

THE GAME CHANGER:

Biofilm removal for systemic health

IMAGE IS FPO PENDING APPROVAL

According to recent scientific studies, it may be possible to reduce the risk of developing some cancers by addressing oral biofilms. Let's take a deep dive into how the oral microbiome impacts systemic health.

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This statistic would break most hygienists' hearts: periodontal disease increased 57% from 1990 to 2010, a number expected to upsurge in the coming years.¹ The sobering article published in *Scientific World Journal* in 2020¹ may prompt dental hygiene professionals to take a long, hard look at the profession and the clinical techniques currently being used. Recognizing that insanity is doing the same thing over and over and expecting different results, it is clearly time for a change.

Precipitating the change is a plethora of research on how the oral microbiome impacts systemic health. Pathogenic bacteria originating in the oral cavity can enter the systemic circulation to cause inflammation of tissues and organs throughout the body, setting the stage for chronic, degenerative

disease.² Periodontopathic bacteria are implicated in many common diseases such as diabetes, cardiovascular disease, pneumonia, low-birth-weight babies, and Alzheimer's disease.^{3,4} With compelling scientific data and new advances in dental technology at the forefront, is the dental hygiene profession continuing to use yesterday's methods to address today's health issues?

Protocols in dental hygiene have progressed little in nearly 100 years. Hygienists have been taught to assess, scale, and polish. Yet, there is a new way—one that focuses on *biofilm removal*. Oral pathogens do not exist in a free-floating, vulnerable, planktonic state as once thought. Instead, they reside in protective communities called biofilms bound to teeth, mucosal surfaces, and dental materials.⁵ Biofilms are everywhere—in nature and all through the body—some advantageous and others dangerous.

Plaque is a dangerous biofilm. Nestled within the sticky, fluid matrix of oral biofilms, pathogenic bacteria communicate, cooperate, and even exchange genetic information.⁶ They derive abundant nutrition, protection, and a way to escape detection by the host's immune system. Over time, biofilms become more complex with some bacteria breaking free to seed biofilms in distant locations, sabotaging systemic health.^{6,7}

The treatment of biofilms is difficult. With time and repeated exposure, the bacteria become resistant to the effects of antibiotics. In fact, bacteria in a mature oral biofilm can be as much as 1,000 times more resistant to antibiotics than the same bacteria living planktonically.⁷ Antibiotic resistance found in biofilms is creating superbugs not easily eradicated by antibiotics. While antibiotics continue to play a role in biofilm treatment, they must be used judiciously.

Bill Costerton, director of the Center for Biofilm Engineering at Montana State University, says antibiotic treatment offers only short-term benefits and is the least effective approach to treating biofilms.⁸ There is another way to effectively disrupt biofilms, but only after their impact on systemic health is known will the majority of dental practices take action and alter their standard of care.

Medicine and dentistry now widely recognize several of the many links between the oral cavity and systemic disease. Less well-known is the link between pathogenic bacteria and the development and recurrence of cancer. Research reveals those with *P. gingivalis* demonstrate a 59% increased risk of pancreatic cancer, while *P. gingivalis*, *T. forsythensis*, and *T. denticola* are linked to cancers of the oral cavity and the esophagus. Individuals with elevated levels of pathogenic oral bacteria *A. actinomycetemcomitans* and *P. gingivalis* have a greater chance of failed response to cancer treatment and are at greater risk for recurrence.⁹⁻¹⁵

According to recent scientific studies, it may be possible to reduce the risk of developing some cancers by addressing oral biofilms.¹⁰ While ongoing

Another timely and compelling area of research fueling the change is the potential effect of biofilms on COVID-19. According to a recent study published in the *Journal of Clinical Periodontology*, patients with periodontitis are three times more likely to suffer severe complications related to COVID-19. They are also four times more likely to be admitted to the intensive care unit (ICU) and be put on assisted ventilation.¹¹

A paper published by Dr. Victoria Sampson, winner of three national dental prizes for her published works, examined the link between oral hygiene and the severity of SARS-CoV-2 infections. She considered the impact of high bacterial loads in the mouth on postviral complications and emphasized improving oral health to reduce the risk of COVID-19 complications.^{12,13}

Echoing those sentiments, *The New York Post* quoted Lior Shapira of Israel's Hebrew University as saying, "Oral care should be part of the health recommendations to reduce the risk for severe COVID-19 outcomes."¹⁴ Nicola West, secretary-general of the European Federation of Periodontology, emphasized the association between periodontal disease and systemic

powders are becoming the gold standard for modern biofilm treatment and prophylaxis. These systems combine air, water, pressure, and powder to remove the biofilm efficiently and effectively—a painless, quiet process most patients say feels good.

Hand instrumentation can be time-consuming, cause potential tissue damage, and produce maximum root surface roughness. Scientific evidence suggests, on average, 47%–50% of the biofilm is left behind using conventional prophylactic methods. By employing a low-abrasive air polishing system using antimicrobial powders, 99% biofilm removal is possible.¹⁶ These air polishing systems (devices and powders) are recommended for use on dental implants, because they are safe and cause no surface damage. They can also be used on the tongue and palate where biofilms often thrive.

Erythritol and glycine are fine, water-soluble powders used to increase the efficacy of air polishing. One way they do this is by decreasing pathogenic oral bacteria and increasing the population of beneficial species. Erythritol, a sugar alcohol used in many food-based products, is effective in suppressing *P. gingivalis*, the primary bacterial strain found in periodontal disease.¹⁷ Glycine, a naturally sweet, nonessential amino acid, has been shown to suppress inflammatory cytokines that interfere with collagen production.¹⁸

The powders also enhance air polishing systems by virtue of their particle size. Glycine particles are only 25 microns in size, and erythritol particles are a minuscule 14 microns. Small particle size makes these powders less aggressive than traditional polishing paste and gentle enough to use on supra- and subgingival tissue without harming natural or restorative oral structures.¹⁹ It is important to note that the powders must be used with compatible polishing devices. For more details, see ems-dental.com.

One cannot overemphasize the importance of a healthy oral microbiome

The oral-systemic link is widely recognized. Less well-known is the link between pathogenic bacteria and the development and recurrence of cancer.

research is essential, preliminary findings have not been lost on the "Father of Biofilms," Bill Costerton. He states, "You don't want a bunch of bacteria hanging around in tissue for long periods of time producing strange chemicals and carcinogens." It is important for clinicians and patients to know *why* change is necessary. Learning about cancer research begins to foster a shift in thinking, surely a step in the right direction for bringing about the change needed in dental hygiene today.

health and reiterated the need for taking a strong preventive approach to periodontitis.¹⁵

The new way the game is played

The act of polishing teeth is moving beyond the esthetic value of removing stain. It is going in a new direction—one focusing on biofilm removal and providing a therapeutic value for overall health. Low-abrasive air polishing systems using glycine or erythritol

in preventing biofilms. Daily home care is essential to biofilm management and improvement of systemic health. While much is being done to help patients maintain oral health, we must remember this is not a war on bad bugs. The goal is a balance of various strains of bacteria—both “good” and “bad”—existing in harmony.

An effective home-care strategy to maintain microbial balance is incorporating the use of oral probiotics. While many are familiar with using probiotics to establish a healthy gut microbiome, few realize their importance in balancing oral ecology and preventing oral biofilms.²⁰ Oral probiotics enhance oral and systemic health.²¹ In the process, they neutralize pH and reduce oral malodor and the feeling of a dry mouth. When tablets or melts of freeze-dried bacteria are allowed to dissolve in the mouth, they become activated by contact with saliva and enter the sulcus. There, they compete for space and resources, crowding out pathogenic bacteria and reestablishing microbial balance. In turn, a healthy oral microbiome makes it difficult for dangerous biofilms to set up residence in the oral cavity.²²

In addition to oral probiotics, xylitol is known to inhibit the growth of pathogenic oral bacteria. Xylitol, a natural sugar alcohol, is considered a prebiotic or food source for beneficial bacteria, with a long history of safely reducing oral pathogens such as *P. gingivalis*.²³ It is important to inform patients about this anticariogenic, anti-periodontopathic ingredient so they can switch out their gum, mints, and candy for those containing xylitol.

To keep biofilms at bay between treatments, it is important to recommend a vigorous home-care regimen. In addition to proper brushing, flossing, and tongue scraping, a water flosser is a beneficial adjunct. Since oral irrigation requires less coordination, strength, and dexterity, it can make oral home care easier for patients, which leads to increased compliance and positive results.

Additional recommendations for conquering biofilms include an effective mouthrinse and toothpaste. One such rinse is ClōSYS Oral Rinse from Rowpar Pharmaceuticals Inc. With a patented formula of chlorine dioxide, the product disrupts biofilms and the anaerobic bacteria residing within. As an antimicrobial, chlorine dioxide has proven to be as effective as chlorhexidine but without side effects such as facilitation of calculus formation, discoloration of teeth, and unpleasant aftertaste. Using the toothpaste together with the mouth rinse amplifies anticariogenic action, biofilm reduction, and remineralization. The ClōSYS products have a long history of safety and efficacy and are alcohol free with a neutral pH.^{24,25}

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Studies of the mouth rinse conducted by two independent, accredited laboratories showed a viral load reduction up to 98.4% within 30 seconds. Studies also showed a 99.9% reduction in viral load due to influenza A, a comorbidity often associated with deaths from COVID-19.²⁶ While lab tests alone cannot tell what happens in the mouth, essential clinical studies are underway to elucidate these findings.

ClōSYS Oral Rinse is also effective as a preprocedural rinse. It protects the patient and dental team by reducing viral loads in the aerosols generated by dental procedures, and it tastes great. Hygienists embracing positive change will want to make this preprocedural step an integral part of their appointments, while educating patients about the benefits of using the rinse and toothpaste in their daily home-care routines.

Conclusion

Considering the abundance of research linking biofilms to systemic health, one must pose the question: Is 50% biofilm removal acceptable in 2021? Using time-consuming, ineffective tools and technology is no longer an option, especially when they result in physical stress and fatigue for the hygienist and potential health risks for the patient.

For years, hygienists have wanted to change the public's perception of them as mere “teeth cleaners.” By offering treatments using updated technology and sharing exciting information dictated by research, hygienists can change their public persona and impact lives. When patients understand why their treatments have changed, and they can see and feel the positive results of effective biofilm removal, they may not only embrace the change but advocate for it.

While research is important, what matters most is seeing favorable outcomes. One thing seems certain: there has never been a greater need or better time for hygienists to impact the lives of their patients. With supportive scientific evidence and new technology in hand, it's time to change the game! **RDH**

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