Biomedical Research Award

Dr. Do-Gyoon Kim, *The Ohio State University*

Dr. Kim's undergraduate and master training was in biology at Yonsei University, Seoul, Korea. He received his PhD degree of mechanical engineering at Rensselaer Polytechnic Institute (RPI), Troy, NY. His PhD dissertation focused intensively on biomechanics of bone-implant interfaces from the microscopic point-of-view. Dr. Kim's training was extended to the macroscopic aspect of bone-implant biomechanics focusing primarily on an interfacial failure of total joint replacements in SUNY Upstate Medical University, Syracuse, NY. When he joined the Bone and Joint Center at Henry Ford Hospital, Detroit, MI, his research topics focused on assessment of tissue stress variability and strength in vertebral bone including a large-scale finite element analysis based on micro-CT images. Currently, as a faculty at the Orthodontic division of The Ohio State University, Dr. Kim is expanding his research career to orthodontic applications. He has published over 80 peer-reviewed journal papers and managed several projects sponsored by National Institutes of Health (NIH), corporate and foundation.

Project Synopsis:
The objective of this project is to examine greater osteogenic differentiation of BMSCs in the jawbone is responsible for its lower risk of fracture due to aging and estrogen deficiency-induced osteoporosis than in the limb bone. Thus, we propose an aim to elucidate effects of estrogen deficiency on characteristics of mandibular and femoral bones of female rats in advancing age. We hypothesize that (1) unlike limb bone, the quality of jawbone does not decrease from estrogen deficiency and may in fact increase; and (2) BMSCs from jawbone are less inhibited by estrogen deficiency than BMSCs from limb bone. Outcomes of this project will validate that jaw BMSCs possess cellular mechanisms that heighten their ability to accelerate bone formation and enhance mineralization by balancing the rapid bone resorption caused by estrogen deficiency.

Benefit to Orthodontic Education:
The findings of this project will provide baseline knowledge to help development of innovative strategies to promote osteogenesis resulting from active bone remodeling during orthodontic tooth movement, particularly for postmenopausal patients.

Importance of AAOF Funding:
AAOF biomedical research awards helped cultivate my early academic career to be an independent researcher. I used this fund to obtain preliminary data that were demanded to receive grants from NIH and other funding sources. The current award will help to develop more advanced interdisciplinary research topics.