

Biological Periodontal Therapy Online Learning Video Activity Script

International Academy of Oral Medicine and Toxicology (IAOMT); www.iaomt.org
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PREFACE TO IAOMT'S BIOLOGICAL PERIODONTAL THERAPY ONLINE LEARNING VIDEO ACTIVITY

Text on screen:

Welcome to IAOMT's Biological Periodontal Therapy Online Learning Video Activity. The "Materials" tab above this video, as well as the text box below this video, contain links to references and resources cited in this activity, scientific literature related to the topics presented, and a script for this entire video. The successful completion of a quiz at the end of this activity is required for individuals participating in an IAOMT course.

In offering this activity, the IAOMT's intention is to present as much scientific information as possible on different dental materials, treatments, patient and dental staff safety, and other aspects of dentistry.

The objective of the Biological Periodontal Therapy Online Learning Video is that at the conclusion of this activity, participants will be able to assess, educate, and manage a patient with periodontal disease from the perspective of biological dentistry.

The IAOMT emphasizes that health care practitioners must make their own professional judgments for the benefit of themselves and their patients and staffs. You are responsible for exercising your own judgment concerning the specific treatment options to utilize in your practice; for complying with applicable laws and regulations including local dental practice acts and informed consent requirements; and for abiding by insurance requirements including written declarations of coverage.

Only proceed if you understand and agree with these statements.

If you are ready to proceed, the activity will begin with Steve Koral, DMD, MIAOMT, Shelby Kahl, RDH, HIAOMT, and other IAOMT members providing you with the coursework for this Biological Periodontal Therapy Online Learning Video Activity.

INTRODUCTION

Welcome to the International Academy of Oral Medicine and Toxicology, the IAOMT, training course on the biological approach to periodontal therapy.

Control of periodontal disease is the second great leg of the mission of dentistry, after control of tooth decay. Periodontal disease is prevalent. It is usually without symptoms, and it is responsible for two thirds of adult tooth loss. It also requires professional attention to detect and control before it becomes so serious that teeth loosen up and are lost.

Periodontal care has been an essential part of the discussion within the IAOMT, right from the beginning. In this course, we'll explore some of the ways that a biological approach in dentistry can contribute to our mission of controlling periodontal disease.

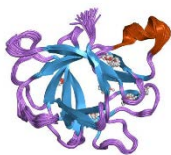
In recent decades, we have made great strides in our ability to treat periodontal disease. We have also done a good job of making health professionals and the general public aware of the serious nature of periodontal disease. The role of periodontal disease in the health of the whole body is now widely known. We understand the harmful contributions of inflammation in the mouth and the impact of the migration of pathogens from the gums to the rest of the body.

Still, the prevailing way people understand periodontal disease is focused on the calculus deposits on the root surfaces, and the prevailing approaches to treating periodontal disease are mechanical, rather than biological, and include brushing, flossing, scaling, root planing, and surgery.



The good news is that modern surgical techniques for treating periodontal disease, especially guided tissue and bone regeneration, are a vast improvement over the old fashioned, excisional, "pocket elimination" techniques. Old excisional techniques exasperate gum recession, create post-operative pain and sensitivity, and could even accelerate loss of supporting bone.

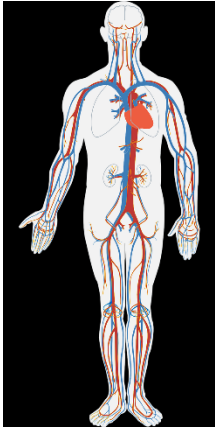
ADVANCES IN PERIODONTOLOGY



Periodontal researchers have been deeply engaged with modern cell biology, and cell biology has provided deep insights into the pathophysiology of periodontal disease. In the 1970s, periodontal researchers described Osteoclast Activating Factor, now known as Interleukin-1B, a key early discovery in the field of cytokine research. Now, the periodontal model is being actively used to investigate the regulatory and homeostatic functions of neutrophils.

<https://www.ebi.ac.uk/>

Microbiology research in periodontal disease has yielded profound insights into the nature of host pathogen relationships. For example, we now know that some of the keystone species in the pathological biofilm, such as *Porphyromonas gingivalis* or *Treponema denticola*, actually hijack the signaling mechanisms of our innate immune system. They take over elements of the complement system and toll-like receptors and twist them to their own purposes. They use our own body's immune molecules to cripple the killing ability of neutrophils, to increase destructive information, and to help populations of co-pathogens thrive in the periodontal environment.



The turn of this millennium brought some crucial new research on the undeniable connections between periodontitis and systemic illness. Notably, a major publication in 2009 linked periodontal conditions with heart disease. It was *The American Journal of Cardiology and Journal of Periodontology Editors' Consensus: Periodontitis and Atherosclerotic Cardiovascular Disease*. The paper helped the medical community acknowledge the link between atherosclerotic cardiovascular disease and periodontitis and offered approaches for reducing the risk of primary and secondary atherosclerotic cardiovascular disease events in patients with periodontitis.

Sources:

Friedewald VE, Kornman KS et al. The American Journal of Cardiology and Journal of Periodontology Editors' Consensus: Periodontitis and Atherosclerotic Cardiovascular Disease. *Am J Cardiol*. 2009; 104:000–000.

Friedewald VE, Kornman KS et al. The American Journal of Cardiology and Journal of Periodontology Editors' Consensus: Periodontitis and Atherosclerotic Cardiovascular Disease. *Journal of Periodontology*. 2009; 80(7): 1021-1032.

Recent studies have likewise offered new information that suggests disease in the gums can spread to other parts of the body and/or disease in other parts of the body can impact the gums. A research article by Li, Kolltveit, Tronstad, and Olsen published in 2000 in *Clinical Microbiology Reviews* titled “Systemic Diseases Caused by Oral Infection” examined the links between periodontal disease and cardiovascular disease, infective endocarditis, bacterial pneumonia, low birth weight, and diabetes mellitus. The researchers specified that bacteria from the mouth could be passed to the bloodstream:

“With normal oral health and dental care, only small numbers of mostly facultative bacterial species gain access to the bloodstream. However, with poor oral hygiene, the numbers of bacteria colonizing the teeth, especially supragingivally, could increase 2- to 10-fold and thus possibly introduce more bacteria into tissue and the bloodstream, leading to an increase in the prevalence and magnitude of bacteremia.”

Source: Li X, Kolltveit, KM, Tronstad L, Olsen I. Systemic diseases caused by oral infection. *Clinical Microbiology Reviews*. 2000; 13(4): 547-558.

Other researchers have explored the association between oral infection and illness as well. Michaud, Joshipura, Giovannucci, and Fuchs concluded that men with gum disease, particularly those who lost teeth within the past four years, were more likely to develop pancreatic cancer.

Source: Michaud DS, Joshipura K, Giovannucci E, Fuchs CS. A prospective study of periodontal disease and pancreatic cancer in US male health professionals. *Journal of the National Cancer Institute*. 2007; 99(2): 171-175.

Other areas of research with growing evidence of links to periodontitis include cardiovascular disease, gastrointestinal and colorectal cancer, diabetes and insulin resistance, respiratory tract infections, adverse pregnancy outcomes, anemia, chronic kidney disease, and rheumatoid arthritis.

Sources:

Bui FQ, Almeida-da-Silva CL, Huynh B, Trinh A, Liu J, Woodward J, Asadi H, Ojcius DM. Association between periodontal pathogens and systemic disease. *Biomedical Journal*. 2019 Feb 1;42(1):27-35.

Balakesavan P, Gokhale SR, Deshmukh V, Williams RC. Periodontal disease and overall health: An update. *European Journal of General Dentistry*. 2013 May 1;2(2):102.

Kriebel K, Hieke C, Müller-Hilke B, Nakata M, Kreikemeyer B. Oral biofilms from symbiotic to pathogenic interactions and associated disease – connection of periodontitis and rheumatic arthritis by peptidylarginine deiminase. *Frontiers in Microbiology*. 2018 Jan 30;9:53.

Maresz KJ, Hellvard A, Sroka A, Adamowicz K, Bielecka E, Koziel J, Gawron K, Mizgalska D, Marcinska KA, Benedyk M, Pyrc K, Quirke A, Jonsson R, Alzabin S, Venables PJ, Nguyen K, Mydel P, Potempa J. Porphyromonas gingivalis facilitates the development and progression of destructive arthritis through its unique bacterial peptidylarginine deiminase (PAD). *PLoS Pathogens*. 2013; 9(9): e1003627.

Furthermore, periodontal pathogens *Treponemas* and *Borrelia burgdorfer* were identified in Alzheimer's disease cases by Miklossy in 2011.

Source: Miklossy J. Alzheimer's disease-a neurospirochetosis. Analysis of the evidence following Koch's and Hill's criteria. *J Neuroinflammation*. 2011; 8: 90.

However, the concept of pathogens playing a role in periodontal disease is far from new. For nearly a century, light microscopy has been applied to locating the parasite *Entamoeba gingivalis* in diseased gums.

Source: Trim RD, Skinner MA, Farone MB, DuBois JD, Newsome AL. Use of PCR to detect *Entamoeba gingivalis* in diseased gingival pockets and demonstrate its absence in healthy gingival sites. *Parasitology Research*. 2011; 109(3): 857-864.

Treatments commonly practiced in popular, modern dentistry such as root planing and surgery do not seem to address the current science or even the past practices from one hundred years ago that recognize the role of pathogens and inflammation in periodontal disease. In fact, by removing parts of the body and/or making a number of surgical incisions, the disease could potentially be worsened and spread to other parts of the body, and different parts of the periodontium could be damaged as well.

In an article titled “Periodontal Medicine: 100 Years of Progress” published in 2019 in the *Journal of Dental Research*, the authors state that “holistic interventions aimed at reducing the total systemic inflammatory burden by doing a phased targeting of all sources with periodontitis as the last phase may be the only means of achieving successful clinical outcomes.”

Source: Beck JD, Papapanou PN, Philips KH, Offenbacher S. Periodontal medicine: 100 years of progress. *Journal of Dental Research*. 2019 Sep;98(10):1053-62.

A BIOLOGICAL APPROACH

With standard periodontal treatment still dominated by mechanical and surgical therapy, and with a lack of good biologically based medical treatments, what can biological dentistry contribute to the conversation? Two major concepts: to recognize periodontal disease as an infection and to see periodontal disease as a whole-body context.

First, recognize periodontal disease as an infection. We know that the bacteria are involved. We know specific microbes are living in a microbiome that has become pathogenic. But we don't currently have a reliable way of altering the details of their ecology, or for using probiotic methods to restore a healthy microbiome. So, we are left with the task of disinfection: a strategy to kill them all.

Second, see periodontal disease in a whole-body context. Ask questions such as: Are there health and lifestyle risk factors at play that can be addressed? Is the patient as healthy as they can be? Is the patient sufficiently well-nourished to be able to do the wound healing necessary to resist periodontal disease?

In essence, a line distinguishing the biological approach from basic mechanical treatment could be drawn between therapies that involve excision of tissue and therapies that involve enabling those tissues to heal.

Our discussion of disinfection strategies begins with the pioneers who witnessed microbes in the gingival environment, created techniques for brushing, and formulated protocols for anti-infective treatments. It is clear why all the pioneers of non-surgical periodontal care used microscopes: the pathogenic microbes all look different than the normal ones.

The key to anti-infective therapy is:

- Look
- Disinfect
- Look Again

Our arsenal includes ozone therapy, laser treatment, and herbal methods for disinfection.

Well-known risk factors include:

- Smoking
- Poor oral hygiene
- Genetic susceptibility
- Gender (males are more likely to have gum disease)
- Hormonal changes in females, especially during pregnancy, just before menstruation, when using oral contraceptives, or after menopause
- Weak or compromised immunity
- Illnesses such as diabetes, cancer and AIDS
- Certain medications, especially bisphosphonate drugs for osteoporosis and/or cancer patients
- Medicines that cause dry mouth
- Drug abuse
- Alcohol abuse
- Issues with dental restorations or bite
- Unsatisfactory diet
- Mouth breathing, creating dry conditions
- Older age
- Oral infection, injury, and/or inflammation

Lesser Known Risk Factors

Less well-known risk factors include:

- Vitamin C deficiency
- Vitamin D deficiency
- Coenzyme Q10 deficiency
- Sugar consumption
- Dental amalgam mercury (silver) fillings
- Dental implants
- Fluoride
- Root canal treated teeth

Vitamin C

The role of Vitamin C in periodontitis has been investigated, and indeed, evidence continues to establish an association between Vitamin C deficiency and periodontal disease. The results of a small study published in 2020 found that the rate of vitamin C deficiency in a periodontal clinic was clinically important and correlated with disease severity. Also, since smokers use up a great deal of vitamin C in metabolizing the tobacco toxins, it is one possible mechanism for their higher risk of periodontal disease.

Sources:

Varela-López A, Navarro-Hortal MD, Giampieri F, Bullón P, Battino M, Quiles JL. Nutraceuticals in periodontal health: a systematic review on the role of vitamins in periodontal health maintenance. *Molecules*. 2018 May;23(5):1226.

Van der Veldena U. Vitamin C and Its Role in Periodontal Diseases–The Past and the Present: A Narrative Review. *Oral Health Prev Dent*. 2020 Jan 1;18:115-24.

Munday MR, Rodricks R, Fitzpatrick M, Flood VM, Gunton JE. A Pilot Study Examining Vitamin C Levels in Periodontal Patients. *Nutrients*. 2020 Aug;12(8):2255.

Vitamin D

Vitamin D status has also been linked to periodontal disease. Authors of a literature review published in 2018 summarized: “An analysis of the literature shows that vitamin D plays a significant role in maintaining healthy periodontal and jaw bone tissues, alleviating inflammation processes, stimulating post-operative healing of periodontal tissues and the recovery of clinical parameters.”

Source:

Jagelavičienė E, Vaitkevičienė I, Šilingaitė D, Šinkūnaitė E, Daugėlaitė G. The relationship between vitamin D and periodontal pathology. *Medicina*. 2018 Jul;54(3):45.

Coenzyme Q10

Coenzyme Q10 is a quinone derivative found naturally in the mitochondria and is also known as CoQ10, Coenzyme Q, CoQ, Ubiquinone, Ubiquinone-Q10, Ubidecarenone, and Vitamin Q10. Deficiency in CoQ10 relating to periodontal disease has been studied for over 50 years, and recent research continues to demonstrate that sufficient levels of CoQ10 can support a healthy periodontium.

Sources:

Kadir AK, Rabbi AA, Rahman MM. CoEnzyme Q10: A new horizon in the treatment of periodontal diseases. *International Dental Journal of Students Research*. 2017 Apr;5:01-6.

Littarru GP, Nakamura R, Ho L, Folkers K, Kuzell WC. Deficiency of coenzyme Q10 in gingival tissue from patients with periodontal disease. *Proceedings of the National Academy of Sciences*. 1971 Oct 1;68(10):2332-5.

Nakamura R, Littarru GP, Folkers K, Wilkinson EG. Study of CoQ10-enzymes in gingiva from patients with periodontal disease and evidence for a deficiency of coenzyme Q10. *Proceedings of the National Academy of Sciences*. 1974 Apr 1;71(4):1456-60.

Prakash S, Sunitha J, Hans M. Role of coenzyme Q10 as an antioxidant and bioenergizer in periodontal diseases. *Indian Journal of Pharmacology*. 2010 Dec;42(6):334.

Tsunemitsu A, Honjo K, Nakamura R, Kani M, Matsumura T. Effect of ubiquinone 35 on hypercitrinemia. *The Journal of Periodontology*. 1968 Jul;39(4):215-8.

Sugar

Not surprisingly, sugar intake has also been linked to periodontal disease. As another example, the consumption of soft drinks has been identified as a risk factor for oral health problems, including periodontitis.

Sources:

Moreira AR, Batista RF, Ladeira LL, Thomaz EB, Alves CM, Saraiva MC, Silva AA, Brondani MA, Ribeiro CC. Higher sugar intake is associated with periodontal disease in adolescents. *Clinical Oral Investigations*. 2020 Jun 9:1-9.

Çetinkaya H, Romaniuk P. Relationship between consumption of soft and alcoholic drinks and oral health problems. *Central European Journal of Public Health*. 2020 Jun 1;28(2):94-102.



Mercury-Silver Fillings, Implants, Fluoride, and Root Canal Treated Teeth

Bone loss and increased inflammation are potential effects of dental amalgam mercury fillings that adversely affect the gum tissue. Fluoride has also been linked to the corrosion of dental amalgam mercury fillings and titanium dental implants. Corrosion can cause the release of metal ions, which increases the possibility of an inflammatory reaction in the periodontal tissue. Additionally, researchers have warned about harmful consequences of chronic endodontic infections from root canal treated teeth that can in turn negatively impact the periodontium.

Sources:

Fisher D, Markitziu A, Fishel D, Brayer L. A 4 year follow-up study of alveolar bone height influenced by two dissimilar Class II amalgam restorations. *Journal of Oral Rehabilitation*. 1984 Jul;11(4):399-405.

Trott JR, Sherkat A. Effect of class II amalgam restorations on health of the gingiva: a clinical survey. *Journal of the Canadian Dental Association*. 1964;30(12):766-70.

Safioti LM, Kotsakis GA, Pozhitkov AE, Chung WO, Daubert DM. Increased levels of dissolved titanium are associated with peri-implantitis - a cross-sectional study. *J Periodontol*. 2017 May;88(5):436-442.

Naguib EA, Abd-el-Rahman HA, Salih SA. Role of fluoride on corrodability of dental amalgams. *Egyptian Dental Journal*. 1994 Oct;40(4):909-18.

Wu MK, Dummer PMH, Wesselink PR. Consequences of and strategies to deal with residual post-treatment root canal infection. *International Endodontic Journal*. 2006; 39(5): 343-356.

Nutritional Support

Nutritional support for periodontal disease includes good general health, good general nutrition, and smoking cessation. In cases where a patient continues to lose ground to periodontal disease despite our therapeutic efforts, we can often find nutritional deficiencies or other lifestyle issues that, when corrected, will allow the therapies to work.

DR. CHARLES C. BASS

The first person to witness microbes in the gingival environment was Anton van Leuwenhoek, who invented the first microscope in the 17th century.



The first real pioneer in recognition of periodontal disease as an infection was Charles C. Bass, MD. Dr. Bass was a microbiologist and specialist in tropical diseases and parasites. He was well known for his research on hookworm and malaria. He is credited for bringing the first medical microscope to New Orleans. There, he ultimately served as Dean of Tulane University Medical School from 1922 until 1940.

Dr. Bass discovered the presence of parasites, *Entamoeba gingivalis*, in periodontitis. After his retirement from Tulane, Dr. Bass turned his attention back to the microbiology of dental diseases. Recognizing the anaerobic nature of gum disease, he set out to determine the best methods for using a toothbrush and floss to disrupt dental plaque. The “Bass Technique” of sulcular brushing is widely acknowledged as the right way to brush teeth, and Dr. Bass is recognized as the father of dental hygiene.

THE KEYES METHOD

If periodontal disease is to be treated without surgery, there must be a way to convert the infected, inflamed, anaerobic, highly oxidized, and acidic environment of the pocket into a healthy place. This is not to physically eliminate the pocket, but to make it aerobic, not inflamed, and free of infection, so that the tissues can heal.



This idea led to the next major advance in nonsurgical periodontics with the career of Paul H. Keyes, DDS. Dr. Keyes received his dental degree from the University of Pennsylvania in 1941 and embarked on an illustrious career in dentistry and dental research. He served a long term as dental director of the US National Institutes of Dental Research from 1954-1980.

Dr. Keyes brought a new, biologically oriented perspective to the surgically focused dental profession. He formulated a comprehensive multi-stage protocol for his anti-infective treatments that have come to be known as the Keyes method. Even though the method was developed in the 1950s and 60s, it remains the backbone of anti-infective, non-surgical, hygiene based periodontal treatment today.

The Keyes Method can be summed up with this quote from Dr. Keyes that was published in the *New York Times* in 1982:

“Periodontists talk about eliminating anatomical defects and monitoring the results of therapy with probes. We eliminate the bacterial risk factors and monitor the results microscopically. How else can you know if you've controlled the infection?”

Source: Brody JE. Nonsurgical Therapy for Gums Spurs Wide Debate. *New York Times*. March 23, 1982. Available from:

<https://www.nytimes.com/1982/03/23/science/nonsurgical-therapy-for-gums-spurs-wide-debate.html>

So, what exactly does the Keyes Method involve? We'll offer an overview by including direct quotes from Dr. Keyes followed up with our IAOMT commentary *in italics*.

Clinical Exam and Microbiological Diagnosis

The Keyes Method states: “Evaluations of tissue damage are supplemented with microscopic assessments of periodontal disease associated microorganisms (PDAM) and the presence of white blood cells (WBC).”

Source: Keyes PH, Rams TE. A rationale for management of periodontal diseases: rapid identification of microbial ‘therapeutic targets’ with phase-contrast microscopy. *The Journal of the American Dental Association*. 1983 Jun 1;106(6):803-12.

See also the Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>.

Our commentary is that the use of phase contrast microscopy provides an excellent, real time screening tool for risk assessment of periodontal disease. Additionally, patients can view the microscopic pathogens and be educated about their condition and motivated to take an active role in the treatment plan which includes at home measures.

Patient Education

The Keyes Method states: “Patients are informed about the nature of periodontal infections, specific bacterial risk factors, how tissue damage occurs, and the possibility of transmission of organisms from person to person.”

Source: Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>.

Our commentary is that this essential point is far too often overlooked. Periodontal pathogens are transmissible, and it is strongly recommended that patients encourage their relationship partners to get their oral plaque examined and treated, if necessary. Patients should also understand that dogs and cats are subject to periodontal disease, too.

Pocket Disinfection

The Keyes Method states: "Treatment includes meticulous debridement of root services (1-10 hours) and irrigations with antiseptic AGENTS to the depths of all pockets."

Source: Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>.

We must recognize that many of the oral pathogens lead a double life-- in the plaque and in the bloodstream. Our therapy must not force them from the sulcus into circulation, so disinfection comes before debridement. Gross debridement is done just enough to get access to the sulcus.

*The key to anti-infective therapy is: **Look, Disinfect, Look Again.** Repeated monitoring using the microscope during hygiene appointments is essential to confirming the success of disinfection. Even the most skilled hygienist has at times been frustrated to see how resistant some species of pathogens are to disinfection.*

A quadrant approach does not work for disinfection, as convenient as it may be for debridement. The pathogens will simply spread from the untreated areas back to quadrant that was treated. The whole mouth must be disinfected at each employment, and our concepts of scheduling should be modified accordingly.

Pocket disinfection is accomplished using a professional pump irrigator with a needle cannula, or with the irrigation function of an ultrasonic device, or both. Disinfecting solutions can be diluted hypochlorite, chloramine-T, molecular iodine, ozone saturated water, etc. The more important factor is-- get another sample, make a new slide, and check to see how thoroughly disinfected the sites are.

The Keyes Method states: "For the first time in dentistry QUALITY of HOMECARE IS MEASURABLE BY USING A MICROSCOPE. The word CLEAN HAS A NEW DEFINITION."

Source: Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>.

Patient Homecare

"Patients are instructed in an EFFECTIVE self-care program using INSTRUMENTS and AGENTS that combat PDAM [periodontal disease associated microorganisms].....We suggest the toothbrush be used with 10-12 brushfuls of BAKING SODA and PEROXYL. COMPLIANCE in homecare is an absolute must."

Source: Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>.

There are so many instruments available for good home care in addition to the traditional Bass brush and floss, electric and sonic toothbrushes, interdental brushes, and pump irrigators that are adapted for patients to learn how to do deep pocket irrigation daily with a bio compatible disinfecting solution.

Monitoring

The Keyes Method states: “After an appropriate interval the patients progress is assessed by MONITORING SUBGINGIVAL microorganisms and the prevalence of white blood cells (WBC).”

Source: Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>.

The lifecycle of these organisms is well known. A decimated population of spirochetes, for example, will take about 10 weeks to re-establish sufficient numbers to again cause disease. We recommend no more than 3 months between visits to monitor those subgingival flora under the microscope.

Modulation of Therapy

The Keyes Method states: “If disease related microbial complexes have not been converted to ones associated with health (BACTERIAL CONVERSION), and if white blood cells levels remain high, IN-OFFICE TREATMENTS and SELF-CARE PROGRAMS need to be MODULATED. Additional AGENTS and DELIVERY SYSTEMS should be considered (CUSTOM-FIT DELIVERY TRAYS).”

Source: Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>

Systemic antibiotics are sometimes considered necessary by the practitioner to clear the infection. Systemic treatment is more likely necessary if amoebas are seen in the slides.

Maintenance

The Keyes Method states: “The frequency of maintenance or recall visits will depend on such factors as: patient’s age, immune system response, diet, smoking, general health, COMPLIANCE with homecare, dexterity, chances of reinfection, the extent of prior tissue damage, etc.”

Source: Dr. Paul H. Keyes website at <https://www.paulhkeyes.com/method.html>

The frequency of maintenance visits, again, will also depend upon the lifecycle of the organisms involved, and visual microscopic confirmation that the patient has been successful in controlling their return.

Dr. Keyes emphasized the use of phase contrast microscope to diagnose the infective load and to monitor the progress of treatment. Pathogens can be characterized. We can see the various bacterial, fungal, and parasitic forms. When it's hooked up to a video monitor, the microscopic view of loads of microbes, or their successful elimination, can serve as a powerful motivator to the patient.

In a typical long treatment appointment, samples might be taken 7 or 8 times for viewing under the microscope. This yields information on microbial organization and the presence of white blood cells and provides instant confirmation that this infection is complete on that day.

BIOLOGICAL PERIODONTICS WITH DR. DAVID KENNEDY

This next video is 15 minutes presentation narrated by Dr. David Kennedy depicting how to use a microscope for treatment. The video describes what the microscope shows, explains the role of parasites and bacteria in gum disease, details how to take a representative sample, and even shows the results of anti-bacterial irrigation. This technique has proven to be very successful for treating disease: eliminating infection and maintaining compliant homecare and ongoing monitoring of the condition.

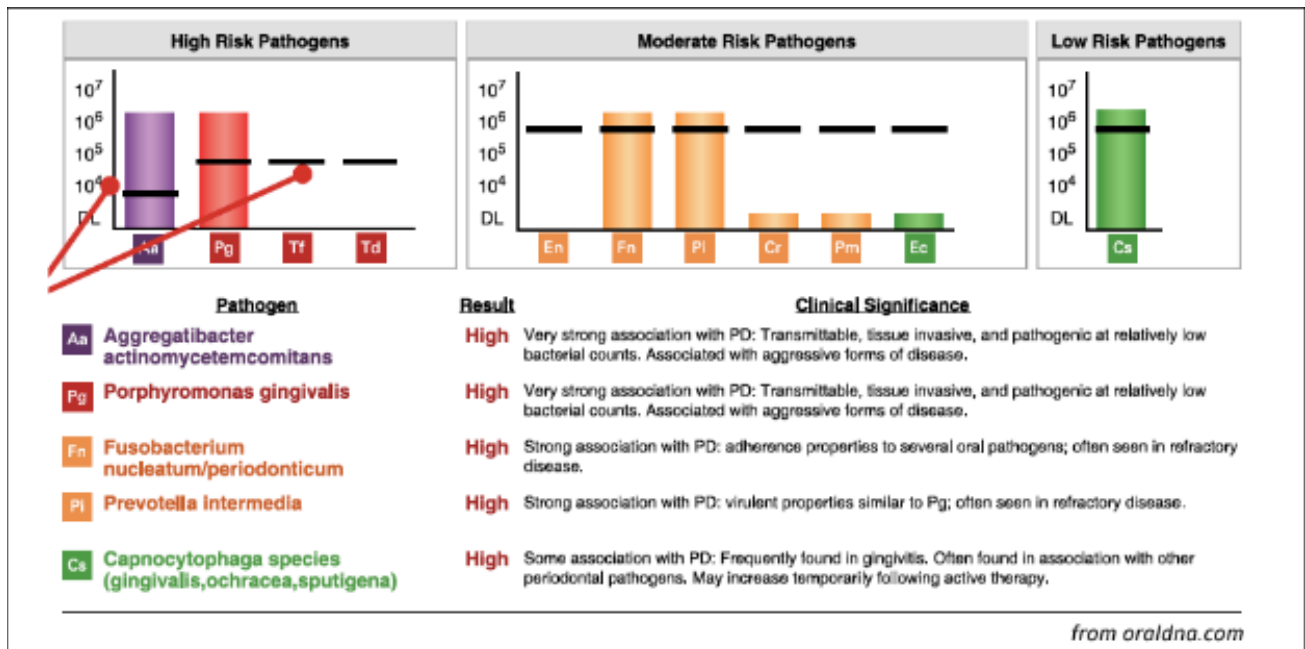
Insert 15-minute video by Dr. Kennedy: <https://youtu.be/xML9MWEL8ao>

DNA PROBES

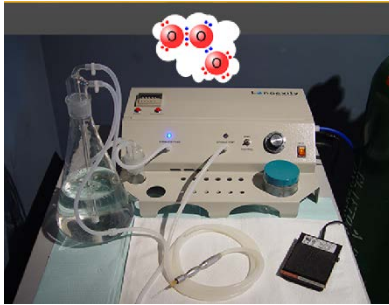
In the 21st century, we have newer methods, such as DNA probes, that can be used to diagnose periodontal infection and monitor progress in treatment. Salivary diagnostics using DNA polymerase chain reaction technology, or PCR, can accurately quantify periodontal pathogens. DNA testing can also reveal a patient's genetic risk for the progression of severe disease.

These methods are relatively expensive, and results take time to come back. They are most useful for initial diagnosis and for an analysis of treatment endpoints. For real time surveillance of the infective load, nothing yet beats the microscope.

Screen to the right:



OZONE THERAPY

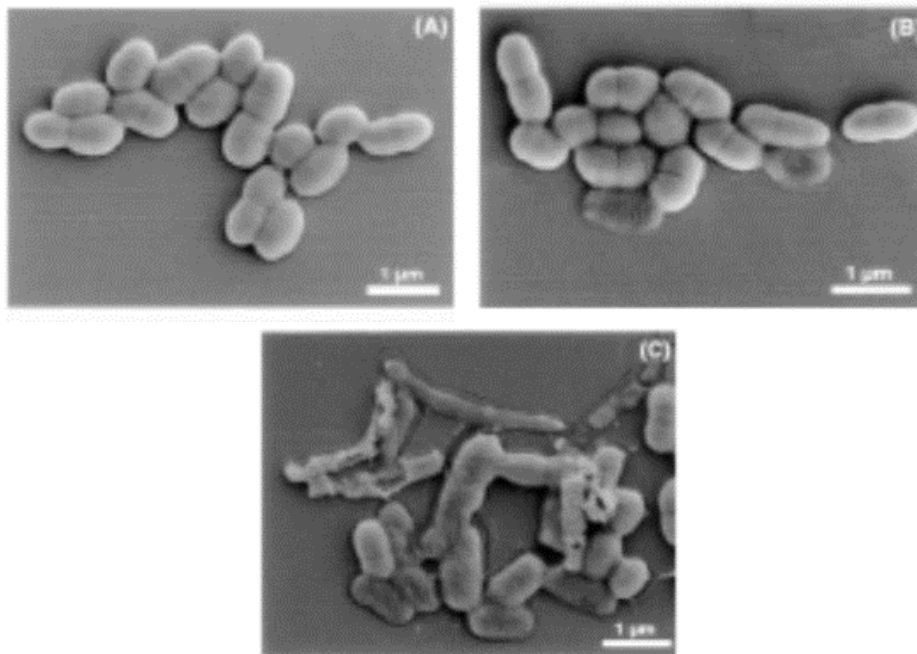


In recent years, ozone therapy in the office setting has emerged as a very exciting addition to our armamentarium and disinfecting the periodontal spaces. Ozone is O₃, a more highly active form of oxygen that is profoundly disinfecting, and highly therapeutic in many other ways. It is made by running medical grade O₂ through an electrical spark in an ozone generator. The resulting combined oxygen/ozone gas can be collected in a syringe for direct use, or bubbled through water to make a powerful, non-toxic irrigant.

Ozone is able to penetrate and oxidize the structure of bacterial biofilms better than almost anything, which makes it uniquely useful for treating the pathogenic biofilms of periodontal disease. This photomicrograph is of an *Enterococcus faecalis* biofilm exposed to distilled water.

This next image shows immediate contact with low concentration ozone water, and again after two minutes of contact with ozone water period the cells in their adhesion breakdown almost immediately.

Screen to the right:



SOURCE: Nagayoshi M, Kitamura C, Fukuizumi T, Nishihara T, Terashita M. Antimicrobial effect of ozonated water on bacteria invading dentinal tubules. *Journal of Endodontics*. 2004 Nov 1;30(11):778-81.

Ozone therapy has become a popular method among biological dentist in recent years.

If you are interested in more information about ozone's use in dentistry and treating periodontal disease in particular, these selected articles will provide a firm foundation of introductory knowledge:

Iliadis D, Millar BJ. Ozone and its use in periodontal treatment. *Open Journal of Stomatology*. 2013; 3(2): ID:32069.

Nardi GM, Cesarano F, Papa G, Chiavistelli L, Ardan R, Jedlinski M, Mazur M, Grassi R, Grassi FR. Evaluation of salivary matrix metalloproteinase (MMP-8) in periodontal patients undergoing non-surgical periodontal therapy and mouthwash based on ozonated olive oil: a randomized clinical trial. *International Journal of Environmental Research and Public Health*. 2020 Jan;17(18):6619.

Pattanaik B, Jetwa D, Pattanaik S, Manglekar S, Naitam DN, Dani A. Ozone therapy in dentistry: a literature review. *Journal of Interdisciplinary Dentistry*. 2011 Jul 1;1(2):87.

Saini R. Ozone therapy in dentistry: A strategic review. *Journal of Natural Science, Biology, and Medicine*. 2011 Jul;2(2):151.

Tiwari S, Avinash A, Katiyar S, Iyer AA, Jain S. Dental applications of ozone therapy: A review of literature. *The Saudi Journal for Dental Research*. 2017 Jan 1;8(1-2):105-11.

Tricarico G, Orlandin JR, Rocchetti V, Ambrosio CE, Travagli V. A critical evaluation of the use of ozone and its derivatives in dentistry. *European Review for Medical and Pharmacological Sciences*. 2020 Jan 1;24:9071-93.

LASER TREATMENT

Another office procedure for pocket disinfection is laser treatment. This is a vast subject area that we will briefly mention in this course.

Research supporting the use of lasers for periodontal therapy continues to bring a wealth of new information about the effectiveness of this non-surgical treatment. These publications are just a small sampling of the numerous scientific articles investigating the application of lasers for treating periodontal problems:

Grzech-Leśniak K, Matys J, Dominiak M. Comparison of the clinical and microbiological effects of antibiotic therapy in periodontal pockets following laser treatment: An in vivo study. *Adv Clin Exp Med*. 2018 Sep;27(9):1263–1270.

Kusek ER, Kusek AJ, Kusek EA. Five-year retrospective study of laser-assisted periodontal therapy. *General Dentistry*. 2012;60(6):540-3.

Lopes BM, Theodoro LH, Melo RF, Thompson GM, Marcantonio RA. Clinical and microbiologic follow-up evaluations after non-surgical periodontal treatment with erbium: YAG laser and scaling and root planing. *Journal of Periodontology*. 2010 May;81(5):682-91.

Nammour S, El Mobadder M, Maalouf E, Namour M, Namour A, Rey G, Matamba P, Matys J, Zeinoun T, Grzech-Leśniak K. Clinical Evaluation of Diode (980 nm) Laser-Assisted Nonsurgical Periodontal Pocket Therapy: A Randomized Comparative Clinical Trial and Bacteriological Study. *Photobiomodulation, Photomedicine, and Laser Surgery*. 2020 Aug 31.

Qadri T, Javed F, Johannsen G, Gustafsson A. Role of diode lasers (800–980 nm) as adjuncts to scaling and root planing in the treatment of chronic periodontitis: a systematic review. *Photomedicine and Laser Surgery*. 2015 Nov 1;33(11):568-75.

Varma SR, AlShayeb M, Narayanan J, Abuhijleh E, Hadi A, Jaber M, Fanas SA. Applications of lasers in refractory periodontitis: A narrative review. *Journal of International Society of Preventive & Community Dentistry*. 2020 Jul;10(4):384.

HERBAL METHODS

Chemical disinfectants like chloramine-T, iodine, or ozone can be effective at removing the populations of microbes in affected periodontal sites, but there are herbal materials that are equally effective without being cytotoxic. Many of them actually promote the healing of tissues while discouraging the infection. For example, topical agents such as aloe vera, colloidal silver, essential oils, and herbs can be efficacious. This includes essential oils of oregano, thyme, peppermint, and clove; and herbs such as calendula, parthenium, black walnut, and wormwood.

However, while we know that topical therapies can be effective at removing the populations of microbes in affected periodontal sites, these do not address the whole-body infection that is likely present. We need to be aware that when we microscopically identify protozoa, spirochetes, staphylococci, or streptococci in the sulcus around the teeth, we are uncovering a type of dysbiosis that often extends throughout the gut and into internal organs as well. Some advocates of herbal methods claim that they can produce a long-term normalization of the gut flora in many cases, producing a whole-body effect.

If you're interested in learning more about the application of herbal therapy to treat the periodontium, we have put together this short list of research articles as a starting point for you:

Forouzanfar F, Sathyapalan T, Orafi HM, Sahebkar A. Curcumin for the management of periodontal diseases: a review. *Current Pharmaceutical Design*. 2020.

Haffajee AD, Roberts C, Murray L, Veiga N, Martin L, Teles RP, Letteri M, Socransky SS. Effect of herbal, essential oil, and chlorhexidine mouthrinses on the composition of the subgingival microbiota and clinical periodontal parameters. *Journal of Clinical Dentistry*. 2009 Jul;20(7):211.

Krasse P, Carlsson B, Dahl C, Paulsson A, Nilsson A, Sinkiewicz G. Decreased gum bleeding and reduced gingivitis by the probiotic *Lactobacillus reuteri*. *Swedish Dental Journal*. 2006 Jan 1;30(2):55-60.

Kumar P, Ansari SH, Ali J. Herbal remedies for the treatment of periodontal disease - a patent review. *Recent Patents on Drug Delivery & Formulation*. 2009 Nov 1;3(3):221-8.

Milovanova-Palmer J, Pendry B. Is there a role for herbal medicine in the treatment and management of periodontal disease? *Journal of Herbal Medicine*. 2018 Jun 1;12:33-48.

Ohtani M, Nishimura T. The preventive and therapeutic application of garlic and other plant ingredients in the treatment of periodontal diseases. *Experimental and Therapeutic Medicine*. 2020 Jan 31;19(2):1507-10.

Saqib SA, AlQahtani NA, Ahmad I, Kader MA, Al Shahrani SS, Asiri EA. Evaluation and comparison of antibacterial efficacy of herbal extracts in combination with antibiotics on periodontal pathobionts: an in vitro microbiological study. *Antibiotics*. 2019 Sep;8(3):89.

Tran PL, Luth K, Wang J, Ray C, de Souza A, Mehta D, Moeller KW, Moeller CD, Reid TW. Efficacy of a silver colloidal gel against selected oral bacteria in vitro. *F1000Research*. 2019;8.

Vorobets NM, Kryvtsova MV, Ravis OY, Spivak MY, Yavorska HV, Semenova HM. Antimicrobial activity of phytoextracts on opportunistic oral bacteria, yeast and bacteria from probiotics. *Regulatory Mechanisms in Biosystems*. 2018;9(3).

CONCLUSION



Success, as always, depends on good nutrition and the maintenance of good general health.

Health, it turns out, also depends upon a well-balanced relationship with our microbiological partners, the human microbiome. Microbiome science is still in its infancy, but it's already clear that we exist in an intimate interdependence with the rest of the biological world, including those critters that grow in our mouths.

Critics of anti-infective periodontal therapy have called it the “scorched earth” method because the goal is to eliminate the biofilms, as opposed to the promotion of healthy thriving oral microflora. Health should be the ideal, not just the absence of disease.

So far, efforts at probiotic therapy for periodontal disease have not been consistently successful. Still, it is our great hope that as we advance in our understanding of the universe of the microbiomes, better methods of promoting periodontal health will emerge. In the meantime, we are confident we can at least achieve “absence of disease” with our perio patients by using anti-infective methods.

POSTFACE TO IAOMT’S BIOLOGICAL PERIODONTAL THERAPY ONLINE LEARNING VIDEO ACTIVITY

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