


news

New study offers advances in laboratory-grown teeth

Dental Tribune International



A recent study has revealed promising breakthroughs in tooth regeneration. (All images © King's College London)

Previous research has shown that, when combined, dental epithelial and mesenchymal cells can form tooth-like structures in vitro called organoids, which mimic the structure and development of teeth and can mature into functional organs. Researchers have explored various biomaterials in which to grow these, but many lack precise control over their properties. A recent study has introduced a new approach using customisable gelatine-based hydrogels, allowing better control of the material environment to investigate and support formation of tooth organoids. The study highlights the potential of bioengineered teeth as an alternative to dental restoration.

In the study, researchers from King's College London and Imperial College London recreated the process of early tooth development in a laboratory setting using the hydrogels they synthesised to simulate key features of the natural tooth niche. This material enabled the cultured cells to interact and organise into tooth organoids.


Lead author Xuechen Zhang, a PhD student at the Faculty of Dentistry, Oral and Craniofacial Sciences at King's College London, said in a press release: "Lab-grown teeth would naturally regenerate, integrating into the jaw as real teeth. They would be stronger, longer lasting and free from rejection risks, offering a more durable and biologically compatible solution than fillings or implants."

According to Zhang, while earlier approaches to tooth regeneration succeeded in forming tooth bud-like structures, the biomaterials used lacked the fine control needed to replicate the nuanced cellular interactions seen during natural tooth development. The new material, however, creates a more stable environment, allowing the cells to interact progressively, more closely mimicking how tooth development occurs in the body.

Towards clinical application

Having successfully established the conditions required for tooth regeneration, the researchers are now working to translate the findings from the laboratory to clinical use in patients. To achieve this, they are exploring two main approaches: transferring immature tooth cells directly into the site of the missing tooth to allow natural growth within the mouth or culturing a complete tooth in the laboratory before implantation in the patient's mouth.

The research forms part of a wider initiative in regenerative medicine, which seeks to harness the body's biological processes to repair or replace damaged tissues and organs. Rather than depending on artificial materials, scientists are developing natural alternatives by culturing stem cells within carefully engineered biological environments.

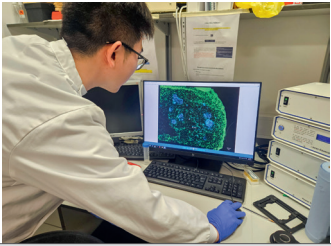


Xuechen Zhang (left) and Dr Ana Angelova Wilcock.

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Co-author Dr Ana Angelova Wilcock, director of the postgraduate programme in Regenerative dentistry at King's College London, commented: "As the field progresses, the integration of such innovative techniques holds the potential to revolutionise dental care, offering sustainable and effective solutions for tooth repair and regeneration."

Editorial note: The study, titled "Grafting tooth organoids using defined bioengineered cross-linked hydrogels", was published in the December 2024 issue of ACS Nano Letters.



Xuechen Zhang looking at tooth cells on a computer screen.

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Italy	1	1,000	23,000	Italian	6,750	3,950	2,950	1,950	1,450	—
implants										
Italy	2	1,000	23,000	Italian	6,750	3,950	2,950	1,950	1,450	—
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