401 N. Lindbergh Blvd.
St. Louis, MO 63141
Tel.: 314.993.1700, #546
Toll Free: 800.424.2841, #546
Fax: 800.708.1364
Cell: 314.283.1983
E-Mail: rhazel@aaortho.org

AAO Foundation Final Report Form
(a/o 5/31/2016)

Type of Award: Orthodontic Faculty Development Fellowship Award

Name(s) of Principal Investigator(s): Achint Utreja

Title of Project: Maxillary Expansion in an Animal Model: Light Buccal Loads Simulating Clinical Mechanics

Period of AAOF Support: 07-01-15 to 06-30-17

Amount of Funding: $20,000

Summary/Abstract:
Maxillary constriction is routinely addressed with rapid maxillary expansion (RME). However, the heavy forces delivered by most RME appliances to expand the palate may lead to deleterious effects on the teeth and supporting tissues. The **objective** of this study was to explore a more physiologic maxillary expansion with light continuous force. **Materials and Methods:** Twenty animals were equally divided into EXPT and CTRL groups. A custom-fabricated archwire expansion appliance made from 0.014" copper-nickel titanium (CuNiTi) wire was activated 5mm and bonded to the maxillary molar segments of animals in the EXPT group for 21 days. The force applied to each maxillary segment was 5cN. Fluorescent bone labels were injected 7, 4 and 2 days prior to euthanasia, and micro-CT and histological analyses were used to compare the tooth movement and bone morphology in the midpalatal suture and buccal aspect of the alveolar process between the two groups. Descriptive statistics (mean ± standard error of the mean) and non-parametric statistical tests were used to compare the outcomes across groups. **Results:** The intermolar width (μm) was significantly greater at the root apex (5737±42.24 EXPT, 5434±54.03 CTRL) and occlusal surface (7868±91.95 EXPT, 7085±35.10 CTRL) ($P<0.01$). The mineral apposition rate was significantly higher in the EXPT group compared to the CTRL group in the buccal and suture regions ($P<0.05$). **Conclusion:** Application of light, continuous force resulted in maxillary osseous expansion due to bilateral sutural apposition and buccal drift of the alveolar processes. This animal experiment provides a more physiologic basis for maxillary expansion.

Response to the following questions:

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

Response: Yes, the specific aim of the proposal was realized.

2. Were the results published?

Response: No, the results are not published. The manuscript has been submitted for publication and is currently under peer-review. AAOF support was acknowledged.

3. Have the results of this proposal been presented?

Response: Yes, the results were presented at the 43rd Annual Moyers Symposium in Ann Arbor, Michigan in 2016. The title was "Maxillary Expansion: Separating Myth from Facts" and the presenter was Achint Utreja. AAOF support was acknowledged.

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

Response: AAOF funding is crucial to generate preliminary data for extramural grant applications. I was fortunate to receive this support from AAOF, and will use the data generated through this project in a NIH research application.

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aaofevp@aaortho.org