Good Health Requires Good Gums

Periodontal infections have ties to many ailments

By MARI N. JENSEN

Health-conscious baby boomers woke up to the specter of gum disease a little more than a decade ago, when even the characters in the *Doonesbury* comic strip started worrying about it. Periodontal disease gives people the long-in-the-tooth look associated with advancing age. Appearances may be the least of the boomers' concerns, however. Medical researchers view gum disease as a clue to serious health problems elsewhere in the body.

It's not surprising that poor health in one part of the body can affect other parts. After all, young children learn that the thighbone's connected to the hipbone, the hipbone's connected to the backbone, and that the links end with the headbone. Yet family doctors have considered the teeth and gums as primarily the dentist's domain, while dentists have traditionally viewed anything beyond the mouth as the M.D.'s territory.

Exploring the links between oral health and overall well-being has led researchers to challenge the myth of "the independence of parts," says dental researcher Robert J. Genco of the State University of New York (SUNY) at Buffalo. Gum infections may both stem from and cause health problems in distant regions of the body. Several teams of scientists are investigating the ties between periodontal infections and systemic disorders such as osteoporosis and heart disease.

"Traditionally, people have considered [periodontal disease] to be a low-grade infection that was pretty self-limiting," says periodontist Steven Offenbacher of the University of North Carolina at Chapel Hill. "But there's more at risk here than people's teeth."

The connection between oral health and overall health may have far-reaching implications. About 60 percent of people in the United States over age 12 have some gum disease, according to the American Academy of Periodontology.

Because teeth are rooted in bone, researchers anticipate a close link between the health of jawbones and general bone strength, which deteriorates in older people. The most well known consequence of fragile bones is a broken hip. Less obviously, weakened jawbones may be more susceptible to attack from the bacteria that cause gum disease, says epidemiologist Jean Wactawski-Wende of SUNY-Buffalo.

"The weaker your bones are, the more likely you are to have tooth loss," she says. "It does make intuitive sense."

To investigate ties between periodontal disease and fragile bones, Wactawski-Wende, Genco, and their SUNY colleagues reviewed the medical records of 2,566 postmenopausal women. Osteoporosis, the weakening of bones that may occur as a person ages, is particularly prevalent in this group. The researchers found that women who had osteoporosis of the hip also had fewer teeth and were more likely to have gum disease than other women.

In the body, two types of cells, which Wactawski-Wende calls the builders and the chewers, work to construct and tear down bone. All is well so long as the builders and chewers work at the same rate. However, as people age, the builders become lazier, she says. As the chewers outpace them, the bone develops holes, and as the holes get larger, the bone breaks more easily.

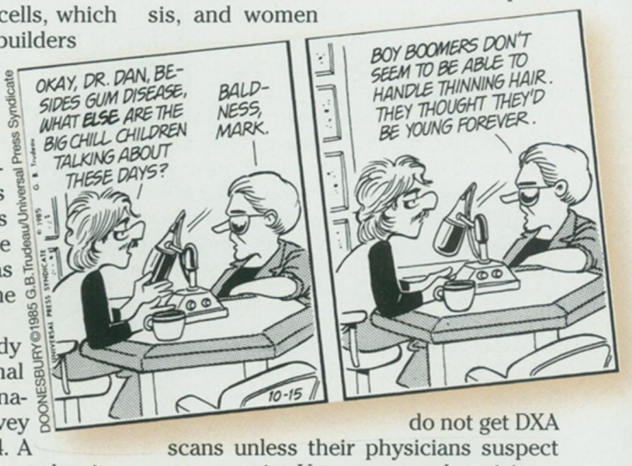
The data for the SUNY study came from the third National Health and Nutrition Examination Survey, a nationwide survey conducted from 1988 to 1994. A medical exam ascertained bone density by using dual-energy X-ray absorptiometry (DXA), a standard method of assessing the extent of osteoporosis. To evaluate the women's oral health, the examiners counted teeth and measured how tightly the gums adhered to them.

The analysis showed that women with osteoporosis of the hip were almost twice as likely to have loose teeth and more likely to have lost teeth than women with healthy bones. Wactawski-Wende presented the team's findings in February at a meeting in Philadelphia of the American Association for the Advancement of Science (AAAS).

Osteoporosis researcher Charles H. Chesnut III of the University of Washington in Seattle says that the SUNY team's research confirms some of his group's findings. "Tooth loss and [decreasing] tooth attachment to the bone may be . . . part of a systemic osteoporosis," says Chestnut. However, he adds, the study cannot determine whether osteoporosis or bacterial infections of the gum came first—it just shows that women who have one disorder are more likely to have the other also.

Determining whether one disease causes or accelerates the other requires a different type of study, one that tracks women over time and regularly measures the health of their gums and their bones. Wactawski-Wende and other researchers at SUNY are planning just such a longitudinal study.

Dentists do not screen for osteoporosis, and women do not get DXA scans unless their physicians suspect osteoporosis. Yet anyone who visits a dentist regularly has X rays taken. Those X rays might be able to do double duty, giving an early warning of osteoporosis and detecting oral health problems, says Marjorie Jeffcoat of the University of Alabama at Birmingham.



"People often see their dentist and dental hygienist more frequently than they see their doctors," she says. "I've been interested in whether it is possible to begin to harness some of the information we get from dental exams."

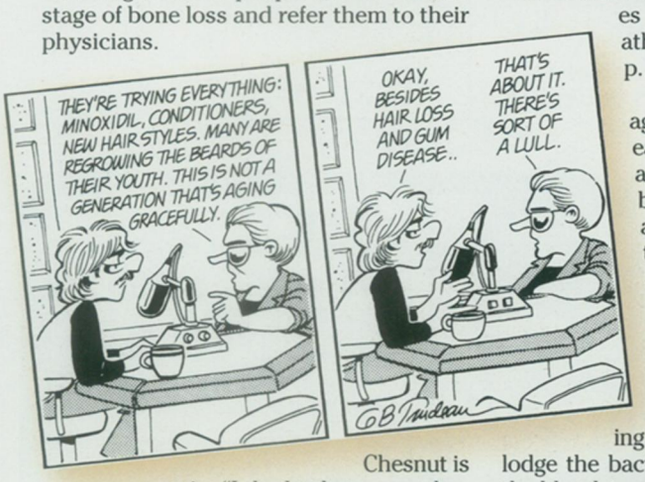
Jeffcoat and her colleagues at Alabama, the Fred Hutchison Cancer Research Center in Seattle, and the National Institute of Dental Research in Bethesda, Md., hypothesize that they can use dental X

rays to assess the overall health of a person's bones by scrutinizing the bone surrounding the teeth. To test their hypothesis, the team is comparing bone density seen in dental X rays to DXA scans of hipbone density for 450 postmenopausal women between the ages of 50 and 85. The study began in 1996 and will continue until 2002.

The researchers modified the traditional technique for dental X rays in one small way. They put a little block of aluminum on the holder that secures the X-ray film in the patient's mouth. Like bone, the aluminum interacts with X rays and thus can serve as a standard for comparison. The researchers developed a computer program to measure the density of the bone against the constant density of the aluminum block.

Preliminary results show that women whose dental X rays reveal less dense bone also have weaker hipbones. Jeffcoat plans to present the team's latest findings at the International Women's Leadership Conference in Nice, France, in June.

She anticipates that dental X rays could help screen for preliminary signs of osteoporosis. "What we would all like to avoid is having waited until [a bone] fractures," she says. In the future, dentists might catch people at the earliest stage of bone loss and refer them to their physicians.



Chesnut is uncertain. "I doubt that many dentists or practicing physicians have a lot of awareness of the connection between dental bone loss and tooth loss and systemic osteoporosis," he says. If the connection is confirmed, however, he expects that doctors and dentists will work together on the problems of bone and tooth loss.

A toothless grin shows obvious damage from periodontal infections, but long before teeth fall out, gum infections may wreak damage throughout the body.

During the early phase of gum disease, bacteria create pus-filled pockets along the base of the tooth. The gums alongside the pockets eventually become an inflamed, oozing mass.

Gum disease can develop into a sizable infection, Offenbacher says. An equivalent infection in a person's hands would be a raw, ulcerated wound that leaks pus, reaches down to the bone, and covers both palms, he notes.

Unlike an infection in the hands, periodontal disease, especially in the early stages, does not cause pain or other annoying symptoms and therefore does not drive its victims to the dentist. Without treatment, the infection flourishes, first destroying gum tissue, then underlying bone, and, after years, causing the teeth to fall out.

Researchers suspect that chronic infections like periodontal disease can affect systems throughout the body, including the cardiovascular system.

Gum disease may increase the risk of coronary heart disease in at least two ways, suggest James Beck of North Carolina and others.

The first mechanism stems from the chronic nature of gum disease. Bacterial infections activate the immune system, the body's defense mechanism. As part of its defense, the body generates a series of chemicals that constitutes an inflammatory response. In a chronic infection, the inflammatory response persists. Unfortunately, the chemicals that help ward off bacterial attackers can also damage body tissues. Such chronic inflammation launches a process that can lead to atherosclerosis (SN: 6/14/97, p. 374).

Besides turning the body against itself, periodontal disease may cause acute damage to the heart. Because the bacteria-filled pockets are up against an open wound in the gum, the bacteria can—and do—get into the bloodstream. Such invasions happen all the time, says Genco. In people with severe periodontal disease, just brushing their teeth or eating some rough food may dislodge the bacteria and set them adrift in the bloodstream.

Generally, the bacteria are cleared from the bloodstream rapidly, says Genco, whose research team took blood samples from patients who were having their teeth cleaned. Bacteria turned up in the blood samples but vanished within 2 minutes. Because such fleeting infections do occur, people with heart murmurs or damage to a heart valve are advised to take antibiotics before dental procedures to prevent bacteria dislodged into the bloodstream from causing heart infections.

Research on animals suggests that such short-lived infections in the blood may significantly affect even healthy hearts. At the AAAS meeting, Mark C. Herzberg of the University of Minnesota in Minneapolis reported that injecting rabbits with one strain of *Streptococcus sanguis*, a bacterium found in plaque, caused heart abnormalities.


D. Clem/Amer. Acad. of Periodontology

Periodontal disease has destroyed some of the bone surrounding the tooth on the far left, exposing its root.

Herzberg and Maurice W. Meyer, also of Minnesota, began this research with test-tube experiments showing that some *S. sanguis* strains, those containing a surface protein called PAAP, cause human blood platelets to clump. When the researchers injected PAAP-containing *S. sanguis* into rabbits, the animals' heart rates, blood pressure, and breathing rates all increased within 3 minutes.

In the recent study, the team gave the rabbits electrocardiograms (EKGs) for 30 minutes after injecting the bacteria. Within 3 minutes, the EKGs showed abnormal heartbeat patterns. The aberrant beats indicated that the rabbits were having episodes of heart ischemia, periods when the heart muscle was not getting enough oxygen, Herzberg says. In humans, such ischemias are often precursors of heart attacks.

All the changes seen in the rabbits indicate that the animals' hearts are having to work harder, he says. "We don't know if they go on to heart attacks, but we would certainly like to find out." The team intends to expand the experiments by following animals long enough to tell whether the heart muscle gets injured.

Despite such findings, *S. sanguis* is not necessarily an enemy. A common oral bacterium, this species does not ordinarily appear harmful, and it may actually fend off other, more destructive bacteria. If a person's gums are healthy, there is little chance that this microbe in the mouth will get into another part of the body and behave badly, he says. "If people are diligent with their oral hygiene, I don't think these bugs should cause a problem."

Researchers are establishing more and more links between periodontal infections and ailments such as heart disease and osteoporosis, Genco says. "We have only just begun to understand the many, many implications of chronic infections like periodontal disease on other diseases," he says.

"It's clear that dentists are going to have to know much more about systemic diseases and [that] physicians need to be more aware of oral diseases." □