Dr. Mohammad S. Mohammad
2026 Research Aid Award
University of Pennsylvania

1) Short Biography

Dr. Mohammad M is a second-year orthodontic resident and Master of Science in Oral Biology candidate at the University of Pennsylvania School of Dental Medicine. He earned his Bachelor of Science in Biology and Doctor of Dental Surgery degrees from Creighton University, followed by an internship and general dentistry experience in Kuwait. His research interests span oral biology, immunology, and translational orthodontic research, with experience in basic science, epidemiology, and clinical studies.

2) Brief description of your project

Our project investigates how neutrophils, the body's first immune responders, influence new bone formation during rapid maxillary expansion (RME). Although RME is a common orthodontic procedure used to correct maxillary constriction, the biological mechanisms responsible for stabilizing the expanded suture remain poorly understood. Emerging evidence suggests that neutrophils may play an important role in coordinating tissue regeneration and osteogenesis.

Using a mouse model of RME, we will selectively deplete neutrophils and evaluate how their absence affects bone regeneration within the mid-palatal suture. Bone formation will be assessed through micro-CT imaging, histologic analyses, and molecular markers of osteogenesis and stem cell activity.

By identifying the role of neutrophils in orthodontic bone remodeling, this study aims to improve our understanding of the immune mechanisms underlying skeletal expansion. These findings may ultimately lead to strategies that enhance post-expansion stability, reduce relapse, and improve outcomes for orthodontic patients.

3) Statement of how orthodontic world will benefit from your award

This award would support research aimed at improving the predictability and stability of rapid maxillary expansion, one of the most commonly performed procedures in orthodontics. By advancing our understanding of how immune cells, particularly neutrophils, contribute to bone regeneration, this work has the potential to identify biologic factors that influence treatment response and relapse risk. Ultimately, these findings may lead to more personalized treatment strategies, improved retention protocols, and novel therapeutic approaches that enhance patient outcomes. Beyond the immediate clinical implications, the knowledge gained from this project will contribute to the growing field of orthodontic immunobiology and help bridge the gap between basic science discoveries and everyday orthodontic practice.

4) Why the foundation is important to your project

The AAOF's support is important because it provides the resources needed to pursue research that addresses questions directly relevant to orthodontic patient care. Funding will help cover the costs of animal experiments, laboratory analyses, and data collection required for this project. It will also give us the opportunity to share our findings at professional meetings and learn from others in the field. We

hope this work will improve our understanding of bone healing during rapid maxillary expansion and contribute to more predictable treatment outcomes, better stability, and reduced relapse for our patients.

5) **How Foundation funding is expected to or has benefitted your career**

The AAOF Research Aid Award will advance my career as an orthodontic resident by supporting my development as both a clinician and researcher. It will provide the opportunity to conduct meaningful translational research, present our findings at national meetings such as the AAO, and engage with experts and potential collaborators in the field. Through this project, I hope to improve our understanding of the biologic mechanisms underlying rapid maxillary expansion and contribute to more predictable and stable treatment outcomes for patients. The AAOF's support reinforces the importance of research in advancing orthodontic care and will help prepare me for a future academic career dedicated to patient care, education, and scientific discovery.