

AAO Foundation Award Final Report
(a/o 2/12/08)

Principal Investigator	Steven J. Lindauer
Co-Investigator	
Secondary Investigators	A. Denis Britto Robert J. Isaacson John Morton
Award Type	Biomedical Research
Project Title	<i>In-Vitro</i> Evaluation of Three-Dimensional Orthodontic Mechanical Force Systems
Project Year	2000
Institution	Virginia Commonwealth University
Summary/Abstract (250 word maximum)	Previously, a three-dimensional finite element computer model was developed to predict the moments and forces produced by an activated orthodontic archwire inserted at molar and incisor attachments. As with all computer models, the results were theoretical, and dependent on certain assumptions made when constructing the model. The purpose of this study was to measure the force systems produced by actual archwires in a simulated clinical setting and compare them to those predicted by the computer model. A laboratory model simulating molar and incisor attachments was created. Stainless steel and beta-titanium wires were activated by placing vertically oriented bends at various points along both straight wires and full-contoured arches. Moments and forces produced at the molar and incisor brackets were measured using a force-moment gauge (OrthoMeasure) for both the two-dimensional and three-dimensional simulations. Force and moment magnitudes measured were smaller for beta-titanium than stainless steel but qualitative differences in the relative moments and forces produced were not apparent between the two materials. Comparisons between two-dimensional and three-dimensional measures showed that there were quantitative and qualitative differences, as predicted, but the magnitude of the differences were not as great as originally predicted by the finite element computer model.
Were the original, specific aims of the proposal realized?	There were 3 Specific Aims to be addressed in this study. The first was to compare force systems measured from 2-D and 3-D wire configuration <i>in-vitro</i> . The second aim was to determine the effects of varying wire material and wire cross-sections on these force systems. The third aim was to determine the effect of wire shape on the 3-D force systems. All 3 aims were met successfully.
Were the results published? If not, are there plans to publish? If not, why not?	Lindauer SJ, Isaacson RJ, Britto AD: <i>Three-Dimensional Force Systems from Activated Orthodontic Appliances</i> . Semin Orthod 7: 207-214, 2001.

Have the results of this proposal been presented? If so, when and where? If not, are there plans to do so? If not, why not?	The results were presented at several local and regional including the Rocky Mountain Society of Orthodontists Annual Meeting, Salt Lake City, UT, 2001; Southern Association of Orthodontists Annual Meeting, Savannah, GA .