Biomedical Research Award

Dr. Christine Hong, *University of California, San Francisco*

Dr. Christine Hong is a tenured Associate Professor in the Division of Orthodontics at the UCSF School of Dentistry. She currently serves as the Program Director of Post-doctoral Orthodontic Residency at the UCSF School of Dentistry. Dr. Hong obtained her dental education from the Harvard School of Dental Medicine and completed her orthodontic residency and M.S. in Oral Biology at UCLA School of Dentistry. In 2012, Dr. Hong received the AAOF Subtelny, Baker, Eastman Orthodontic Faculty Development Award and again in 2013 she received the AAOF Willie and Earl Shephard Orthodontic Faculty Development Award for her contribution and continued dedication to orthodontic education and basic, clinical and translational research. In 2014 and 2016, Dr. Hong received the AAOF Biomedical Research Awards on "Preclinical Evaluation of Bisphosphonates in Stability of Cleft Bone Graft" and "Preclinical Evaluation of Nanodiamond-Enhanced Estrogen Delivery in Palatal Expansion" These AAOF awards have significantly enhanced the development of Dr. Hong's full-time academic career, furthering her potential to strengthen orthodontic education for both pre-doctoral and post-doctoral students and establish herself as an independent investigator in orthodontic research.

Project synopsis:
Osteocytes are mechanosensory cells that detect and control responses to mechanical stimulation and mediate osteoclast and osteoblast function during bone homeostasis; however, the role of osteocytes in regulating orthodontic tooth movement (OTM) is largely unknown. Among the signaling pathways involved in bone remodeling, transforming growth factor-β (TGFβ) signaling, in particular, is a vital component that dictates activities of all cellular components of the bone remodeling unit. In order to understand the effect of TGFβ in osteocytes, a transgenic mouse line with the specific deletion of TGFβ receptor II in osteocytes ($T\beta RII^{ocy-/-}$) was generated. In this study, orthodontic tooth movement animal model in $T\beta RII^{ocy-/-}$ mice will be utilized to elucidate the role of osteocyte-intrinsic TGFβ signaling in alveolar bone remodeling during tooth movement and delineate the underlying biological processes. It is hypothesized that osteocyte-intrinsic TGFβ signaling is critical in the regulation of alveolar bone remodeling directly via perilacunar/canalicular remodeling and indirectly via mechanosensitive induction of sclerostin and RANKL production by osteocytes.

Benefit to orthodontic education:
Orthodontics is a continuously evolving field that strives to effectively and efficiently modulate OTM. OTM relies on alveolar bone remodeling triggered by mechanical stress from orthodontic appliances. Despite osteocytes being the most abundant cell type in the bone, constituting more than 90% of bone cells, the role of osteocytes in regulating OTM and alveolar bone remodeling remains largely unknown. This AAOF Biomedical Research Award study will improve the understanding of the osteocyte function during OTM. This scientific knowledge will inform new strategies to optimize orthodontic treatment and develop future innovations in orthodontics.

Importance of AAOF Funding:
With the support of the AAOF, Dr. Hong will be able to advance her ongoing translational research projects to answer important orthodontic clinical questions. In addition, this award will provide Dr. Hong the opportunity to accumulate preliminary data, essential for the successful recruitment of NIH/NIDCR funding with a focus on addressing orthodontic clinical questions.