

AAO Foundation Award Final Report

Principal Investigator	Sunil Kapila, BDS., MS., PhD.
Co-Investigator	Ruth Globus, PhD.
Secondary Investigators	None
Award Type	Biomedical Research Grant
Project Title	Modulation of osteoblast activity and bone remodeling by mechanical strain
Project Year	1996
Institution	University of California San Francisco
Summary/Abstract	<p>In these studies we tested the hypothesis that the matrix metalloproteinase (MMP) –inductive responses in mechanically stimulated osteoblasts is dependent on the stage of cellular differentiation and is mediated by matrix-integrin interactions.</p> <p>Our findings showed that cyclic mechanical strain caused an increase in TGF-β1 and –β2 in pre-osteogenic cells and a small increase in TGF- β1 and none of TGF- β2 in differentiated MC3T3-E1 cells. Additionally, the preosteogenic cells had minimal changes in MMP activity, while the MC3T3-E1 cells demonstrated substantial increases in 72 kDa gelatinase and collagenase. Additional work in our laboratory showed that induction of collagenase is also triggered by specific matrix-integrin interactions. We found that intact fibronectin induces 92-kDa gelatinase in periodontal ligament fibroblasts, while a 120 kDa proteolytic fibronectin fragment containing the cell binding domain induces collagenase.</p> <p>Together these findings suggest that MMP-inductive response to mechanical strain may be both cell-type specific and differentiation-dependent and are likely mediate via cell-matrix interactions.</p>