

## Biomedical Research Award

### Dr. Sercan Akyalcin, Tufts University School of Dental Medicine

#### BIO

Dr. Akyalcin completed his orthodontic training at the The University of Texas Health Science Center at Houston. Currently, he serves as the director of the advanced education program of Orthodontics at Tufts University School of Dental Medicine in Boston/MA. In his career as a dental educator and orthodontist, he has published more than 40 peer-reviewed papers, eight book chapters, co-authored an orthodontic textbook, and has received many prestigious awards. He actively serves on the editorial review board of American Journal of Orthodontics, Angle Orthodontist, and some other prominent dental journals. Dr. Akyalcin has been honored as an invited speaker at many national and international orthodontic meetings.



#### SYNOPSIS

The goal of this proposal is to understand the potential impact of genetic variants identified in patients with tooth agenesis (TA) in tooth development. Our previous work revealed novel variants associated with TA; however, their function is yet to be elucidated. We will use computational modeling to predict the effects of each variant, and will then test these effects in an *in vitro* model of stem cells of dental origin. We will evaluate the impact of each variant on gene transcription, target protein function, and on the expression of additional tooth development genes. Finally, we will verify if preferential associations exist between each variant and specific TA phenotypes considering number and type of teeth missing, and family history of TA. Our results will improve understanding of the mechanisms underlying TA as well as clinical characterization of the condition towards better diagnosis, recurrence risk estimates, and future tooth replacement therapies.

This project stems from previous collaborative work between Drs. Akyalcin and Letra, whose combined expertise in dentistry, orthodontics, human genetics, and molecular biology have led to successfully funded projects and publications in high impact journals involving orthodontic residents. Our projects involve recruitment of patients with TA for clinical and basic science research and translation of research findings as a unique approach towards improved patient management, education and scientific formation of orthodontic residents.

Funding from the AAOF is of crucial importance to our project as we continue collecting data towards our goal of providing a solid foundation for future studies

targeting specific mechanisms and pathways affecting tooth development. Through the support from the AAOF, we are able to offer high caliber research opportunities to orthodontic residents as they train to develop into excellent orthodontists. Furthermore, the foundation has significantly contributed to Dr. Akyalcin's career in many forms such as academic promotion, national and international recognition and attainment of a leadership position at a major institution.