

BLASTING AWAY BIOFILMS

Common dental irrigation devices pack a major punch against oral biofilm infections.

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Dental irrigation jets can play a big part in the fight against harmful oral biofilms, according to a study conducted by the USC School of Dentistry Center for Biofilms that appears this month in the *Compendium of Continuing Education in Dentistry*.

Biofilms, sludgy three-dimensional matrices that can house many types of bacteria, adhere strongly to surfaces, including tissues in the mouth and other parts of the body, said Parish Sedghizadeh, director of the Center for Biofilms. Bacteria in biofilms are responsible for many types of infections, including oral diseases, and don't respond to traditional antibiotic treatment as well as planktonic, or free-floating, bacteria.

The pulsating, pressurized jets of water appear to physically detach the biofilms from oral tissue, including teeth and exposed jawbone. While previous clinical research indicated positive effects of dental jet use, the cleaning power of water pressure on dental biofilms had not been directly visualized and documented until this study, said Sedghizadeh.

"The clinical studies were very positive, but we weren't sure about what degree of biofilm removal was occurring until now," he said. "We knew it worked, but we hadn't visualized it."

Slices of extracted teeth with advanced periodontal disease were doused with saliva, incubated to grow microbial biofilms and then treated with a Waterpik® dental irrigation jet. Using scanning electron microscopy and confocal microscopy, researchers took images of the tooth slices before and after treatment. The "before" photos reveal a slimy surface teeming with bacteria, while the photos taken after the dental jet treatment show a near-pristine tooth surface with little bacterial presence.

"The results were almost impossible for me to believe the first time through," said J. William Costerton, the founding director of the USC Center for Biofilms. "One of the difficulties with plaque biofilm is that you really can't see it; it's clear, so we didn't have visual evidence of complete removal. But now with these direct methods, the scanning electron microscopy, you apply a dental water jet to plaque on the surface of a tooth and you look with a scanning scope and it's gone. It's simply gone."

Beyond the possible impact on routine oral hygiene, the findings hold special significance for patients suffering from or at high risk for osteonecrosis of the jaw, a debilitating condition in which biofilms infect the jaw and cause the death of bone tissue. Sedghizadeh advises his osteonecrosis patients to regularly irrigate and wash any exposed jawbone, such as a tooth extraction site. While this oral hygiene step was previously performed with a manual plastic syringe, he said the dental jets provide much higher water pressure and cleaning ability as well as better usability.

"Many of the osteonecrosis patients are elderly and have dexterity problems, and they find it hard to use the syringe," Sedghizadeh said. "With an irrigation jet, they can easily "power wash" the bone until it heals and remain in good compliance with their aftercare instructions."