

AAO Foundation Award Final Report

Principal Investigator	Bruce W. Hultgren DDS MS
Co-Investigator	
Secondary Investigators	Arthur G. Erdman, University of Minnesota, Department of Mechanical Engineering and John Pilgrim – October 1999
Award Type	Biomedical Research
Project Title	A Study In Variations of Facial Growth Using Applied Kinematics
Project Year	1996
Institution	U of Minnesota(Dept. of Mech. Eng.) \$15000 from AAOF and private funding from Dr. Hultgren (in excess of \$25000)
Summary/Abstract (250 word maximum)	<p>Various methods have been used to study variations in facial growth involving qualitative morphometric or geometric methods. With the advent of Bjork's implant study, new insight was gained in our understanding of the motion characteristics associated with facial growth and development longitudinally. This led to the development of a mathematical model to describe the kinematic application to facial growth and development as a master's thesis by Dr. Bruce W. Hultgren in 1977 at the University of Minnesota. This research was done with cephalometric tomograms and did not involve implants. The purpose of the AAO Foundation Award grant was to apply this same kinematic model to the Rodney Matthew's implant study. A quantitative analysis employing kinematic techniques was applied to this patient group. This model was able to quantify variations in facial growth within this implant population. Secondly, a computer model to graphically display this data was developed, contributing to a master's thesis by John Pilgrim at the University of Minnesota, Department of Mechanical Engineering. Lastly, an analysis of implant marker reliability and their relative stability when measuring consecutive cephalometric time intervals kinematically was completed. Two different techniques were employed to measure this digitizing error. Subsequently, a mathematical analysis was done demonstrating the effect this error had on the location of the instant center associated with the cephalometric time intervals of facial</p>

	growth.
Were the original, specific aims of the proposal realized?	Yes. 1) Variations in facial growth were quantified kinematically, 2) a software program was developed to animate the vector displacements due to growth in the maxilla and mandible as planned, 3) an analysis of implant stability was performed, 4) two methods were used to calibrate the error in the digitized implant data. 5) the effect of implant digitizing error on the center of rotation calculation was quantified and graphically displayed.
Were the results published? If not, are there plans to publish? If not, why not?	Yes, results were published in part as a master thesis by John Pilgrim, University of Minnesota, Department of Mechanical Engineering, 1999. There are hopes of publishing one to two papers from an orthodontic perspective within the next year.
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?	Results have not been presented. Hopefully, yes, if papers submitted are accepted for publication.