P53-Hippo signaling preserves dental follicle cell fate in vertebrate evolution

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BACKGROUND

Cranial neural crest cells (CNCCs) play an essential role in craniofacial development and function. These cells have the ability to differentiate into multiple cell types, contributing to diverse craniofacial structures, including bones, cartilage, and connective tissue. Despite their significance, the mechanisms governing the cell fate decisions of post-migratory CNCCs remain largely unknown. Transcription factors play a central role in orchestrating these developmental processes by regulating gene expression programs. P53 is a well-known master regulator, extensively studied in cancer biology for its role in controlling cell growth and apoptosis. However, its role in postnatal development, particularly in craniofacial development, is less understood.

PURPOSE

To investigate the role of P53 in regulating the postnatal development of CNCCs.

MATERIAL AND METHOD

The transgenic mouse model used in this study was *Gli1-CreER;Trp53*$^{fl/fl}$. Techniques used in this study included immunohistochemistry, RNAscope, CUT&RUN-seq, bioinformatic analyses, and cell culture.

RESULTS

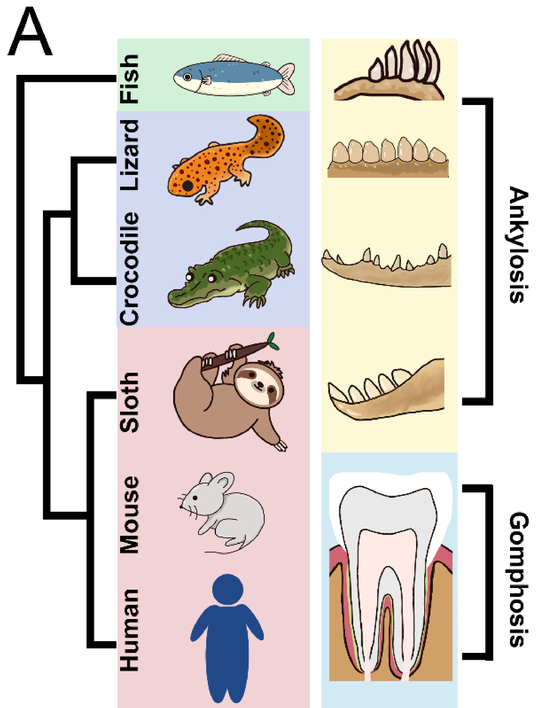

Fig 1. Tooth attachment across vertebrates.

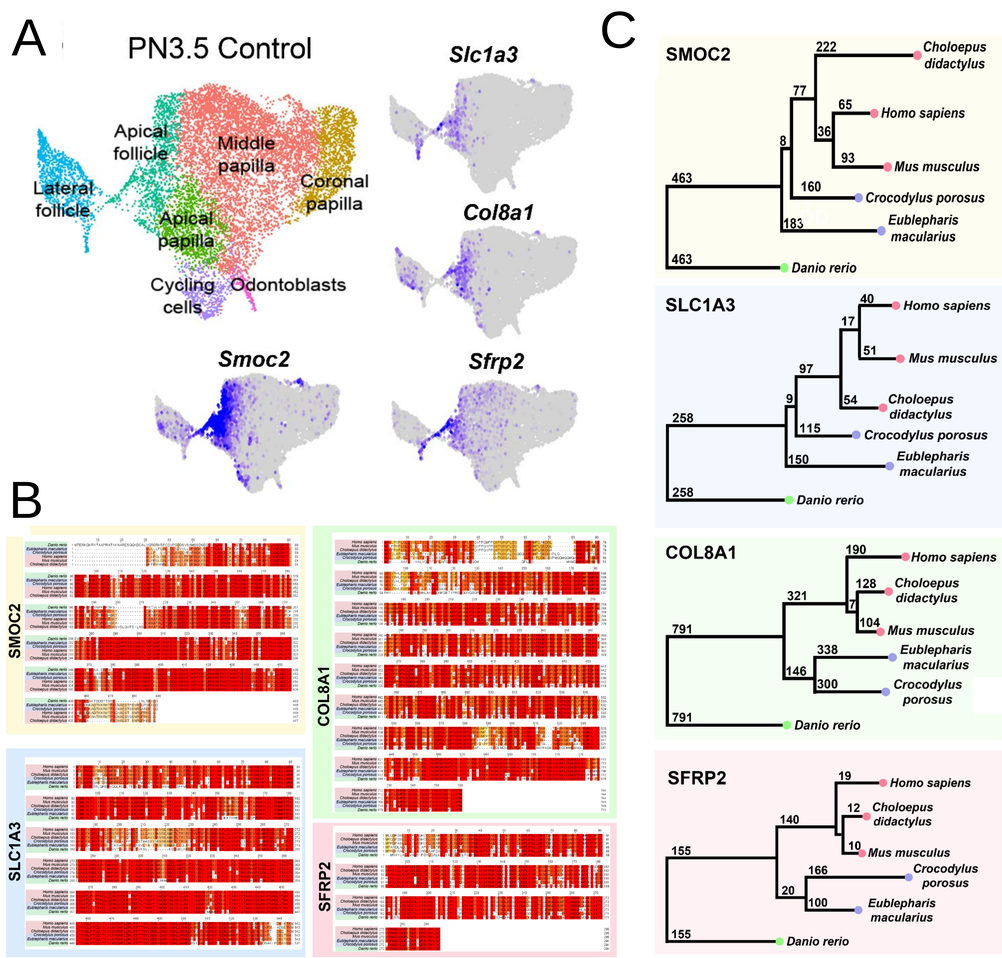

Fig 2. Divergence of dental follicle cell markers during vertebrate evolution.

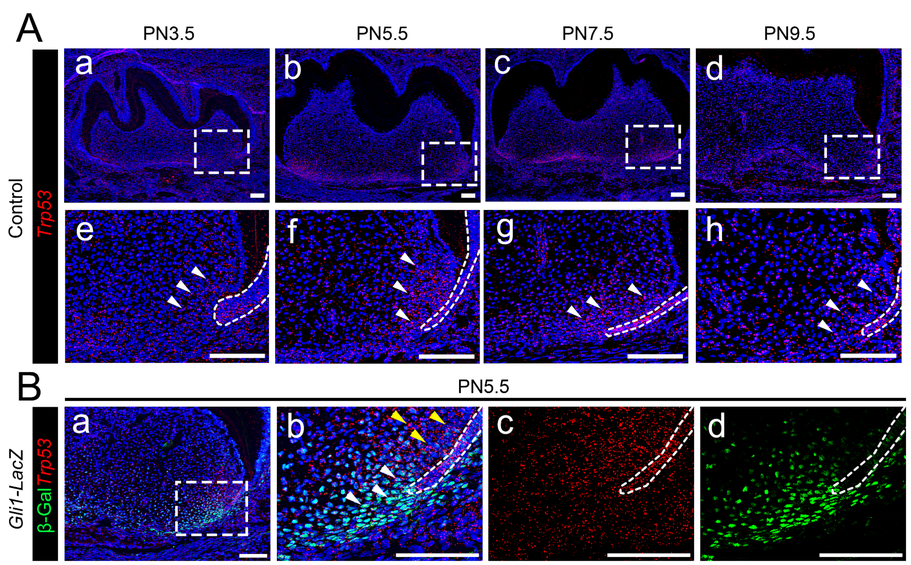

Fig 3. Expression of P53 in the developing molar.

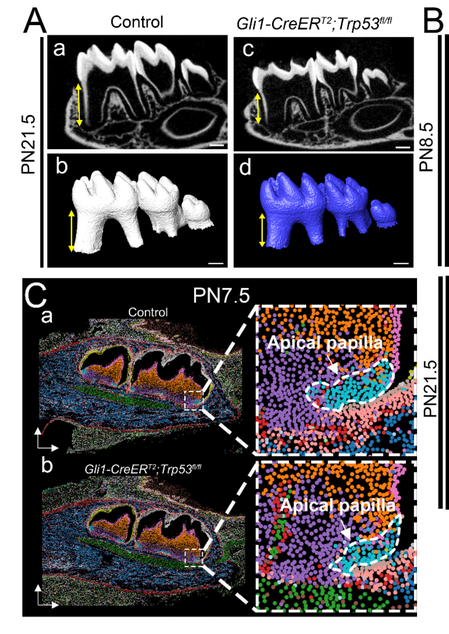

Fig 4. Deletion of P53 in the GLI1+ lineage leads to a shortened tooth root phenotype and an increased number of SP7+ cells in the alveolar process of the mandible.

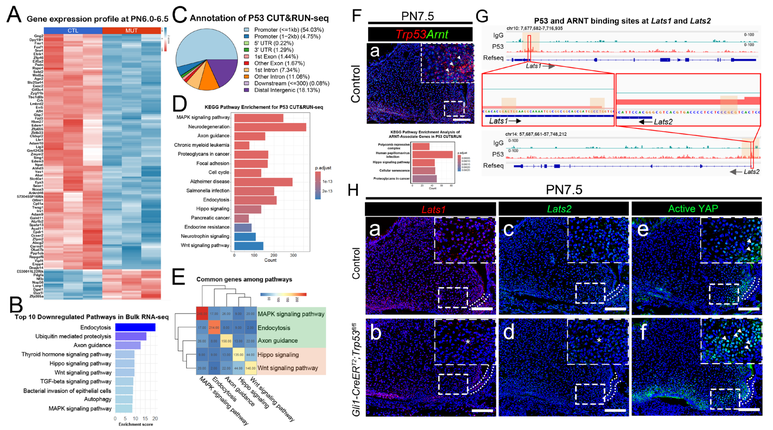

Fig 5. P53 regulates Hippo signaling during tooth root development.

CONCLUSION

These findings suggest that P53 plays a broader role in developmental biology beyond its established functions in cancer, potentially influencing other aspects of postnatal tissue formation and regeneration.

ACKNOWLEDGEMENTS

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