AAO Foundation Award Final Report

Principal Investigator	Donald Wexler
Co-Investigator	
Secondary Investigators	
Award Type	Biomedical Research
Project Title	Immunohistochemical Studies of Transforming Growth Factor-Beta during Orthodontic Tooth Movement
Project Year	1996 - 2000
Institution	University of Florida
Summary/Abstract	This research proposal investigates transforming growth factor beta (TGF-ß) as a local mediator of orthodontic tooth movement. TGF-ß is known to increase at bone fractures and would healing sites and is expressed in osteoblasts, fibroblasts, platelets, and macrophages, cells commonly found in paradental tissues. However, very few data exist on the levels of TGF-ß activity and its expression during tooth movement. Our specific aim was as follows. To describe the levels and spatial expression of TGF-ß in orthodontically treated tissues of the rat. Orthodontically treated tissues of the rat were used to describe the expression of TGF-ß in both compression and tension sites over time. Twelve animals were euthanized at each of six time points (0, 1, 2, 5, 7, and 14 days) following the placement of a spring-activated orthodontic appliance bilaterally onto the first maxillary molars. Paradental tissues surrounding the first maxillary molars were examined for cells which express TGF-ß protein using immunohistochemistry and were compared to sham-activated controls. Results indicated tooth movement of the maxillary first molar in a mesial direction in experimental rats having springs placed to these teeth. Control rats without springs had lesser amounts of tooth movement and in a distal direction (distal drift). There were significant differences (p=0.0001) between levels of tooth movement in experimental group vs. Controls. However, there were no significant differences (p=0.25) between timepoints within experimental group or controls. Using polyclonal antibodies to TGF-ß1, there were no significant differences in levels of staining for this protein between the experimental and the control groups, or between

	compression and tension sides of the roots of the maxillary first molar. Results suggest a decreased role for TGF-ß1 protein in the modulation of the bone turnover process during orthodontic tooth movement. Future studies will need to focus on other potential modulators which may be involved in controlling the biological processes during orthodontic tooth movement, in order to develop means to alter and enhance those processes and to develop methods for monitoring the local tissue responses to orthodontic treatment. Such methods would be useful to clinicians in several important areas: for decreasing treatment times, for controlling negative sequelae like anchorage loss or root resorption, for enhancing the stability of results, or for assessing patient compliance.