



## Where Biofilms Form

Biofilms happily colonize many household surfaces in the bath and kitchen, including toilets, sinks, countertops, and cutting boards. Poor disinfection practices and ineffective cleaning products may increase the incidence of illnesses associated with pathogenic organisms encountered during normal household activity.

## How Biofilms Form

- Free-swimming bacterial cells land on a surface, arrange themselves in clusters, and attach.
- The cells begin producing a gooey matrix.
- The cells signal one another to multiply and form a microcolony.
- The microcolony promotes the coexistence of diverse bacterial species and metabolic states.
- Some cells return to their free-living form and escape, perhaps to form new biofilms.

## What Is Biofilm?

**Y**ou may not be familiar with the term biofilm, but it is something that you come into contact with every day. The plaque that forms on your teeth and causes tooth decay and periodontal disease is a type of biofilm. Clogged drains also are caused by biofilm, and you may have encountered biofilm-coated rocks when walking into a river or stream.

Biofilms form when bacteria adhere to surfaces in some form of watery environment and begin to excrete a slimy, glue-like substance that can stick to all kinds

### Dental plaque

*is a yellowish biofilm that builds up on the teeth.*

of materials—metals, plastics, soil particles, medical implant materials, biological tissues. Biofilms can be formed by a single bacterial species, but biofilms more often consist of many species of bacteria, as well as fungi, algae, protozoa, debris, and corrosion products. Essentially, a biofilm may form on any surface exposed to bacteria and some amount of water.<sup>1</sup>

Dental plaque is a yellowish biofilm that builds up on the teeth. Biofilms contain communities of disease-causing bacteria and their uncontrolled accumulation has been associated with cavities and gum disease (both gingivitis and periodontitis).<sup>1,3</sup>

In the past, scientists studied bacteria by looking through a microscope at cells suspended in a water droplet. Today, scientists believe that the disease-causing bacteria do not exist as isolated cells, such as in the water droplet, but rather they adhere to various wetted surfaces in organized colonies that form diverse communities—biofilms.

## Antibiotic Control of Biofilm

Although gum disease can be controlled by proper oral hygiene (tooth-brushing, flossing, rinsing), gingivitis (the mildest form) is still experienced by most of the US population at some point in life; a smaller proportion (30% to 40%) experience periodontitis (the severe form). Treatment of oral infections requires removal of the biofilm and calculus (tartar) from the teeth and gums by surgical or nonsurgical procedures, followed by antibiotic therapy. Unfortunately, these infections are not completely responsive to antibiotics. For this reason, oral infections are chronic diseases that require ongoing treatment and daily care by proper oral hygiene measures. Prevention is the best strategy.<sup>2</sup>

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## Chemical Control of Biofilm

When good oral hygiene practices fail to prevent the development of biofilms, toothpastes and mouthwashes with chemotherapeutic agents can be used. These agents can kill microorganisms in the biofilm. Chlorhexidine, triclosan, and essential oils and minerals—agents proven to kill the harmful bacteria—can reduce the degree of plaque and gingivitis, while not allowing disease-causing microorganisms to colonize.<sup>3</sup>

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### Reprints

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References are available at the *Contemporary Oral Hygiene* Web site.

## Biofilm and Your Health

Biofilms are highly resistant to antibiotics. Consequently, very high and/or long-term doses are often required to eradicate biofilm-related infections. Biofilms are responsible for diseases, such as<sup>4</sup>:

- **Otitis media**  
the most common acute ear infection in US children
- **Bacterial endocarditis**  
infection of the inner surface of the heart and its valves
- **Cystic fibrosis**  
a chronic disorder resulting in increased susceptibility to serious lung infections
- **Legionnaire's disease**  
an acute respiratory infection resulting from the aspiration of clumps of *Legionella* biofilms detached from air and water heating/cooling and distribution systems
- **Hospital-acquired infections**  
infections acquired from the surfaces of catheters, medical implants, wound dressing, or other medical devices

## Is Biofilm on Your Oral Appliances?

In addition to biofilm being present in the mouth, it also forms on dental prostheses and appliances, such as removable dentures and partials, mouthguards, and nightguards. Dental prostheses can become colonized with large numbers of microorganisms within 2 hours. Biofilm on your oral appliances and prostheses can increase your risk for cavities and gum disease, especially on the teeth used to maintain your dental prosthesis in your mouth.<sup>5</sup>

### 4 Tips to Control Biofilm

- Brush your teeth and all mouth prostheses or appliances to mechanically disrupt the biofilm. Choose a toothpaste containing antibacterial ingredients, such as triclosan.
- Rinse your mouth with a mouthwash containing antibacterial ingredients, such as chlorhexidine, cetylpyridinium chloride, or mixture of essential oils in alcohol.
- Soak your prosthesis with a commercially available cleaner.
- If your denture liner is cracked, porous, or peeling, ask your dentist to repair it. To eliminate unwanted disease-causing organisms, ask your dentist to replace your prosthesis every 7 years.

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### Disclaimer

*The content of this guide is for information purposes only. It does not substitute for the dentist's professional assessment based on the individual patient's case.*

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