

Think Outside the Mouth

Treatment Planning for Non-surgical Periodontal Treatment

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The Mouth Body Connection

“The magnitude of bleeding upon probing underscores the reality of vascular dissemination of periodontal pathogens through the ulcerated epithelial lining of the periodontal pocket, a known reservoir for virulent bacteria and their pro-inflammatory endotoxins” Casey Hein, RDH www.Caseyhein.com

- **Widespread systemic health effects may be associated with, exacerbated by, or caused by periodontal disease.**

An Association: patients with periodontal disease could be at an increased risk for systemic disease, but evidence does not support periodontal disease being causative

A Causal Relationship: periodontal disease initiates or causes the systemic disease

A Bi-directional Relationship: periodontal disease contributes to or causes the systemic disease and the systemic disease contributes to or causes periodontal disease

- **Oral environment serves as a reservoir for pathogenic bacteria and in susceptible hosts, the balance shifts from homeostasis within the biofilm to an imbalance that fosters inflammation and disease.**
- **Periodontitis can influence the host immune response and become a source for disseminating pathogens systemically, thereby increasing the burden of inflammation and circulating inflammatory markers.**
- **The host response to inflammation can be influenced by behavioral, environmental, acquired, bacterial and genetic factors.**
- **Disruption, removal and control of disease-promoting biofilm can drive down inflammation.**
- **Restoration of homeostasis promotes health.**

***READ: Periodontitis: from microbial immune subversion to systemic inflammation
By **George Hajishengallis** *Nature Reviews Immunology* **15**, 30–44 (2015)

CARDIOVASCULAR DISEASE AND PERIODONTAL DISEASE

Extensive review of the literature indicates that PD is associated with ASVD independent of known confounders. They do not report a causative relationship.
Circulation 2012

The Oral Infections and Vascular Disease Epidemiology Study (INVEST) of 2013 found that improvements in periodontal status are associated with diminished progression of carotid atherosclerosis.
Journal of the American Heart Association 2013

In coronary heart disease patients with periodontitis, BOP is strongly associated with systemic CRP levels; this association possibly reflects the potential significance of the local periodontal inflammatory burden for systemic inflammation.
Journal of Clinical Periodontology 2014

Biochemical and physiological analyses involving in vitro experiments, animal models, and clinical studies provided evidence for the substantial impact of periodontal pathogens, their virulence factors, and bacterial endotoxins on all general pathogenic CVD mechanisms such as endothelial dysfunction, systemic inflammation, oxidative stress, foam cell formation, lipid accumulation, vascular remodeling, and atherothrombosis. Interventional studies showed moderate beneficial effects of PD treatment on reducing systemic inflammation and endothelial dysfunction. However, no interventional studies were performed to assess whether periodontal therapy can primarily prevent CVD. In summary, current data suggest for a strong contributory role of periodontal infection to CVD but cannot provide sufficient evidence for a role of PD as a cause for cardiovascular pathology.

Experimental and Molecular Pathology 2016

Periodontal pathogens influence the triad of factors increasing the risk of CVD: increased lipoprotein serum concentration, increased endothelial permeability and increased binding of lipoproteins in arterial intima
Post Graduate Medical Journal 2016

DIABETES AND PERIODONTAL DISEASE

Susceptibility to periodontal disease is increased approximately 3-fold in people with diabetes. Periodontal infection may exacerbate insulin resistance.
Diabetologia 2012

The result indicates that SRP is effective in improving metabolic control in Type 2 Diabetes Mellitus patients possibly through the reduction of TNF- α which in turn might improve the insulin resistance.
Journal of Clinical and Diagnostic Research 2014

There is low quality evidence that the treatment of periodontal disease by SRP does improve glycemic control in people with diabetes, with a mean percentage reduction in HbA1c of 0.29% at 3-4 months; however, there is insufficient evidence to demonstrate that this is maintained after 4 months. In clinical practice, ongoing professional periodontal treatment will be required to maintain clinical improvements beyond 6 months. Larger, well-conducted and clearly reported studies are needed in order to understand the potential of periodontal treatment to improve glycemic control among people with diabetes mellitus.

Cochrane Database Systematic Review 2015

After controlling for confounding factors, the mean Periodontal Inflamed Surface Area (PISA) was a significant risk factor for HBA_{1C} and a significant risk factor for diabetic retinopathy and neuropathy.

Frontiers of Medicine 2017

Among patients with Type II diabetes, the number of teeth was an independent risk factor for diabetic retinopathy. Diabetics with <20 teeth had an 8.7 fold risk of having diabetic retinopathy compared to diabetics with \geq 28 teeth after adjusting for confounding factors.

Medicine 2017

Nonsurgical periodontal treatment substantially improved glycemic control with an attributable 2.2 point reduction in HbA1c levels in poorly controlled Type II diabetics 3 months post treatment.

BMC Oral Health 2018

OBESITY/BMI AND PERIODONTAL DISEASE

The fact that TNF-alpha and IL-6 are produced in the adipose tissues could support the shared link between obesity, type 2 diabetes and periodontitis

Internal Medicine 2010

A high waist circumference significantly associated with periodontal disease opposed to BMI.

Journal of Periodontology 2011

Increases in BMI were associated with worsening of periodontal status, in Japanese university students, whereas lack of inter-dental cleaning was associated with exacerbated gingival bleeding.

Journal of Clinical Periodontology 2014

Obese patients with PD harbored higher levels and/or higher proportions of several periodontal pathogens than those with normal weight and PD.

Journal of Clinical Periodontology 2016

It is not clear if periodontal treatment during pregnancy has an impact on preterm birth.

Cochrane Database Systematic Review 2017

PERIODONTITIS AND NAFLD

P gingivalis significantly higher in NAFLD patients. Periodontal treatment has been found to improve the liver functional parameters in NAFLD patients, signifying the fact that P gingivalis-positive periodontitis may be a risk factor for the progression of NAFLD.

**Journal of Periodontology 2006
BMC Gastroenterology Journal 2012**

Clear association between liver abnormalities and periodontal condition in males with low alcohol consumption

Journal of Oral Science 2015

RESPIRATORY DISEASES

Based upon 19 studies, a systematic review of the literature reveals the following: There is fair evidence of an association of pneumonia with oral health. There is poor evidence of a weak association between COPD and oral health. There is good evidence that improved oral hygiene and frequent professional oral health care reduces the progression or occurrence of respiratory diseases among high-risk elderly adults living in nursing homes and especially those in intensive care units.

Journal of Periodontology 2006

A cross-sectional study of a group of 100 cases of hospitalized patients with respiratory diseases compared to a group of 100 cases systemically healthy outpatient controls supports an association between respiratory disease and periodontal disease. Patients with respiratory disease had significantly greater poor periodontal health (OHI and PI), gingival inflammation (GI), deeper pockets, and CALs compared to controls.

Journal of Periodontology 2011

RHEUMATOID ARTHRITIS AND PERIODONTAL DISEASE

Small studies have shown significant decreases in disease activity scores, and decreases in gingival crevicular fluid inflammatory markers 1 to 6 months following periodontal therapy in rheumatoid arthritis patients.

Rheumatology International 2013

A systematic review of the literature reveals that non-surgical periodontal treatment in individuals with periodontitis and RA can lead to improvements in markers of disease activity in RA. All studies had low subject numbers with the periods of intervention no longer than 6 months. Larger studies are required to explore the effect of non-surgical periodontal treatment on clinical indicators of RA.

Seminars in Arthritis and Rheumatism 2014

Nonsurgical periodontal treatment was associated with a significant reduction in the disease activity score for RA patients.

Revista Brasileira de Rheumatologia 2016

ADVERSE PREGNANCY OUTCOMES AND PERIODONTAL DISEASE

Contradictory evidence exists revealing a reduction in adverse pregnancy outcomes following periodontal therapy in the second trimester. Periodontal therapy, if administered before pregnancy, may provide more beneficial results.

Journal of International Oral Health 2015

Once the inflammatory cascade is activated during pregnancy interventions may be ineffective in reducing PTB. Treatment may be too late.

New England Journal of Medicine 2006

Systematic Review indicates SRP reduced risk of PTB only for women at high risk of PTB.

Journal of Periodontology 2012

Systematic Review indicates there is a low but existing association with PD & adverse pregnancy outcomes.

Quintessence International 2015

442 pregnant women evaluated in South Africa. Mean age 24. Mothers with no PD delivered LBW infants in 2.7% of cases. Mothers with severe PD delivered LBW infants 75.5% of cases.

International Dental Journal 2016

IRRITABLE BOWEL DISEASE/COLORECTAL CANCER AND PERIODONTAL DISEASE

F. nucleatum strains isolated from inflamed tissues of IBD patients are more invasive than those from the normal tissues.

Current Opinion in Microbiology 2015

“We demonstrate that Fn adheres to, invades and induces oncogenic and inflammatory responses to stimulate growth of CRC cells through its unique FadA adhesion... This study unveils a mechanism by which Fn can drive CRC and identifies FadA as a potential diagnostic and therapeutic target for CRC.”

Cell Host Microbe 2013

When F. nucleatum is co-infected with other oral species, (T forsythia, P gingivalis and Streptococci) synergy in virulence is observed as evidenced by enhanced bone loss, abscess, or death.

Current Opinion in Microbiology 2015

ERECTILE DYSFUNCTION AND PERIODONTAL DISEASE

From the results of this study, it can be concluded that chronic periodontitis and ED are associated to each other. The possible mechanism, which may be involved, is that periodontal pathogens after entering blood stream may travel to distant sites where these stimulate release of pro inflammatory cytokines and acute phase proteins, which may lead to endothelial damage causing ED.

Indian Journal of Dental Research 2014

Periodontal disease may be a significant risk factor for erectile dysfunction, sperm mobility and time to conception.

Dental Update 2015

ALZHEIMER'S DISEASE AND PERIODONTAL DISEASE

The most convincing evidence for a causal relationship between oral bacteria and AD is noted for spirochetes. *P. gingivalis*, *C. pneumonia*, *H. pylori*, Herpes simplex type I virus, and *Candida* are among the prime candidate pathogens in AD brains. It is likely that oral infection can be a risk factor for AD but it is not the only one. Experiments in humans may require long exposure time to disclose key events and mechanisms of AD.

Journal of Oral Microbiology 2015

After adjusting for confounders, history of periodontal inflammatory burden (CAL > 3mm) was associated with an increased amount of amyloid B plaques, a central feature of AD.

Neurobiological Aging 2015

Virulent strands of *P. gingivalis* access the CNS during health. Does infection-driven inflammation represent early AD pathology?

Mediators of Inflammation 2015

In the laboratory setting on mice infected with *P. gingivalis*, *P. gingivalis* periodontal infection contributed to cognitive impairment in older mice related to an increase in pro-inflammatory cytokines and brain inflammation. It is possible that periodontal disease has a similar impact on the development of AD.

Immunity & Ageing 2018

CHRONIC KIDNEY DISEASE AND PERIODONTAL DISEASE

Patients with CKD have higher prevalence of periodontal disease while non-surgical periodontal therapy has been indicated to decrease the systemic inflammatory burden in patients with CKD specially those undergoing hemodialysis therapies.

Pakistan Journal of Medical Sciences 2013

PT decreases inflammatory burden in patients undergoing hemodialysis.

Journal of Clinical Periodontology 2015

Increased probing depth and HbA1c levels correlated with increased progression of chronic kidney disease.

American Journal of Medicine 2017

ORAL CANCER AND PERIODONTAL DISEASE

Each millimeter of bone loss due to periodontal disease was associated with a greater than fourfold increased risk of head and neck cancer.

Cancer Epidemiology Biomarkers & Prevention 2009

Advanced PD associated with 2.5-fold increased risk of lung, bladder, Oropharyngeal, esophageal, kidney, stomach & liver cancer in never smokers.

Annals of Oncology 2016

BREAST CANCER AND PERIODONTAL DISEASE

Periodontal disease was associated with increased risk of postmenopausal breast cancer, particularly among former smokers who quit in the past 20 years.

Cancer Epidemiology Biomarkers & Prevention 2016

Breast Cancer patients with periodontitis undergoing chemotherapy can see improved clinical outcomes from Nonsurgical Periodontal Therapy.

Journal of Periodontology 2016

PANCREATIC CANCER AND PERIODONTAL DISEASE

P.g and A.a are associated with significantly increased risks of pancreatic cancer based upon analyzing over 14,000 salivary samples over a 10-year period.

Journal of the American Medical Association 2016

Does treating periodontal disease reduce overall medical costs?

- **Impact of periodontal therapy on general health: evidence from insurance data for five systemic conditions.**
Jeffcoat MK, Jeffcoat RL, Gladowski PA, Bramson JB, Blum JJ. Am J Prev Med 2014; 47(2):166-74
- **Claims That Periodontal Treatment Reduces Costs of Treating Five Systemic Conditions are Questionable**
Aubrey Sheiham, BDS, PhD, DHC J Evid Base Dent Pract 2015;15:35-36

***The American Journal of Cardiology and Journal of Periodontology Editors’
Consensus: Periodontitis and Atherosclerotic Cardiovascular Disease
Journal of Periodontology 2009***

- Weight reduction
- Increased physical activity
- Reduced intake of saturated fats
- Limited alcohol intake or alcohol in moderation
- Cessation of tobacco

Periodontitis & Atherosclerotic CVD: Consensus Report of the Joint European Federation of Periodontology/American Academy of Periodontology Workshop on Periodontitis & Systemic Diseases

Journal of Periodontology 2013

- Periodontal disease increases risk for atherosclerotic vascular disease (ASVD)
- Periodontal pathogens may induce inflammation directly or indirectly
- Intervention trials not yet conclusive
- Referral for a complete physical for of perio patients with increased risks
- Modifiable risk factors should be addressed in the dental office: Comprehensive treatment of periodontal diseases, smoking cessation, advice on lifestyle modifications related to diet and exercise

Beat The Heart Attack Gene by Brad Bale, MD and Amy Doneen, ARNP
The heart attack and stroke prevention center- www.baledoneen.com

PERIODONTAL RISK ASSESSMENTS

Innate

Acquired

Environmental

What are the modifiable risk factors???

www.philipsoralhealthcare.com - C.A.R.E. Online Risk Assessment

Data Collection & Assessment = Diagnosis

- **Annual Periodontal Charting** - Patients should receive a comprehensive periodontal evaluation and their risk factors should be identified at least on an annual basis. 2011 AAP Comprehensive Periodontal Therapy
www.floridaprobe.com VoiceWorks
- **Tissue Response Each Visit**
- **Current Disease Activity = Current Radiographs**

Salivary Diagnostics:

Oral DNA Labs www.oraldnalabs.com

OraVital www.oravital.com

~TREATMENT PLAN FOR OPTIMAL HEALTH & DISEASE REMISSION~

Evidence-based Clinical Practice Guideline on the Nonsurgical Treatment of Chronic Periodontitis by Means of Scaling and Root Planing With or Without Adjuncts

Committee of experts and review of the literature:

Evidence Favors: SRP as initial nonsurgical treatment for chronic periodontitis

Evidence Favors: systemic subantimicrobial-dose doxycycline (20 mg 2X daily 3-9 months)

Weak Evidence: systemic antibiotics

Weak Evidence: chlorhexidine chips

Weak Evidence: photodynamic therapy with a diode laser

Expert Opinion For: doxycycline hyclate gel & minocycline microspheres

Expert Opinion Against: non-PDT diode, NdYAG, and erbium lasers as SRP adjuncts

Journal of the American Dental Association 2015

Host-Modulation Therapy

Sub-antimicrobial dose doxycycline (SDD)

Chemically-modified tetracyclines (CMT)

Sub-antimicrobial dose doxycycline helps prevent collagen breakdown by targeting collagenase and MMPs in periodontitis, and has been shown to reduce inflammatory cytokines in patients with periodontitis and diabetes or cardiovascular diseases.

RDH Magazine 2016

SRP + SDD: 12% improvement in HbA1C

No change in HbA1C other groups

Pharmacological Research 2011

6 mo. regimen SDD on CVD patients

58% reduction in CRP / 34% reduction in IL-6

Pharmacological Research 2011

Locally Applied Antimicrobials:

www.MyArestin.com - minocycline microspheres / RX Program

www.Atridox.com - doxycycline

www.PerioChip.com - chlorhexidine

Topical Antioxidants – antibacterial (essential oils) and anti-inflammatory (polyphenols) www.periosciences.com

Low-dose Hydrogen Peroxide - shift the pathogenic biofilm and increase pH www.Perioprotect.com

Tobacco Cessation – 1-800 QUIT NOW

Dietary Modifications – A diet low in carbohydrates, rich in Omega 3 fatty acids, rich in Vitamins C & D, and rich in fibers can significantly reduce gingival & periodontal inflammation

Stress management - Regular exercise can reduce the risk of periodontal disease

Daily Disease Control - [www.sonicare.com](http://www sonicare.com), www.waterpik.com, www.curaprox.com, www.tepe.com

Plaque HD Toothpaste – www.plaquehd.com

Illumination & Magnification – www.orascoptic.com, www.Q-optics.com

Classification of Periodontal Disease www.perio.org

CHRONIC

Localized $\leq 30\%$

Generalized $\geq 30\%$

$\leq 10\%$ bone damage

$\leq 33\%$ bone damage

$\geq 33\%$ bone damage

AGGRESSIVE

Localized $\leq 30\%$

Generalized $\geq 30\%$

$>33\%$ bone damage

~FULL MOUTH DEBRIDEMENT OR QUADRANT THERAPY?~

2015 Systematic Review & Meta-Analysis of Full Mouth Debridement (FMD) compared to Quadrant Scaling (QS) 13 Studies. 3 to 12 month follow-up. Pocket depth reduction 0.25mm greater for FMD vs. QS in single-rooted teeth with 4 – 6 mm pockets. Clinical attachment level gain 0.33 greater for FMD vs. QS in single and multi-rooted teeth with moderate pockets. Both treatments were effective with no serious side-effects of treatment. Time savings with FMD. Authors favored FMD.

Journal of Periodontal Research 2015

Extended Appointment Considerations for FMD

- Diagnosis and Initial Debridement, as indicated, prior to therapy
- Allot time for wellness education & strategies to modify risk factors
- Guarantee appointment with credit card or prepayment for extended time

Gingivitis is Reversible

Peri-Implant Mucositis is Reversible

Manage Biofilm Differently!

Glycine-based powder may become the air polishing powder of choice due to its low abrasiveness on gingival tissues, tooth structure, restorative materials and its potential to clean both supragingival and subgingival surfaces... Glycine has the potential to revolutionize the current dental hygiene recall appointment, as we know it.

Journal of Dental Hygiene 2013

A Paradigm Shift In Mechanical Biofilm Management? Subgingival Air Polishing: A New Way to Improve Mechanical Biofilm Management in the Dental Practice

Quintessence International 2013

Summary: More efficient, more comfortable, safe!

Sodium bicarbonate powders should not be used in periodontally affected dentitions because of their considerable potential for harm to cementum, dentin and gingiva.

International Journal of Dental Hygiene 2016

Air polishing technology and powders for coronal & subgingival biofilm management:

www.Hu-Friedy.com/HFEMS - Download: Clinical Evidence brochure

www.Hu-Friedy.com

www.Airngoconcept.com

www.Colteen.com

Clinical Protocols for Biofilm Management with Subgingival Air Polishing:

Optional: Sodium bicarbonate air polish for heavy stain removal on enamel

1. (Disclose biofilm) Air polish with low-abrasive powder for supra and subgingival biofilm removal prior to instrumentation
2. Remove supragingival and subgingival calculus and coronal with power instruments (Use 11/12 explorer or ultrasonic on low setting to detect subgingival calculus)
3. Site-specific instrumentation with hand instruments (Laser optional)
4. Adjunctive agents, as indicated

Periodontal maintenance is started after the completion of active therapy and continues at varying intervals for the life of the dentition or implant replacements.

ADA CDT 2018

Periodontal Maintenance

Goal: Disease Remission
Dismantle/Remove Biofilm
Modify Risk Factors
Evaluate Disease Threshold
Assessment for Referral/Co-Management

PM is not synonymous with a prophylaxis. Most patients with a previous history of periodontitis should obtain PM at least four times per year, since that interval will result in a decreased likelihood of progressive disease, compared to patients receiving PM on a less frequent basis. Nevertheless, the PM schedule should be individualized.

AAP Position Paper Journal of Periodontology 2003

“The professional is obligated to inform the patient that professional plaque control is necessary on a 2 – 3 month basis...Providing periodontal treatment without accompanying Periodontal Maintenance should be considered negligent care by the practitioner....The patient retains the duty to perform adequate personal plaque control and acquires the duty of complying with the prescribed interval for professional plaque control. Failure of the patient to comply with these duties will result in disease progression, which the professional will be powerless to prevent.”

Journal of the American Dental Association 1980