

## Research Aid Award

### Dr. Po-Jung Chen, *University of Connecticut Health Center*

#### Biography

Dr. Chen is a first-year orthodontic resident at the University of Connecticut Health Center. He graduated from dental school at Kaohsiung Medical University in Taiwan. He then completed his master's degree in Dental Science at National Yang-Ming University, and simultaneously completed his clinical orthodontic training at the Taipei Veterans General Hospital, Taiwan. He is a diplomat of the Taiwan Board of Orthodontics. After 6 years of practice in orthodontics in Taiwan, he came to the University of Connecticut Health Center and completed a clinical orthodontic fellowship, and a postdoctoral research fellowship. He has been proactive in advancing his knowledge in clinical orthodontics along with pursuing his interest in translational research. Dr. Chen has a strong interest in pursuing an academic career as a clinician-scientist.



#### Project Synopsis

Temporomandibular Joint Disorders (TMD) are estimated to affect up to 36 million individuals in the United States each year. Approximately 10% of people who have TMD have irreversible damage to the joint. Degenerative diseases of the Temporomandibular Joint (TMJ) affect the mandibular condylar cartilage (MCC), the TMJ disc, and the cartilage of the glenoid fossa. Unlike other musculoskeletal diseases, partial or total joint replacement is the only option for degenerative diseases of the MCC. One promising strategy to slow and/or prevent degradation of the TMJ is the use of biotherapeutic intra-articular injections, thus delaying the total joint replacement and improving quality of life. Proteoglycan 4 (PRG4, also known as lubricin) is a mucin-like glycoprotein that contributes to the lubrication of cartilage surfaces. PRG4 is present in the TMJ and plays an essential role in the maintenance of this joint. PRG4 knockout mice show TMJ degeneration as early as 2 months of age. However, there are few studies examining the biomechanical characterization of the PRG4-deficient TMJ, which is critical to fully characterizing the extent of TMJ degeneration and understanding the effects of restoring PRG4 expression on TMJ integrity. A combination of biomechanical and immunohistochemical techniques will be used to characterize the TMJ in PRG4 deficient mice (PRG4 Gene Trap) and determine the effects of restoration of PRG4 expression. The innovation of this project lies in the multidisciplinary approach, and the potential to translate this research from bench to clinic as an effective therapy for TMD. This project will examine biomechanical changes of cartilage in the TMJ. We will characterize the TMJ cartilage at various stages of disease using established biochemical techniques and a sophisticated automated biomechanical indentation technique. Completion of this project will contribute to our understanding of the role PRG4 expression plays in TMD. This project will also provide the framework for

development of a rhPRG4-based potential therapeutic to halt or delay TMJ arthritis progression, providing a minimally-invasive, biologically effective therapeutic which could improve the lives of millions of people who suffer from TMD.

### **Importance of AAOF Funding**

The support and generous funding from the AAOF plays a pivotal role in conducting this research. Also, completion of this work will serve as a key professional stepping stone to further Dr. Chen's career aspirations in academia combining his interests in clinical excellence and research.