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Molecular Pathogenesis of Oral Squamous Cell Carcinoma

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Abstract

Background: Oral squamous cell carcinoma is the most common subtype of head and neck carcinoma. The development of oral squamous cell carcinoma (OSCC) is a multistep process requiring the accumulation of multiple genetic alterations, influenced by a patient's genetic predisposition as well as by environmental influences, including tobacco, alcohol, chronic inflammation, and viral infection. **Discussion:** Tumorigenic genetic alterations consist of two major types, tumor suppressor genes, which promote tumor development when inactivated and oncogenes, which promote tumor development when activated. Tumor suppressor genes can be inactivated through genetic events such as mutation, loss of heterozygosity, or deletion, or by epigenetic modifications such as DNA methylation or chromatin remodeling. Oncogenes can be activated through overexpression due to gene amplification, increased transcription, or changes in structure due to mutations that lead to increase transforming activity. These events result in the increased production of growth factors or cell-surface receptors and the activation of intracellular messenger signaling, leading to autonomous growth of tumor cells without extracellular growth stimuli. Along with evasion of growth inhibitory signals by the inactivation of tumor suppressors and the inhibition of apoptosis, leads normal oral epithelial cells to acquire the malignant phenotype. As OSCCs grow, invade, and metastasize, new blood vessel formation is critical and OSCCs, like most tumors, are able to create a blood supply by stimulating endothelial cell proliferation and new blood vessel formation. **Conclusion:** The understanding of the molecular alterations contributing to the development of OSCC is leading to improvements in the early diagnosis of tumors and the refinement of biologic treatments individualized to the specific characteristics of a patient's tumor.

Keywords: oral squamous cell carcinoma, multistep carcinogenesis, oncogene, tumor suppressor gene.