

AAO Foundation Award Final Report

Principal Investigator	Sunil Kapila, BDS., MS., PhD.
Co-Investigator	Yvonne Kapila, DDS., PhD.
Secondary Investigators	None
Award Type	Biomedical Research Grant
Project Title	Cellular and molecular pathophysiology of root resorption during orthodontic tooth movement
Project Year	1997
Institution	University of California San Francisco
Summary/Abstract	<p>On the basis of previous studies, we hypothesized that fragments of matrix molecules generated in the hyalinized zone play a critical role in initiating cementum and root resorption during tooth movement. These matrix fragments likely produce an inflammatory response and induce the expression of matrix metalloproteinases (MMPs) in periodontal ligament (PDL) fibroblasts. Cytokines produced during the inflammatory process also induce MMPs in PDL cells. The increased expression of these MMPs then leads to degradation of organic matrix on the cementum and subsequent root resorption by osteoclasts.</p> <p>Our studies have demonstrated that (1) that specific fibronectin fragments induce the MMPs, collagenase-1 (MMP-1) and stromelysin-1 (MMP-3) in periodontal ligament cells, and (2) that these fragments are indeed present in gingival crevicular fluid of patients with periodontal disease. More recently, we have shown that collagenase inhibits the osteoblastic differentiation of PDL cells that could result in a smaller pool of osteoblasts available for reparative processes within the periodontal ligament. Our current studies are also examining the role of fibronectin fragments in limiting the osteoblastic differentiation of PDL cells and in enhancing osteoclastic activity via an increase in MMP expression in these cells.</p>