

# AAO Foundation Award Final Report

## Type of Award

Orthodontic Faculty Development Fellowship Award

## Name of Principal Investigator

Hechang Huang

## Title of Project

The effects of VEGF on alveolar bone remodeling and orthodontic tooth movement.

## Period of AAOF Support (e.g. 07-01-15 to 06-30-16):

07-01-2014 to 05-31-2016

## Amount of Funding

\$15,000

## Summary/Abstract (250 word maximum)

RESEARCH: The rate of orthodontic tooth movement is largely determined by bone remodeling. We aimed to examine the effects of local vascular endothelial growth factor (VEGF) injection on the formation of osteoblasts and osteoclasts, orthodontic tooth movement, PDL hyalinized tissue area and alveolar bone remodeling. C57BL/6 mice were divided into three groups at days 0, 7, 14 and 28 (T0-3): Control (C), PBS (P) or VEGF injection (V). Each mouse had a close coil spring from the incisors to a first molar. The contralateral molar was internal control. Histomorphometric and microCT methods were used to study bone remodeling and tooth movement. In all groups, orthodontic force increased bone remodeling and RANKL/OPG ratio at T1-3 with minimum effect on M-CSF. VEGF enhanced bone remodeling, rate of tooth movement, osteoclast formation through increased RANKL/OPG ratio at T1-3, and increased osteoblast formation at T3. Hyalinized tissue area in PDL was reduced in the V group with force application. Local injection of VEGF stimulated osteoclast formation by increasing RANKL/OPG ratio, osteoblast formation and bone remodeling, thus accelerating orthodontic tooth movement.

EDUCATION: The purposes have been fulfilled by attending faculty development workshops and professional conferences that provided trainings on building research collaborations, teaching, learner's assessment, time management and grant writing.

TEACHING: The goals have been achieved by attending coursework and workshops to improve teaching skills, and a competency-based curriculum has been created.

CLINICAL: Clinical skills have been successfully improved by attending CE courses, craniofacial team and periodontology-orthodontics conference under the mentorship of Dr. Richard Faber.

Response to the following questions:

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

Mostly. The labeling of alveolar periosteal cells with AAV-2 was not performed due to technical concerns. Q-PCR was not performed because of inadequate RNA extracted. Other aims have been realized.

2. Were the results published?

Not yet. A manuscript is under preparation for submission to a dental journal before 10/31/2016 as planned.

3. Have the results of this proposal been presented?

Not yet. Plan to present.

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

The AAOF OFDFA award has been very helpful for my research and career development. I intend to use the data from this study for publication in peer-reviewed journals and presentation at national and international conferences. This study will also provide preliminary data for the application of NIH grant or other research funding.