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## Understanding the Microbiome in Your Mouth

“Your mouth mirrors what is happening in your body,” says biologic dentist [Gerry Curatola](#). For over thirty-five years, Curatola has been treating patients with periodontal conditions at his practice in New York City. In his book, a gum issue is rarely, if ever, just a gum issue.

Curatola’s background in alternative medicine partly explains his holistic approach: He attended Harvard Medical School’s program in Complementary and Alternative Medicine after graduating from the New York University College of Dentistry. (He now serves as adjunct clinical associate professor in NYU’s Department of Cariology and Comprehensive Care.) He’s also spent decades conducting and studying oral microbiome research. (There’s a wing in his name at NYU for translational research, which applies tools from basic biology and clinical trials to address critical health needs.)

And then there’s what Curatola has observed in the dental chair: Healing the body helps heal the mouth, and vice versa. While bacteria are often blamed for problems like tooth decay and gum disease, Curatola says there’s no such thing as good bacteria or bad bacteria. Bacteria either behave well or poorly, depending on the condition of their terrain. Which is why he

focuses on maintaining homeostasis within the oral microbiome. This is slightly more involved than brushing your teeth after dinner and calling it a day, says Curatola, but it's simple enough to manage once you know how.

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## A Q&A with Gerry Curatola, DDS

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# Q

*What is the oral microbiome, and how does it relate to our overall health?*

# A

The understanding of the entire human microbiome has helped us redefine what it means to be human. We are a composite of many species, and there is a symbiotic relationship between man and microbe that is foundational to our ability stay alive and thrive with countless bodily functions. In the mouth, this unique community of mostly bacterial organisms, known as the oral microbiome, is an intelligent, semipermeable membrane that performs vital functions to help keep our mouths healthy. These functions include transporting ionic minerals from saliva to the surface of teeth to aid in remineralization, carrying molecular oxygen to the gums and soft tissue, and eliminating free radicals and other waste products from the surface. In addition to these important functions, the oral microbiome plays a vital role in protecting us from harmful environmental organisms.

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# Q

*How can you tell if the oral microbiome is imbalanced?*

# A

When the oral microbiome is in a state of balance, otherwise known as microbial homeostasis, its nature is very different from its nature when it's in an imbalanced state. The ecosystems in your mouth are referred to as the oral biofilm, or plaque. A balanced oral microbiome consists of bacteria that are mostly aerobic—meaning they rely on oxygen to live. They form a thin, protective, clear, and odorless film. Your teeth feel squeaky-clean and your gums appear pink and well oxygenated in this balanced state.

When imbalanced, this biofilm transforms into a thick, sticky, and smelly film, which is commonly observed as the off-white plaque film on your teeth in the morning. Often this repetitive formation results from constant disturbances of the oral microbiome. It is important to note that in the human microbiome there is no such thing as “good bacteria” and “bad bacteria.” Rather, it's just bacteria that behave well (probiotics), or those that behave poorly (pathogens), depending on the condition of their terrain. A number of species of bacteria in the mouth associated with tooth decay and gum disease are totally benign in a balanced oral microbiome.

Symptoms that often signal an imbalanced oral microbiome include bad breath, bleeding gums, and frequent tooth decay. Each of these symptoms is a sign of an imbalance that is connected to the microbiome being too thick, called a hypertrophic biofilm.

An imbalance can also show up as an atrophic biofilm, which means it's too thin. This results in mouth ulcers and sensitive teeth. I often compare flossing or cleansing between teeth to picking up the garbage on the side streets in New York City on a warm summer day. If you don't, it will only get worse, and issues will continue to arise. It's important to include interdental cleansing—whether with floss, interdental brushes, or picks—as part of your oral-hygiene regimen.

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## Q

*What causes this imbalance?*

## A

Constant disturbances to this essential ecology in the mouth can cause the oral microbiome to be in a continual state of imbalance. Disturbances can include harmful oral-care products, a diet high in refined carbohydrates and sugar, a low pH in the mouth, and stress.

Many oral-care products were developed by soap manufacturers over a hundred years ago and are detergent- or alcohol-based and tough on the microbiome. Our focus for the past fifty years has been on eradicating this microbial community, viewing bacteria as “invaders” that should be “killed on contact.” Even many natural oral-care products that are focused on “killing plaque” with natural essential oils can be harmful to the important function of the oral microbiome.

At my practice, we help our patients understand what I call the three important commandments of the human microbiome.

1. We are made up of microbes.
2. These microbes run us.
3. The best way to stay healthy in every respect, including our oral health, is to make peace with our microbes.

That has been the core philosophy behind the research and efficacy of the Revitin Toothpaste, which I spent fifteen years developing.

Another cause of imbalance is a diet high in sugar and refined carbohydrates. Carbohydrates and sugar produce acid that eats away at the enamel and causes tooth decay. A diet high in refined carbohydrates and sugar can cause a shift in the oral microbiome from slightly alkaline to a more acidic pH. This causes a shift in the corresponding flora in the mouth.

Another major culprit that leads to an imbalance is stress. Stress causes a cascade of events that, in turn, stresses the oral microbiome. First and most important, it causes a decrease in salivary flow. Saliva is the lifeblood of the mouth, and it is essential for the oral immune system and continuous remineralization of teeth. The oral microbiome interacts with saliva by carrying ionic minerals like calcium and phosphorus from saliva to the surface of tooth enamel. Stress also causes a shift in the pH to a more acidic environment and promotes unhealthy grinding and clenching of teeth and jaw discomfort.

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# Q

*In your experience, what leads to gum issues and cavities?*

# A

The germ theory, which is now outdated, stated that bacteria were the cause of both tooth decay and gum disease. We now know that this is not the case—and that naturopathic medicine had it right all along. Naturopaths have always said that disease is about not the seed (bacteria) but the soil (microbial terrain). The causes of both tooth decay and gum disease are imbalances of the terrain—the oral microbiome. It’s really an amazing paradigm shift in scientific understanding.

In 2009, *The Journal of the American Dental Association (JADA)* declared that periodontal disease is an archetypal biofilm disease. In other words, there is not one specific bacteria but rather a community environment problem that can lead to [gum disease](#). The shift in the environment of the oral microbiome from microbial homeostasis—a balanced terrain with mostly aerobic bacteria—to an imbalanced, hypertrophic biofilm results in the unfavorable propagation of anaerobic bacteria. This includes the growth of *Streptococcus mutans* bacteria, most associated with tooth decay, and *Porphyromonas gingivalis* bacteria, which are associated with the periodontal inflammation and progression of gum disease. Keeping the oral microbiome terrain balanced is essential to keeping this progression in check.

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# Q

*How do you go about rebalancing the oral microbiome?*

# A

In *The Mouth-Body Connection*, I outline the four cornerstones to promoting a healthy mouth and a balanced oral microbiome.

The first is to take inventory of what oral-care products you are using and then eliminate products that might strip and/or destroy the microbiome. This includes detergent-based toothpastes and alcohol-containing mouthwashes. I recommend staying away from ingredients like:

- Sodium laurel sulfate (SLS)
- Sodium fluoride
- Triclosan
- Artificial sweeteners (such as sodium saccharin, aspartame, xylitol, and erythritol)
- Artificial color dyes (often made from coal tar)
- Propylene glycol
- Diethanolamine (DEA)
- Microbeads (tiny solid plastic particles)

The second is what I call Triple-A nutrition: foods that are alkalizing, anti-inflammatory, and antioxidant-rich, along with supporting supplements. For example, eating organic fruits and vegetables and natural and organically raised meat, fish, poultry, and eggs; eating and drinking fermented foods—like kombucha, sauerkraut, and dill pickles—on a regular basis; drinking herbal teas and coffee in moderation; and using filtered water for cooking and drinking.

For more than thirty-five years, I observed well-intentioned patients who told me they spent “hours in the bathroom” on their oral-hygiene regimen, but they continued to be prone to dental decay and gum disease. It became obvious that there was a multifactorial basis to this. Nutrition always seemed to be a cornerstone of oral health and critical in helping keep the pH and microbial terrain in balance.

The third is healthy exercise. Movement and high-intensity exercise techniques for as little as fifteen minutes a day can help decrease the stress-induced, inflammatory flight-or-fight response. Exercise has been shown to increase circulatory function—including for teeth and gums—and improve immune system competence. The increase in circulation that is gained during exercise has been shown to improve the prevention of decay by improving the dentinal tubular fluid flow, which is a continuous movement of nourishing interstitial liquid that flows from the tissues inside the tooth outward through the enamel and into the mouth. Blood supply is the major route via which all organs are nourished and defended, and one major cause of disease and malfunction is restricted blood supply. In the teeth, the blood supply ends in the capillaries within the dental pulp, and it has been observed that restricted blood supply in teeth increases tooth decay.

Finally, the fourth key to a balanced microbiome is stress management. As previously mentioned, stress plays an important role in salivary function, as well as muscular control, TMJ, and overall tooth and gum health. Stress can contribute to grinding your teeth—or bruxism—which can wear down and flatten your teeth. Constant grinding depletes your enamel, causing your teeth to become more sensitive. Grinding can also impact the joints and muscles in the jaw and neck, which can lead to jaw pain and clicking or popping sounds. Stress can also dry out your mouth, which can contribute to gum disease. I advise patients to begin incorporating yoga and meditation into their lives not only to improve their breathing and other body vitals but also to help keep their microbial flora in balance.

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*Gerry Curatola, DDS, is a biologic restorative dentist and the founder of Rejuvenation Dentistry. He studied neuroscience at Colgate University and attended dental school at the New York University College of Dentistry, where he now serves as an adjunct clinical associate professor in the Department of Cariology and Comprehensive Care. He studied nutrition and wellness at the Pratt Institute and completed Harvard Medical School’s program in complementary and alternative medicine. He’s the author of The Mouth-Body Connection.*

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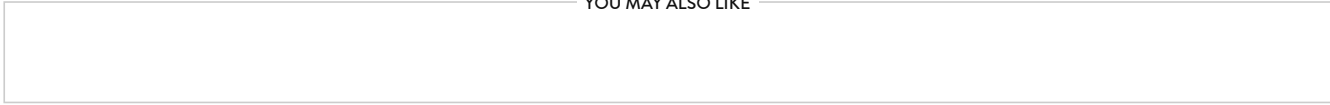
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