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AAO Foundation Final Report Form
(a/o 3/6/2016)

Please prepare a report that addresses the following:

Type of Award, e.g., Orthodontic Faculty Development Fellowship Award, Postdoctoral Fellowship Award, Biomedical Research Award, Center Award, Educational Innovation Award, Program Award, Research Aid Award

Name(s) of Principal Investigator(s): Sumit Yadav

Title of Project: Role and Mechanism of BMP2 in Mandibular Condylar Cartilage

Period of AAOF Support : 07-01-15 to 09-15-16

Amount of Funding: 20,000

Summary/Abstract (250 word maximum)

Objectives: To evaluate the effects of conditional deletion of BMP2 on the mandibular condylar cartilage (MCC) and the subchondral bone. **Materials and Methods:** Three weeks old αSMACreERT2; BMP2cKO mice were injected with tamoxifen and mice were euthanized 2 week, 1 month and 2 months after the tamoxifen injections. Mice were dissected and examined by **x-ray,** micro-CT and histology. Sagittal sections of condyles were stained for TRAP, EdU, alkaline phosphatase and toluidine blue. Changes in gene expression in the MCC and the subchondral bone were analyzed using Real-Time PCR **Results:** Bone volume fraction, tissue density and trabecular thickness were significantly decreased in the MCC and the subchondral bone with the deletion of BMP2 from the αSMA expressing cells at different time point.

Furthermore, histological analysis revealed decrease in mineralization (Von kossa staining), TRAP activity, EdU positive cells. Using this model, we have shown that cell lineage specific deletion of BMP2 leads to a marked decrease in the mineralization of the extracellular matrix and subchondral bone. Furthermore, we observed that BMP2 deletion leads to altered morphology of the cells in the hypertrophic zone of the MCC. The cells in the hypertrophic zone of the cartilage were round with a large nucleus. Our gene expression analysis validated that there was a decrease in the expression of Col10a1 (maturation marker), Ihh (mineralization marker) and Sox9 (proliferative marker). **Conclusion:** Lineage specific BMP2 deletion from αSMA expressing cells leads to decreased matrix synthesis, decreased matrix mineralization, decreased hypertrophic differentiation, decreased bone volume fraction and decreased tissue density.

Response to the following questions:

1. Were the original, specific aims of the proposal realized? Yes
2. Were the results published? We have submitted NIDCR grant based on the preliminary data we obtained from the AAOF funding. We anticipate to publish the result in near future
    a. If so, cite reference/s for publication/s including titles, dates, author or co-authors, journal, issue and page numbers
    b. Was AAOF support acknowledged?
    c. If not, are there plans to publish? If not, why not?
3. Have the results of this proposal been presented? We have just finished the research. The results will be presented in future meetings.
    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?
4. To what extent have you used, or how do you intend to use, AAOF funding to further your career? The results from the proposed research were used to submit NIDCR grant. The PI (Sumit Yadav) has submitted one NIDCR/NIH grant.

Please mail hard copy to AAOF and also send electronically
(as a Word document and e-mail attachment) to
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