

Alan Pierce
pierceaj@techtoday.us

Painless Dentistry

If technologists could remove two dental procedures that you have to suffer through when you go to the dentist, what would you choose? My guess is you would want to eliminate the dental drill that your dentist uses to remove the damaged (decayed) part of a tooth. Next up, you would likely also want to eliminate the injections that your dentist gives you to dull the pain that you would otherwise feel when a tooth is being drilled.

I suspect that the feeling you got reading the above paragraph was just as painful as the feeling created in my mind when I wrote it. The good news is that there is a new dental technology that eliminates the pain of having a tooth drilled. And if tooth decay can be removed without painful drilling, then there is no need to numb the area around the affected tooth. So this technology not only removes the need for the drill, it also probably eliminates the need for most Novocain injections.

The National Science Foundation (NSF) and the National Institute of Health (NIH) funded the research that created the plasma brush, which is the new tool that can remove dental decay and prepare a tooth for a filling without any painful drilling. (See photo.) The team that developed this technology included professors and researchers from the School of Dentistry at the University of Missouri-Kansas City and the School of Dentistry at the University of Tennessee-Memphis.

The bacteria that cause tooth decay collect in the crevices of your teeth. They consume the sugars that are found in the foods and candy that you eat. They also secrete acids that, over time, eat away the minerals found in the protective enamel outer layer of your teeth. Once through your tooth's protective layer, the acids continue to eat holes in your teeth, thus creating cavities. Brush-

ing your teeth often with toothpaste that contains fluoride can help prevent cavities because you are washing the sugars off your teeth and coating your teeth with a mineral (fluoride) that can strengthen tooth enamel through a process called remineralization. Here, the fluoride mineral fills in the area damaged by



University of Missouri and Nanova Inc.

This new dental tool can remove dental decay and prepare a tooth for a filling without any painful drilling.

the acid produced by bacteria and thus can prevent tooth decay.

When decay is already present in a tooth, fluoride is no help and you must go to the dentist. So a breakthrough to painless dentistry would be welcomed by everyone—including dentists. Statistics indicate that dentists spend 75% of their time performing procedures to solve problems caused by tooth decay.

The plasma brush accelerates ions into an air stream that destroys the cell walls of the bacteria that caused the tooth decay. Without a functional cell wall, the bacteria quickly die and are easily flushed out from the cavity (hole) that it created in your tooth.

If you used a mirror to watch your dentist using this tool, you would see a white light coming out of the tip of the plasma brush. The physics involved define this light that is cool to the touch as a “cool flame.” What you

would feel, as your dentist works on your tooth, is a cool breeze—nothing that would cause pain.

The ion flow from the plasma brush not only kills the bacteria, it also causes a chemical reaction that etches the surface of the sterile hole in your tooth. Note that the bacteria caused the hole and the plasma brush destroyed the bacteria as it sterilized the hole in your tooth. The resulting etched surface forms a 60% stronger bond between the filling material and your tooth than the current dental drilling procedure. The filling (dental amalgam) is the material that your dentist adds to the tooth to seal the hole and restore your tooth to its original shape.

The plasma brush is fast. According to a December 20, 2011, press release from the University of Missouri's news bureau, “[I]n less than 30 seconds, the plasma brush uses chemical reactions to disinfect and clean out cavities for fillings.” The patent on the new technology is held by the University of Missouri and Nanova Inc. Nanova is a new company that was formed by the developers of this technology to bring the plasma brush to market.

The last two hurdles to pain-free dentistry are the completion of the testing of the plasma brush on people and its approval by the federal Food and Drug Administration. If the clinical trials remain extremely positive, the researchers and Nanova Inc. hope to see their technology start to appear in dental offices by the end of 2013.

You can see just how different the plasma brush tooth preparation procedure is from the drilling method now used at www.technologytoday.us/page13.html.

Recalling the Facts

1. What causes tooth decay?
2. The drill your dentist uses and the plasma brush both prepare a tooth for a filling. How do these procedures differ and how are they similar? 🗨️

Alan Pierce, Ed.D., CSIT, is a technology education consultant. Visit www.technologytoday.us for past columns and teacher resources.