

Biomedical Research Award

Dr. Achint Utreja, *Southern Illinois University School of Dental Medicine*

Dr. Achint Utreja is an Associate Professor and Head of the Section of Orthodontics at Southern Illinois University School of Dental Medicine (SIU SDM). He completed a clinical certificate in Orthodontics and received a Ph.D. in Biomedical Science from the University of Connecticut. His research interests include the biological mechanisms underlying remodeling in craniofacial structures under the influence of mechanical loading such as during orthodontic tooth movement. He is also interested in the developmental and functional biology of the temporomandibular joint (TMJ).



The proposed project will be conducted in collaboration with Dr. Dan Welch, a neuro-scientist whose research focus is on the physiological mechanisms underlying the control of masticatory behavior. The objective of this animal study is to analyze and correlate the electromyographic (EMG) and histologic changes in the muscles of mastication after treatment with posterior bite blocks.

Posterior bite blocks are routinely used during orthodontic treatment. The placement of composite resin on the occlusal surfaces of either the maxillary or the mandibular posterior teeth produces an intrusive force on the posterior dentition. In addition to this dental effect, the masticatory muscles are stretched or are under tension, leading to auto-rotation of the mandible. In growing patients with an anterior open bite, these dental and skeletal changes can contribute to bite closure. Besides the clinical use in anterior open bite cases, posterior bite blocks are also used to increase the vertical occlusal dimension in patients with a deep overbite. This transient opening of the bite reduces anterior occlusal interferences and allows leveling of the curve of spee. In addition to the elective use of posterior bite blocks, orthodontic treatment using clear aligners places thermoplastic polyurethane material on the occlusal surfaces of the teeth. The opening of the bite and the associated effects on the muscles of mastication are similar to traditional bite blocks. However, depending on the duration of clear aligner treatment, the bite opening effect can be relatively prolonged.

Overall, the data generated from this clinically relevant project will contribute towards an increased understanding of the role of prolonged bite opening during orthodontic treatment with either fixed or removable appliances. The results of this study will also serve as preliminary findings for future collaborative and individual external grant submissions for both investigators.

The funding amount provided by the AAOF is crucial for the success of this project as majority of the financial support will be utilized for research activities. The importance of the Foundation and its support of faculty in the early stages of their academic career cannot be overemphasized. Both investigators are highly appreciative of AAOF support and look forward to completing the research project.