to the different instrumentations ( $p > 0.05$ ). MMP-8 was significantly improved in all groups except for EP ( $*p < 0.05$ ).

**Conclusion:** Within the limits of the study, it can be concluded that polishing and rinsing on implants with PD  $\leq 3$  mm and inflammation (mucositis) leads to similar results compared to instrumentation modalities. After prosthetic rehabilitation implants will be followed up.

**P1176****Lack of consensus amongst israeli dental professionals regarding the prevalence, etiology and treatment of post-implant restoration mucosal inflammation (Mucositis) and crestal bone loss (Peri-implantitis)**

A. Grossman, A. Zini, A.J. Saffer

*Jerusalem/Israel*

**Aim:** Varying definitions of post-implant restoration mucosal inflammation (Mucositis) and crestal bone loss (Peri-implantitis) has led to a wide range of reporting of its prevalence, etiology and pathogenesis, calling into question its definition as a disease entity. The purpose of the study was to determine the amount of consensus found amongst Israeli dental professionals with regard to the condition.

**Material and Methods:** A survey of 185 Israeli dental professionals which included general dentists and dental specialists was conducted to determine whether there was consensus (over 70%) regarding the definition, etiology and treatment of the condition. The questionnaire included four sections. 1) General biographical data including education and practice setting 2) Experience in placing and restoring dental implants 3) Specific questions with regard to the prevalence and experience with the condition 4) Treatment options.

**Results:** The results reported a lack of consensus regarding the prevalence of Mucositis and Peri-implantitis as well as its contributing factors. While there was consensus that bacterial plaque was the "biggest contributing factor" (79%) there was little consensus to the contribution of surgical skill, type of restoration, implant surface, patient's systemic condition and history of periodontal disease to the condition. Not surprising was the finding that there was very little consensus with regard to the treatment of the condition.

**Conclusion:** The survey confirms what is generally reported in the dental literature as the lack of consensus amongst dental professionals regarding the prevalence, etiology and treatment of Mucositis and Peri-implantitis

**P1177****Approach to peri-implantitis and mucositis is influenced by dental training and experience with natural teeth**

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*Jerusalem/Israel*

**Aim:** The purpose of the dental survey was to determine if dental training or professional experiences with natural teeth influences the approach of dental professionals to Peri-implantitis and Peri-implant Mucositis.

**Material and Methods:** A survey of 27 questions, which included biographic data relating to the dentists age, sex, dental training, years of experience, type of practice and professional experiences were given to a 185 Israeli general practitioner dentists and dental specialists with experience in either placing or restoring dental implants or both. The dental specialists included were periodontists, prosthodontists and oral maxillofacial surgeons. The survey questions related to their definition

and perception of disease prevalence as well as the etiology and treatment of the condition.

**Results:** There was strong consensus amongst all groups with regard to it's definition and etiology. Yet there were statistical differences between groups when it related to the prevalence of Mucositis ( $p = 0.028$ ) and Peri-implantitis ( $p = 0.02$ ). Significant differences were found between groups as it related to contributory effect of placement skill ( $p = 0.039$ ), type of implant ( $p = 0.034$ ) and systemic condition of the patient ( $p = 0.045$ ). There were also great differences noted in treatment approaches (mucositis  $p = 0.01$ , Peri-implantitis  $p = 0.034$ ). Many of these differences could be attributed clinical experiences and treatment philosophies developed in their dental training.

**Conclusion:** Based on the results of the survey, strong differences remain between the different specialty groups and general dentists with regard to prevalence, contributory factors and treatment of Peri-implantitis and Mucositis, which could be attributed to clinical experiences and treatment philosophy .

**P1178****Evaluation of a combined surface detoxification treatment and surgical regenerative therapy for peri-implantitis defects: a 1-year follow-up of a prospective single cohort study**

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*Torino/Italy*

**Aim:** This study investigated a mechanical/chemical/laser aided surface decontamination procedure, together with a regenerative surgical treatment modality for advanced peri-implantitis lesions.

**Material and Methods:** Twenty-six patients, mean age 53 years, presenting a total of sixty-two peri-implant crater-like defects completed the 12-month observation period following flap surgery, defect debridement with granulation tissue removal, surface decontamination and guided bone regeneration. The implant surface was decontaminated mechanically using an ultrasonic scaler with a teflon tip and an air-abrasive glycine-powder device, chemically using 0.5% chlorhexidine gel and with the adjunctive use of 980 nm diode laser. The infra bony component of the defects was augmented with a bovine bone mineral protected with a resorbable porcine collagen membrane. Probing Pocket Depth (PPD), Bleeding on Probing (BoP), Pus exudation and radiological Marginal Bone Level (MBL) were recorded at baseline and after 12 months.

**Results:** One-year follow-up demonstrated clinical and radiographic improvements. PPD decreased from 6.80 to 3.67 mm, corresponding to a statistically significant reduction of 3.13 mm after one year. MBL was 3.77 mm at baseline and 1.88 mm at the final evaluation, with a significant gain of 1.90 mm. Nineteen defects (30.64%) showed complete bone filling. BoP significantly decreased from 79.03% to 18.68% (difference 60.35%). Before treatment, pus was present around twenty-four implants, and only four implants (6.45%) still presented pus with deep pockets after 1 year and thereafter were extracted.

**Conclusion:** The implant surface decontamination protocol and the regenerative surgical procedure investigated seems to be effective in controlling advanced peri-implantitis lesions on a 1-year follow-up.

## P1179

### Long-term results of implant periapical lesion: three case reports

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Gangneung/Korea

**Aim:** The aim of this case report is to investigate the possible etiologic factors and managements of IPL by presenting three clinical cases managed by either the infected form or the inactive form with the long-term follow-up period.

**Material and Methods:** Three patients those who had dental implant placed and showed radiolucent lesion around implant periapical area between September 2001 and January 2007 in the department of periodontics, Gangneung-Wonju national university dental hospital are described.

**Results:** Among three patients, one patient with no clinical symptom was regarded as inactive form, which was regularly checked up without any additional treatment. Despite no evidence of abscess or fistula formation, two patients who complained of pain around the implant were regarded as infected form and has been under the systemic antibiotic therapy for two or three weeks. One patient showed that the symptom subsided and the size of radiolucent lesion decreased. No additional treatment was done thereafter. However, the other patient showed increased size of lesion causing the implant unstable, which led to remove the implant and to replace it later. There was neither additional increase of the lesion nor functional problem for all three patients.

**Conclusion:** In conclusion, it is important to minimize surgical trauma resulting bone heating during the surgery and to detect IPL in early stage before jeopardizing the stable implant and manage properly using systemic antibiotic therapy and surgical approach if needed, depending on infected form and inactive form.

## P1180

### Non-surgical treatment of periimplantitis. A retrospective study

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Leioa/Spain

**Aim:** The aim of this retrospective study is to analyze the results of a non-surgical treatment protocol of peri-implantitis and to determine which factors influence treatment outcomes.

**Material and Methods:** 21 patients with 30 implants having received non-surgical treatment of peri-implantitis were evaluated and signed a written informed consent. The protocol of treatment included 5 appointments (T0, T6w, T12w, T6 m and T12 m) in which ultrasonic debridement and subgingival irrigation with chlorhexidine digluconate were performed. After T0, systemic antibiotics were prescribed. Clinical parameters were recorded in each appointment. X-rays were performed in T0, T12w, T6 m and T12 m, and bone loss was measured. Implants were considered successful when pocket depth (mean and maximum) was  $\leq 5$  mm and no further loss was observed. Data were analysed using a statistical software (IBM® SPSS® Statistics 22).

**Results:** At 12 m, mean pocket depth experienced a reduction of 2.87 mm ( $p < 0.01$ ), mean recession increased 0.47 mm

( $p = 0.01$ ) and more than 65% of the implants showed 0–1 points of bleeding. A mean mesial and distal bone gain of 1.19 mm [0–3.02] and 1.07 mm [(-0.61) –3.02], respectively, were observed. 11 implants (36.7%) were considered as a failure and 19 implants (63.3%) as a success. The statistical analysis found no correlation between this treatment outcomes and the parameters studied.

**Conclusion:** Within the limits of this study, it can be concluded that this non-surgical protocol could be a potentially useful tool in the treatment of peri-implantitis. Further prospective studies are needed in order to determine which factors can influence treatment outcomes.

## P1181

### Investigation of the neurogenic inflammation in periimplant and periodontal diseases

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**Aim:** Biologically active neuropeptides have been demonstrated to have regulatory effects on inflammatory response that is called as neurogenic inflammation. We aimed to investigate this phenomenon in periimplant diseases comparing with periodontal diseases.

**Material and Methods:** Thirteen individuals with at least 1 implant/tooth with healthy periimplant/periodontal tissues, 13 patients with periimplant mucositis/gingivitis and 13 patients with periimplantitis/periodontitis as of similar distribution and number were allocated to constitute the study groups. Healthy teeth and implants, the teeth/implants with gingivitis/periimplant mucositis and periodontitis/periimplantitis were classified as groups 1, 2, 3, 4, 5 and 6 respectively. Periimplant sulcular and gingival crevicular fluid levels of SP, NKA, CGRP and NPY neuropeptides were determined by ELISA to evaluate the neurogenic inflammation.

**Results:** The neuropeptide levels were statistically different in the independent groups ( $p < 0.001$ ) while were only statistically different for NKA between groups 5 and 6 in the dependent groups ( $p < 0.001$ ). SP and NKA demonstrated an increase from health to disease in contrary to CGRP and NPY ( $p < 0.001$ ). There was a positive correlation between SP and NKA, and negative correlations between them and CGRP and NPY ( $p < 0.001$ ). CGRP and NPY revealed a positive correlation between each other ( $p < 0.001$ ).

**Conclusion:** Our findings suggest that local neuropeptides release may be detected in periimplant tissues and that periimplant diseases may have a neurogenic inflammatory process similar to periodontal diseases.

## P1182

### RCT comparing differences in peri-implant microflora between fully and partially edentulous patients, a 5 year follow-up

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Leuven/Belgium

**Aim:** The aim of this RCT was to investigate differences in microbiological parameters of implants in partially vs. fully edentulous patients, all with a history of severe periodontitis.

**Material and Methods:** Eight partially edentulous and ten fully edentulous patients received 4–6 implants (mandible or maxilla), according to a split-mouth design. The moderately (48 TiUnite) and minimally rough (48 turned) implants were alternated in the same jaw. 15 patients could be followed up for 5 years. Microbial samples were taken subgingivally and investigated by means of culture techniques and qPCR to detect five periodontopathogens: *Porphyromonas gingivalis* (Pg), *Tannerella forsythia* (Tf), *Fusobacterium nucleatum* (Fn), *Prevotella intermedia* (Pi), and *Aggregatibacter actinomycetemcomitans* (Aa).

**Results:** In partially edentulous patients, the biofilm matured to a higher concentration of pathogens when compared with fully edentulous patients. The average subgingival implant concentration was higher for the partially edentulous patients for the pathogen Aa ( $1.16E + 04$  cells/ml  $\pm$   $2.82E + 04$  vs  $4.27E + 02$  cells/ml  $\pm$   $1.28E + 03$  for fully edentulous patients). Higher counts of Pg ( $7.52E + 07$  cells/ml  $\pm$   $2.80E + 08$  vs  $8.03E + 06$  cells/ml  $\pm$   $2.40E + 07$ ), Tf ( $1.44E + 07$  cells/ml  $\pm$   $4.29E + 07$  vs  $5.30E + 06$  cells/ml  $\pm$   $1.14E + 07$ ), Pi ( $7.06E + 05$  cells/ml  $\pm$   $1.68E + 06$  vs  $2.24E + 04$  cells/ml  $\pm$   $6.71E + 04$ ) were recorded for the partially edentulous patients versus the fully edentulous patients.

**Conclusion:** Partially edentulous patients were more prone to be colonized with a higher number of periodontopathogens than fully edentulous patients.

## P1183

### Forecasts for peri-implant bone loss by predictive analytics

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**Aim:** To identify possible predictors of peri-implantitis susceptibility and clusters of peri-implantitis patients.

**Material and Methods:** Clinical and radiographic variables were retrieved from a group of 55 implant-treated periodontal patients (235 implants with a mean  $7.3 \pm 4.5$  years of service). First, all 16 variables entered a decision tree regression model (DTR) with exhaustive chi-square automatic interaction detection as growing method. Target variable was individual implant marginal bone loss (IIMBL). Secondly, principal component analysis (PCA) was used as variable reduction method for a k-nearest neighbour (k-NN) regression model, having IIMBL as the target variable. Thirdly, a reduced list by particle swarm optimization (PSO) entered a support vector machines model (SVM). All models were regularized by converting IIMBL to cross entropy values based on clustering by unsupervised kernel density estimation (KDE). 10-fold resampling cross validation (CV) was applied to all models.

**Results:** DTR resulted in a rule using 5 variables (smoking, compliance with recall, medical history, age, number of remaining teeth) (resubstitution error 0.011, CV 0.014). PCA with k-NN promoted gender, age and number of teeth, showing prediction root mean squared error (RMSE) 0.110, CV 0.117. PSO with SVM selected compliance with recall, implant surface, smoking, presence of molars, medical history and type of overlying prosthesis, showing RMSE 0.119, CV 0.121. KDE identified 3 clusters of patients, at modes 1.7, 4 and 6 mm.

**Conclusion:** Artificial intelligence methods suggested a set of clinical predictors of susceptibility to peri-implant bone loss that can aid in the design of personalised dental implant therapy.

## P1184

### Clinical and Radiographic Assessment of Peri-implant Tissues of 596 Implants

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Istanbul/Turkey

**Aim:** The aim of this cross-sectional study was to assess radiographic and clinical features of peri-implant tissues after 1 year.

**Material and Methods:** Patients, who applied to the Periodontology Department, Marmara University within last 2 years and having implants in function for at least 1 year, were recruited in this study. A total of 596 implants in 180 consecutive patients (F:M 112:68,  $55 \pm 12$  years) were evaluated. In addition to full mouth plaque index (PI), gingival index (GI) and probing depth (PD), presence of suppuration, bleeding on probing (BOP) around implants were also recorded. The radiographic bone loss was measured by an Image J<sup>®</sup> program on standardized digitalized periapicals taken with long cone parallel technique.

**Results:** Out of 596 implants, 352 (59%) were diagnosed as peri-implantitis (PI:  $1.57 \pm 0.59$ , GI:  $1.82 \pm 0.37$ , PD:  $4.07 \pm 1.89$  mm) and 223 (37%) as peri-implant mucositis (PI:  $1.36 \pm 0.49$ , GI:  $1.77 \pm 0.35$ , PD:  $3.2 \pm 0.76$  mm). Only in 21 (4%) implants (mean period of  $41 \pm 22$  months) peri-implant tissues were healthy (PI:  $0.71 \pm 0.4$ , GI:  $0.88 \pm 0.25$ , PD:  $2.4 \pm 0.53$  mm). The mean period for implants with peri-implant mucositis was  $42 \pm 31$  months whereas it was  $61 \pm 39$  months for implants with peri-implantitis. While peri-implantitis and peri-implant mucositis were found in 71% and 26% of the subjects respectively, only 3% of subjects had healthy peri-implant tissues.

**Conclusion:** Within the limits of this study, it can be concluded that peri-implant diseases can occur as time goes by, so patients with implants should be recalled for strict maintenance care program to prevent potential inflammation of peri-implant tissues.

## P1185

### Implantoplasty approach on peri-implantitis – case series

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Coimbra/Portugal

**Aim:** Implantoplasty refers to the use of rotating instruments to smoothen rough implant surfaces which are exposed to the oral cavity, with the objective of reducing the adherence of plaque and facilitating implant surface cleaning. Surgical elimination of pathological peri-implant pockets in combination with implantoplasty has been advised for the approach of supracrestal component of peri-implantitis lesions, reducing the risk of re-infection.

This case series evaluate the clinical and radiographic outcomes of surgical treatment of peri-implantitis lesions by implantoplasty.

**Material and Methods:** After nonsurgical therapy, four patients (n = 11 implants) underwent flap surgery to expose implant surface. Granulation tissue was removed and bone defect anatomy regularized. Implant surface was smoothed using fine grit diamond and Arkansas polishing burs, under copious irrigation. Minocycline and chlorhexidine were applied for decontamination. The mucoperiosteal flaps were apically repositioned and fixed with modified mattress sutures. Clinical and

x-Ray parameters were recorded at baseline and follow-up periods (6/18/24 months).

**Results:** Pocket depth was reduced to 2–3 mm and bleeding on probing was eliminated. Gingival recession was a constant finding. No progression of bone loss was detected after the first 12 months.

**Conclusion:** The implantoplasty approach of supra-osseous peri-implantitis defects seems to be a reliable option, in specific non-aesthetic cases, in a short and medium-term basis.

## P1186

### Prevalence of peri-implant Mucositis and Peri-implantitis in axial and tilted Implants Supporting a fixed full-arch Restoration: a retrospective Study

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Milano/Italy

**Aim:** Purpose of this retrospective study was to compare the incidence and prevalence of peri-implant mucositis and peri-implantitis in axial and tilted implants supporting a fixed full-arch prosthesis.

**Material and Methods:** Sixty-nine patients were included in the study. Each patient received a fixed full-arch prosthesis supported by two mesial axial with straight abutments and two distal 30° tilted implants with angulated abutments to rehabilitate the maxilla, the mandible or both. Three-hundred thirty-six implants (Branemark System MKIV or NobelSpeedy Groovy®, Nobel Biocare AB, Zurich Switzerland) for 84 restorations were delivered. Patients were scheduled for follow up visits every 6 months in the first 2 years and yearly after. At each follow up visit plaque index, bleeding index and probing depth were recorded and peri-implant mucositis (BI >2) and peri-implantitis (BI > 2, PD >4 mm, detectable radiographical bone loss) were diagnosed.

**Results:** The overall follow up range was 12–130 months (mean 63.2 months). The prevalence of peri-implant mucositis in axial implants ranged between the 4.76% (8 implants) and 0% while in tilted implants varied from the 5.36% (9 implants) and 0%. Peri-implantitis occurred in four axial and in four tilted implants.

**Conclusion:** The prevalence of peri-implant mucositis and peri-implantitis were lower than those shown in most of the studies in literature. No significant differences were found between axial and tilted implants in the onset of peri-implant mucositis and peri-implantitis. Therefore the use of this kind of rehabilitation could be considered a feasible therapeutic option, on the condition of adopting a systematic hygienic protocol.

## P1187

### Peri-implant tissues evaluation in a compromised beagle dog model

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**Aim:** Evaluate peri-implant soft and hard tissues in a biofilm compromised beagle model.

**Material and Methods:** Six beagle dogs had all mandibular pre-molars and first molar extracted. Plaque was allowed to accumulate 16 weeks before implants placement. Two non-submerged implants were placed/hemimandible (Standard Plus, Regular Neck, SLA® 3.3 × 8 mm, Institut Straumann®, Switzerland). According to split-mouth design two groups were randomly defined: Test Implants (TI-no plaque control for 17 weeks) and Control Implants (CI-plaque control for 17 weeks). Clinical (Presence-of-Plaque (PP), Mucositis (Muc), Probing Depth (PD), Bleeding-on-probing (BOP), Gingival Recession (GR), Clinical attachment level (CAL)), radiographic (distance implant shoulder (ISH)-first bone-to-implant contact (fBIC)) and histological data (gingival margin-apical junctional epithelium (GM-aJE), bone crest-apical junctional epithelium (BC-aJE), implant shoulder-bone crest (IS-BC), gingival margin-apical inflammatory infiltrate (GM-aINF), inflammatory percentage infiltrate (%INF)) were measured throughout the 17 week experimental period. Correlations between PD and GM-aJE and between ISH-fBIC and IS-BC were tested. Non-parametric Friedman and post-hoc Wilcoxon and Mann-Whitney tests were used ( $p < 0.05$ ). Correlation was tested using Spearman correlation coefficient. Statistical power was calculated (PD at W17).

**Results:** At week 17 all clinical parameters (except RG) had intergroup differences ( $p < 0.05$ ). No intergroup radiographic statistically significant differences were found. Histomorphometry showed a single difference between groups for %INF ( $p < 0.05$ ). A positive correlation was found between PD and GM-aJE (TI) and also for IS-fBIC and IS-BC (CI and TI). Statistical power was 0.97 (effect size 1.66).

**Conclusion:** The absence of measures to control plaque was the tested variable and resulted in statistically significant differences between groups in some clinical and histological parameters. However lesions seen in this animal model do not overlap peri-implantitis clinic features.

## P1188

### Non-surgical peri-implantitis treatment with or without systemic antibiotics

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**Aim:** To retrospectively compare non-surgical treatment (NST) with systemic antibiotics (AB) and NST alone on clinical and microbiological parameters of peri-implantitis. Further, the need for peri-implant surgical treatment (ST) after 3 months was evaluated.

**Material and Methods:** 40 patients with peri-implantitis (bleeding on probing (BOP), pocket probing depth (PPD)  $\geq 5$  mm, bone loss  $\geq 3$  mm) who received NST + AB (375 mg amoxicillin and 250 mg metronidazole) or NST alone were retrieved from our patient records. Clinical and anaerobic bacterial culture data were collected at baseline and at 3 months. The need for ST was evaluated 3 months after NST; defined as the presence of BOP, PPD  $\geq 5$  mm and bone loss  $\geq 3$  mm. From every patient one dental implant with the deepest PPD and BOP was selected as target implant and the deepest site as target site.

**Results:** At implant and target site level, reduction of PPD (both  $p < 0.001$ ), increased recession (REC) ( $p = 0.003$ ;  $p < 0.001$ , respectively) and decreased BOP ( $p < 0.001$ ;  $p = 0.005$ , respectively) were found. At implant level

NST + AB showed greater mean REC ( $p = 0.002$ ) and reduced BOP ( $p = 0.04$ ) compared with NST alone. At site level NST + AB showed more PPD reduction ( $p = 0.004$ ) and REC ( $p = 0.004$ ). At evaluation, 47.5% of the implants did not need ST and there was no difference between the study groups. Both treatment modalities showed a reduction in prevalence and proportions of classical periodontal pathogens with no difference between both treatments.

**Conclusion:** Both NST + AB and NST significantly improve the clinical parameters after 3 months. Microbiological parameters and the need for ST were comparable between both groups at 3-month evaluation.

## P1189

### Complex surgical management of ailing implants – role of peri-implant soft tissue reconstruction after prosthetically driven reimplantation of the mistreated site (two-years follow-up): a case report

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**Aim:** The aim of this case presentation was to underline the importance of proposed implantation, and to evaluate the long-term effectiveness of soft tissue maintenance following reimplantation of a failed implant site.

**Material and Methods:** Two ailing implants, at site 37, were surgically removed, sockets were filled with collagen fleece and sutured. Four months later sufficient bone was observed at the place of 36 for submerged implant placement. After the time of recovery, simultaneously with uncovering, peri-implant soft tissue reconstruction followed. A modified vestibuloplasty was performed together with the placement of free gingival graft (FGG), harvested from the palate, to cover the exposed periosteum. Periodontal dressing was applied for 7 days at implant site, palatal donor site was covered with an absorbable collagen fleece fixed with mattress sutures. After 2 months uneventful healing, prosthetic restoration followed.

**Results:** 6 months, and 2 years postoperatively, sufficient and stable keratinized mucosa was observed at the buccal aspect of 36 dental implant, with no signs of inflammation, and radiological bone loss. Reestablished soft tissue and prosthetic conditions helped the patient in oral hygiene maintenance, and prevented microbial contamination.

**Conclusion:** The presented case may underline the importance of prosthetically driven implant placement and the role of appropriate soft tissue environment around dental implants.

## P1190

### Experimental peri-implant mucositis: comparison of clinical and neutrophil responses with gingivitis in humans

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**Aim:** We aimed to develop, characterize and validate an experimental peri-implant mucositis model in humans and compare

clinical and neutrophil markers to experimental gingivitis in the same subjects.

**Material and Methods:** Fifteen healthy human subjects were recruited having 2 Straumann tissue level implants in function for at least 1 year, and 2 teeth in corresponding positions. Teeth and implants had no radiographic bone loss and PD  $\leq 4$  mm. Subjects underwent an experimental three week period of undisturbed plaque accumulation and optimal plaque control was re-instituted for three weeks. Clinical data (plaque index, gingival index, angulated bleeding score) and crevicular fluid samples were collected at days 0, 7, 14, 21 and 42. Two neutrophil proteins (lactoferrin and myeloperoxidase) were analyzed in crevicular fluid.

**Results:** During the plaque accumulation phase plaque index, gingival index, angulated bleeding scores, crevicular fluid volumes and neutrophil markers increased, in a time-dependent manner. Despite lower plaque levels there was a trend for a greater increase in bleeding, gingival index and crevicular fluid volumes in implants compared to teeth and most of these outcomes remained elevated in implants following the 3 week resolution phase. Neutrophil markers were higher at implants compared to teeth at baseline but there were no significant differences from teeth during the experimental period and crevicular fluid concentrations returned to baseline at day 42.

**Conclusion:** Peri-implant mucosa develops a stronger clinical inflammatory response to plaque accumulation than gingiva. Experimental gingivitis and peri-implant mucositis are reversible at the neutrophil biomarker level.

## P1191

### Bacterial activity in peri-implantitis and periodontitis

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**Aim:** Peri-implantitis is an inflammatory disease affecting mucosa and supporting bone around osseointegrated implant. Recently, we showed the difference of core microbiota between peri-implantitis and periodontitis, even though the sources of bacteria around the implant were present elsewhere in the oral cavity. However, the difference of their active microbiota and function has not elucidated. Therefore, this study aimed to clarify the functional microbial difference between peri-implantitis and periodontitis.

**Material and Methods:** Eleven patients who have peri-implantitis and periodontitis were selected. The diagnostic criteria were exhibiting sites with probing pocket depth (PPD)  $\geq 4$  mm, bleeding on probing (BOP) and/or pus discharge and concomitant radiographic bone loss. Sub-gingival and sub-mucosal biofilm samples were taken from the deepest pockets of each site, and we characterized bacterial community of 16S rRNA and 16S rRNA genes (rDNA) using Illumina miseq.

**Results:** A total of 7,493,910 post-trimmed 16s rRNA and rDNA sequences were used for the following microbial composition analysis. The detected taxa were different between rRNA and rDNA. When we hypothesized that there were the active bacteria (the ratio of 16S rRNA to rDNA  $\geq 1$ ) in microbial community, they have specific functions. Among those functions, secretion system was common between peri-implantitis and periodontitis, but others were not.

**Conclusion:** We present the first analysis of microbiome of peri-implantitis and periodontitis comparing bacterial activity.

The results indicate that the key function of microbiome in peri-implantitis differs from those of periodontitis, suggesting that approach for its treatment should be different from periodontitis.

## P1192

### Effect of Er, Cr:YSGG laser treatment in implant mucositis and mild implantitis

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**Aim:** to compare the clinical treatment outcome of implant mucositis or mild implantitis between Er, Cr:YSGG laser and traditional curettage.

**Material and Methods:** 20 patients with implant-mucositis or mild implantitis were enrolled in this study, perio-pathogenic bacterial sampling and clinical parameters examination (modified PLI, BOP, PD) were delivered at baseline and 1.3 months after the treatment. The patients were randomly distributed into test group and control group (both F/M = 5/5, Mean age was 56.8 and 57.1 years old respectively). Implants in test group received Er, Cr:YSGG laser (wavelength 2780 nm, 100 mJ/pulse) treatment for 5 min, implants in control group was debrided by curettes for 5 min. Bacterial DNA was subtracted and perio-pathogenic bacteria Pg, Td, Tf, Fn was detected by PCR in the end of experiment.

**Results:** there were no significant differences in general characteristics between the two groups. Compared with baseline, BOP and PD decreased 1, 3 months after treatment in both groups ( $p < 0.05$ ), BOP mean decreased from  $4.50 \pm 1.51$  to  $3.10 \pm 1.51$  and  $2.90 \pm 1.29$ , PD from  $3.89 \pm 1.29$  mm to  $3.41 \pm 1.16$  mm and  $3.48 \pm 1.24$  mm in test group; BOP mean decreased from  $4.23 \pm 1.30$  to  $3.00 \pm 2.04$  and  $3.08 \pm 1.29$ , PD from  $3.83 \pm 1.61$  mm to  $3.35 \pm 1.50$  mm and  $3.42 \pm 1.42$  mm in control group, but there were no significant improvement differences between the two groups. There were also no significant changes of bacteria detection after the treatment both in two groups.

**Conclusion:** Er, Cr:YSGG showed the same treatment outcome with the traditional curettage, may become a supplement in dealing with mild inflammation around implant.

## P1193

### Effect of titanium surface decontamination using non-contact, high-frequency ultrasonic water flow

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**Aim:** Although one of the most important procedures in managing peri-implantitis is the removal of biofilm from titanium surfaces, this is not sufficient with conventional dental devices. Recently, we have developed a new cleaning system in which high-frequency ultrasonic (345 kHz) is superposed on a water flow from the nozzle. One such technology is an ultrasonic water flow that was developed to clean semiconductors. The purpose of the present study was to compare the efficacy of two different cleaning procedures with contaminated implant surfaces, ultrasonic water flow and brush cone.

**Material and Methods:** Plaque biofilm was formed on titanium specimens kept intra orally for 72 h with five volunteers. For each titanium specimen, residual plaque biofilm (RPB) areas were evaluated as a percentage of the scanned surface selected at random by digital microscope. The decontaminated titanium surfaces were analyzed by energy dispersive X-ray spectroscopy (EDX) and scanning electron microscope (SEM).

**Results:** Ultrasonic water flow was effective for significantly reduction of biofilm from microstructure titanium. Statistical analysis revealed that mean scores ( $\pm$ SD) of ultrasonic water flow ( $4.6 \pm 2.9$ ) is lower than brush cone ( $22.9 \pm 6.8$ ). After treatment of the ultrasonic water flow for 60 s, microorganisms were not observed on the titanium surfaces. EDX revealed that the chemical composition of the titanium surface had not changed after to the ultrasonic water flow.

**Conclusion:** These results suggested that the ultrasonic water flow exposure in a non-contact mode effectively removed adherent biofilm on microstructure titanium.

## P1194

### Non-surgical therapy of peri-implantitis: mechanical debridement with titanium curettes versus mechanical debridement combined with ultrasonic device, Er:YAG laser and Air-Abrasion: 6-month outcomes of a randomized controlled clinical trial

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**Aim:** The objective is to compare the clinical and microbiological effects in non-surgical treatment of peri-implantitis.

**Material and Methods:** 29 subjects with peri-implantitis were randomly assigned to two treatment groups. Implants in the control group (C; N = 16) received mechanical debridement with titanium curettes, implants in the test group (T; N = 13) received adjunctive therapy with a carbon tipped ultrasonic device, Er:YAG laser and Air Abrasion. Data were collect before, 3 and 6 months after therapy. Outcome variables included BoP, PPD, CAL, full mouth plaque scores and bacterial counts of peri-implant sites.

**Results:** At 3 months, the average BoP has reduced 21% in the test group (92.28% vs 73.17%), 9% in the control group (86.27% vs 78.92%). At 6 months, mean BoP reduction is 15% in both groups (T: 92.28% vs 78.75%, C: 86.27 vs 73.04%). At 3 months, the average PPD has reduced 10% in the test group (5, 86 vs 5.28 mm), 12% in the control group (5.86 vs 5.13 mm). At 6 months, mean PPD reduction is 0.3% in the test group (5.86 vs 5.84 mm), 12% in the control group (5.86 vs 5.14 mm). At 3 months, the average CAL has reduced 12% in the test group (4.98 vs 4.38 mm), 8% in the control group (5.08 vs 4.66 mm). At 6 months, mean CAL reduction is 6% in the test group (4.98 vs 4.66 mm), 15% in the control group (5.08 vs 4.33 mm).

**Conclusion:** Non-surgical peri-implantitis therapy is usefull, but preliminary data do not show clear differences between control group and test group.

## P1195

### Soft tissue grafts in the treatment of periimplantitis: Case Reports

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**Aim:** Using three case reports we demonstrate the successful use of soft tissue grafts for the treatment of periimplantitis.

**Material and Methods:** In the first case a patient showed seven years after augmentation of the maxilla using an ilia crest graft (ICG) a resorption of the graft in the bucco-oral dimension with a concomitant absence of zone of keratinized mucosa (KM) and periimplantitis. Following anti-infective therapy, thickening of the buccal mucosa was performed using a free connective tissue graft (fCGT); two month later a free gingival graft (FGG) was transplanted. In the second case the patient was referred with recurrent periimplant infections. Prior to referral the patient received a bone graft using a block allograft with simultaneous implantation. A dehiscence of the graft with loss of periimplant bone and KM could be observed two years later. The graft was removed and implants decontaminated. Two month later a FGG was transplanted. In the third case a patient presented with a horizontal resorption of the graft with a secondary bacterial infection of the periimplant pockets five years after augmentation of the maxilla using ICG. A FGG was transplanted after anti-infective therapy and apically repositioned flaps.

**Results:** During a three-year follow-up period neither periimplant inflammations nor progressive bone loss could be detected. Thickening of the periimplant mucosa using fCTG prior to FGG transplantation might be indicated in some cases.

**Conclusion:** Reconstructing a sufficient amount of KM using FGG appear to present a crucial factor in the treatment of periimplantitis and thus should be embedded if indicated.

## P1196

### Is keratinized mucosa indispensable to maintain peri-implant health?

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**Aim:** The purpose of this systematic review was to determine whether KM is necessary for maintaining peri-implant health.

**Material and Methods:** Cochrane Library, MEDLINE, EMBASE, and Virtual Health Library (VHL) databases were utilized to search original articles. The search terms used on electronic databases were "dental implants" OR "endosseous implants" AND "periimplant" OR "attached" OR "masticatory" OR "keratinized" AND "soft tissue" AND "mucosa" AND "gingival". The inclusion criteria were: 1. Human studies published; 2. English language; 3. Studies evaluated the association between KM width and the peri-implant tissue health; 4. Studies that have follow-up of 12 months; 5. Publication of studies not older than 10 years. Two readers reviewed each article independently, and the information obtained was compared. The following five variables were evaluated: sample size, study design, selection description, diagnostic methods, and follow-up.

**Results:** A total of 235 articles and abstracts about KM width surrounding endosseous dental implants were gathered. 14 relevant studies were selected for more detailed evaluation. Three studies were judged to be of high methodological quality; four studies were judged to be of moderate methodological quality; and none of the selected articles was categorized as low methodological quality.

**Conclusion:** In support of the initial hypothesis, the literature consulted indicates that the presence of an adequate zone of keratinized tissue might be critical. However, further studies are needed to determine the clinical significance of keratinized tissue around dental implants, as there are still many disagreements in the literature.

## P1197

### In vivo comparison between a hydrophobic gingiva-adhesive and a standard water-soluble chlorhexidine-gel on supragingival biofilm formation on implant abutments

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**Aim:** To compare in-vivo and against a control the effect of two chlorhexidine-containing formulations on areas covered by biofilm of healing abutments, one and two weeks after following a special protocol of supragingival application.

**Material and Methods:** 17 patients, wearing 42 healing abutments were distributed in 3 groups. In Group1, a hydrophobic gingiva-adhesive gel (durimplant, lege artis Pharma GmbH + Co.KG, Dettenhausen,Germany) was applied by gentle rubbing, and at home after evening brushing, every second day. In Group2, a standard hydrophilic gel (Chlorhexamed, GlaxoSmithKlineCons. HealthcareGmbH&Co. KG, Germany) was applied in the same way, twice daily. The control group received no gel. Healing caps were removed after 7 and 14 days, to assess the relative area of supragingival biofilm formation. The supragingival abutment area was delimited using duplicates and a modification of Elter's method (2008). Biofilm formation was analyzed using low-vacuum SEM, including secondary electron-detection. Mann-Whitney test was used to assess the inter-group variations of biofilm-covered areas.

**Results:** After 7 days, the mean percentage of biofilm-covered reached  $20.19 \pm 17.67\%$  in Group1,  $17.98 \pm 11.58\%$  in Group2, and  $36.95 \pm 16.27\%$  in the control group; there was a significant difference between both Chlorhexidine-containing gel groups and the control ( $p < 0.05$ ), but no significant differences between Groups1 and 2. After 14 days, the percentage of biofilm-covered areas reached  $28.31 \pm 15.95\%$  in Group1,  $19.47 \pm 8.89\%$  and  $32.61 \pm 13.91\%$  in Group2 and control group, respectively; the only significant difference was between Group2 and the control group ( $p < 0.05$ ).

**Conclusion:** Both Chlorhexidine gels resulted in significant reductions of biofilm-covered areas at 7 days when compared with the control, but in no significant differences between them. At 14 days, only the soluble Chlorhexidine gel resulted in significant reductions when compared with the control.

## P1198

### Risk factors associated with peri-implant mucositis

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**Aim:** To determine the prevalence of peri-implant mucositis and the association between systemic and local risk factors.

**Material and Methods:** This was an analytical cross-sectional study on 74 patients with restored single implants treated at the Faculty of Dentistry of the University of the Western Cape, from 1st January 2005 until end October 2011. Various risk factors evaluated for peri-implant disease included gender, smoking, diabetes, implant position in dental arch, implant connection, implant diameter, type of implant restored crown, keratinized gingival width, and oral hygiene. Peri-implant mucositis was evaluated by visual examination, measured by bleeding on probing (BOP) using a Vivacare TPS<sup>®</sup> periodontal probe. A positive response was considered a sign of peri-implant mucositis. The prevalence of peri-implant mucositis in the sample and the null hypothesis was tested with the chi-squared test for not normally distributed data.

**Results:** There was an overall prevalence of peri-implant mucositis of 70.3% per implant site. Null hypothesis was rejected by four risk factors which had a statistically significant association with peri-implant mucositis: anterior dental arch position; wider keratinized gingival widths; poor to fair oral hygiene status; and prior oral hygiene instructions. Analysis of the data revealed the majority (77.27%) of implant-supported cement retained restorations in the anterior area presented with BOP. This may be explained by the extrusion of cement around a cement-retained restoration which, given time in a vascular environment could elicit a foreign body inflammatory reaction.

**Conclusion:** The high prevalence rate highlights the need for implant maintenance. Cement-retained restorations negatively influence the long term mucosal health around implants.

## P1199

### Efficacy of an adjunct diode laser application in the treatment of peri-implantitis: a clinical, radiographic and microbiologic study

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**Aim:** Eradication of the pathogenic bacteria and the infected sulcular epithelium presents a significant challenge in the treatment of peri-implantitis. In this prospective clinical, radiographic and microbiologic split-mouth study, efficacy of a diode laser (DL) as an adjunct to conventional scaling in the treatment of mild-to-moderate peri-implantitis was investigated.

**Material and Methods:** Ten patients (mean age: 55.1, SD: 11.4) carrying 48 two-piece, rough-surface implants diagnosed with peri-implantitis were recruited. In addition to the conventional scaling and debridement (control group), crevicular sulci and the corresponding surface of random 24 implants were lasered by a DL running at 1.0 W pulsed mode (laser group). Healing was assessed by periodontal indexes (baseline and after one and six months), microbiologic specimens (baseline and one month) and radiographs (baseline and after six months).

**Results:** Baseline mean pocket depths (4.71, SD: 0.67 and 4.38, SD: 0.42 mm), marginal bone loss (2.71, SD: 0.11 and 2.88, SD: 0.18 mm) were similar between the control and laser groups ( $p = 0.12$ ,  $p = 0.11$  and  $p = 0.09$  for baseline and after one and six months respectively). After six months, laser group revealed a higher MBL (2.79 SD: 0.48) than the control group (2.63, SD: 0.53); ( $p < 0.0001$ ). In both groups, microbiota of the implants were found unchanged after one month.

**Conclusion:** In the present investigation, adjunctive use of a DL caused an increased MBL and did not yield any additional positive influence on the peri-implant healing microbiota than conventional scaling alone.

## P1200

### Comparison of the diagnostic potential of radiographic methods at detecting peri-implant bone defects. An in vitro experimental study

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**Aim:** To evaluate the diagnostic performance of conventional periapical radiography (PR) direct digital periapical radiograph (DDR), digital panoramic radiography (PANO) and cone beam computed tomography (CBCT) in the detection of peri-implant bone defects.

**Material and Methods:** Fifteen implants (Restore<sup>®</sup> and Renova<sup>®</sup> (Dental Keyston Burlington, USA) were placed in four dry human mandibles. Bone peri-implant defects were created randomly: five sites with no bone defects, five with 0.5 mm bone defects, five with 1.5 mm bone defects, five with 2.0 mm bone defects and five with 3.0 mm bone defects. Radiographs were taken using: PR, DDR, PANO and CBCT. The radiographic images were examined by an observer at three different times. The diagnosis of the presence or absence of peri-implant bone defects was recorded on a five-point scale.

**Results:** DDR had better sensitivity (75%) as well as the PR and better specificity (100%) than other radiographic techniques. The intraobserver agreement level was rated moderate for DDR, PR, PANO and fair for CBCT.

**Conclusion:** Direct digital radiography is the most accurate technique in the detection of bone defects followed by conventional periapical radiography, digital panoramic and CBCT.

## P1201

### Comparison of regenerative outcome between macro- and microthreaded implants in peri-implantitis defects

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**Aim:** Due to their favorable bone reaction, implants with microthread configuration have been widely used in clinic. However, the influences of microthread design on regenerative outcome in peri-implantitis defects are not fully investigated. The aim of this study is to compare the regenerative outcome in micro- and microthreaded implants in peri-implantitis defects.

**Material and Methods:** Microthreaded implants and macrothreaded implants were placed in healed alveolar ridge of the mandibular fourth premolar region in beagle dogs. After three months later, experimental peri-implantitis defects were induced by ligature. To reconstruct peri-implantitis defects, guided bone regeneration procedures were performed using hydroxyapatite, collagen gel and barrier membrane. After three months of healing, animals were sacrificed.

**Results:** Amounts of bone regeneration were significantly greater in microthreaded implants than macrothreaded implants in both buccal and lingual sides ( $p = 0.027$ ,  $p = 0.040$ , respectively). Amount of re-osseointegration and ratio of vertical bone fill were greater in microthreaded implants, but it was not significantly different in both sides. Bone-to-implant contact of re-osseointegrated bone was significantly greater in macrothreaded implants in the lingual side ( $p = 0.020$ ).

**Conclusion:** Microthreaded implants showed favorable results in bone regeneration for peri-implantitis defects than macrothreaded implants.

## P1202

### Surface changes of dental implant systems in hydrogen peroxide

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**Aim:** Titanium and its alloys are the most commonly used materials in the field of implantology due to its good mechanical and biological properties. However, some therapeutic solutions widely used in daily general dental practice can lead to corrosion of titanium-based materials. **Aim:** To evaluate surface changes and degradation of dental implant systems after their immersion in hydrogen peroxide.

**Material and Methods:** Dental implant systems were embedded in epoxy resin and cross-sectioned along the implant vertical axis. Sectioned samples were grinded, polished and then cleaned under an ultrasonic bath to perform optical profilometry and scanning electron microscopy (SEM) of the selected areas. These areas were immersed in 35% hydrogen peroxide (PG) for 16 min. After immersion, surfaces were cleaned and analyzed once again by SEM and profilometry.

**Results:** SEM analysis revealed topographic changes in implant systems after immersion in sodium fluoride. Implants showed an appearance of excessive oxidation with loss of material while abutment surfaces revealed intergranular corrosion. After immersion in hydrogen peroxide although the profilometry results have showed increase of roughness

**Conclusion:** The surface change caused by hydrogen peroxide 35% was significant, considering the Ra roughness mean values.

## P1203

### Inconsistency between abundance of 16S rRNA and mRNA in bacterial community of periodontitis and peri-implantitis

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**Aim:** Elucidation of relationship between abundance of 16S rRNA (translation) and mRNA (transcription) in bacterial community of periodontitis and peri-implantitis.

**Material and Methods:** Sub-gingival plaques were obtained from the deepest pockets at the periodontitis and peri-implantitis in the same patient, and bacterial total RNA was extracted. Metatranscriptomic analyses were performed to identify both the species with high abundant 16S rRNA and highly expressing functional genes.

**Results:** Significant difference of alpha- and beta-diversity in 16S rRNA abundance was not observed, and the major species with high abundant 16S rRNA were similar in the microbiota of periodontitis and peri-implantitis. In the red complex, abundant *Porphyromonas gingivalis* 16S rRNA was observed in almost all the samples of both the two groups, while this was not the case for *Tannerella forsythia* and *Treponema denticola*. Analyses of mRNA revealed there was a discrepancy between the species with high abundant 16S rRNA and with highly expressing functional genes. Although the major bacterial species expressing high amounts of functional genes were shared with the two diseases, some specific genes were found in each group. The specific genes that were found in peri-implantitis might be associated with rapid disease progression of peri-implantitis.

**Conclusion:** We demonstrated the high abundance of 16S rRNA was not necessarily for the pathogenicity. The species in which transcription of virulent genes are activated should be important for clarifying the progression of polymicrobial infection, although they are not high abundant 16S rRNA in microbiota.

## P1204

### Osteonecrosis around the dental implants after intravenous bisphosphonates treatments: case reports

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**Aim:** Bisphosphonate-related jaw necrosis (BRONJ) associated with dental implant is a rare but reported as a complication. As a result of this complication loss of implant has been reported.

**Material and Methods:** A-58-year old female and a-62-year-old male patient were referred to the Department of Periodontics, Gazi University, Turkey, for refractory pain on their posterior mandible associated with purulent discharge. The patients had a history of intravenous bisphosphonate (BP) therapy for metastatic bone diseases. The female patient who had two implants inserted 2 years and the male patient who had a implant inserted 4 years before initiating BP treatment, were diagnosed with severe bone defects on their mandibular posterior dental implants and treated for peri-implantitis. Surgical therapy was performed in both patients. After flap elevation

necrotic bone was observed around the implants. Part of the necrotic bone and granulation tissues removed during surgery were sent for a pathological examination. Concentrated growth factor (CGF) was applied to the areas and flaps were sutured with a primary closure. The histological features of the lesions showed that the necrotic bone with empty lacunae was infiltrated by inflammatory cells and bacterial colonies.

**Results:** The use of CGF to enhance wound healing, reduce bone exposure and pain, may be a good treatment protocol in BRONJ subjects.

**Conclusion:** The placement of dental implants in cancer patients treated with intravenous BP is contraindicated and beside, already osseointegrated dental implants can cause the osteonecrosis around the implant after BP administration.

## P1205

### Treatment of implants with peri-implant disease: case report.

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Milano/Italy

**Aim:** Peri-implantitis is an infection from pathogenic bacteria that activates the inflammatory response and produces peri-implant bone loss. Aim of this study was to clinically evaluate at 6 months the healing of two implants treated for peri-implant disease.

**Material and Methods:** In one partially edentulous patient two implants (#31 and #41) were diagnosed for peri-implant disease induced by plaque accumulation. No trauma of occlusion, malposition or cementum remnants were assessed. Implants had been placed about 10 years ago after bone regenerative procedure in an external structure. At the clinical evaluation bleeding on probing and suppuration were observed. In all sites, probing depth was between 10 and 13 mm for both implants. Implants were treated with debridement performed with ultrasonic device and curettes, and pockets were irrigated with hydrogen peroxide. After treatment, therapies with systemic antibiotic (Amoxicillin + clavulanic acid 1 g, twice for 6 days) and local antiseptic (Chlorhexidine gel 1%, twice for 3 weeks) were prescribed. Visits of control were performed until 6 months. Radiographs were performed before treatment and after 6 months.

**Results:** After therapy, probing depth was strongly reduced and returned in the physiological range. Recession of peri-implant mucosa appeared. No bleeding on probing and suppuration was assessed. At the radiographic evaluation, partial re-mineralization of the defect was observed.

**Conclusion:** Treatment of implants affected by peri-implantitis with debridement, hydrogen peroxide, systemic antibiotic and local antiseptic may re-establish clinically healthy peri-implant condition. At 6 months this results can be maintained. Partial re-mineralization of the defect can be observed.

## P1206

### Is gaseous ozone application enhance the healing of surgical peri-implantitis treatment? –A preliminary study

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**Aim:** The beneficial biological effects of ozone, its healing and tissue regeneration properties, make the use of ozone well indicated in dentistry. Currently, limited data are available for the effectiveness of gaseous ozone application as an adjunct to surgical periodontal therapy. The aim of this study was to evaluate the clinical results of surgical periodontal treatment combined with the gaseous ozone application in peri-implantitis patients.

**Material and Methods:** A total number of 8 implant from 5 patients requiring peri-implantitis surgery were included and a combined resective and regenerative procedure used in the treatment of peri-implantitis in this study. Ozone therapy was performed during the surgical procedure and also 1 week before and after the surgery (3 times in a week) to enhance the healing of soft tissue and bone around implants. The following clinical parameters were recorded in a period of 6 months: bleeding on probing (BOP), probing depth (PD) and clinical attachment level (CAL).

**Results:** Peri-implant PD was measured at four sites per implant. At 6 months, 8 implants (32 sites) were evaluated. The mean value of PD decreased from 4.68 mm at baseline to 1.71 mm after 6 months. BOP was evaluated for 32 surfaces, 24 of which (75%) showed bleeding before the operation. BOP was observed at only 1 surface (3.5%) at the sixth month. At the end of the six months the CAL values decreased.

**Conclusion:** This study concludes that the use of ozone as an adjunctive therapy to surgical treatment in peri-implantitis patients yielded positive clinical results after 6 months.

## P1207

### Effectiveness of probiotics and photodynamic therapy in peri-implant mucositis: a cross-over clinical study

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**Aim:** Evaluate the effectiveness of the simultaneous use of probiotics and photodynamic therapy for the treatment of peri-implant mucositis and gingivitis.

**Material and Methods:** 20 systemically and periodontally healthy patients, 41 to 78 years of age, participated in a cross-over design to evaluate the effectiveness of probiotics adjunction to photodynamic therapy for peri-implant mucositis and gingivitis. Peri-implant mucositis and gingivitis were induced for both treatments by 14 days undisturbed plaque accumulation. Plaque index (PII), marginal bleeding (MB), bleeding on probing (BOP) and probing depth (PPD) were measured at baseline, 14 days after plaque accumulation, 14 days and 1 month after treatment application at implant and tooth level.

**Results:** Clinical parameters increased from baseline to 14 days decreasing at 28 days and 1 months. Kruskal-Wallis test revealed significant differences ( $P < 0.0125$ ) in time in all

parameters at tooth level (both control and test group). At implant level, the value of plaque accumulation tended to be lower with greater bleeding response than at tooth level, but the significant difference in time was reached only for plaque index, marginal bleeding index, marginal bleeding sites and bleeding on probing sites at test group. Compared at the same time period, neither of test or control groups showed statistical difference.

**Conclusion:** The induced inflammation of 14 days was reproducible after 1 month of wash-out between treatments. Both treatment protocols were effective but neither of them was superior to the other.

## P1208

### Management of retrograde peri-implantitis: Case report

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Rabat/Morocco

**Aim:** Peri-implant apical infections are challenging situations in implant dentistry because sufficient knowledge on etiology and treatment is lacking. Retrograde peri-implantitis (RPI) is defined as a clinically symptomatic periapical lesion that develops shortly after implant insertion while the coronal portion of the implant sustains a normal bone-to-implant interface. The etiology of RPI is unclear and may be attributed to several causes. The management of RPI has been attempted by either resective or regenerative techniques. The aim of this case report is to present the treatment and 1-year follow-up of an implant with a periapical lesion.

**Material and Methods:** An implant-associated periapical bony defect was successfully treated with regenerative approach. Via the elevation of a full-thickness flap, curettage of the apical lesion, irrigation with povidone iodine solution, and placement of deproteinized bovine bone mineral as bone substitute. Complete resolution of the apical defect was achieved, as evidenced by clinical and radiographic examination 1 year after treatment.

**Results:** Most case reports suggest that the residual bacteria in a radiographically healed socket or in an adjacent periapical lesion are the main causes of RPI. Many techniques have been used: debridement only, combination of debridement with grafting material, detoxification of the infected implant surfaces or apicoectomy. We should emphasize on periodic clinical and radiographic examination of implants that are placed adjacent to endodontically treated teeth and a shorter recall program.

**Conclusion:** Curettage and regeneration of the periapical lesion associated with decontamination of the apical portion of implants seems to be a viable treatment modality in the management of RPI.

## P1209

### Osteomyelitis and pathological mandible fracture in patient with endosseous implants: unusual case report

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Istanbul/Turkey

**Aim:** The following clinical report describes an unusual consequence of peri-implantitis.

**Material and Methods:** In December 2009, 52-year-old woman with controlled Type-2 diabetes (HbA1c <6.5) presented at the Department of Periodontology of Bezmialem Vakif University, Turkey. Her complaint was tooth absence. According to diagnosis, she was treated for periodontal disease and four implants had been placed in the left side of the mandible. She had received yearly clinical and radiographic evaluations for five years. During this period, periapical radiographs did not reveal evidence of progressive periimplant bone loss. In June 2014, the patient applied for decementation of the bridge on the left side. She complained for severe pain. In diagnosis, Type 2 mobility and 5 mm periodontal pocket in distal region had seen for 35 tooth. Besides this, in the same region resorption was detected for both implants. So, surgical periimplantitis treatment was applied for this problem and controlled with CT records.

**Results:** It was seen from the CT, there was a green tree fracture occurred on the left side of the mandible. The implants were explanted from the bone and fracture lines were come together with mini-screws and plates. At the 2-month review appointment the patient complained any pain or unusual sensation.

**Conclusion:** Such a recall process may result in detection of implant failure at an early stage so that treatment strategies can be implemented

## P1210

### A case report: Therapy of peri-implantitis with an autogenous bone graft and apically repositioned flap associated with implantoplasty.

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Montrouge/France

**Aim:** Resective or regenerative surgical approaches are proposed for the treatment of peri-implantitis depending of the morphology and the shape of bone defects.

Several experimental and clinical studies assessed the positive effects of regenerative treatment procedures at intrabony defect components. Suprabony defects in non-aesthetic regions can be treated by an apically repositioned flap.

**Material and Methods:** The clinical case report presents a combined defect configuration including a buccal supra crestal as well as a palatal intrabony aspect. The treatment was performed by a combination of autogenous bone graft on the palatal part and apically repositioned flap involving implantoplasty on the buccal part, with follow up during 2 years.

**Results:** This is an opportunity to discuss the conditions of osseointegration of contaminated implant surface, different materials for filling intrabony defects and the potentiation of peri-implant maintenance by performing an implantoplasty at the implant surface exposed.

**Conclusion:** In conclusion, the protocol used for the peri-implantitis seemed influence positively the survival of the implant affected by peri-implantitis. However, studies need to be conducted to assess the long-term results

## P1211

### Prevalence of peri-implant mucosal inflammation

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**Aim:** The aim of this study was to determine the prevalence of peri-implant mucosal inflammation.

**Material and Methods:** Seventy-one subjects with a total of 357 implants in function for at least 6 months were examined. Bleeding on probing (BOP) and probing pocket depth (PPD) were evaluated in 6 sites of each implant. Bivariate analysis was used to assess the association between bleeding on probing and sex, age, diabetes, hormonal reposition, smoking habits, probing depth and keratinized tissue width.

**Results:** Fifty-four % of the participants showed mucosal inflammation, and  $31.6 \pm 28.5$  of sites per person had mucosal inflammation. No significant association was found between bleeding on probing the independent variables.

**Conclusion:** Peri-implant mucosal inflammation was observed in more than half of patients and a mean of 32% of sites showed inflammation.

## P1212

### Functionalized polyetheretherketone inhibiting oral biofilms

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**Aim:** The objective of this work was to evaluate the biofilm formation on polyetheretherketone embedding antibiofilm compounds.

**Material and Methods:** Samples were functionalized by using sulfuric acid treatment and then dissolved into dimethyl sulfoxide (DMSO<sup>®</sup>, Synth, Brazil). A dip coating technique was used to synthesize thin films on glass-based substrates. Sulfonated PEEK was characterized by thermal gravimetry (TGA), infrared spectroscopy (FTIR) and scanning electron microscopy (SEM) before contact with a mixed biofilm composed of *Streptococcus mutans* and *Enterococcus faecalis*. After biofilm formation in specific growth medium, the optical density (OD) of biofilms was assessed by spectrophotometry. Also, SEM analyses were performed to inspect the biofilm morphology. The results were statistically analyzed via one-way analysis of variance (ANOVA), with a significance level of  $p < 0.05$ .

**Results:** Elemental analysis indicated a degree of sulfonation (DS) at 65% while TGA curves confirmed the presence of SO<sub>3</sub>H and lactams into SPEEK structure. That can be determined by the presence of sulfonic acid groups as revealed at bands 3440, 1252, 1080, 1024, and 709 cm<sup>-1</sup> in the FTIR spectra. Also, the identification of Br or Cl indicated the presence of U27-2 lactam in the SPEEK composition. The biofilm density on the surface of SPEEK containing lactam was lower than that on SPEEK free of lactams.

**Conclusion:** Functionalization technique of polyether-ether-ketone by sulfur acid treatment can be useful to incorporate organic antimicrobial such lactams. That indicated a potential antibiofilm effect of SPEEK embedding lactams as a structural material for dental applications.

## P1213

### Biofilms formation on different materials for rehabilitation supported by dental implants

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**Aim:** The bacterial adhesion onto materials applied in oral rehabilitation supported by implants is a complex process and should be elucidated. The aim of this study was to evaluate the density of the biofilm and number of microorganisms present on different materials for rehabilitation supported by dental implants in order to optimize the choice of material.

**Material and Methods:** Sixty samples were divided into four groups of materials for oral rehabilitation: feldspar-based porcelain; CoCrMo alloy, commercially pure titanium grade IV and yttria-stabilized zirconia. For biofilm formation, was used a human saliva diluted into BHI supplemented with sucrose for growth of biofilms for 24 and 48 h. After this period, the biofilm was removed in diluted suspension by the method of 1% protease. The biofilm was analyzed by spectrophotometry at 630 nm and colony forming units method (CFU/cm<sup>2</sup>). Sample groups were selected for Scanning Electron Microscopy High Resolution (FEG-SEM) to evaluate the morphology of biofilms on different surfaces.

**Results:** The results showed higher values of absorbance (630 nm) and CFU/cm<sup>2</sup> for biofilms formed on CoCr alloys compared to that of other materials tested, and also to biofilm density and number of microorganisms. The results obtained by absorbance and CFU/cm<sup>2</sup> methods were similar for biofilms grown after 24 and 48 h on zirconia porcelain and titanium. However, the titanium alloy showed slightly higher values compared to that of ceramic materials.

**Conclusion:** This may indicate a trend to accumulation of oral biofilms on prosthetic structures based on CoCr compared to structures based on titanium or zirconia.

## P1214

### Effect of novel lactam-based synthetic compounds on *S. mutans* biofilms

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**Aim:** The aim of this study was to assess the effect of novel fourteen lactam-based synthetic compounds on the inhibition of biofilms composed of *S. mutans* by microbiological analyses.

**Material and Methods:** The compounds were solubilized in 100% dimethyl sulfoxide (DMSO) in a concentration of 5 mg/ml. Then, different concentrations of the compounds in solution ranging from 0.17 up to 87.5 µg/ml were tested. The initial suspension (30 µl) containing *S. mutans* cells were re-suspended in 3 ml of TSB and incubated for 24 h in a micro-aerophilic chamber at 37°C. After 24 and 48 h of growth, the biofilm density was measured by solution absorbance at 630 nm and crystal violet staining method at 595 nm using spectrophotometer (Tecan Infinite M200, Switzerland). The statistical analysis of the results was performed by one-way analysis of variance (ANOVA) at a significance level of 5% ( $p < 0.05$ ).

**Results:** A group of four compounds was active against planktonic growth and biofilm formation. Another group of five lactams was active against biofilm formation, but inactive against the bacterial growth. One lactam was active against planktonic growth only. Finally, other four lactams showed a low activity against both planktonic and biofilm growth.

**Conclusion:** Thus, nine of the fourteen lactam-based compounds showed to be active against biofilm formation of *S. mutans*. Considering such interesting outcome obtained on lactam-based compounds, it is suggested that further studies should be conducted for therapeutic purposes.

## P1215

### Analysis of a complex oral biofilm on abutments implants surfaces

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**Aim:** Dental implant rehabilitation has become a routine procedure to replace missing teeth. Its success depends on proper osseointegration, as well as the lack of inflammation. An important factor contributing to the development of inflammation is the attachment of microorganisms and subsequent development of biofilms on the prosthetic components. The aim of this investigation was to compare the in vitro development of a complex oral biofilm on two different abutments implants surfaces, titanium and zirconia.

**Material and Methods:** Pure titanium (Ti) and zirconia stabilized with yttrium (ZrO<sub>2</sub>) disks were used as experimental groups. Roughness and surface energy of all surfaces was analyzed. Biofilm development was performed by incubating the disks in rich medium containing a complex representative saliva derived oral microbial community for 16 and 48 h. The bacterial profile was evaluated by Denaturing Gradient Gel Electrophoresis (DGGE) and the dominant bands were excised and sequenced for genus identification. Also, a qualitative assessment of the attached biomass was evaluated by confocal microscopy.

**Results:** We found similarity on bacteria profile after 16 h and 48 h. However, confocal microscopy confirmed that the Ti discs amassed less bacteria compared to ZrO<sub>2</sub> surfaces.

**Conclusion:** These new findings suggest that the material composition has an important impact on the type of bacteria that adhered onto abutment surfaces. This information can lead to important development in strategies to create anti-microbial titanium surfaces, leading to significant improvement in implant longevity.

## P1216

### Pathogenic in vitro oral biofilm on implant surfaces

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**Aim:** To assess the efficacy of two chemical agents, chlorhexidine and amoxicillin with metronidazole, at different exposure times, on a five-species pathogenic oral biofilm (*Streptococcus mitis* (S.m), *Actinomyces viscosus* (A.v), *Veillonella parvula* (V.p), *Fusobacterium nucleatum polymorphum* (F.n) and *Por-*

*phyromona gingivalis* (P.g)), formed in layers around three different implant surfaces (Dentsply Implants®).

**Material and Methods:** An experimental in vitro investigation was conducted using an incidental non-probabilistic finite sample of oral bacteria and titanium implant surfaces, comprising Machined (n = 40), TioBlast (n = 40), and OsseoSpeed (n = 32) disks. A five-species biofilm was developed around titanium disks under sterile conditions, introducing each species sequentially at different time periods. Subsequently, the biofilm was exposed to two different chemical agents (chlorhexidine and amoxicillin with metronidazole) for 1, 5 and 10 min.

**Results:** Multifactorial ANOVA analysis showed that chlorhexidine was more effective in reducing the amount of colony-forming units (CFU) of A.v, S.m and V.p (pvalue ≤0.05). The combination of amoxicillin with metronidazole was more effective reducing the amount of P.g CFUs (pvalue ≤0.05). In addition, no differences are observed between the effectiveness of either chemical agent against F.n (p value ≤0.05).

**Conclusion:** Chlorhexidine is more effective than the combination of amoxicillin with metronidazole against early colonizers after at least 10 min of exposition. Antibiotic treatment shows a higher bactericidal effect on late colonizers adhered to Machined surfaces, maintaining low proportions for at least 10 min of exposition.

## P1217

### Photodynamic therapy in the regenerative treatment of periimplantitis

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**Aim:** Periimplantitis is a common biological complication in implant dentistry. There is no evidence suggesting which could be the most effective interventions for the treating peri-implantitis. Photodynamic therapy shows promising results in non-surgical management of initial periimplantitis.

**Material and Methods:** Forty-eight year old patient was referred to IRON clinic after her previous dentist had diagnosed a periimplantitis and prescribed the associatiob amoxicilin + metronidazol for 15 days. The clinical exam showed a fenestration in the soft tissue around the implant 22 without supuration but with high probing depth and bleeding on probing. Radiographically, a loss of 4 mm around the implant was notes. Regenerative treatment of periimplantitis was planned. After opening a full thickness flap, mechanical debridement was carried out with titanium currettes and a glycine-based powder air-polishing for subgingival biofilm removal was applied to the surface of the implant. Photodynamic therapy was used to decontaminate the implant surface. The guided bone regeneration was performed with xenograft and native collagen membrane. Connective tissue graft was done to correct the soft tissue defect. One year after treatment the bone level remains stable with acceptable aesthetics and healthy periodontal tissues.

**Results:** The reosteointegration of previous infected implants in rough surfaces was accepted by many authors in the literature. The most important factor to n is achieve reosteointegration is the decontamination of the implant surface.

**Conclusion:** Photodynamic therapy in adjunction with surgical mechanical debridement seems to be a safe and efficient therapy do decontaminare the rough implant surface prior to regenerative treatment of periimplantitis.

## P1218

### The effect of five air-abrasive powders on the viability and proliferation of different types of cells: an in vitro study

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**Aim:** Air abrasive devices seem to be a promising alternative for the treatment of peri-implant diseases. Previous research has indicated that air-abrasive powders may have different effect on viability and proliferation of various cell types, but with contradictory results. The aim of this in vitro study was to investigate the possible effect of five commercially available air-abrasive powders on the viability and proliferation of three different types of cells.

**Material and Methods:** The following powders were used: sodium bicarbonate (SB), erythritol with chlorhexidine (Er + CHX), amino acid glycine (Glyc) of 2 different commercially available products and tricalcium phosphate + glycine (TC + Glyc). Gingival fibroblasts (GF), gingival epithelial cells (EPT) and periodontal ligament fibroblasts (PDLF) were cultured for 6 h in solutions containing the different powders. Cell viability was evaluated by means of fluorescence activity of a redox indicator (Alamar Blue<sup>®</sup> Assay) which correlates to cellular activity. Proliferation was determined with a fluorometric indicator of cell numbers based on the fluorescence enhancement exhibited by the CyQUANT GR dye upon binding to DNA (Cyquant<sup>®</sup> Cell Proliferation Assays Kit).

**Results:** There was a significant reduction in the viability and proliferation of all cell types after incubation with SB and Er + CHX solutions, whilst the rest of powders did not have any effect on these parameters.

**Conclusion:** Our study suggest that SB and Er + CHX use for the treatment of peri-implant disease may have a negative effect on GF, EPT and PDLF.

## P1219

### Dental implant osseointegration loss caused by periapical endodontic infection of an adjacent natural tooth: case report and review

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**Aim:** Successful implants are not only characterized by achieving osseointegration but also by the long-term maintenance of it. There are many factors that have to be considered when planning implant treatment. One of these factors is the periapical condition of adjacent teeth to the edentulous space. The aim of this presentation is to report a case of a failed implant that apparently was affected by the periapical pathology of an adjacent tooth.

**Material and Methods:** We report a case of a non smoker 54 years female without relevant medical history. A single implant was placed in the edentulous span corresponding to the upper right first premolar which was missed for more than one year. After a 18 months healing period implant was loaded. At

this time the implant maintained Branemark's success criteria and an implant stability quotient (Osstell ISQ<sup>®</sup>) of 74. Implant failure came out six months after loading. Periapical pathology of adjacent upper right second premolar appeared on computerized tomography, which compromise the failed implant zone and fractured sinus floor over the upper right first molar.

**Results:** In the current literature there are numerous studies about the failure of osseointegration of implants placed into infected sites. However there are few studies on implant failure due to infectious disease in adjacent teeth.

**Conclusion:** Given the current literature and as we noted in our case, achieved osseointegration after placement and conventional loading of dental implants could be compromised due to a periapical infection process of the adjacent teeth.

## P1220

### Efficacy of non-surgical & surgical treatment of peri-implantitis: a subgroup meta-analysis

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**Aim:** To assess the clinical performance of therapeutic approaches to peri-implantitis (PI) in terms of probing pocket depth reduction (PD) and bleeding on probing (BoP).

**Material and Methods:** RCTs on PI treatment with at least 10 subjects per group and 6 months follow-up were identified through electronic databases and hand-searched journals (until September 2014). PD and BoP were the primary outcomes. Weighted means and forest plots were calculated overall and in sub-group analysis according to the protocol of treatment.

**Results:** 14 trials met the inclusion criteria (9 non-surgical and 5 surgical, 427 patients). The overall weighted mean differences (WMD) for PD reduction were 0.71 mm (CI:[0.47, 0.95],  $p < 0.01$ ). Sub-group analysis identified 0.68 mm (CI: [-0.09, 1.46],  $p < 0.085$ ) for non-surgical instrumentation and 0.89 mm (CI: [0.56, 1.21],  $p < 0.001$ ) for laser application. Surgical therapy showed an overall PD reduction of 2.18 mm (CI:[1.90, 2.46],  $p < 0.01$ ). open flap debridement showed a 3.63 mm (CI: [1.89, 5.37],  $p < 0.001$ ) reduction and 2.58 mm (CI: [2.35, 2.08],  $p < 0.001$ ) in reconstructive treatment. The overall WMD for BoP reduction for surgical treatment was 47.16% (CI: [39.83, 54.48],  $p < 0.01$ ) and 37.62% (CI: [22.49, 52.84],  $p < 0.01$ ) in non surgical treatment.

**Conclusion:** Six months after treatment reduction of PD and improvement of BOP is noted after both non-surgical and surgical treatment. However, the quality of the overall literature is limited. Thus, data should be cautiously interpreted.

## P1221

### RANKL/OPG profile around dental implants with machined and rough surfaces

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**Aim:** To evaluate profile of receptor activator nuclear factor kappa-B ligand (RANKL) and osteoprotegerin (OPG) in the

peri-implant crevicular fluid (PICF) around implants with machined and rough implants surfaces affected and non-affected with peri-implantitis.

**Material and Methods:** Clinical and radiological examination were performed in 25 patients with peri-implantitis and 25 patients with healthy peri-implant tissues. 24 h following clinical examination the PICF samples were retrieved from the 11 machined and 14 rough surface implants affected by peri-implantitis and from the 10 machined and 15 rough surface implants with healthy peri-implant tissues. RANKL and OPG levels were evaluated in the PICF samples using enzyme linked immunosorbent assay and commercially available diagnostic assays.

**Results:** All measured clinical parameters were significantly higher in the peri-implantitis when compared to healthy implants. Inter-group comparison demonstrated that RANKL levels were significantly higher in peri-implantitis comparing to healthy peri-implant tissues as opposed to OPG that was significantly increased around healthy implants. Among implants affected with peri-implantitis the implants with rough surface demonstrated higher RANKL levels compared to the machined surface implants while in the group of healthy implants both implant types provided similar RANKL/OPG pattern.

**Conclusion:** There is a difference in the RANKL profile between implants with machined and rough surfaces in condition of peri-implantitis while the RANKL/OPG pattern seems to be similar between these implant types in case of healthy peri-implant tissues.

## P1222

### Long-term follow-up of short dental implants in human – Clinical evaluation

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**Aim:** The aim of this study was to evaluate patients who had short implants installed (<10.0 mm) assessing the implant stability and local tissue aspects.

**Material and Methods:** All patients (mean age 64 years) were treated on the Implantology Service's Brazilian Army (OCEx/RJ), since 2000 to 2008, using Nobel<sup>®</sup>, 3i<sup>®</sup>, Conexão<sup>®</sup> (Brazil) and Ankylos<sup>®</sup> systems, in posterior region of maxilla or mandible. It was evaluated 53 implants: 51 external hexagon (6.71% MKIII-Nobel<sup>®</sup>; 33.33% Conexão<sup>®</sup>; 1.96% 3i), 1 Replace Select<sup>®</sup> (RPL) (Nobel<sup>®</sup>) and 1 morse taper-connection (Ankylos<sup>®</sup>). About all implants, 12 were wide platform (22.64%) and 41 regular platform (77.36%). The implant's length was 7 mm (9.44%), 8 mm (3.77%) and 8.5 mm (86.79%).

The clinical data evaluated were: implant's information (diameter x length, platform); implant loss; mucositis; depth peri-implant pockets; implant exposition; keratinized oral mucosa; and local bleeding.

**Results:** Based on the data obtained, only four patients had mucositis (7.55%), sixteen presented local bleeding (30.19%), four implants with thread exposure (7.55%) and thirteen with only the platform exposed (24.53%). The loss of bone insertion was assessed and a significant pocket depth (>3 mm) was found on twenty implants (37.74%).

**Conclusion:** Verifying the long-term data, short implants are an excellent choice for oral rehabilitation when there is a few bone height. Besides that, particular attention must be given for the correct hygienization and prophylaxis.

## P1223

### Regenerative surgical treatment of peri-implantitis: a systematic review and clinical case report

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**Aim:** The object of this study was to perform a systematic literature review to investigate if there today is any evidence on beneficial effects when using regenerative procedures when treating peri-implant lesions and perform a pilot study on peri-implant lesions with a regenerative procedure.

**Material and Methods:** Pubmed database were searched for articles published up to 2013-10-31 and were examined. Initial search of titles and abstracts were screened and assessed for possible inclusion in the review. After the first exclusion the remaining articles were detailed evaluated with full texts to decide inclusion.

Regenerative surgery were performed in 2 patients with different outcomes.

**Results:** Initial step 1 resulted in identification of 160 articles. After screening of titles and abstracts 35 articles were left for a more detailed evaluation. After a careful analysis 10 articles were included.

**Conclusion:** There is today a variety of treatment protocol used in studies for treating peri-implant defect with a regenerative technique. No conclusion between the best methods for treatment can be drawn from the available studies, but short-term studies show that patient benefits from different surgical therapy. Even though they demonstrate a favorable outcome the long-term effect is unknown. Future RCT studies comparing the results of peri-implantitis treatment with regenerative techniques to a control group with non-regenerative surgery is needed to evaluate treatment outcome. The results from the systematic review and clinical outcome of 2 cases is presented.

## P1224

### Non-surgical management of peri-implantitis using the Erbium, Chromium: Yttrium Scandium Gallium Garnet laser: one year follow up case series

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**Aim:** To assess the efficacy of using an Erbium, Chromium: Yttrium Scandium Gallium Garnet (Er, Cr:YSGG) laser in the non-surgical treatment of peri-implantitis

**Material and Methods:** Implants diagnosed with peri-implantitis and having at least one 5 mm pocket around them were included into the study. In total 28 implants consisting of 68 sites >4 mm were treated non-surgically with an Er, Cr:YSGG water-cooled laser, using a 14 mm, 500 µm diameter, radial firing tips (Biolase). Probing depths, recession and bleeding on probing were recorded at baseline, after 2 months, 6 months and 1 year.

**Results:** The age range of patients was 27–69 years (mean 55.9); the mean pocket depth at baseline was 6.19 mm (range 5–12 mm), reducing by a mean of 3.71 mm to 2.48 mm by one year follow up (p < 0.001). The mean recession after treatment per implant was 0.38 mm (range 0–2.25 mm). The mean CAL gain per implant was 3.33 mm (p < 0.001). The number of

bleeding sites continued to reduce at each follow up, with 13% bleeding sites remaining after one year ( $p < 0.003$ ). Radiographs showed signs of bony infill having occurred in some cases. There was no significant difference between the results found at 2 months, 6 months and 1 year.

**Conclusion:** The use of the radial firing tip with the Er, Cr: YSGG laser is a novel concept in the management of peri-implantitis and in view of the positive findings in this case series, further studies including RCTs are required to further evaluate the potential benefits of this new minimally invasive treatment approach.

## P1225

### Insufficient root canal treated adjacent teeth to implants: a risk factor causing peri-implantitis? A clinical and histological case report

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**Aim:** Peri-implantitis is an inflammatory process affecting the soft and hard tissues surrounding an implant. The etiopathogenesis of peri-implantitis is complex and related to a variety of factors. Insufficient root canal treated adjacent teeth can affect dental implants and cause peri-implantitis. The aim of this study was to determine the severity and extent of peri-implantitis. The diagnostic process consists to score the damage of periodontal tissues, as expressed by probing depth, loss of clinical attachment and histological evaluation. This case report illustrates treatment of peri-implantitis using a regenerative procedure also.

**Material and Methods:** A 43-year-old male patient presented with advanced peri-implantitis around a mandibular right first molar implant that was placed and restored 2 years before his visit. The orthopantomograph film showed the presence of radiolucency in the most coronal part of the implant and insufficient root canal treatment of the adjacent tooth.

**Results:** Treatment consisted of flap reflection, surface decontamination, and fill of closing the defect with xenografts. The graft was covered with titanium mesh, and the flap was coronally advanced and sutured. The granulomatous tissue was sent for histological examination. Based on a histological report it was finally diagnosed as a pyogenic granuloma. For the measurement of the stability an Osstell device has been used.

**Conclusion:** The etiology of Peri-implantitis in this instance could possibly be related to an insufficient root canal treatment of the adjacent tooth. The predictable regenerative procedure may improve clinical parameters and regenerate new bone around peri-implantitis affected implants. Re-osseointegration is possible to obtain on a previously contaminated implant surface.

## P1226

### Experimental periimplantitis on platform switching connection implants

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**Aim:** The aim was to assess the progression of experimentally induced periimplantitis on implants with a platform switching connection design.

**Material and Methods:** In 6 Beagle dogs the mandibular premolars and first molars were extracted (PM1-M1). After a 3 months healing period, 36 platform switching connection implants were placed (6 per dog, 3 per side). 3 months later, periimplantitis was induced by means of silk ligatures around the implants during a period of 3 months. 1 month after ligature removal, another 3-month double-silk-ligature induction period was performed. Clinical parameters (probing pocket depth, recession, plaque index, bleeding on probing and keratinized tissue) were recorded by the same examiner every month.

**Results:** During the first ligature-induction period, clinical parameters changed from 1.82 mm (95% CI = 1.73–1.90) to 3.19 mm (95% CI = 2.87–3.50) in probing depth and from 11.81% (95% CI = 5.37–18.24) to 97.92 (95% CI = 94.26–101.57) as bleeding on probing, but significant bone loss was not detected. Once these initial ligatures were removed, the mucosal inflammation diminished to 59.03% (95% CI = 45.93–72.12) and probing depths were reduced to 2.33 mm (95% CI = 2.11–2.56). After the application of a second double ligature protocol, the clinical parameters rebounded (PD = 4.02 mm (95% CI = 3.68–4.37) BoP = 100%) and evidence of bone loss was demonstrated. However, when ligatures were removed, pocket depth and bleeding on probing were again reduced (PD = 2.99 mm (95% CI = 2.56–3.41), BoP = 68.05% (95% CI = 46.69–89.42))

**Conclusion:** Periimplant disease progression was slow in platform switching connection implants, requiring a second period of induction with double ligature protocol

## P1227

### Luting-Cement-associated peri-implantitis recovered with removal of excess cement, repeated debridement and delivery of screw-retained prosthesis: A report of two cases

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**Aim:** Introduction: Excess cement extrusion in cement-retained implant restorations can induce peri-implantitis, which has no standard care. Two cases of the disease recovered are presented.

**Material and Methods:** Case report: Case 1: a 46-years-old female was diagnosed with a severe chronic periodontitis. After standard periodontal therapy, the implant was placed at site 22. The peri-implantitis was observed with mucosal swelling, contact pain, suppuration, 10 mm of probing depth (PD) and radiographic bone loss, 19 days after the cementation of the interim prosthesis in May 2006. The mass of the excess cement was removed and the implant surface was debrided with scalers. A screw-retained definitive prosthesis was delivered in spite of 5 mm of PD and slight suppuration in August 2006. Regular supportive periodontal therapy followed with repeated debridement at 21 implant. The bone loss and the deep PD were recovered in August 2014. Case 2: a 61-years-old male diagnosed with a moderate chronic periodontitis fell in a similar cement-associated peri-implantitis at site 11 as with case 1 in February 2012. The similar therapy had been performed. 7 mm of PD and approximately 2 mm of bone resorption were recovered up to 2 mm and 0 mm in November 2014, respectively.

**Results:** Discussion: It could be crucial not only to remove the mass of the excess cement, but also to eliminate the residual and the bio-film in the long term, to recover the disease.

**Conclusion:** Cement-associated peri-implantitis could be recovered with removal of excess cement, repeated debridement of implant surface and delivery of screw-retained prosthesis.

## P1228

### Treating peri-implantitis with topical oxygen therapy

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**Aim:** The aim of the presented case studies was to examine the effectiveness of topical oxygen therapies in a treatment regime for peri-implantitis.

**Material and Methods:** Wound healing requires that a variety of cells increase their metabolic activity for the reparative processes such as cell proliferation, bacterial defence, angiogenesis and collagen synthesis to progress satisfactorily. This results in a high demand for oxygen. The role of oxygen in wound healing is not yet completely understood. However many observations have shown wound healing to be enhanced by increasing pO<sub>2</sub> levels in the tissues. By contrast severe and destructive processes have been shown to occur under hypoxia. Peri-Implantitis and periodontitis are bacterial infections with chronic inflammation characteristics. It has been shown that the pO<sub>2</sub> value in areas of peri-implantitis is significantly lower than in healthy tissue. Moreover, the pO<sub>2</sub> value has been shown to correlate with pocket depth. Interestingly, the deeper the pocket, the lower the pO<sub>2</sub> value. These lower oxygen levels can reduce the body's resistance to bacteria and hence the healing potential of the wound. Changing this chronic wound to an acute wound through curettage, together with a local application of an oral gel releasing oxygen into the wound bed, should greatly aid in the repairing process and accelerate healing.

**Results:** The case studies show the effectiveness of the treatment regime to reduce probing depth and increase bone height.

**Conclusion:** Whilst further research is required, the case studies show the potential effectiveness of topical oxygen therapies in the treatment of peri-implantitis.

## P1229

### Inferior alveolar nerve transposition using piezosurgery for dental implants

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**Aim:** The aim of this study is to evaluate the mental nerve function after use of piezosurgery in IAN transposition and implant placement.

**Material and Methods:** 7 cases, 13 sides with severely atrophic posterior mandible was included, 4 cases are edentulous and 3 with some remaining anterior teeth. Buccal cortex bone was removed with the piezoelectric device (Mectron Piezosurgery Device, Mectron, Genova, Italy) mounted with OT7, OT1 and OT5 tip. 9 lateral incisive branches were severed and 4 lateral incisive branches were preserved, the mental nerve and IAN proximal portion can be freed from the canal, then lateral corticotomy is extended posteriorly to isolate the IAN, after IAN

transposition, the implants were placed, finally, the GBR were done around the implants to cover the defects using the excised bone, BIO-OSS and BIO-GIDE, then the IAN was left to lie laterally from its canal. Patients underwent subjective and objective assessment of outcome 7 days, 3 months and 6 months postoperation.

**Results:** Almost every lateral was temporal paresthetic or hypoesthetic at 7 days post operation, but on follow-up at 6 months, 11 sites were normal with complete recovery of the sensitivity within 6 months after the surgical procedure. 1 side still have small piece of areas of numbness or tingling, 1 patient complained disturbance of periodontal sensibility in residual anterior teeth.

**Conclusion:** Inferior alveolar nerve transposition is one of the therapeutic options which can be safely and predictably performed with Piezosurgery with excellent recovery of the mental nerve sensitivity, preservation of incisive branches is difficulty during IAN transposition.

## P1230

### Efficiency of photodynamic therapy in the treatment of peri-implantitis. A randomized controlled clinical trial

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**Aim:** The aim of this study was to evaluate clinical and microbiological outcomes, prior to and following the treatment of peri-implantitis, using surgical methods with or without an adjunctive photodynamic therapy.

**Material and Methods:** 30 systemically healthy patients with peri-implantitis diagnosed were divided into two groups. In the experimental group (15 patients) photodynamic therapy was used for decontamination of implant surface and peri-implant tissues during the surgical procedure. Decontamination of implant surface and peri-implant tissues in the control group (15 patients), was performed with chlorhexidine gel followed by saline irrigation. Bleeding on probing (BOP), plaque index (PI), peri-implant probing depth (PPD), mucosal recession (MR), and clinical attachment level (CAL) were recorded at baseline and at 3 months after the surgical treatment. Samples for microbiological identification were collected before therapy, during surgical therapy and 3 month after therapies. Anaerobes' identification systems using enzymatic tests were applied for the identification of the isolated anaerobes.

**Results:** The photodynamic therapy application was associated with significant decontamination of implant surfaces and peri-implant tissues with complete elimination of anaerobic bacteria when compared with chlorhexidine application, immediately after surgical procedure and 3 month after. The use of photodynamic therapy resulted in significant decrease of BOP when compared with chlorhexidine. There was no significant difference in PD and CAL results between two groups.

**Conclusion:** The results of this study indicate that the photodynamic therapy can be used as an adjuvant therapy for decontamination of implant surface and surrounding peri-implant tissues in the treatment of peri-implantitis.

**P1231****The "VISTA" vestibular incision subperiosteal tunnel access technique for treatment of multiple anterior recession defects utilizing calcium phosphosilicate (CPS) putty and platelet rich fibrin**

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**Aim:** To evaluate clinically, the efficacy of novel and minimally invasive VISTA Vestibular Incision Subperiosteal tunnel Access in combination with collagen membrane, calcium phosphosilicate and platelet rich fibrin in the treatment of gingival recession defects.

**Material and Methods:** A sample size of total 14 patients with 34 teeth were treated. After achieving local anaesthesia, a vertical incision was placed extending 3 mm from attached gingiva into the alveolar mucosa. A subperiosteal tunnel was created utilizing VISTA elevators. After achieving mobility of

the mucogingival complex the coronal repositioning was done by means of anchored horizontal mattress sutures. The collagen membrane pre-trimmed to fit the tunnel was inserted, Below the membrane, the PRF membrane was slid, below which the CPS putty was injected.

**Results:** Six months follow - up results showed significant improvements in all clinical parameters. There was no significant variation in plaque index, gingival index and bleeding on probing at 6 month compared to that of baseline. The width of attached gingiva displayed a mean increase of 0.24 mm difference, but was statistically non-significant. Gingival thickness displayed 0.43 mm increase and 2.4 mm improvement in clinical attachment level was found and both were statistically significant. The recession depth reduction amounted to 2.12 mm and was statistically significant. The mean root coverage achieved was  $96 \pm 0.05$  at 6 months and out of 34 teeth treated, 28 teeth showed complete root coverage (82.35%).

**Conclusion:** Assessment of clinical parameters confirmed that VISTA combined with collagen membrane, calcium phosphosilicate and PRF is an effective root coverage procedure for the treatment of multiple gingival recession.