

Biomedical Research Award

Dr. Kyungsup Shin, *University of Iowa*

Biography

Dr. Kyungsup Shin is Assistant Professor, Graduate Program Director for the Department of Orthodontics, and Director for Clinical Research at the College of Dentistry, University of Iowa. Dr. Shin received a B.S. in Chemical Engineering from Yonsei University, an M.S. in Chemical Engineering from Korea Advanced Institute of Science and Technology, a Ph.D. in Biomedical Engineering from the University of Michigan, a D.M.D. from Harvard School of Dental Medicine, and an M.S. in Orthodontics and certificate in Orthodontics from the University of Iowa. He became a Diplomat of the American Board of Orthodontics in 2016. Dr. Shin's research areas include biomaterials and biomimetics for bone and cartilage tissue engineering, craniofacial anomalies, cleft lip and palate, and temporomandibular joint disorders.



Project Description

Pathological fibrous tissue formed in the temporomandibular joint (TMJ) can lead to seriously disabling diseases such as fibrous TMJ ankylosis. TMJ fibrous ankylosis can progress into bony ankylosis if not appropriately treated, which generally requires surgical intervention. Despite the clear and immediate need for treatment, there are no existing non-surgical therapies to prevent or treat fibrous ankylosis in TMJ.

Recently, exosomes have attracted attention due to their great potential to promote intercellular communication leading to enhanced cell recruitment, differentiation to specific cell lineage, and tissue repair. Mesenchymal stromal/stem cells (MSCs) are promising sources of exosomes, and exosomes derived from bone marrow stromal cells (BMSC-Exos) showed an evident reduction of fibrosis in the liver and lung. Therefore, BMSC-Exos have the potential as a therapy to treat TMJ fibrous ankylosis without surgical intervention. Dr. Shin and his team hypothesize that myofibroblasts activate human fibrous ankylosis, and MSC-derived exosomes have the potential to alleviate myofibroblast activities.

Benefit to Orthodontic Education

The need for treating complications TMJ is unmet and remains very challenging to clinicians, including orthodontists. Knowledge gained from his project could contribute to advancing our understanding of the role of exosomes on myofibroblast activities and eventually to developing non-surgical therapeutic approaches for fibrotic tissue in TMJ.

Importance of AAOF funding/help advancing career

Over the past five years, the AAOF has continuously supported Dr. Shin's research projects (PFA, OFDFA, and two BRAs). AAOF grant support enabled Dr. Shin to generate preliminary data for his federal grant applications. In 2020, Dr. Shin received his first federal grant (NIH/NIDCR R03 DE030166) as the Principal Investigator, and he humbly attributed this to the AAOF's dedicated support. Generous support from the AAOF is genuinely pivotal to his research investigations and his growth as an independent research scientist and orthodontic educator.