AAO Foundation Award
Final Report

Type of Award: Biomedical Research Award

Names of Principal Investigator(s): Phimon Atsawasuwan

Title of the project: The effect of shockwave therapy on orthodontic relapse

Period of AAOF support: 07-01-14 to 06-30-16

Amount of AAOF Funding: $25,000

Summary/Abstract (250 words maximum):

Relapse is a major problem for orthodontic treatment, with a high occurrence following treatment. Several preventive approaches have been extensively studied with various results and are subject to limitations. Extracorporeal Shockwave Therapy (ESWT) has shown to promote positive effects on bone healing and alveolar bone regeneration so it might be an alternative approach to delay orthodontic relapse. Until now the approach to determine tooth movement in small animals such as rodents is limited only the use of digital caliper. In this study we utilized digital scanners, which were commercially available with different scanning technologies to validate the tooth movement dimension in a small scale. Fifty five adult male rats were installed with 50 cN springs to protract their first maxillary molar for 28 days then the springs were removed to create relapse. On the date of spring removal, the rats in one group were subjected to ESWT while the others were not. Relapse was studied using PVS impression and different digital scanners. At certain timepoints, serum biochemistry was investigated. We found no significant difference between the amount of relapse with or without ESWT exposure ($P>0.05$), however, the discrepancy of relapse distances using different digital scanners was found ($P<0.05$). There was no difference in serum biochemistry between groups. ($P>0.05$) The result suggested that ESWT was a safe approach but the parameter used should be further investigated. In addition, in the study of minute scale of tooth movement such as rodent tooth movement, different digital scanners rendered different accuracy of measurement.

Response to the following questions:

1. Were the original, specific aims of the proposal realized?

   Yes. We accomplished all the proposed aims

2. Were the result published?

   The result has been analyzed and prepared for the manuscript. The manuscript has been prepared for submission to Angle Orthodontist Journal.

Chen Y, Ganjawalla K, Oubaidin M, Kelling A, Evans CA, Atsawasuwan P "Effect of Extracorporeal Shockwave Treatment on Tooth Movement in Rats" 2016 (in preparation)

The other manuscript will be submitted for publication in Journal of Veterinarian Medicine.
Al-Kharsa S, Oubaidin M, Kelling A, Evans CA, Atsawasuwan P "Discrepancy of Digital Scanners and Polyvinyl Siloxane Impression on Rat Molar Width" 2016 (in preparation)

a) If so, was AAOF support acknowledged?
Yes, AAOF was acknowledged in the acknowledgement part of the manuscript

b) If not, are there plans to publish? If not, why not?
N/A

3. Have the results of this proposal been presented?

a) If so, when and where? Was AAOF support acknowledged?
AAOF was always acknowledged at every meeting and every presentation where this project was presented.
a.1) **Atsawasuwan** as a keynote speaker at 2015 annual meeting of Thai Association of Orthodontists.
a.2) A part of the project was present in Consortium for Orthodontic Advances in Science and Technology, Itasca, IL in September 2014.
- Chen Y, Ganjawalla K, Oubaidin M, Evans CA, **Atsawasuwan P**. Effect of Shockwave Therapy on Orthodontic Tooth Movement. Consortium for Orthodontic Advances in Science and Technology, Itasca, IL, ABSTRACT #1, 2014. **Poster Presentation Award**.
a.2) A part of the project was used as a project of MS postgraduate student in the department and the result of the MS project was present at AADR/CADR Annual meeting in Los Angeles, CA in March 2016
- Al-Kharsa S, Viana G, Evans CA, **Atsawasuwan P**. Comparative Three-Dimensional Analysis of Rat Molars Using Different Digital Scanners. J Dent Res 95(Spec Iss A): 334, 2016 (www.dentalresearch.org).
- Al-Kharsa S, Viana G, Luan X, Kelling A, Evans CA, **Atsawasuwan P**. Comparative Three-Dimensional Analysis of Effect of Shockewave on Relapse Using Different Digital Scanners. University of Illinois, College of Dentistry, Clinic and Research Day, ABSTRACT #101, 2016.
a.3) A part of the project was presented in clinical & Research day at University of Illinois at Chicago, College of Dentistry.
- Oubaidin M, Chen Y, Ganjawalla M, Kelling A, Evans CA, **Atsawasuwan P**. Effect of Shockwave Therapy on Orthodontic Tooth Movement. University of Illinois, College of Dentistry, Clinic and Research Day, ABSTRACT#183, 2015.
a.4) Preliminary data for the project was presented at AADR/CADR Annual meeting in Boston, MA in March 2015.

- Ganjawalla K, Chen Y, Oubaidin M, Kelling AL, Evans CA, **Atsawasuwan P**. Effect of Shockwave Therapy on Orthodontic Tooth Movement. J Dent Res 94 (Spec Iss A): , 2015 (www.dentalresearch.org).

b) If not, are there any plans to do so? If not, why not and will AAOF support be acknowledged? N/A

4) To what extent have you used, or how do you intend to use, AAOF funding to further your career?

With the generous funding of this AAOF Biomedical Research Award for this project, we had an opportunity to investigate the effect of extracorporeal shockwave on orthodontic tooth movement and relapse. Gaining the insight into the mechanisms of extracorporeal shockwave on periodontium and alveolar bone will enhance a translational approach to improve orthodontic care. We have presented our results at several domestic and international meetings and promoted the recognition of AAOF support for orthodontic research. AAOF funding is a key component to promote my academic career and gives me an opportunity to pursue my research interest in orthodontic tooth movement. The BRA from AAOF was also used to support a resident research project at UIC. Moreover, the funding from AAOF allows me to obtain preliminary results for development of my research proposal and establishment of my research direction toward independent investigator status.