Bad Breath Might Inhibit Bone Regeneration

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The two primary volatile sulphur compounds (VSCs) causing bad breath are hydrogen sulfide and methyl mercaptan. VSCs are toxic compounds that cause pathogenic changes in periodontal tissues. VSCs strongly suppress the synthesis of gingival collagen cells through several means, including apoptosis, which is programmed cell death or cell suicide.

Using animal models, researchers have reported that hydrogen sulfide passes through non-keratinized sublingual mucosa in 30 minutes, allowing it to reach the alveolar bone surface quickly. Hydrogen sulfide also increases the permeability of the sulcular epithelium and breaks down basement membrane cells. With increased permeability, bacterial toxins including lipopolysaccharide and prostaglandin can move through the epithelium and into the connective tissue, triggering the periodontal pathogenesis process. VSCs are also released with cell death from subgingival pocket epithelium.

VSCs of bad breath are involved with both onset of periodontal disease and chronic destruction of periodontal tissues. VSCs initiate the periodontal pathogenesis process by enhancing permeability of the junctional epithelium and VSCs are released at the time of cell death during chronic periodontitis.

Researchers in Nippoin Dental University in Tokyo, Japan, wanted to know if the impact of hydrogen sulfide on osteoblasts would prevent bone repair and therefore indirectly lead to ongoing bone loss.

Laboratory studies measured the effect of hydrogen sulfide on osteoblast cells and found evidence in the cascade of reactions that DNA synthesis was reduced, which inhibited osteoblast cell proliferation. Changing the equilibrium between osteoblasts and osteoclasts will allow proliferation of osteoclasts, potentially leading to bone loss.

Clinical Implications: Bad breath is both the result and the cause of tissue destruction in periodontal disease.

Imai, T., Ii, H., Yaegaki, K., Murata, T., Sato, T., Kamoda, T.: Oral Malodorous Compound Inhibits Osteoblast Proliferation. J Perio 80: 2028-2034, 2009.

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