

OUR MOUTHS, OURSELVES

As the interrelationship between the mouth and the rest of the body becomes clearer, dental professionals, doctors and patients will need to rethink the term “oral health”

BY SHARON GUYNUP

SINCE TIME IMMEMORIAL, people have struggled to maintain adequate oral health. As far back as A.D. 250, Kemetic Egyptians used myrrh and other antiseptic herbs to treat infected gums. The Nubians that dwelt in the Nile River valley two centuries later drank beer as a palliative for unhealthy teeth; it may have worked well, as it was brewed from grain contaminated with the same bacteria that produces tetracycline.

Lengthening teeth and receding gums have historically been considered a consequence of surviving into adulthood. (In his 1852 novel *The History of Henry Esmond, Esq.*, William Thackeray used the expression “long in the tooth” to describe a middle-aged person.) The few teeth that didn’t decay in youth usually loosened with the passing years, as the tissues supporting them were eroded by periodontal disease. Those teeth ultimately fell out.

Today, people are living longer, and gum disease has supplanted tooth decay as the most common cause of tooth loss in adults. The disease affects about 80 percent of Americans over age 65, according to the American Dental Association. At the turn of the last millennium, then—U.S. surgeon general David Satcher called periodontal disease the “silent epidemic” in his landmark report, *Oral Health in America*. Given the state of public health, good oral hygiene may prove to be more critical than just preserving your smile. A growing body of research suggests that periodontal disease may play a role in a variety of systemic health problems as wide ranging as diabetes, respiratory illness, pregnancy complications, and heart disease.

It is this body of research—and the attendant health policy implications it engenders—that is the subject of this custom publication from Scientific American, *Oral and Whole Body Health*, produced with the generous support of the Procter & Gamble Company. Here we present, for the benefit of both health professionals and patients, the latest pieces in the ever-growing puzzle of oral disease’s connection to systemic health. You’ll hear from some of the pioneering researchers themselves about their ongoing explorations into the mouth-body relationship.

Like any new area of scientific inquiry, some data paint a very clear picture while other results are still inconclusive. Several studies, for example, have found that blood-sugar levels in diabetics with periodontal disease were significantly reduced when the patients’ gum disease was treated. Others, like the ones examining the connection between periodontal disease and heart conditions, have not yet uncovered a definitive causal relationship. But new information on this

“oral-systemic link” emerges almost daily. For example, in May 2006 it was announced at an American Society for Microbiology meeting that researchers have identified genes in certain oral bacteria that allow the organisms to invade and infect human arterial cells. This certainly expands to the discussion of the possible biologic pathways that might link the mouth and the heart (or other parts of the body). Additionally, this year will see the results of two major studies examining the relationship between oral disease and pregnancy complications in expectant mothers.

So what exactly is the connection between what happens in your mouth and your overall health? Some of the millions of bacteria that lurk in our mouths (numbering more than all the cells in our bodies) are the primary culprits—along with the subsequent inflammation they cause. These microorganisms form complex colonies of sticky plaque. This tenacious plaque — what microbiologists call a “biofilm” — is composed of durable, coral reef–like structures, building up at the gum line and in between teeth.

Some of the approximately 500 species of bacteria in your mouth are not innocuous flora. They cause gingivitis, infecting gums. Your immune system steps in to fight these invaders—gums become inflamed, and may bleed when you brush.

The fields of dentistry and medicine have traditionally been worlds apart. But in light of the growing evidence pointing to links between oral and whole body health, this separation of disciplines is slowly beginning to change.

Interestingly, if this same type of infection appeared on a person’s arm or another body part, they would no doubt go running to the doctor for treatment—but bleeding, tender gums are often ignored.

Untreated, this tenderness progresses into full-blown periodontitis, and here the immune system shows its dark side. This simmering inflammation ulcerates gums and summarily destroys the soft tissue and bone that anchors your teeth. It also sends inflammatory substances throughout the body.

Researchers are discovering that out-of-control inflammation may prove to be the engine that drives an ever-growing list of greatly feared, chronic illnesses from clogged arteries

and heart attacks to arthritis and cancer. This inflammation link is just one of a number of hypotheses explaining how chronic oral infection may trigger or intensify systemic diseases.

Another concern is that the microbial ecosystem in your mouth doesn't just stay there. Stealthy, virulent bacteria overgrow in inflamed gum tissues; with each bite of food or stroke of a toothbrush, some of those microbes can seep into your bloodstream, traveling to distant parts of your body. The question is: can they set up shop elsewhere and cause harm? It is known that some of these bad bugs, when inhaled, can cause pneumonia, particularly in the elderly. Some are also able to move through arteries to the uterus and have been found in the placenta.

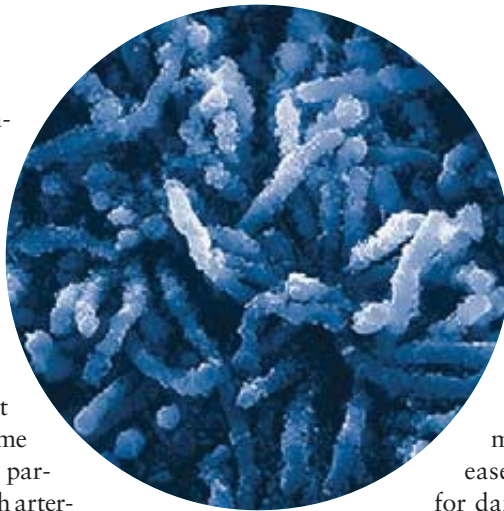
CLEARLY THE MOUTH is in many ways the “gateway” to the rest of the body. However, this connection is often overlooked. In the U.S., the fields of dentistry and medicine have traditionally been worlds apart. But in light of the growing evidence pointing to links between oral and whole body health, this separation of disciplines is slowly beginning to break down. The notion that dentists care for only gums and teeth, while doctors look after everything else is being rethought.

There is a dawning realization that often it is a dentist or periodontist who first discovers a larger health problem, because of what they see in a patient's mouth—and that doctors need to look at more than the tonsils when a patient opens wide and says “ah.” For example, diabetics tend to develop periodontal disease at three to four times the rate of nondiabetics. If a dental professional sees gum inflammation in someone who brushes and flosses regularly, they need to ask, “Have you checked your blood sugar lately?” Or, conversely, the doctor of a patient with uncontrolled blood sugar may need to refer them to a dental professional.

There is already a ripple effect in some sectors of the insurance industry. Some insurers are finding it more cost-effective to include periodontal treatment among covered services for diabetics and pregnant women. But if additional research solidifies the links between gum disease and other chronic illnesses, sweeping changes will be needed to provide access to care. This will be crucial for the segments of society—the poor and the elderly—who are most at risk for oral disease as well as conditions such as heart disease and diabetes. It is a huge public health issue: periodontal treatment and prevention can cost between \$100 and \$1,000 annually per patient.

Over the past few years, newspapers, magazines and other national media outlets have hyped numerous stories about the possible systemic health risks of periodontal disease as well as inflammation's general link to a broad range of diseases. Some articles have greatly exaggerated or oversimplified the connection, enough so that the expression “floss or die” has become a standing joke among researchers.

Even some opportunistic law firms have jumped on the bandwagon. One in Arizona solicits potential malpractice cas-



BUGS WITH STAYING POWER:

Once thought to be a mere congregation of pathogens, dental plaque is now known to be a dynamic – and tenacious – microbiological community called a biofilm.

es on their Web site, warning: “if you or someone you know had periodontal disease, diagnosed or undiagnosed, and either ignored or treated unsuccessfully, before or during the same time as any of the mentioned systemic diseases, you may be eligible for damages caused by these systemic diseases.” Although an extreme example, it embodies the confusion and hype surrounding this topic and underscores the need for objective, credible analysis. And it ignores the fact that oral disease is complex.

For example, changing hormone levels can cause flare-ups in women during pregnancy and while premenstrual—or in those taking oral contraceptives. Other medications can also make gums more susceptible to infection, including antihistamines, antidepressants, cancer drugs, steroids, and especially those that cause “dry mouth,” disrupting the mouth's bacterial ecosystem. Genetic, microbial, immunological and environmental factors influence both the risk and progression of infection. For example, the American Academy of Periodontology says that perhaps one third of Americans may be genetically susceptible—making them up to six times more likely to develop periodontal disease. It could be that in some cases these same factors or susceptibility might independently cause harm elsewhere in the body, creating a mere illusion of oral-systemic causality.

Of course, one of the most important differences between periodontal disease and other systemic conditions is that the former has a known cause and is quite treatable. Dental professionals should never lose sight of the fact that they are addressing a disease that significantly contributes to disability and a lack of well-being in the population. This fact alone makes it important to treat this condition, regardless of whether it might contribute to other serious illnesses. And although no one should overstate the oral-systemic link, proffers Robert Genco, a professor of oral medicine and microbiology at the University at Buffalo, no one should underestimate what can happen if it's ignored, either. While the mouth's relationship to the rest of the body will certainly be a matter of public health, of patient awareness and of the changing roles among caregivers, it will first and foremost be a matter of science. ●

SHARON GUYNUP is editorial director of *Oral and Whole Body Health*.