



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)**

Please prepare a report that addresses the following:

Type of Award: 2017 AAOF Orthodontic Faculty Development Fellowship Award

Name(s) of Principal Investigator(s): Shankar Rengasamy Venugopalan

Title of Project: Genomic Analyses in Ameloblastoma

Period of AAOF Support: July 1, 2017 to December 31, 2018 (No cost extension end date)

Amount of Funding: \$20000

Summary/Abstract of Completed Project (250 word maximum)

Objective: Ameloblastomas are a group of common odontogenic tumors that originate from the dental epithelium. These tumors are aggressive in nature and present as slow growing painless cortical expansion of the jaw. Histologically, the follicular and plexiform subtypes of the solid/multicystic constitute two-thirds of the ameloblastomas. The objective of this study was to identify unique genetic variants in follicular and plexiform ameloblastomas using deep whole-exome sequencing (WES).

Methods: This study was approved by the University of Missouri Kansas City (UMKC) Institutional Review Board. Archived follicular (n=4) and plexiform (n=6) ameloblastoma Formalin Fixed Paraffin Embedded (FFPE) tissue blocks were retrieved from the UMKC Department of Oral Pathology, Medicine, and Radiology. A sample of tumour tissue was dissected under a microscope. Genomic DNA was isolated from the FFPE tissue samples using the Covaris® LE220 protocol. Samples were prepared for deep WES using the IDT Exome Research Panel (IDT, Coraville, IA). Sequencing was completed on an Illumina NovaSeq 6000 with an average of 20GB of data resulting in a mean 400X coverage (paired end 150 nucleotide reads). Gapped alignment to reference sequences (GRCh37.p5) was performed with Dragen (Illumina) and analysis completed using custom-developed software, RUNES and VIKING.

Results and Conclusions: Initial analyses revealed variants in *BRAF* in all follicular samples. However, in the plexiform tumours, variants were identified in *KRAS*, *SMO*, *FGFR2*, and *BRAF*. Based on preliminary analyses the variants found in plexiform ameloblastoma appear to be more heterogeneous than previously reported. Further bioinformatics analyses are underway to confirm these findings.

Response to the following questions:

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

Yes, the original specific aims of this proposal was realized. In my 2017 OFDFA, I proposed didactic and practical experience components.

- i. I was one of the two faculty scholars selected for the University of Missouri Faculty Scholars (UMFS) Program. The goals of this program was to help faculty members prepare academic portfolio; be an effective educator and mentor; promote collegial networks for collaborations; and produce scholarly work. During the UMFS program, I attended 3 University of Missouri System-wide multi-day retreats and monthly on-campus events.
- ii. As proposed in the educational plan, I attended the 2018 ADEA, AADR, and AAO meetings; and the COAST workshop. I was also a presenter in the 2018 ADEA and the COAST workshop.
- iii. During the funding period, I directed 3 courses – 1 for DDS students and 2 for the Orthodontic residents. The following table describes the courses that I directed/guest lectured during the 2017–18 funding period.

Term	Course/Program	Participation
Fall 2017	D6436 Growth & Development (DDS Year 2)	Course Director and Lecturer
Spring 2018	BIO–SCI5706 Growth & Development (Graduate)	Course Director and Lecturer
Summer 2018	BIO–SCI5707 Growth & Development (Graduate)	Course Director and Moderator
Spring 2018	D6526 Orthodontics I (DDS Year 2)	Lecturer
Spring 2018	D6526L Orthodontics Lab (DDS Year 2)	Lab Instructor
All Terms	D6656C Orthodontic Clinic	Clinical instructor

- iv. In the funding period (2017–18), I successfully passed the American Board of Orthodontics Written Examination held on April 12, 2018. In addition to above mentioned activities, I completed the requirements of DDS Program for internationally trained Faculty Members offered by the UMKC School of Dentistry and received the diploma in Fall 2017.
- v. As proposed in the clinical skills plan, I participated as one of the examiners in the *Comprehensive Clinical Examinations* for Orthodontic Residents. During these exams, I evaluated the in-progress and finished orthodontic cases presented by the residents. I completed formal evaluation of the presenting residents using a structured rubric. I closely worked with the year 3 and 4 DDS students in one-on-one basis to help them treatment plan their orthodontic cases. Both in the Pre-doctoral and Advanced Education Orthodontic Clinic, I supervised the DDS students/Orthodontic Residents respectively.
- vi. The Research Plan for my 2017 OFDFA is a collaborative endeavor with *Dr. Emily Farrow* (Children’s Mercy Hospital Center for Pediatric Genomic Medicine), and *Dr. Craig Whitt* (UMKC School of Dentistry Department of Oral Pathology, Medicine, and Radiology). Further bioinformatic analyses of the genomics data from sequencing the ameloblastoma samples are under way and will submit the manuscript soon.

2. Were the results published?

a.) If so, was AAOF support acknowledged? – Manuscript is yet to be published.

b.) If not, are there plans to publish? If not, why not and will AAOF support be acknowledged?

Further bioinformatic analyses of the genomics data from sequencing the ameloblastoma samples are under way and will submit the manuscript soon. When we submit the manuscript, funding from the AAOF will be acknowledged.

3. Have the results of this proposal been presented?

a.) If so, when and where? Was AAOF support acknowledged?

The data has not been presented. We are hoping to publish the manuscript soon.

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

I most sincerely thank the members of PARC and the AAOF for funding the OFDFA titled “*Genomic Analyses in Ameloblastoma*”. This award has been tremendously helpful in honing my teaching and clinical skills. Also, the data generated from this project will be used as a preliminary data for extra-mural grant application.

Accounting for Project: No left over funds.

Please return to AAOF via email attachment to aaofevp@aaortho.org