Orthodontic Faculty Development Fellowship Award

Dr. Hyeran Helen Jeon, *University of Pennsylvania*

The 2020 Willie and Earl Shepard Fellowship Award

Biography

Dr. Hyeran Helen Jeon is an Assistant Professor in the Department of Orthodontics at the University of Pennsylvania. Dr. Jeon has received her DDS at Pusan National University, and Periodontics training and a MSD degree at Ewha Womans University, and Orthodontics training and a DScD degree at University of Pennsylvania. Dr. Jeon is a Korean Board of Periodontology Board certified periodontist (2008) and American Board of Orthodontics Board certified orthodontist (2014). Her main research interests are: (1) bone remodeling, (2) wound healing, and (3) maxillary expansion using temporary anchorage devices (TADs).

Project Description

Orthodontic tooth movement (OTM) models are effective for the study of mechanical loading-induced bone remodeling. After the constant application of mechanical loading to the tooth, alveolar bone and periodontal ligament (PDL) remodeling occurs. During OTM osteoclasts resorb bone on the compression side and osteoblasts produce new bone on the tension side of the PDL. Osteocytes are one of the most sensitive cell types that respond to mechanical loading and comprise 90-95% of the whole bone cell population in the adult animal. In addition, a key feature of osteocytes is their ability to regulate the function of both osteoclasts and osteoblasts orchestrating the biomechanical regulation of bone mass and structure for efficient load bearing. However, how the osteocytes sense the mechanical loads on bone and coordinate adaptive alterations in bone mass is not yet completely understood. Primary cilium, a single hair-like projection, function as a mechanical sensor in osteocytes. Intraflagellar transport protein (IFT) proteins are required for primary cilia biogenesis. In this study, we examine the role and mechanism of IFT proteins in osteocytes during OTM using the transgenic mice.

Benefit to Orthodontic Education

While only limited information is available on the cellular and molecular events induced during orthodontic tooth movement, the animal models described here will provide an opportunity to examine the mechanisms how osteocytes sense and respond to mechanical force. Clinical benefits from this study are that we might substantially reduce the treatment time for malocclusion through induced osteoclastogenesis and bone resorption. Inversely, by modifying the cells related to osteoclastogenesis, we can make them more resistant to the orthodontic relapse. Considering all together, this study will affect not only orthodontic treatment, but also other areas of the Dental and Craniofacial Research

including tissue engineering, distraction osteogenesis, and bone remodeling. Like other biomedical disciplines, this kind of biological study will benefit future clinical orthodontics, which has to adapt to advances in biological applications to optimize clinical results and efficiency of treatment.

Importance of AAOF funding

Recently Dr. Jeon has received the Willie and Earl Shepard Fellowship Award from the AAOF. This funding will be used mainly for Dr. Jeon's research support, allowing her to produce the preliminary data for future extramural grant proposals. This generous funding from the AAOF will greatly help Dr. Jeon's academic and scientific growth.