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Characterization of inhibitory effects of suspected periodontopathogens on osteogenesis in vitro.

Loomer PM, Ellen RP, Tenenbaum HC

Department of Periodontics, Faculty of Dentistry, University of Toronto, Canada.

By using an in vitro bone-forming culture system, the chick periosteal osteogenesis (CPO) model, the direct effects on osteogenesis of sonicated extracts derived from oral bacteria were examined. Both extracts from bacterial species having strong associations with periodontal diseases (*Porphyromonas gingivalis*, *Actinobacillus actinomycetemcomitans*, and *Prevotella intermedia*, hereinafter referred to as suspected periodontopathogens) and extracts from species not correlated with periodontal disease (*Streptococcus sanguis*, *Veillonella atypica*, and *Prevotella denticola*, hereinafter referred to as nonpathogenic bacteria) were tested. All bacterial cultures were grown under standard anaerobic culture conditions. Sonicated bacterial extracts were prepared from the bacterial pellet. These were added in various proportions to the CPO cultures. Parameters of osteogenesis, including alkaline phosphatase activity, calcium and P(i) accumulation, and collagen synthesis, were measured in 6-day-old cultures. Compared with controls grown in the absence of bacterial products, osteogenesis was inhibited significantly in cultures treated with extracts derived from the suspected periodontopathogens. No osteogenic inhibition was observed in cultures treated with extracts from the nonpathogenic bacteria. These results suggest that the ability to inhibit osteogenesis in vitro may be a pathogenic property shared by a limited group of species. Further characterization of the *P. gingivalis* extracts revealed that both proteinaceous and nonproteinaceous products, including lipopolysaccharide, were able to inhibit osteogenesis. *P. gingivalis* extract-mediated inhibition of osteogenesis in CPO cultures was blocked by indomethacin, implicating prostaglandins in the regulation of the bacterial effects. The bacterial extracts had either reversible or irreversible inhibitory effects on osteogenesis when added after differentiation or before/during differentiation of bone cells, respectively.

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