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Loss of Gsa in osteocytes leads to craniofacial osteopenia and defective mineralization

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- Parathyroid hormone (PTH) regulates bone formation
- Osteocytes express PTHr (GPCR)
- DMP1-GsαKO mice have significant decrease in both trabecular and cortical bone (femur)
- Osteopenia is driven by high expression of sclerostin

o (LRP5/6, Wnt signaling pathway)

• Objective: Investigate the role of Gsα signaling in craniofacial growth, condylar remodeling, and enamel mineralization



Vertebrae



Mice Lacking $Gs\alpha$ in osteocytes are severely osteopenic Fulzele et al. 2018.

Trabecular

Cortical

Materials & Methods

□ A total of twenty-eight, sixweek-old mice were used (Gsα fl/fl or Control, DMP1-*Cre;Gsα fl/fl or DMP1-GsαKO*)



 \Box Mice lacking Gs α by DMP1-Cre-mediated loss of Gsa in osteocytes



hematoxylin and eosin (H&E) and Immunohistochemistry (IHC)



using ImageJ

- i. ii.
- iii.



\Box Sections of 5 μ m to be stained with

Three linear measurements of mandible

Mandibular length (Red) Condyle head length (Blue) Condyle head width (Orange)

Mice lacking Gsα in osteocytes have decreased craniofacial bone volume





GsaKO (Dmp1-Cre; Gsa fl/fl)

Condylar bone lining cells are decreased in DMP1-GsaKO mice



Condylar bone lining cells are decreased in DMP1-GsαKO mice

Effect of Gsα deficiency on tooth mineralization





GsαKO (Dmp1-Cre; Gsα fl/fl) 10x

GsαKO (Dmp1-Cre; Gsα fl/fl) 20x

Discussion/Conclusion

- Mice lacking Gsα expression predominantly in osteocytes (DMP1- GsαKO) develop \bullet severe osteopenia in the craniofacial bones and condyles specifically
 - High sclerostin expression
 - Reduced bone formation
- Gsα signaling in osteocytes plays an integral part in condylar remodeling; thus, it might be essential in developing the temporomandibular joint
- Sclerostin expression is suppressed by PTH (Gsα)
- Conclusion: Our studies identified Gs α signaling in osteocytes and odontoblasts as important in maintaining • normal bone and tooth homeostasis
- Future studies:
- Assessment of the furcation area & the PDL for any signs of inflammation and ongoing periodontal disease İ.
- Generate more mice to dissect their heads and image them axially to investigate clefting in relation to Gsa ii.

Acknowledgments

Paola Divieti Pajevic, M.D., Ph.D

Noah Warshawsky, MS

Melih Motro, DDS, Ph.D

Alpdogan Kantarci, DDS, Ph.D







