The billions of bacteria and other microscopic critters living in your mouth influence the health of your teeth and gums, not to mention the sweetness of your breath. Can they also affect what goes on in your heart, blood vessels, and bloodstream? That question hasn't been fully answered. Oral health and heart health are certainly associated, meaning that people with gum disease and tooth loss tend to have more heart disease than those with good oral health. The missing links are whether conditions in the mouth cause problems in the heart and elsewhere, and whether treating them can prevent heart attacks and other cardiovascular problems.

Determining the nature of the connection is important. If it's a cause-and-effect relationship, then improving oral health offers yet another way to prevent heart attack, stroke, and other forms of cardiovascular trouble.

The inflammation connection
Bacteria love the mouth. They thrive in its warm, steamy environment, where they are routinely bathed with sugar and other nutrients. The number of bacteria and other microbes living in the mouth at any one time easily exceeds the number of people on Earth. Many of the colonists are good, and help keep the mouth healthy. Some are neutral. Others are downright harmful.

Gum disease gets a foothold when plaque—the sticky film that forms on teeth—extends into the sulcus, the shallow trough where gum meets tooth. Toxins released by the bacteria irritate the surrounding tissue. The immune system responds to the infection and irritation. Inflammation ensues. This is called gingivitis. The surface of the plaque slowly hardens into calculus, or tartar, which further inflames the gums.

Although harmful bacteria are the intended targets of inflammation, the process inadvertently erodes some of the tissue and bone that support the teeth. This is known as periodontitis. The pockets that form around the teeth can become further infected, leading to a vicious cycle that weakens teeth.

Treating periodontitis usually involves scaling, a procedure that removes plaque and calculus above and below the gum line. In some cases, the dentist will surgically remove damaged gum tissue or prescribe antibiotics to reduce infection.

Could inflammation in the mouth contribute to inflammation in arteries, which is responsible for the growth of cholesterol-filled plaque and its rupture, an event that triggers heart attacks and most strokes?

Distant disease
The notion that problems in the mouth cause diseases elsewhere in the body has been around for at least 2,000 years. Although it makes sense, it has been difficult to prove. Modern science is now exploring several pos-
Heart disease prevention continued

sible mechanisms that may connect the two processes.

In people with periodontitis, chewing and toothbrushing release bacteria into the bloodstream. Several species of bacteria that cause periodontitis, such as *Porphyromonas gingivalis*, have been found in atherosclerotic plaque. It is possible that they contribute to the inflammatory damage that sets up heart disease.

Oral bacteria could also harm blood vessels or cause blood clots by staying put in the mouth and releasing toxins that resemble functional proteins found in artery walls or the bloodstream. The immune system’s response to these toxins could harm artery walls or make blood clot more easily. It is also possible that inflammation in the mouth revs up inflammation throughout the body. This could set the stage for atherosclerosis or push it along at a faster clip.

Unfortunately, studies in humans haven’t yet yielded clear connections between oral health and heart health.

Conflicting results are one reason for the lack of clarity. Several studies have shown a strong positive association between oral and cardiovascular health, others turned up no connection at all. It is also possible that periodontal disease and cardiovascular disease travel together not because the former causes the latter but because both are caused by the same things, like age, cigarette smoking, diabetes, low socioeconomic status, or other variables common to both.

Dr. Kaumudi Joshipura and her colleagues at the Harvard Schools of Dental Medicine and Public Health offer another possibility. They postulate that periodontal disease and the resulting tooth loss may lead to poor dietary habits that, in turn, could contribute to heart disease risk.

Oral health on trial

Trials trying to nail down the connection (or lack of one) by treating periodontal disease to see if it affects heart disease or stand-ins for it, such as markers of inflammation or the flexibility or function of arteries, haven’t met with total success, either.

Several trials showed that intensive treatment for periodontal disease reduced blood levels of inflammation-related proteins such as C-reactive protein and interleukin-6, improved artery function, and even led to better cholesterol and blood pressure readings. In other similar trials, treatment had no effect on these measures. The big problem with these studies is that most were too small or too short to definitively identify the links between the mouth and the heart.

A larger, longer trial, called Periodontitis and Cardiovascular Events, could cut through the confusion—if the results of a small, nearly completed pilot trial suggest that a larger one would make sense. Plans call for giving intensive periodontal treatment to 2,000 people with gum disease and heart disease, and standard treatment to another 2,000.

It still pays to brush

Take care of your teeth for your teeth’s sake. Brush and floss every day, and see your dentist at least twice a year for regular cleanings and oral exams. Get help if you have sore or receding gums, or if your gums bleed when you brush. If you’ve already lost one or more teeth, talk with a nutritionist to find foods you can eat that are good for your overall health. All of these strategies will pay off for your oral health, and they just may benefit your heart.
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