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AAO Foundation Final Report Form (a/o 6/30/2020)

In an attempt to make things a little easier for the reviewer who will read this report, please consider these two questions before this is sent for review:

- Is this an example of your very best work, in that it provides sufficient explanation and justification, and is something otherwise worthy of publication? (We do publish the Final Report on our website, so this does need to be complete and polished.)*
- Does this Final Report provide the level of detail, etc. that you would expect, if you were the reviewer?*

Please prepare a report that addresses the following:

Type of Award: **Research Aid Award**

Name(s) of Principal Investigator(s): **Po-Jung Chen**

Institution: **University of Connecticut**

Title of Project: **Investigating PRG4 Re-expression as a Treatment for TMJ Degenerative Diseases**

Period of AAOF Support: **07-01-19 to 12-31-20**

Amount of Funding: **5,000**

Summary/Abstract

Objectives: The objectives of this project were to understand the role of PRG4 expression in TMD through characterization of TMJ cartilage at various stages of disease using established biochemical techniques and a sophisticated automated biomechanical indentation technique. Our hypothesis was that PRG4 deficiency leads to degeneration of the TMJ mandibular condylar cartilage and PRG4 restoration will prevent and slow down the degeneration of the TMJ cartilage.

Materials and Methods: *Mice:* PRG4 gene trap (GT) mice and WT C57B6/J controls (age and sex matched) were used. Time points for assessment were at 2 weeks, 2 and 6 months (N=8 mice / time point for WT and PRG4 GT). PRG4 expression was restored in the GT mice through

induction of Cre-mediated recombination using tamoxifen. Time points for assessment was at 2 and 6 month. **Micro-CT:** Mandibles were harvested and fixed and subjected to micro-CT scanning. **Biomechanical Testing:** The cartilage stiffness and thickness of the mandibular condylar cartilage was measured by an automated indentation technique using a Biomomentum Mach-1 v500csst with a 3 axis motion controller, 0.1um resolution, enhanced calibration of a multiaxial 17N load cell. **Results: Micro-CT:** Micro-CT analysis revealed significant increased bone density and bone volume fraction in PRG4 re-expression mice in comparison to GT mice in both 2 month and 6 month group. **Histology:** There was significant decreased TRAP activity in PRG4 re-expression mice. In Safranin O/Fast Green and Toluidine Blue staining, it showed there were cartilage degenerated progress in the GT mice, but improved cartilage integrity with PRG4 re-expression. There were significant increased MMP13 and ADAMTS5 immunohistochemistry staining in GT mice, while decreased in PRG4 re-expression mice. **Conclusion:** Our results suggest that missing PRG4 leads to condylar cartilage degeneration and PRG4 restoration will slow or prevent degeneration of the TMJ.

Detailed results and inferences:

1. If the work has been published, please attach a pdf of manuscript OR
2. Describe in detail the results of your study. The intent is to share the knowledge you have generated with the AAOF and orthodontic community specifically and other who may benefit from your study. Table, Figures, Statistical Analysis and interpretation of results should be included.

Respond to the following questions:

1. Were the original, specific aims of the proposal realized? **Yes**
2. Were the results published? **I am working on manuscript now**
 - a. If so, cite reference/s for publication/s including titles, dates, author or co-authors, journal, issue and page numbers **N/A**
 - b. Was AAOF support acknowledged? **Will do when submitting for publication**
 - c. If not, are there plans to publish? If not, why not? **Yes**
3. Have the results of this proposal been presented? **No**
 - a. If so, list titles, author or co-authors of these presentation/s, year and locations
 - b. Was AAOF support acknowledged?
 - c. If not, are there plans to do so? If not, why not? **Yes**
4. To what extent have you used, or how do you intend to use, AAOF funding to further your career?

The AAOF funding has helped me to generate data for my master thesis and future grant submission and to publish key manuscripts soon.

Accounting for Project: i.e., any leftover funds, etc.

There was no leftover funds left.