

**CURRENT CONCEPTS IN PERIODONTICS**  
**NEWSLETTER 1-**  
**LINKS BETWEEN PERIODONTAL DISEASE AND SYSTEMIC DISEASE**

An increasing body of evidence is developing linking the effects of periodontal and gingival diseases with a vast number of systemic maladies. While many of the studies yet to prove a causality, a palpable association has developed in individuals with periodontal inflammation and systemic disease. Of concern is the significant role of bacteria in many of these diseases and the growing extent of bacterial resistance to commonly prescribed antibiotics. The objective of this newsletter is to update you, as the dental professional, on these links and the mechanism behind these associations.

Cardiovascular disease (CVD) and Atherosclerosis

We are all aware of the classical risk factors for CVD, which are hypertension, hypercholesterolemia, cigarette smoking and obesity. However, these factors only account for about 2/3 of the variation in the incidence of CVD. Researchers are finding another possible risk factor for the pathogenesis of CVD is periodontal infection. In fact, chronic periodontal disease has been linked to an increased incidence of myocardial infarction (MI) and stroke with periodontal patients having a two-fold greater chance. Combine that in our patients who are hypertensive, have increased triglycerides, smoke or are obese and the incidence of a fatal MI or stroke becomes much more significant. The proposed mechanisms of action include: 1.) impaired neutrophil function, 2.) bacterial products elicit recruitment of inflammatory cells into vessels, thus exacerbating the atherogenic process, 3.) elevated levels of C-reactive proteins, and 4.) oral bacterial inducing aggregation of platelets within vessels. Lastly, dental plaque and periodontal disease have already been proven to be strongly associated with infective endocarditis, a deadly condition if not treated with antimicrobial intervention.

Diabetes Mellitus

Diabetes has been well established as a clear risk factor for periodontal disease. Those suffering from diabetes suffer greater attachment loss and more periodontal abscesses. For effective management of periodontal disease, the patient must have adequate control of one's blood sugar. Thus, diabetics with periodontal disease should aggressively be treated to eliminate periodontal inflammation. (The suggested range for control is 80-110mg/dl.) Conversely, evidence exists to verify that active periodontal disease decrease's the individual's ability to maintain proper metabolic control. The exact mechanism of this link is unknown but we do know that uncontrolled diabetes leads to: 1.) impaired function of neutrophils (neutrophils are considered the first line of defense at the cellular level), 2.) decreased collagen metabolism, 3.) increased collagen destruction, 4.) increased levels of AGE's (Advanced Glycation End products), 5.) and increased levels of glucose in the crevicular fluids, which may contribute to an overgrowth of anaerobic bacteria.

Pre-term Low Birth-weight Babies (PLBB)

Although infant mortality rates have declined over recent years, pre-term low birth weight infants (affecting as much as 10% of all births) remains a major cause of perinatal morbidity and mortality. Known risk factors for PLBB include age of the mother (>34y/o

or <17y/o), African-American ancestry, poor prenatal care, low socio-economic status, alcohol or tobacco abuse, high blood pressure, genitourinary tract infections, diabetes, and multiple pregnancies. Of concern is the fact that efforts are being made by health professionals to diminish the effects of these risk factors, but yet, the rates of PLBB have just slightly declined. A possible explanation for this may point to a chronic or low level infection in mothers. During normal labor the body produces inflammatory mediators such as prostaglandin E2 (PGE2) and tumor necrosis factor alpha (TNF $\alpha$ ), which are known to initiate parturition. During a bacterial infection, the body produces elevated levels of such inflammatory mediators, thus likely speeding up the time of gestation. As you can see, a periodontal (bacterial) infection may likely influence the course of pregnancy. Recent studies are confirming that mothers with PLBB are indeed showing greater levels of periodontal attachment loss compared to mothers with normal weight babies.

### Respiratory Diseases

Various infectious agents (bacteria, viruses, fungi, and parasites) have been proven to cause pneumonia. Bacterial pneumonia is primarily induced via aspiration of bacteria that colonize the oropharyngeal region and lower respiratory tract. Most all of the known bacteria present during bacterial pneumonia are present during periodontal infections. Alarmingly, some of the pathogenic bacteria have been shown to increase in periodontal patients following treatment with antibiotics. This might be explained by the fact that the antibiotics are only suppressing certain bacteria and thus allowing other potentially more threatening subspecies to overpopulate. Patient who have compromised immune systems (i.e diabetics, alcoholics, elderly, etc.) are thus more prone to develop infections. Emphysema (destruction of the air spaces distal to the terminal bronchi) and chronic bronchitis (inflammatory condition associated with excessive mucous production of the pulmonary tract) two other respiratory diseases that are likely exacerbated by the aspiration of bacteria, however conclusive evidence is lacking associating this.

### Osteoporosis/Post-menopause

As women become post-menopausal, there has been documented evidence that show a decrease in bone mineral density. It would seem logical that such a loss in bone density may lead to an increase in periodontal breakdown. However, these findings have yet to be confirmed. What has been shown is that decreased levels of estrogen were associated with an increase in gingival inflammation. The explanation of this increase in gingival inflammation has not been proven, but it is suggested that it may be linked to the balance of estradiol and progesterone. Unbalance levels of these sex hormones can decrease the chemotactic abilities on neutrophils.

### Rheumatoid Arthritis

Both rheumatoid arthritis and periodontal disease have an inflammatory etiology resulting in bone loss and are induced by bacterial by-products such as lipopolysaccharide. In addition, both diseases have shown a favorable a response (at varying levels) to treatment which decreases levels of macrophages and osteoclasts and tissue destroying enzymes. While some studies have found that patients with rheumatoid

arthritis had greater levels of periodontal attachment loss compared to those without the disease, studies have been equivocal.

#### Other Diseases

Oral bacteria that enter the bloodstream have even been linked in rare instances to brain abscesses. Diseases such as Crohn's disease and ulcerative colitis have found elevated levels of microorganisms commonly associated with oral infections. Another area of interest is in patients with prosthetic joints and devices. As these become more commonplace in our patients, we must be increasingly aware of the vulnerability to bacterial infection of these which can be life threatening. Various different microorganisms have been cultivated in infected patients and no one antibiotic presently is available which would definitively prevent infection in a patient who followed a recommended prophylaxis regimen!

In summary, researchers are unmasking the links of periodontal disease and systemic diseases and elucidating the mechanisms behind them. Recently, obesity, pancreatic cancer, Alzheimer's and other diseases have been shown to be linked to periodontal disease. As dentists, we are justly focused on preventing periodontal infections to ultimately prevent the loss of the dentition. But in addition to that, it is important to educate our patients on such links and to motivate them to improve their periodontal health as a holistic approach to improve their overall health.

The next newsletter will address the current status on locally applied antibiotics and chemotherapeutics. Please call our office if you would like any further information on these topics or have any questions.

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