The Mouth-Body Connection

Part 2: Health Gums and a Healthy Heart

Drs. Todd & Amy Kinney, DDS

The Department of Health and Human Services has selected oral health as one of the 12 Leading Health Indicators *for Healthy People 2020*. Oral diseases ranging from cavities and gum disease to oral cancers cause pain and disability for millions of Americans. Unfortunately, the impact of oral disease does not stop at the mouth and teeth. Research has shown that oral health, particularly gum disease, is related to several chronic and life-threatening diseases, including **diabetes, heart disease, and cancer**.[1234] In pregnant women, poor oral health has also been associated with premature births and low birth weight.[5]

In Part I of this series, the relationship of diabetes and gum disease, called **periodontal disease**, was addressed. People with diabetes or who are overweight have more periodontal disease and a higher risk of heart disease and stroke. Chronic gum disease can make blood sugar control worse in diabetics, and treating gum disease can help regulate blood sugar levels and reduce systemic inflammation. Professional dental cleanings can significantly reduce a diabetic's risk for a heart attack.

In recent years, not only have we realized that gum disease increases the risk of having diabetes by 50%[6] but research also implicates gum disease with increasing the risk of certain cancers by 30–50%.[7] We will address periodontal disease and cancer in Part III of this series.

A Mouthful of Evidence

The relationship between heart disease and oral health is nothing new. It was just over 20 years ago that a Finnish cardiologist and his team reported findings that their patients with **myocardial infarction** (heart attack) had poorer oral health, including gum disease and tooth decay.[8] This landmark paper in 1989 stimulated a tidal wave of interest in the associations between oral health and various systemic diseases over the last two decades.

In 1993, one of the first studies on the association of periodontal disease and heart disease recognized periodontal disease to increase the risk of heart disease by 76%,[9] and the evidence continues to grow each year. As early as 1998, the ***American Academy of Periodontology*** (AAP) issued a strong warning that gum infections represent a "far more serious threat" to the health of millions of Americans than previously realized. **Over 2800** referenced citations on periodontal disease and cardiovascular disease can be found on ***PubMed***. Nearly half of these articles have been published in the past 10 years, and one-third in just the last 5 years.

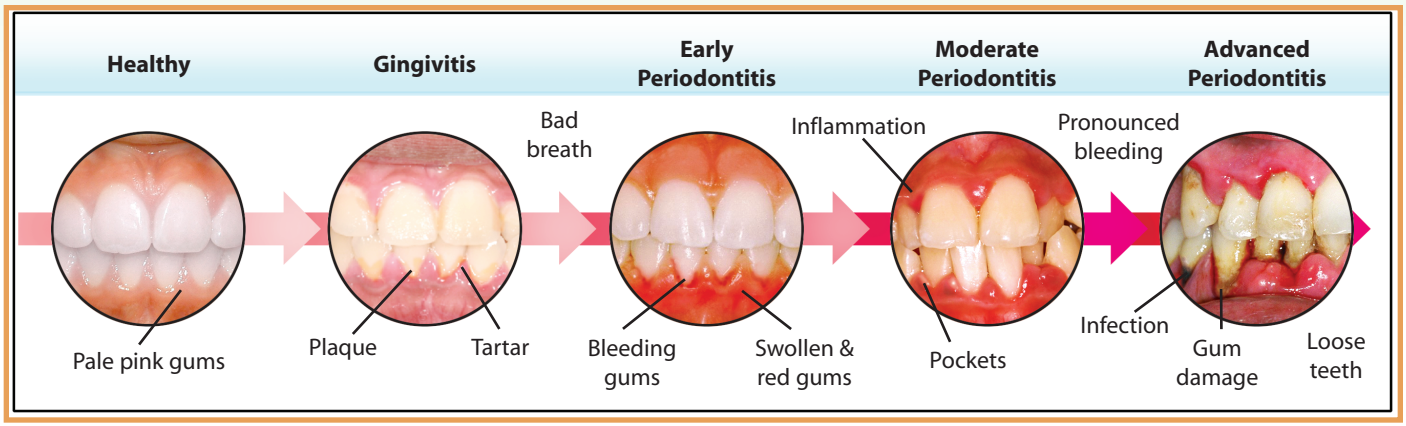
> It is impossible to have optimal health without having good oral health… studies have demonstrated an association between periodontal disease and diabetes, **cardiovascular disease**, stroke and adverse pregnancy outcomes."
>
> *—Dr. Donna Shalayla, M.D., Former U.S. Surgeon General*

Long in the Tooth

Periodontal disease is a chronic infectious inflammatory disease that affects the gum tissue and bone supporting the teeth. Is it estimated that nearly **85%** of the U.S. adult population is afflicted with periodontal disease at some time in their lives.

One out of every two American adults aged 30 and over currently has periodontal disease, according to recent findings from the ***Centers for Disease Control and Prevention*** (CDC). A 2012 study in the ***Journal of Dental Research*** estimates that nearly half (65 million) American adults have mild, moderate or severe periodontitis, the more advanced form of the disease. In adults 65 and older, prevalence rates increase to 70%.[10]

Periodontal disease is higher in men than women (56% vs. 38%) and is highest in Mexican-Americans (67%) compared to other races. Other segments with high prevalence rates include: current smokers (64%);



Progression of gingivitis to periodontal disease, which can be a key factor in heart disease.

those living below the federal poverty level (65%); and those with less than a high school education (67%).

Staggering Statistics

Heart disease, also called **cardiovascular disease** (CVD), kills an estimated **630,000** Americans each year, and it's the leading cause of death for both men and women in the US.[11] The CDC estimates that 935,000 heart attacks and 795,000 stokes occur each year.[12] Heart disease and stroke are the first and third of all deaths in the United States. The American Heart Association estimates more the 83 million Americans currently live with one of more types of CVD, creating estimated health care costs nearing **$450 billion** each year. Sadly, epidemiological data show that as many as 50–70% of CVD events occur in low-risk populations without easily identifiable causes.[13]

Both gum disease and heart disease are **chronic inflammatory conditions** that can take decades to develop and they can exist subclinically for years before any symptoms become noticeable to the patient. CVD can be a killer by heart attack or stroke. 90% of coronary artery disease is asymptomatic. In fact, 50% of the time the very first symptom of heart disease is **cardiac arrest**. Every year, over 400,000 people in the US—nearly half of the people who have heart attacks annually—die from sudden cardiac arrest in hospital emergency rooms or before they can receive medical attention.

There is strong proof that people with gum disease are at greater risk for heart disease—including heart attacks, stroke and atherosclerosis—than people with healthy gums. The link between gum disease and heart disease exists separately from other risk factors for heart disease, such as smoking, diabetes, obesity, or high blood pressure. The research documenting the relationship between gum disease and heart disease indicates people with the most serious gum infections have the greatest risk.

Got Plaque?

Complications from gum disease are the number-one cause of tooth loss in adults according to the AAP, but that isn't the only consequence. Periodontal disease starts when sticky bacterial biofilms, called **dental plaque**, build up on teeth and root surfaces. These bacteria and other microorganisms cause acute inflammation and bleeding gums. If gum infection becomes chronic, turning **gingivitis** (the earliest stage of gum disease—9 out of 10 adults have it and don't know it!) into **periodontitis**, the risk for irreversible bone loss around the teeth dramatically increases, and with it so does the amount of bacteria spilling into the bloodstream and spreading infection throughout the rest of the body.

As bacteria, endotoxins (poisons released from dead bacteria) and inflammatory compounds seed from the mouth into the circulation, the body produces antibodies against these common oral bacteria to keep them in check. Usually these bacteria are killed, but as gum disease becomes more chronic and inflammation progresses, a hyperimmune reaction develops and the antibodies end up attacking the tissue where the blood meets the artery along with the invading bacteria. With a foothold in the walls of arteries, called the **endothelium**, these oral bacteria cause the lining to become inflamed, increasing blood clotting and promoting the formation of **arterial plaques**.

The body attempts to wall off this inflammation by depositing cholesterol, which promotes the buildup of plaques in the blood vessels, narrowing the vessels from the inside. The coronary arteries and heart valves are especially susceptible as are the carotid arteries that feed the brain. As the buildup of plaque increases the arteries become atherosclerotic or hardened leading to hypertension, and if the plaque becomes unstable and ruptures it can have three potentially deadly outcomes: **acute heart attack, cardiac arrhythmia**, and **stroke**.

The Cholesterol Myth

In their book, *Reverse Heart Disease Now*, co-authors and integrative cardiologists Stephen Sinatra, MD, and James Roberts, MD, address the role of repeated cardiovascular injury caused by chronic inflammation and the role of infectious oral bacteria. They simply remind us, "To help put out the fire in your

arteries, you need to put out the fire in your mouth."

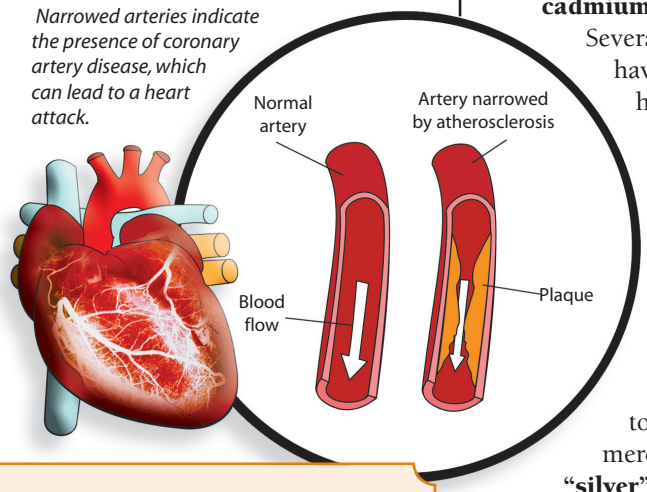
Medicine's traditional finger-pointing at cholesterol as the bad guy has recently shifted to acknowledging inflammation as the most important factor in plaque formation and arterial disease. "Both periodontal disease and cardiovascular disease are inflammatory diseases, and **inflammation** is the common mechanism that connects them," says Dr. David Cochran, DDS, PhD, past president of the AAP and Chair of the Department of Periodontics at the University of Texas Health Science Center at San Antonio.

The oral bacteria found in periodontal disease have been identified in atherosclerotic plaque of patients with coronary artery disease. Periodontal disease is associated with elevated levels of **C-Reactive Protein** (CRP), a key inflammatory marker. In 2000, a Harvard study put CRP on the map as the best predictor for identifying people at risk for heart disease, not bad cholesterol. CRP actually interferes with the process that inhibits blood clots, which can predispose a person to a sudden heart attack or stroke. The presence of the highest levels of CRP indicates five times the risk of developing CVD, and four times the risk of heart attack and stroke. If cholesterol were to blame, then everyone with CVD would have high cholesterol, when in fact, half of all heart attacks occur in people with normal cholesterol levels.

It seems bacteria must have help to do harm, and other factors, such as smoking, toxic chemical and heavy metals, oxidative stress, bad fats, poor diet, food allergies, elevated insulin, high blood pressure, excess stress, and other inflammatory diseases can set the stage for infection. In rheumatoid arthritis for example, researchers have discovered that a woman's risk for heart attack is doubled.

Garbage In

So, cholesterol isn't the problem after all—it's **chronic inflammation**—caused by bacteria, environmental toxins, and diet. Overloading the body with highly processed carbohydrates (sugar, flour and all the products made from them) and omega-6 vegetable oils, like soybean, corn, canola and sunflower that are found in many processed foods, are some of the biggest culprits of inflammation. The cholesterol theory led to the promotion of the Standard American Diet (SAD) that is low in saturated fats and high in polyunsaturated fats (omega-6 vegetable oils) and carbohydrates. The high levels of **omega-6 fatty acids** compared to **omega-3 fatty acids** in this type of diet is believed to contribute to autoimmune and inflammatory diseases as well as cancer and cardiovascular disease.[14 15]



Narrowed arteries indicate the presence of coronary artery disease, which can lead to a heart attack.

> Medicine's traditional finger-pointing at cholesterol as the bad guy has recently shifted to acknowledging **inflammation** as the most important factor in plaque formation and arterial disease.

A number of studies have shown that the heart is especially sensitive to heavy metal toxicity and they indicate hypertension or high blood pressure may be related to accumulative heavy metal overload. The cardiovascular, immune and nervous systems are all extraordinarily sensitive to heavy metals like **cadmium**, **lead** and **mercury**. Several European studies have shown significantly higher incidences of coronary atherosclerosis, congestive heart failure, cardiac myopathy, and cardiac arrest in patients with elevated mercury levels. Drs. Sinatra, Roberts, and others feel these toxic metals, especially mercury from fish, **"silver" mercury-amalgam dental fillings**, and vaccines, play an active role in inflammation, mitochondrial dysfunction and plaque formation.

Are You at Risk?

Despite the fact that 15–20 million people in the US take expensive (and controversial) statin medications like Lipitor®, Crestor®, and Zocor®, and apart from the medical advances in emergency and interventional cardiology, more Americans will die this year of heart disease than ever before.

The latest analysis of lifetime risk of CVD for the average adult was recently published in the November 2012 issue *Journal of the American Medical Association*.[16] The results are alarming. In fact, 3 out of 5 men **without** heart disease or identifiable risk factors at age 45 will develop a CVD (which includes coronary artery disease, stroke, and congestive heart failure) over time. Men are at higher risk than women for all ages. The greater number of lifetime risk factors, such as smoking, diabetes, periodontal

disease, obesity, and high blood pressure, the higher the likelihood of eventually developing heart disease. The message is clear—even people with relatively low risk may suffer from heart problems down the road.

Realizing that traditional preventive medicine is failing to keep up with the increasing prevalence of CVD is a bitter pill to swallow. The evidence supporting that inflammation in the artery wall is the real cause of heart disease and not bad cholesterol is slowly leading to a radical paradigm shift in how heart disease is being treated. **New Cardiology**, as endorsed by Drs. Sinatra, Roberts and others, utilizes integrative care—medication, nutritional supplements and lifestyle changes—to help stabilize these dangerous arterial plaques and reverse them before a life-threatening event can occur or surgery is needed.[17]

Saving Lives—One Smile at a Time

American Heart Association spokesman Dr. Richard Stein, MD, past director of preventive cardiology at Beth Israel Medical Center in New York City and a spokesman for the American Heart Association, says that he: "regularly counsels patients worried about their risk for heart attack or stroke to incorporate good periodontal care in their preventive strategies, just as they would include exercise, healthy diets and appropriate medications."

Fortunately, unlike CVD, signs of periodontal disease occur early and are easily detectable. One of the easiest ways and most comprehensive screening is from your dentist. As a ***Center for Dental Medicine*** we recommend that all adults should receive a Periodontal Health Assessment. In our office we can assess your risk for gum disease by examining your:

- Health history
- Family health history
- Nutrition and diet
- Plaque, bleeding and gum-pocket scores
- Gums, bone and soft tissue
- Existing dental work
- Bite and TMJ health
- Saliva pH testing
- Bacterial levels
- Genetic susceptibility
- CRP and HbA1c levels

The American Heart Association (AHA) has dedicated **February as American Heart Month**. Remember the old saying, *"An ounce of prevention is worth a pound of cure!"* Here is how you can reduce your risk for gum disease and heart disease:

1. Eat a healthy, whole-foods, non-processed, and anti-inflammatory diet.

Periodontal Disease Quiz

Do you have periodontal disease? Many people are unaware that they have gum disease. The absence of pain, obvious inflammation, or tooth decay is no guarantee you are free from periodontal disease. To test your risk, answer each of the following questions as truthfully as possible. Keep track of your to total points (shown in the brackets) and evaluate your score at the end of the test.

How old are you?
- <45 (5)
- 40-65 (10)
- >65 (15) _____

Do you use tobacco?
- No (5)
- Yes (15) _____

Have you seen a dentist in the past two years?
- No (10)
- Yes (5) _____

How often do you floss?
- Daily (5)
- Weekly (10)
- Seldom (15) _____

Do you have any of the following health conditions: Heart disease, osteoporosis, diabetes, or high stress?
- No (5)
- Yes (25) _____

Do you have chronic bad breath or a persistent metallic taste in your mouth?
- No (5)
- Yes (15) _____

How many dental fillings, crowns or implants do you have?
- None (5)
- 1–3 (10)
- 4+ (15) _____

Do your gums bleed after brushing and/of flossing?
- No (5)
- Yes (55) _____

Do you have any loose teeth?
No (5)
- Yes (55) _____

Do you have receding gums?
- No (5)
- Yes (55) _____

Have you had any adult teeth extracted?
- No (5)
- Yes (55) _____

Do you have any root canalled teeth?
- No (5)
- Yes (55) _____

MY TOTAL: _____

Periodontal Disease Risk Score

LOW RISK: **75** *OR LESS POINTS*
MEDIUM RISK: **80–105** *POINTS*
HIGH RISK: **110** *OR MORE POINTS*

If you scored 110 or more points, your risk of having periodontal disease is high and the higher your score, the greater is your risk for tooth loss, diabetes, cancer and heart disease. Even with a high score, your risk can be significantly reduced with proper oral hygiene, professional periodontal care and an anti-inflammatory diet. ■

2. Brush and floss daily to remove plaque.
3. See your dentist and dental hygienist for regular gum disease examinations, even before you see the first signs of bleeding gums or tartar buildup. It could save your life!
4. Live a physically active, emotionally healthy and spiritually profound lifestyle.
5. Listen to your doctor—and don't smoke!

Periodontal disease and heart disease are entirely preventable and both can be treated and reversed if detected early. Regardless of genetic predisposition or other factors, you can live a longer, happier, healthier life with an investment of just a few minutes every day. ■

Drs. Todd and Amy Kinney have provided integrative dental care in Bozeman since 1997. Their health-centered practice was recognized as a Center for Dental Medicine in 2010—one of less than 100 dental practices dedicated to preventive dental medicine.

NOTES

1. Bensley L., VanEenwyk J., Ossiander E.M. Associations of self-reported periodontal disease with metabolic syndrome and number of self-reported chronic conditions. Prev. Chronic Dis. 2011;8(3):A50
2. J. Am. Dent. Assoc. 2006;137(suppl 2).
3. Barnett M.L. The oral-systemic disease connection. J. Am. Dent. Assoc. 2006;137(suppl 2):5S–6S.
4. Division of Oral Health, Centers for Disease Control and Prevention. Public Health Implications of Chronic Periodontal Infections in Adults. Atlanta, GA: 2005.
5. Office of the Surgeon General, U.S. Department of Health and Human Services. Periodontal disease and adverse pregnancy outcomes. Oral Health in America: A Report of the Surgeon General. Washington, D.C.: 2000.
6. Annual meeting American Diabetes Association. June 2008. Dr. George W. Taylor, Univ. of Michigan.
7. Michaud, D.S. Periodontal disease, tooth loss and cancer risk in male health professionals: a prospective cohort study. Lancet Oncol. 2008; 9: 550-58.
8. Mattila K.J., Nieminen M.S., Valtonen V.V., et. al. Association between dental health and acute myocardial infarction. BMJ. 1989;298:779–781.
9. DeStefano F., Anda R..F, Kahn H.S., et. al. Dental disease and risk of coronary heart disease and mortality. BMJ. 1993;306(6879):688-691.
10. P.I. Eke , B.A. Dye , L. Wei, G.O. Thornton-Evans , and R.J. Genco . Prevalence of Periodontitis in Adults in the United States: 2009 and 2010. J DENT RES 0022034512457373, first published on August 30, 2012 as doi:10.1177/0022034512457373
11. American Heart Association, 2012.
12. Centers for Disease Control and Prevention. Heart disease and stroke prevention; addressing the nation's leading killers: at a glance 2011. Available at: www.cdc.gov/chronicdisease/resources/publications/AAG/dhdsp.htm.
13. Jackson R., Marshall R., Kerr A., Riddell T., Wells S. QRISK or Framingham for predicting cardiovascular risk? BMJ. 2009;339:b2673.
14. Simopoulos, Artemis P. (2008). "The Importance of the Omega-6/Omega-3 Fatty Acid Ratio in Cardiovascular Disease and Other Chronic Diseases." *Experimental Biology and Medicine* 233 (6): 674–88. doi:10.3181/0711-MR-311. PMID 18408140.
15. Astrup, Arne; Dyerberg, Jørn; Elwood, Peter; Hermansen, Kjeld; Hu, Frank B.; Jakobsen, Marianne Uhre; Kok, Frans J.; Krauss, Ronald M., et. al. (2011). "The role of reducing intakes of saturated fat in the prevention of cardiovascular disease: Where does the evidence stand in 2010?" *American Journal of Clinical Nutrition* 93 (4): 684–8. doi:10.3945/ajcn.110.004622. PMC 3138219. PMID 21270379.
16. Wilkins, J.T. Lifetime Risk and Years Lived Free of Total Cardiovascular Disease *JAMA*. 2012;308 (17):1795-1801. doi:10.1001/jama.2012.14312
17. Sinatra, S., 2007. *Reverse Heart Disease Now: Stop Deadly Cardiovascular Plaque Before It's Too Late.* (Stephen Sinatra and James Roberts; with Martin Zucker.) New Jersey. John Wiley & Sons, Inc.