

AAO Foundation Award Final Report

Type of Award: BRA

Name(s) of Principal Investigator(s): Wellington J. Rody Jr.

Title of the project: The Search for Soluble Biomarkers of Root Resorption

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

Amount of AAOF Funding: \$ 25,000

Summary/Abstract (250 words maximum):

The orchestration of bone and dentin resorption, which are mediated by osteoclasts and odontoclasts respectively, is required for normal dentition. Conversely, dysregulated bone or dentin resorption is associated with a host of oral diseases. To date non-invasive approaches to monitor mineralized tissue remodeling and to distinguish between dentin and bone resorption are lacking. We hypothesize that osteoclasts and odontoclasts have distinct markers that would allow for distinction between their activities during mineralized tissue remodeling. In this *in vitro* cell culture project, we interrogated the proteins and small vesicles (exosomes) secreted by osteoclasts and odontoclasts in an attempt to identify markers that are unique to dentin breakdown. Results showed no statistically significant differences between the number of exosomes produced by osteoclasts vs. odontoclasts. Nevertheless, we were able to identify approximately 120 exosome proteins that are mainly detected in odontoclast media but not osteoclast media using liquid-chromatography mass spectrometry (LC-MS). We also carried out a technique named “phage display biopanning” and were able to identify clones that are mainly reactive to odontoclast products. In conclusion, our results indicate that there is a proteomic difference in the content of the cell culture media produced by odontoclasts and osteoclasts. Further clinical research may show whether these proteomic profiles can identify oral fluid biomarkers to assess root resorption status in orthodontic patients.

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 results published?

One paper has already been published: Huyin, N; Von Moss, L; Smith, D, Rahman, I; Felemban, M; Zuo, J; Rody Jr, WJ; McHugh, K; Holiday, LS. Characterization of regulatory extracellular vesicles from osteoclasts. *J Dent Res.* 2016 Jun;95(6):673-9. PMID: 26908631.

a.) If so, was AAOF support acknowledged.

Yes, AAOF was acknowledged at the end of the published manuscript.

b.) If not, are there plans to publish? If not, why not?

The plan is to submit one or two more articles for publication by the year-end.

3. Have the results of this proposal been presented? Yes.

a) If so, when and where?

Preliminary findings were presented at the AADR/CADR meeting in Los Angeles CA: Rody WJ et al. Exosomes: A Source of Markers for Bone and Dentin Resorption. AADR/CADR Annual Meeting & Exhibition. Los Angeles CA. March 2016 (Oral Presentation)

b) If not, are there plans to do so? If not, why not?

We intend to discuss the final results at future meetings.

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

AAOF has become a critical funding source for projects that are relevant to our specialty. My funding from AAOF is allowing me to generate preliminary data and publications to prepare an NIH grant application. In summary, my laboratory was able to pursue new avenues of investigation that would not otherwise be possible. I have also used AAOF funding to support resident research projects that have great potential to provide a meaningful experience for them.

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