



**2024 OFDFA  
Dr. Michael Lee, St. Louis University**

**Short Biography**

Dr. Michael M. Lee is an assistant professor of orthodontics at Saint Louis University Center for Advanced Dental Education (SLU CADE). He obtained his Doctor of Dental Surgery degree at the University of Minnesota in 2020 and Master of Science in Dentistry degree from orthodontic residency at SLU CADE in 2022. Upon graduation, he joined his alma mater as a full-time faculty member. In 2024, he was appointed as the Pillar's Endowed Chair in Orthodontics. His research focuses on the biomechanics of tooth movement, clear aligner therapy and biomaterials. His responsibilities include serving as a full-time clinical supervisor and the course director for orthodontic biomechanics and temporary skeletal anchorage.

**Brief Description of Project**

The proposed project, "Biomechanical effects of selective thickness modification in 3D-printed clear aligners" will investigate strategies for enhancing tooth movement using directly 3D-printed clear aligners. 3D-printed clear aligners possess unique material properties and potential for novel design features, the biomechanical effects of which remain largely unexplored. The project aims to utilize finite element analysis models to assess the forces and moments produced by different clear aligner designs with selectively modified thickness during lingual bodily movement of the maxillary central incisor. Comparisons of the stress distribution pattern and the displacement tendency will provide insights on the optimal aligner design to control the tipping tendency from application of lingual forces. The resulting data will be validated against findings from in vitro force and moment transducer studies.

**Contributions to Orthodontic Education**

To enhance his teaching practice, Dr. Lee plans to enroll in a two-semester teaching skills program offered by the Saint Louis University Reinert Center for Transformative Teaching and Learning. His goal is to earn teaching credits and a completion certificate by engaging in in-person workshops, a day-long institute and a small-group observation and feedback session. Through participating in these pedagogical activities, he aims to learn different learning and teaching styles, better establish learning outcomes for his courses, consider faculty-student relationships, and improve fundamental classroom teaching skills.

Additionally, Dr. Lee plans to attain proficiency in the fields of machine learning and artificial intelligence, as well as to gain expertise in digital graphics and animation. A working knowledge of machine learning and artificial intelligence will facilitate appreciation of impending issues in orthodontics, as well as lead to relevant future educational and research initiatives at his institution. Practical skills in digital graphics and animations will improve the quality of his lecture materials and allow for more effective dissemination of information outside of his institution. He will enroll in open-access courses to enhance his knowledge and practical skills.

### **Importance of the Foundation on Project and Career**

With support from the American Association of Orthodontists Foundation (AAOF), Dr. Lee will be empowered to pursue his research, education, teaching and clinical plans to become a more effective orthodontic educator. Firstly, the funding from the grant will provide him with a degree of financial support needed to fully devote his time and efforts to advancing his research efforts in the biomechanics of clear aligner therapy, as well as attending in-person and online training courses to enhance clinical and didactic knowledge and practical skills. Secondly, the support from the AAOF will strengthen the credibility of his research activities, opening doors for future collaborations and acquisition of resources for continued contributions to the orthodontic profession.