AAO Foundation Award Final Report

Principal Investigator	Sunil Kapila, BDS., MS., PhD.
Co-Investigator	None
Secondary Investigators	Michael Lyons, DDS., MS. Megan O'Connor-Auger, DDS., MS.
Award Type	Biomedical Research Grant
Project Title	Mechanically Induced Expression of TGF-βs in Craniofacial Sutural Explants
Project Year	1994
Institution	University of California San Francisco
Summary/Abstract	The purpose of this study was to determine the contribution of TGF-βs to bone formation during mechanically induced remodeling of craniofacial sutures. We aimed to determine the quantitative and qualitative changes in expression of TGF-βs and bone remodeling in coronal sutural explants subjected to compressive and tensile loading. During this grant period, Dr. O'Connor-Auger designed and tested an apparatus to load mice cranial sutures in vitro. This apparatus consisted of two spring loaded plastic pieces to which the calvarial bone was mounted and subjected to tensile and compressive loading. Dr. O'Connor-Auger first characterized the loads placed by this instrument on calvarial sutures and demonstrated histologic changes with stretched collagen fibers in loaded sutures. Dr. Lyons concurrently performed studies to evaluate changes in expression of TGF-β1 and –β2 in osteoblastic cells subjected to cyclic tensile loading at 6 cycles per minute and 5% strain. Cyclic tensile loading of the cells resulted in significantly higher expression of TGFβ1 and –β2 by 12 hours in some cases and by 72 hours in all cases. Together our studies have demonstrated the feasibility of developing an apparatus for in vitro loading of calvarial sutures and also show that osteoblasts show increased TGF-β expression in response to mechanical strain. The latter finding might provide the basis for matrix anabolic responses in loaded bone.