

# Teeth: a future renewable natural resource?

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Most vertebrates have continuous tooth generation, meaning that lost teeth are replaced with new teeth. Mammals, however, including humans, have teeth that are generally only replaced once, when milk teeth are replaced with permanent teeth.

Researchers from the Institute of Biotechnology at the University of Helsinki and their collaborators from Berlin and Kyoto have now shown that continuous tooth generation can be induced in mammals. The research results were published in the scientific journal *Proceedings of the National Academy of Sciences*, USA (PNAS).

The researchers activated the Wnt signalling pathway in mouse tissue; this signalling pathway is one of those used for cell communication and plays an important role in embryonic development. As a result of stimulating this particular signalling, one mouse molar developed dozens of new teeth with normal dentin, tooth enamel and developing roots. The crowns were, however, simple and cone-shaped, unlike the typically more complex multiple cusps of mouse molars.

The development of the new teeth was studied through tissue culture, and it became clear they were the result of germination from previously developed teeth, just like the teeth of lower vertebrates. The evolutionary trend in mammalian dentition has generally been toward a decrease in tooth generation, as well as towards a more complex shape of the crowns of teeth. The research indicates that Wnt signalling could have played a crucial role in these changes during evolution.

The results also suggest that mice have retained incipient potential for continuous tooth generation and that it can be unlocked by activating Wnt signalling. It is reasonable to conjecture that the potential for continuous tooth generation may also have been retained in humans. Who knows: perhaps dentists in the distant future may be able to use this million-year-old regenerative potential to make their patients grow new teeth to replace lost ones.

Source: University of Helsinki

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