

Painless plasma jets could replace dentist's drill

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Plasma jets capable of obliterating tooth decay-causing bacteria could be an effective and less painful alternative to the dentist's drill, according to a new study published in the February issue of the *Journal of Medical Microbiology*.

Firing low temperature plasma beams at dentin - the fibrous [tooth](#) structure underneath the enamel coating - was found to reduce the amount of dental bacteria by up to 10,000-fold. The findings could mean plasma technology is used to remove infected tissue in tooth cavities - a practice that conventionally involves drilling into the tooth.

Scientists at the Leibniz-Institute of Surface Modifications, Leipzig and dentists from the Saarland University, Homburg, Germany, tested the effectiveness of plasma against common oral pathogens including *Streptococcus mutans* and *Lactobacillus casei*. These bacteria form films on the surface of teeth and are capable of eroding [tooth enamel](#) and the dentin below it to cause cavities. If left untreated it can lead to pain, tooth loss and sometimes severe gum infections. In this study, the researchers infected dentin from extracted human molars with four strains of bacteria and then exposed it to plasma jets for 6, 12 or 18 seconds. The longer the dentin was exposed to the plasma the greater the amount of bacteria that were eliminated.

Plasmas are known as the fourth state of matter after solids, liquids and gases and have an increasing number of technical and medical applications. Plasmas are common everywhere in the cosmos, and are

produced when high-energy processes strip atoms of one or more of their electrons. This forms high-temperature reactive [oxygen species](#) that are capable of destroying microbes. These hot plasmas are already used to disinfect surgical instruments.

Dr Stefan Rupf from Saarland University who led the research said that the recent development of cold plasmas that have temperatures of around 40 degrees Celsius showed great promise for use in dentistry. "The low temperature means they can kill the microbes while preserving the tooth. The dental pulp at the centre of the tooth, underneath the dentin, is linked to the blood supply and nerves and heat damage to it must be avoided at all costs."

Dr Rupf said using plasma technology to disinfect tooth cavities would be welcomed by patients as well as dentists. "Drilling is a very uncomfortable and sometimes painful experience. Cold plasma, in contrast, is a completely contact-free method that is highly effective. Presently, there is huge progress being made in the field of plasma medicine and a clinical treatment for dental cavities can be expected within 3 to 5 years."

Provided by Society for General Microbiology

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