

## Biomedical Research Award

**Dr. Noriaki Ono, University of Michigan**

### Biography

I received my DDS degree from Tokyo Medical and Dental University, Japan in 2003, and obtained my orthodontic certificate and PhD degree in 2007 at the same institute. I completed clinical fellowship in orthodontics and became a diplomate of the Japanese Board of Orthodontics in 2009. I subsequently spent five years at Massachusetts General Hospital and engaged in postdoctoral research activities focusing on bone biology, while teaching as a part-time clinical instructor in the orthodontics program of Harvard School of Dental Medicine. In 2014, I came to the University of Michigan School of Dentistry as an Assistant Professor at the Department of Orthodontics and Pediatric Dentistry.



### Synopsis of Research Project

The cranial base is central to craniofacial growth that determines the skeletal pattern of the face. The cranial base undergoes endochondral ossification and houses unique bidirectional growth plates termed the synchondroses, which are structurally similar to the epiphyseal growth plate of long bones. Currently, little is known about the mechanism how the cranial base maintains its growth potential. Our laboratory has recently found that growth-associated skeletal stem cells (gSSCs) are formed among resting chondrocytes in the epiphyseal growth plate of long bones. In this project, we aim to define formation and cell fates of resting chondrocytes in the cranial base synchondrosis. First, using a fluorescent knock-in reporter allele, we will test our first hypothesis that resting chondrocytes expressing parathyroid hormone-related protein (PTHrP) are formed within the postnatal cranial base synchondrosis. Second, using *in vivo* lineage-tracing experiments, we will test our second hypothesis that resting chondrocytes in the synchondrosis behave as skeletal stem cells similar to those in the epiphyseal growth plate of long bones. This study is expected to deepen our understanding of the cranial base synchondroses as growth centers. We believe that such fundamental knowledge is essential to predicting how individual genetic variants affect the growth pattern of the face, as well as to guiding our future endeavor in facilitating personalized orthodontics to predict and modify craniofacial skeletal growth.

### Importance of the Foundation

This prestigious biomedical award from the AAOF is extremely important for me to expand my research arena into the craniofacial biology. This award will allow me to apply my expertise in mouse genetics to exploring the mechanism for cranial base growth and development. I plan to take advantage of the data generated from this study as a vehicle for new NIH research grant applications. As an orthodontist who has substantial background in bone biology, I would like to contribute myself to advancement of the orthodontics and craniofacial research field. I believe that the project supported by this award will develop further and help me establish a new research focus that is more directly relevant to our clinical questions.