Biomedical Research Award

Dr. Lucia Cevidanes, *University of Michigan*

Dr. Lucia Cevidanes is the Thomas and Doris Graber Professor of Dentistry and Associate Professor at the Department of Orthodontics at the University of Michigan, and a Diplomate of the American Board of Orthodontics. She is a practicing clinician who has published over 145 manuscripts on 3D imaging for which she has received research grants from the American Association of Orthodontics Foundation and the National Institute of Dental and Craniofacial Research. Her work has been recognized by the American Association of Orthodontists Thomas M. Graber Award, the B F Dewel Award, Milo Hellman Award, and the Wuehrmann award from the American Academy of Oral and Maxillofacial Radiology. Her interests include Artificial Intelligence and 3D Imaging to solve difficult clinical problems in orthodontics, studying current and new treatment approaches and technical procedures, and understanding treatment outcomes for craniofacial anomalies and dentofacial deformities.

Two of the main challenges computer aided clinical decision support systems are 1) achieving similar levels of accuracy as clinicians in a fully-automated fashion and 2) designing holistic approaches to identify subsets of patients' biomarkers which are most predictive of patients' outcomes or health status. The goal of this proposal is to tackle these challenges by designing novel robust computational techniques, including machine learning and image processing methods for a clinical decision support system for diagnosis and prediction of progression of osteoarthritis (OA) of the Temporomandibular joint (TMJ).

This application proposes the development of efficient Data Science approaches for data processing and analytics of clinical, biological, and high dimensional imaging data from TMJ OA patients. Our previous AAOF support led to the work now funded by NIDCR R01 award on "Integrative Predictors of Temporomandibular Joint Osteoarthritis**."** We have integrated quantitative markers for diagnosis and assessment of progression of TMJ OA, as well as extended the capabilities of 3D Slicer4 into web-based tools and disseminated open source image analysis tools. The Data Science approaches in this AAOF BRA proposal will scale up our previous integrative indicators of TMJ OA, bringing in a cutting-edge clinical Decision Support System and providing preliminary work for a future U01 multicenter submission. The AAOF funding will allow development of tools for precise quantification of Temporomandibular Joint changes.