

AAO Foundation Award Final Report

Principal Investigator	Christine Hong
Co-Investigator	
Secondary Investigators	
Award Type	Orthodontic Faculty Development Fellowship Award
Project Title	Effects of Bisphosphonate Administration on Midpalatal Expansion/Retention in an Animal Model
Project Year	2013-2014
Institution	UCLA School of Dentistry, Section of Orthodontics
Summary/Abstract (250 word maximum)	<p>Aim: Mid-palatal suture expansion is an important part of orthodontic treatment as it is effective in treating transverse maxillary deficiencies in orthodontic patients including craniofacial patients. However, it is subject to a high rate of relapse. Recent studies have shown that bisphosphonates may additionally increase osteoblastic activity. The aim of this study is to evaluate the effects of bisphosphonate administration on bone formation in response to mid-palatal suture expansion in rats.</p> <p>Methods: Sixteen rats were divided into two groups: Control (n=6) and Bisphosphonate (BP) (n=10). Following 7 days of palatal expansion using helical loops, control and BP groups were given injections of saline and BP (0.1 mg/kg), respectively. After 14 days of retention, half the rats from each group were sacrificed. The retention device was removed from the remaining rats and they underwent 7 days of relapse. The diastema between central incisors was obtained at different time points to evaluate the amount of expansion and relapse. Additionally, micro-CT analysis and histological analysis were performed.</p> <p>Results: Clinical measurements revealed a significant decrease in relapse ratio in BP group ($12.8 \pm 3.82\%$) compared to control group ($25 \pm 1.73\%$). Micro-CT analysis showed more bone volume and density in BP group. H&E staining revealed more and better organized bone formation in the sutural area. Lastly, immunohistochemical staining and TRAP staining demonstrated increased number of osteoblasts and decreased number of osteoclasts in BP group compared with control group.</p> <p>Conclusion: Systemic application of bisphosphonates after mid-palatal expansion may have positive effects on reducing relapse by promoting osteoblastic bone formation.</p>

<p>Were the original, specific aims of the proposal realized?</p>	<p>Yes. All of the below specific aims were achieved.</p> <p>1. Educational program aim: Dr. Hong was engaged in various orthodontic educational programs for both pre-doctoral and post-doctoral students. Dr. Hong taught research and orthodontic clinical courses to post-doctoral students and taught didactic courses to pre-doctoral and advanced standing students. In order to expand her knowledge in basic science and translational research, she attended weekly Dental Research Institute research seminars, bone research journal club with the orthopedic hospital research group, and stem cell seminar series. Dr. Hong audited courses offered by UCLA Clinical and Translational Science Institute.</p> <p>2. Research program: Research has been the main focus of Dr. Hong's faculty development plan. Dr. Hong continues to lead her laboratory. She integrated her accumulated skills in biomedical engineering and clinical orthodontics in translational research by establishing three novel orthodontic animal models. Lastly, she expanded her stem cell and craniofacial research projects with Dr. Cun-Yu Wang. Dr. Hong and her group have published and presented at AADR and AAO meetings. She received multiple grants and awards including AAOF biomedical research award, NIH K08 career development award, cleft palate foundation award, UCLA faculty career development award, UCLA faculty research award, and UCLA School of Dentistry Seed Grant.</p>
<p>Were the results published? If not, are there plans to publish? If not, why not?</p>	<p>The manuscript is in active preparation and the results will be submitted for publication by July, 2014.</p>
<p>Have the results of this proposal been presented? If so, when and where? If not, are there plans to do so? If not, why not?</p>	<p>Yes. It was presented for poster presentation at AADR in Charlotte, NC, March, 2014 and for oral presentation at AAO in New Orleans, LA, April, 2014.</p> <p>G. Iravani, J. Park, T. Kwon, C.Hong. Bisphosphonate Administration Effects on Retention and Relapse upon Maxillary Expansion. J Dent Res 93 (Spec Iss A): 1291, 2014 (www.iadr.org).</p>
<p>To what extent have you used, or how do you intend to use, AAOF funding to further your career?</p>	<p>The AAOF funding was used for travel fees in presenting Dr. Hong's research. The funding was also used as supplemental support to Dr. Hong's salary. AAOF funding has made Dr. Hong's academic career goals a reality.</p>