

New hope for old teeth as scientists try to regrow enamel

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Tooth enamel is an astonishing material. It can resist heat, cold, acid and daily wear — and lasts for decades. But it has one great flaw, which is evident in the teeth of almost all adult Britons: once it's gone, it's gone.

Now, though, scientists claim to have found a way to regrow it, or something very similar to it, using a process akin to that which constructed the enamel in the first place. They hope that the resulting technology could revolutionise dentistry, allowing us to effectively

grow new enamel and even fill in cavities permanently.

"Enamel has tremendous properties," said Alvaro Mata, from Queen Mary, University of London. "It's a material nature makes that is made to last, but not to regenerate."

It is formed early in our development, when a matrix made out of proteins encourages minerals to form a highly ordered crystal structure. "What we tried to do is recreate that process, to end up with a material of similar stability, acid resistance, and mechanical properties," said Professor Mata.

For a paper in the journal *Nature Communications*, he worked with his academic colleague Sherif Elsharkawy to make a protein matrix that could pull minerals out of saliva and encourage them to crystallise. They showed that this structure, which initially looked a little like a contact lens, grew a substance very similar to enamel.

Professor Mata said that they now wanted to try applying it to real teeth, to show that it can form a seamless bond with the surrounding tooth, and replace worn-down enamel.

"We envisage a thin bandage, a few

microns in thickness, that you can coat or position on top of the tooth in areas that are problematic," he said. "Then it will use the saliva, and in time we will have this regeneration taking place."

Damien Walmsley, the British Dental Association's scientific adviser, said he was excited by the study. "It shows that potential improvements in dentistry go hand-in-hand with developments in materials science," Professor Walmsley said. "We look forward to seeing how effective these materials could be in preventing and treating tooth decay."

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