

The Oral-Systemic Connection

The Facts, the Opportunities: Can Your practice Be in the Lifesaving Business?

By Robert J. Schulhof, AB, MA

The oral-systemic disease connection is a revolutionary chance for astute dentists to change the character of their practices by adopting a wellness model. In a recent Viewpoint article (A New Paradigm for Dentistry and Medicine, *Dentistry Today*, November 2008, pages 16-18), the author shared an overview of the opportunities the oral-systemic connection presents.

In this article, the first in a series of in-depth articles on how dental professionals can implement a wellness program into their practices, the author reviews the most recent research connecting periodontal disease with systemic diseases. Future articles will examine the paradigm shifts required in attitudes, diagnostics, in-office treatments, and home care for those dental practices that seek to effectively change the health of their patients.

A Major Turning Point for the Future of Dentistry

Most dental historians consider the Surgeon General's first-ever report on oral health, published in May 2000, as the official kick-off of the oral-systemic connection. The report, in part, states the following (*italics added*):¹

“The terms *oral health* and *general health* should not be interpreted as separate entities. Oral health is integral to general health; this report provides important reminders that oral health means more than healthy teeth and that you cannot be healthy without oral health. Further, the report outlines existing safe and effective disease prevention measures that everyone can adopt to improve oral health and prevent disease... Recently, research findings have pointed to possible associations between chronic oral infections and diabetes, heart and lung diseases, stroke, and low-birth weight, premature births.”

Since the time this report was released, an amazing amount of research has surfaced to improve our understanding of these associations, far too many to list in an overview paper such as this one. (Interested readers are invited to download a listing of more than 100 links to papers on this topic by visiting exceptionalpractice.com/diamond/documents/References.doc.)

Of course, the clinical practitioner is not interested in the statistical facts as much as guidance that can directly affect treatment decisions. The question of interest is, “If I treat this patient's periodontal disease, will it reduce his or her risk of systemic disease?” After looking at the statistical research, we now know that in the average practice the answer in hundreds of cases is a resounding *yes*.

Landmark Articles on the Oral-Systemic Connection

It has been more than 8 years since the surgeon general's statement on the importance of good oral health as it relates to total systemic health. How has this research affected the way *you* practice dentistry? Is it possible clinicians need to move beyond simple soft-tissue disease management to a new, higher standard of care? How has the plethora of

emerging research and statistical data affected the way you treat this serious health risk? How many more of your patients' lives will needlessly be at risk of secondary systemic disease infection as a result of periodontal infection and inferior decades-old treatment? While hundreds of articles have been written on oral-systemic relationships, as a health scientist, the author will discuss a few he considers landmarks worthy of special note:

Pre-Term Birth

Periodontal disease has been shown to increase the risk of pre-term/low-birth weight babies, and periodontal treatment has been shown to reduce the incidence of these occurrences. Specifically, López showed an 80% reduction in pre-term/low-birth weight babies (from 10% untreated to 2% treated) when the mothers received treatment for periodontal disease prior to the second trimester of pregnancy.²

Because of pregnant women's younger age, though, true periodontal disease is much less common than pregnancy-associated gingivitis. As such, López, et al, later was able to demonstrate a 68% reduction of pre-term/low-birth weight babies in women with pregnancy-associated gingivitis who received periodontal therapy.³ This latter article shows that good oral care is important for the majority of pregnant women.

Heart Disease

According to Ridker,⁴ a patient's level of C-reactive protein (CRP), a substance produced by the liver in response to inflammation, is a better predictor of cardiac events than high cholesterol. This inflammation-correlated risk factor for heart disease has been shown to increase with periodontal disease and to decrease with the treatment of periodontal disease.

Further, in a 2000 article on systemic markers as they relate to cardiovascular disease in patients with periodontitis, Loos and Craandijk showed that periodontal disease, being chronic inflammation, could significantly increase CRP, therefore increasing the risk of heart attack.⁵ The University of Buffalo's Grossi showed in 2004 that treatment of periodontal patients with elevated CRP using scaling and root planing along with topical antibiotics significantly reduced CRP, often to low-risk levels. D'Aiuto⁶ and Iawamoto⁷ later confirmed this research.

These results are of great practical importance, because CRP can be tested in the dental office with a simple finger stick (Healthpoint Diagnostix). We recommend testing before treatment, helping the patient to evaluate his or her cardiac risk, and also after treatment to assess if risk has been measurably lowered due to periodontal treatment.

Endothelial Function/Vascular Function

Rather than a risk factor like cholesterol or CRP, endothelial function is a direct measurement of the effectiveness of the circulatory system. This is now of great interest in dentistry because endothelial function can be measured directly in the dental office with a device called the Endo-PAT2000 System (Itamar Medical),⁸ and treatment of periodontal disease has been shown to improve endothelial function significantly.

In a 2007 article on this topic, Tonetti concluded that intensive treatment of periodontitis improved endothelial function; improvements at 6 months appeared to be in response to therapy, and improvements were correlated with a reduced quantity of periodontal lesions (P=0.002) and with reduced gum bleeding scores (P=0.003). The

mechanism by which this occurred is not certain, however Tonetti stated that it could include “direct effects from Gram-negative bacteria and their product invading periodontal tissue or indirectly acting as triggers for a systemic inflammatory response that harms the vascular walls.”⁹

Effect of Periodontal Treatment on Healthcare Costs

The real bottom line is also the financial bottom line. We have now arrived at the point where insurance companies see that treating periodontal disease is a medical necessity, and they are willing to pay for periodontal treatment. Treating periodontal disease in cardiac patients, diabetics, and pregnant women can be a tremendous cost-saving measure for the insurance companies: it reduces their cost of major heart surgeries, long-term expenses associated with diabetes treatment/dialysis, and post-natal intensive hospitalization costs. Several studies, with insurance companies as the lead or co-investigator, helped reach this conclusion.

Aetna and Columbia shared the results of a joint study in 2006 involving approximately 145,000 Aetna members with continuous dental and medical coverage. It demonstrated a relationship between treating periodontal disease and a reduction in the total cost of care for patients suffering from diabetes, coronary artery disease, and cerebrovascular disease or stroke. According to the study, periodontal care appeared to have a positive effect on medical care costs, with earlier treatment leading to lower costs for members with these 3 chronic diseases.¹⁰

That same year, CIGNA HealthCare began reimbursing patients fully for out-of-pocket costs of periodontal scaling and root planing and periodontal maintenance if they were enrolled in both its dental insurance and disease management programs for diabetes and cardiac care. This was an extension of its maternity/dental health program that offered special dental benefits to pregnant members of its medical and dental programs.¹¹

In light of this, many dental practices now routinely use special software to submit charges for periodontal treatment to patients’ health insurance companies and are being reimbursed.

Diabetes

It is well known that diabetics, because of their impaired immune systems, are twice as likely to get periodontal disease. The relationship also goes the other way: the periodontal bacteria challenge blood sugar control and increase the rate of diabetes. Additionally, it has been shown that periodontal disease greatly increases diabetes complications; it also increases mortality rates by a factor of 7 or more in later years. The good news is that treating periodontal disease can significantly lower HbA1c, the definitive measure of blood sugar control. Several studies help support these assessments:

In 2004 Saito, et al, published the results of The Hisayama Study, which examined the relationship between periodontal disease and glucose intolerance in non-diabetics.¹² It demonstrated that people with normal glucose tolerance who 10 years later developed impaired glucose tolerance were also much more likely to have deep pockets. Deep pockets, current glucose tolerance levels, and the development of glucose intolerance were related, according to the study.

The results of a study published a year later suggested that periodontal disease is strongly predictive of mortality from ischemic heart disease and diabetic nephropathy in

Pima Indians with type 2 diabetes.¹³ Results indicated that Pima Indians with little or no periodontal disease had a much lower death rate (3.7%) compared to those with severe periodontal disease (28.4%).

Finally, results from a study examining the relationship between periodontal therapy and blood sugar control demonstrated that perio treatment (ie, scaling and root planning) in diabetic patients could improve metabolic control and reduce HbA1c levels up to 20 percent 3 and 6 months after treatment (from 7.2 to 5.7). The study results were published in a 2006 article in the *Journal of Periodontology*. A healthy level of HbA1c is between the ranges of 4.0 to 6.0; in diabetics this number is greater than 7.0, and 6.0 to 7.0 is pre-diabetic.¹⁴

The Oral-Systemic Circle: What Is Cause? What Is Effect?

It would be wrong to oversimplify the cause-effect relationship between oral health and systemic health. Yes, it is true that periodontal disease can increase the rate of systemic disease, but it is also true that people tend generally to be either healthy or unhealthy, and unhealthy people get more diabetes, heart disease, cancer ... and periodontal disease.

An article published in 2006 cited researchers from the University of Buffalo, who found after examining the Third National Health and Nutrition Examination Survey that obesity is a significant predictor for periodontal disease, independent of age, gender, race, ethnicity, and smoking.¹⁵ This underscores the importance of counseling the patient on diet, exercise, smoking, and other lifestyle factors if treatment is going to be successful in the long term.

How Many Lives Could You Save?

Quantifiable Life-Savings

The question isn't whether treating periodontal disease will save lives by reducing heart attacks and diabetes as well as other systemic diseases, but rather, how many lives will be saved? The average healthy patient has about a 1% chance of a heart attack per year, (AHA 16) depending on a number of risk factors. Almost 30% of your adult patients will have some relationship with diabetes, 7% will have it and know it, 3% will have it and not know it, and 20% are prediabetic. (NDIC 17) Following is an example of the impact that a dental practice might have as a wellness center. If the practice has 2,000 active patients with an average age of 50 years, and 50% (1,000) have bleeding and/or pockets >4 mm, then clinicians can do the following:

Prevent 16 heart attacks a year.

If we combine the distribution of CRP of people with periodontal disease with the risk of CRP at different levels, we have the table below.

CRP Range Mg/L	0-1.0	1.0-5.0	5.0-9.0	9+
% of Population	50%	25%	15%	10%
Midpoint Risk Level	1	3	5	6
Contribution to risk.	0.5	0.75	0.75	0.6
Total Risk Factor	2.6			

This shows that the average person with periodontal disease has approximately 2.6 times the risk of a heart attack of the average person. If we have 1000 periodontal patients in the practice and reduce their risk to normal we would prevent 1.6% X 1000=16 heart attacks.

It should be noted that the JUPITER study 18, showed that reducing CRP by 37 %, in 8500 patients with normal cholesterol, reduced the heart attack rate by over 50%

Save 40 people from becoming type 2 diabetics a year, adding 8.2 years to their life expectancy. Of your 2,000 patients 20% (400) have HbA1c scores between 6.0 and 6.9, meaning that if you didn't intervene and stop their periodontal disease, then they would likely become diabetics within the next 10 years. That totals 40 people per year for 10 years that you could save from diabetes.

Discover 60 people who have diabetes now and don't know it, adding years to their life. Of your existing patients, 3% (60) have diabetes now and don't know it. Co-management now with their primary care medical doctor can greatly increase their survival rate.

Save the lives of 4 type 2 diabetics a year. Odds are 200 of your patients have type 2 diabetes, and 80% (160) of those have periodontal disease. Treating their periodontal disease will stop about 2.5% (4) of those from dying (mainly from ischemic heart disease and kidney disease) each year.

Non-Quantifiable Life-Savings

Discover cancer through CRP testing. Cancer is an inflammatory disease and tends to raise CRP off the charts. Our offices have found people with very high CRP scores and referred them to their medical doctor, who then found cancer that was previously undetected. Early discovery of cancer can often be the difference between successful treatment and a terminal disease.

Discover endothelial dysfunction. We have all heard of people like the newscaster Tim Russert, who had cholesterol under control with medication, checked out okay on stress tests, and died suddenly of a heart attack. Every day people are subject to atherosclerosis, sudden cardiac death (two-thirds asymptomatic), acute coronary syndrome, plaque rupture, vasoconstriction, or reaction to mental triggers, and all these people had something in common: endothelial dysfunction. A dentist with an Endo-PAT2000 System could be discovering patients who are in danger well before they need to see the cardiologist, and track their progress to health on your wellness program.

Making Your Practice Into a Wellness Center

We routinely evaluate practice statistics from recall appointments, which show that while more than 50% of the monthly recall patients have periodontal disease, only about 10% of them receive treatment for it. Patients feel that “bleeding gums are normal” and don’t consider it a problem. These patients would be highly motivated to accept periodontal care, however, if they fully understood the risk to their health of that “little bit of bleeding.” Fully implementing periodontal treatment in the practice not only would treat these patients who need care, but it could also more than double hygiene productivity and profitability by adding an additional \$20,000 per month.

Additionally, by establishing an oral-systemic testing protocol in your practice as part of your wellness assessment, you could be discovering diabetics, pre-diabetics, and people with impending heart attack risk weekly, putting your practice on the leading edge of preventative medicine in your area. Today, every dentist in town is the consummate “cosmetic dentist.” Why not be the leader in health in your area and build your own wellness center niche?

Finally, you will discover the benefits of positioning your practice as a leader in advanced treatments for periodontal disease. Since periodontal disease and systemic disease are intimately related, it is vital to co-manage your periodontal patients with the other members of their healthcare team. This will create two-way referral relationships with other members of the medical profession and bring higher quality patients to your practice—patients that value their health and have been referred to you by their physician.

Like anything worthwhile there will be challenges to undertaking this effort, including management, diagnosis, treatment, and marketing. We will deal with these issues in future articles.

BIOGRAPHY:

Mr. Schulhof is the CEO and founder of Diamond Age Systems and the chief scientist for Centers for Dental Medicine. He earned his master’s degree in mathematical statistics at UCLA in 1964 and began his scientific career with Hughes Aircraft company and the Lunar Lander Program. His career in dental research and management began in 1969, and he has contributed more than 100 articles to the dental scientific and management literature. He can be reached at bschulhof@qwest.net or (866) 546-5444, ext. 3.

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