Organoids from human tooth showing epithelial stemness phenotype and differentiation potential

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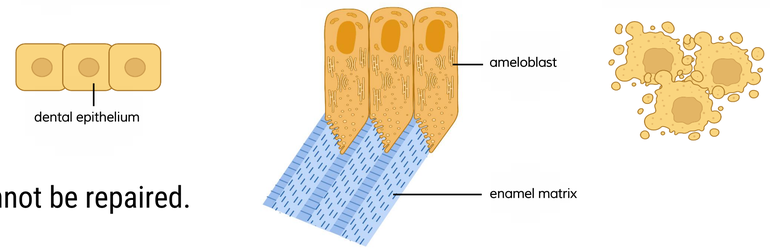
BACKGROUND & AIM

During development.. .. dental epithelium gives rise to .. .. ameloblasts, which deposit enamel .. .. but once formed, undergo apoptosis.



Once damaged, enamel cannot be repaired.

AIM: to develop an **epithelial organoid research model** derived from **human tooth tissue** to study **dental epithelial stem cell biology** and explore its potential to **differentiate into ameloblasts and deposit mineralized tissue.**

CONCLUSION

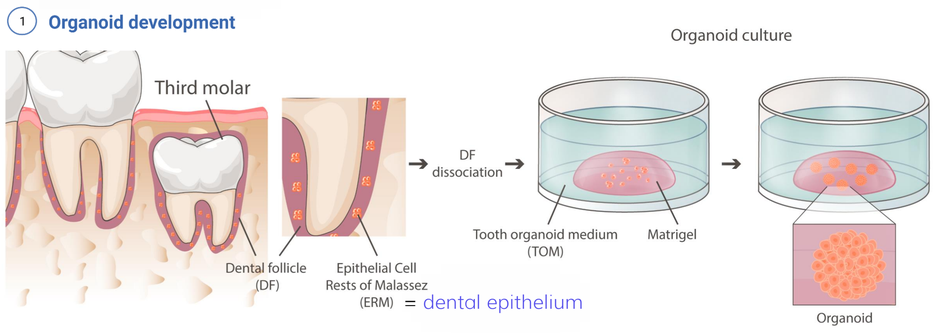
The **tooth organoid model** provides more insight into:

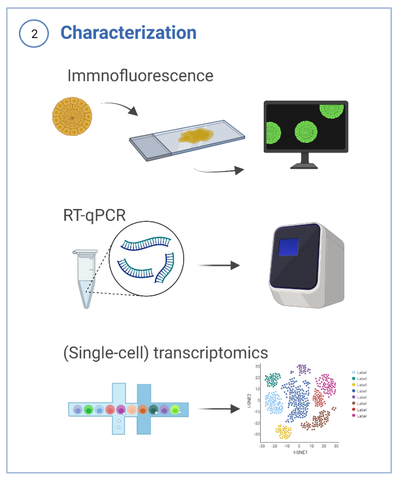
- **epithelial stem cell biology and function**, as well as
- their **interplay with dental mesenchyme** and
- their **differentiation capacity**, all at present poorly characterized and comprehended in humans.

> *This is the first study to have developed human tooth organoids. Our organoid/assembloid modeling may signify the start toward bioengineering a tooth or tooth parts for future replacement therapy.*

METHODS

We developed a method to generate organoids from the dental follicle of third molars (wisdom teeth) from young adolescents, which contains dental epithelial (stem) cells.

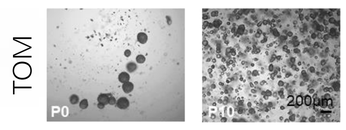




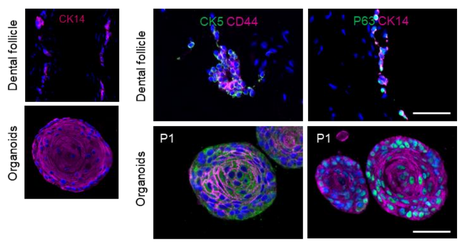
RESULTS

The organoids ..

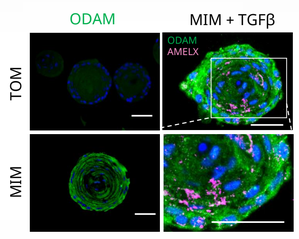
.. are long-term expandable.



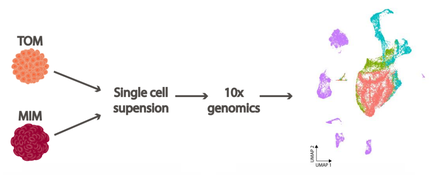
.. molecularly and functionally mimic the ERM.

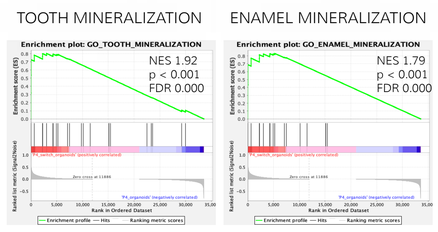


.. differentiate toward ameloblasts.

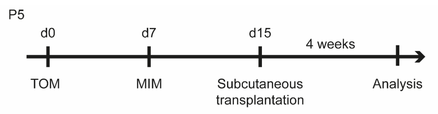


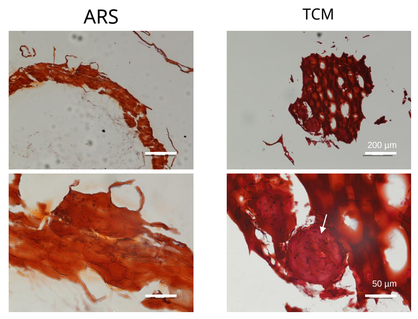
TGFβ promotes differentiation



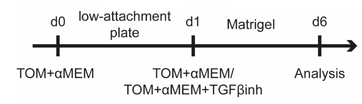


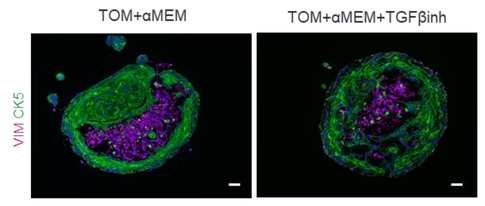
.. deposit mineralized tissue when transplanted *in vivo*



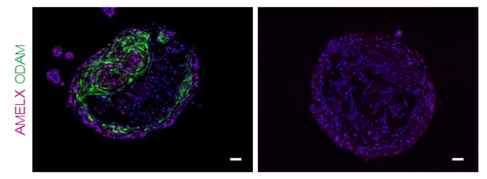


Mesenchymal-epithelial organoid (assembloid) modelling promotes ameloblast differentiation ..





.. and is abbrogated by TGFβ receptor inhibition



FUTURE PERSPECTIVES

biobanking | clinical compounds | co-culture systems | gene editing | disease modeling and drug screening | food industry | host-microbe interactions | mineralization and hard tissue formation

Affilitations:

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LET'S CONNECT!

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