

Biomedical Research Award

Dr. Kurt Kasper, The University of Texas Health Science Center at Houston

Dr. Kasper holds an appointment as Associate Professor in the Department of Orthodontics at The University of Texas Health Science Center at Houston. He earned a doctorate in bioengineering from Rice University and a bachelor of science in biomedical engineering from Case Western Reserve University. His research applies fundamentals of engineering, materials science, and the biosciences toward the development and evaluation of biomaterial-based technologies to meet clinical needs. He has been recognized with a variety of honors, including the Young Investigator Award of the Society For Biomaterials, the Young Investigator Award of the North American Chapter of the Tissue Engineering and Regenerative Medicine International Society (TERMIS), and the Educational Award of the Americas Chapter of TERMIS.



Patients often present concern regarding the esthetics associated with fixed appliances during orthodontic treatment, which has motivated considerable investment over the years in the development of “esthetic brackets.” Recent advances in additive manufacturing technologies present the potential for fabrication of esthetic orthodontic brackets in-office via 3D-printing using materials cleared for intraoral use. As clinical cases of 3D-printed brackets emerge in the literature, a need exists to investigate key properties of 3D-printed brackets, including their mechanical and color stability, to inform the orthodontic community regarding potential advantages and limitations. The overall objective of the present proposal is to evaluate the mechanical and color stability of 3D-printed orthodontic brackets.

As orthodontists increasingly embrace 3D-printing technologies in workflows for patient care, it is important that evidence-based resources guide them in appropriate application of the technologies to meet clinical needs. However, research to this end is not presently a high priority for funding through federal sources. Accordingly, generous support of the project through The American Association of Orthodontists Foundation (AAOF) provides crucial resources for the completion of the research and the potential publication of the findings for the benefit of the profession.

The project will involve the participation of residents and dental students, thereby enhancing their professional training and broadening their engagement in collaborative translational research. Moreover, the project will enable Dr. Kasper to build upon research previously supported by the AAOF at the exciting intersection of bioengineering and orthodontics. Dr. Kasper deeply appreciates the opportunities for continued professional mentorship and exposure to clinical orthodontics made possible through the generous support of the AAOF as he continues to expand his research program. As a bioengineer by training, Dr. Kasper acknowledges support from the AAOF has been instrumental in enabling his transition to orthodontic research and in fostering his career development.

Digital workflows and 3D printing technologies are enabling exciting new methods for the fabrication of appliances for use in nasoalveolar molding approaches to early management of cleft lip and palate. While these technologies present the potential to advance the state-of-the-art of patient care through nasoalveolar molding, key properties associated with the materials applied in the fabrication of the appliances via 3D printing must be explored to evaluate the potential clinical utility of the approach. The overall objectives of this project are to evaluate the mechanical properties of acrylics applied in the fabrication of nasoalveolar molding appliances by 3D printing workflows and to characterize bacterial adhesion to the materials in culture.

As orthodontists and craniofacial teams increasingly embrace 3D-printing technologies in workflows for patient care, it is important that evidence-based resources guide them in appropriate application of the technologies to meet clinical needs. However, research to this end is not presently a high priority for funding through federal sources. Accordingly, generous support of the project through The American Association of Orthodontists Foundation (AAOF) provides crucial resources for the completion of the research and the potential publication of the findings for the benefit of the profession.

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