

Microbial Marvels

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TODS 2026

Learning Objectives:

1. Understand key factors in periodontal breakdown and propose evidence-based solutions to reduce risks
2. Analyze studies on probiotics' effectiveness in reducing oral disease risk and associated conditions
3. Evaluate the importance of strain-specific probiotics in dental practice and their potential impact
4. Evaluate scientific literature supporting various adjunctive therapy recommendations for oral health
5. Develop strategies for patient-specific care plans that maintain a healthy oral microflora balance

Symbiosis: Interaction between two different organisms living in close physical association, typically to the advantage of both.

Dysbiosis: A disruption in the homeostasis of the microbiome leading to an imbalance in the microflora.

- The transition from oral health to disease, which occurs in oral dysbiosis, leads to a significant change in the oral microbiota composition and functions.
- Compared to healthy subjects, people affected by periodontal disease show considerably larger proportions of:
 - The red complex (*Porphyromonas gingivalis*, *Tannerella forsythia*, *Treponema denticola*)
 - The orange complex species (including bacteria like *Fusobacterium nucleatum* and *Prevotella intermedia*) and
 - The purple complex is in significantly lower proportions (comprising *Veillonella parvula* and *Actinomyces odontolyticus*) and *Actinomyces* species.

Reference: Di Stefano M, Santonocito S, Polizzi A, Mauceri R, Troiano G, Lo Giudice A, Romano A, Mascitti M, Isola G. A Reciprocal Link between Oral, Gut Microbiota during Periodontitis: The Potential Role of Probiotics in Reducing Dysbiosis-Induced Inflammation. *Int J Mol Sci.* 2023 Jan 6;24(2):1084. doi: 10.3390/ijms24021084. PMID: 36674600; PMCID: PMC9867370.

3 Types of Dysbiosis:

- 1) Loss of beneficial bacteria
- 2) Overgrowth of potentially pathogenic bacteria
- 3) Loss of overall bacterial diversity

Refereece: Di Stefano M, Santonocito S, Polizzi A, Mauceri R, Troiano G, Lo Giudice A, Romano A, Mascitti M, Isola G. A Reciprocal Link between Oral, Gut Microbiota during Periodontitis: The Potential Role of Probiotics in Reducing Dysbiosis-Induced Inflammation. *Int J Mol Sci.* 2023 Jan 6;24(2):1084. doi: 10.3390/ijms24021084. PMID: 36674600; PMCID: PMC9867370.

Why do we need Bacteria?

- Help degrade food
- Help make nutrients available
- Neutralize toxins
- They play an essential role in the defense against infections by protecting colonized surfaces from invading pathogens
- Extensive research focused on interventions to restore microbial health and balance in the oral microbiome, including prebiotics, probiotics, and antimicrobial agents, as potential therapeutic approaches for treating and preventing oral dysbiosis and its associated diseases.

Bacteria and their Implications to Oral and Systemic Health:

- Healthcare focused on the gut microbiota until recently, when microbial populations of other body regions, especially of the oral cavity, became of concern.
- Oral health is influenced by resident bacteria, as well as an individual's age, health, nutritional status, and lifestyle choices.
- Probiotics form the cornerstone of such biotherapy.

Reference: Mohanty, Rinkee; Asopa, Swati Joshi; Joseph, M. Derick; Singh, et al. Red complex: Polymicrobial conglomerate in oral flora: A review Journal of Family Medicine and Primary Care 8(11):3480-3486, November 2019. doi: 10.4103/jfmpc.jfmpc_759_19

The Oral-Systemic Connection: Key Pathogens and Their Impact Beyond the Mouth

Oral Pathogen → Systemic Effect

P. gingivalis → Systemic inflammation → Atherosclerosis → Alzheimer's disease

F. nucleatum → Bloodstream dissemination → Colorectal cancer → Pregnancy complications

A. actinomycetemcomitans → Immune dysregulation → Rheumatoid arthritis

Red Complex Bacteria → Chronic inflammation → Cardiovascular disease risk

Reference: Thomas, C.; Minty, M.; Vinel, A.; Canceill, T.; Loubières, P.; Burcelin, R.; Kaddech, M.; Blasco-Baque, V.; Laurencin-Dalichieux, S. Oral Microbiota: A Major Player in the Diagnosis of Systemic Diseases. *Diagnostics* 2021, 11, 1376. <https://doi.org/10.3390/diagnostics>

Assessment?

When are you exploring?

What probe are you using?

What do we have available to us to help manage pathogenic bacteria?

Does it consider the ecosystem of the oral microflora?

What's in our tool kit? (Chairside & Home Care Options)

1. Chairside

Antibiotics:

Pro	Cons
Treatment of Bacterial Infections	Decreased Bacterial Diversity
Saves Lives and Prevents complications	Selection of Resistant Bacteria
Management of Chronic Conditions	People do not take them correctly
Control of Infectious Diseases	Cannot be prescribed by an rdh
Improving Quality of Life	

Laser Bacterial Reduction

- Delays re-colonization period
- Biostimulation promotes healing and improves post-operative comfort
- Targets biofilm and accretions that have migrated into the sulcular epithelium.
- Stimulation of ATP production
- Charges and excites the mitochondria of anaerobic bacterial cells which in turn take in more oxygen

Hydrogen Peroxide and Diode laser: Reference: *Disinfection Potential of 980 nm Diode Laser and Hydrogen Peroxide (3%) in “Critical Probing Depths” Periodontal Pockets: Retrospective Study, El Mobadder et al, 2022*

Diode Laser and SRP: Reference: *Jiang Y, Feng J, Du J, Fu J, Liu Y, Guo L, Liu Y. Clinical and biochemical effect of laser as an adjunct to non-surgical treatment of chronic periodontitis. Oral Dis. 2022 May;28(4):1042-1057. doi: 10.1111/odi.13847. Epub 2021 May 3. PMID: 33715262; PMCID: PMC9292540.*

Utilizing a diode laser in dental hygiene practice – By Joy Raskie RDH Mag Jan 2023

Patient Selection:

- Patients with inflammation
- Patients with gingivitis
- Patients with periodontal disease
- Immunocompromised patients
- Periodontal maintenance appointments (3-, 4-, or 6-month)
- Patients with risk factors
- To reduce the risk of bacteremia and aerosol risk
- Improved healing

Gingivitis Diagnosis LBR + Prophylaxis + Irrigation & LBR • LBR pre-treatment • Prophylaxis • H2O2 irrigation + LBR post treatment as required	Periodontitis Diagnosis LBR + NSPT + Irrigation & LBR • LBR full mouth • Anesthesia as required • Quad NSPT/SRP • H2O2 irrigation • LBR • Re-eval in 6 weeks	Periodontal Stability or Remission LBR + Periodontal Maintenance + Spot irrigation & LBR • LBR • Perio Maintenance • Spot treat with H2O2 irrigation and LBR
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Instrumentation Options;

When selecting instruments, we should consider:

- Deposit size
- Deposit location
- Pocket shape
- Pocket depth
- Root anatomy
- Burnished calculus
- Functional safety of the instrument

It is not a one-size-fits-all

Know the anatomy of the tooth

Understand the anatomy of the instrument

2. At Home:

Power brushing:

Reference: Anti-Gingivitis and Anti-Plaque Efficacy of an Oral Hygiene Routine including Oral-B® iO Oscillating-Rotating Electric Toothbrush, Stannous Fluoride Dentifrice, CPC Rinse and Floss: Results from a 12-week Trial

“Clinical trial by Adam et al demonstrated when patients use a regimen consisting of Oral-B iO, Crest SnF₂ paste, Crest cetylpyridinium chloride (CPC) rinse and Oral-B floss (vs. control group using a manual regimen), 100% of the subjects suffering from gingivitis transitioned to healthy gingival state after 12 weeks.”

Study: The effects of oscillating-rotating electric toothbrushes on plaque and gingival health: A meta-analysis
 Grender J, Adam R, Zou Y. The effects of oscillating-rotating electric toothbrushes on plaque and gingival health: A meta-analysis. *Am J Dent.* 2020 Feb;33(1):3-11. PMID: 32056408.

- **Purpose:** To compare the effects of oscillating-rotating (O-R), sonic (side-to-side), and manual toothbrushes on plaque and gingival health after multiple uses in studies up to 3 months.
- **Findings:** Meta-analysis by Grender et al demonstrated that the use of an oscillation-rotation (O/R) electric toothbrush resulted in 7.4x greater odds of moving patients to generally healthy state (vs. manual brush). The multidirectional shear forces create a highly effective mechanical plaque biofilm removal
- **Clinical Significance:** This subject-level meta-analysis of studies up to 3 months provides sound evidence supporting recommendations for patients with various degrees of gingival bleeding to use oscillating-rotating electric toothbrushes over manual and sonic toothbrushes to improve plaque control and gingival health.

Improving Home Care tools and options:

Disclosing

- **Disclosing agents are excellent tools for educating patients about biofilm**
- **Disclosing solution with two colours such as BioClear Dual Color demonstrates:**
 - Plaque 24 hours or less is stained pink
 - Plaque 24 and older is stained blue
- Ideally added for all patients with periodontal and caries risk

Interdental Brushes

- To effectively remove plaque and prevent gum inflammation, cavities and bad breath, interdental cleaning is recommended daily. There are many available tools such as: floss, picks and interdental brushes.

J Clin Periodontol 2015; 42 (Suppl. 16): S71–S76 doi: 10.1111/jcpe.12366

- Flossing vs. Interdental Brushes Results: Flossing cannot be recommended other than for sites of gingival and periodontal health, where inter-dental brushes (IDBs) will not pass through the interproximal area without trauma. Otherwise, IDBs are the device of choice for interproximal plaque removal.
- It is important to ensure you select the correct size and tool to improve oral health outcomes

Kotsakis GA, Lian Q, Ioannou AL, Michalowicz BS, John MT, Chu H. A network meta-analysis of interproximal oral hygiene methods in the reduction of clinical indices of inflammation. J Periodontol. 2018 May;89(5):558-570. doi: 10.1002/JPER.17-0368. PMID: 29520910; PMCID: PMC5984142.

- “BNMA enabled us to quantitatively evaluate IOH aids and provide a global ranking of their efficacy. Interdental brushes and water-jets ranked high for reducing gingival bleeding, whereas toothpicks and floss ranked last.”

Gingival Stimulation:

- Effectively dislodges food particles from tight interdental spaces
- Precisely removes subgingival plaque and biofilm around teeth and restorations
- Stimulates gingival papillae to enhance microcirculation and promote tissue health

Who benefits from gum stimulation?

Patients with a clinical presence of:

- Copious biofilm around the gingival margins
- Periodontal pockets on the buccal, lingual and palatal aspects
- Gingival hyperplasia and hypertrophy
- Furcations
- Pericoronitis
- Severe crowding
- Open contacts
- Gingival recession

1.7 % Hydrogen Peroxide and Prescription Trays:

Benefits of 1.7% Hydrogen Peroxide Perio Gel

- 1) Debrides Matrix: Removes dead tissue and debris from the periodontal pockets

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- 2) Debrides Bacterial Cell Walls: Disrupts the outer layers of bacteria, reducing their viability.
- 3) Oxygenates the Pockets: Creates an oxygen-rich environment, inhibiting anaerobic bacteria growth
- 4) Safe for Pregnancy and Nursing: Hydrogen Peroxide is naturally occurring in breast milk.
- 5) No Allergic Reactions: Naturally produced in the body.

Perio Tray Therapy Benefits

- May decrease bleeding, inflammation, and pocket depths
- Uses a 1.7 % Hydrogen Peroxide gel in custom trays that create a vacuum seal
- Easy to use: 10–15 min/day
- Customized and comfortable
- Leads to optimal restorative results (Implants too!)
- Whitens teeth
- Freshens breath
- Prevents (re)infection

Patient Selection:

- Gingivitis patients with 10+ BOP
- Patients with a Periodontitis diagnosis
- Perio maintenance patients
- Patients with implants, crowns and/or veneers
- Prevention
- Medically compromised patients
- Halitosis patients
- Cosmetic/whitening patients
- Patients identified as high-risk for caries or periodontal disease
- Geriatric patients
- Patients who smoke

Marshall MV, Cancro LP, Fischman SL. Hydrogen peroxide: a review of its use in dentistry. *J Periodontol*. 1995 Sep;66(9):786-96.

Dunlap T, Marshall M, Costerton J, Schaudinn C, Sindelar B, and Cotton J. Subgingival Delivery of Oral Debriding Agents. [The Journal of Clinical Dentistry](#) 2011;22:149-158.

Putt M and Proskin H. Custom Tray Application of Peroxide Gel as an Adjunct to Scaling and Root Planing in the Treatment of Periodontitis: Results of a Randomized, Controlled Trial after 6 Months. [The Journal of Clinical Dentistry](#). 2013;24:100-107.

Oral Probiotics

Not All Oral Probiotics Have the Same Clinical Evidence - Key Findings from PubMed Clinical Trials (Nov 2025)

- *L. reuteri* DSM 17938 + ATCC PTA 5289 have the strongest overall body of evidence, with the highest number of clinical trials across plaque, gingivitis, periodontitis, and caries indications.
- Clinical studies demonstrate improvements in plaque accumulation, gingival inflammation, bleeding scores, and oral microbial balance when used as an adjunct to oral hygiene.
- *S. salivarius* K12 has the second largest overall evidence base, primarily in oral health and halitosis applications.
- *S. salivarius* M18 has limited but growing evidence in plaque control, gingivitis, periodontitis, and caries prevention.
- Probiotics should be viewed as an adjunct to mechanical biofilm disruption, not a replacement for brushing, interdental cleaning, or periodontal therapy.
- Can maintain a healthy balance in the mouth while also colonizing in the gut to get the systemic effect.
- BioGaia Prodentis® contains the probiotic strains *L. reuteri* ATCC PTA 5289 and *L. reuteri* DSM 17938.
 - *L. reuteri* DSM 17938 was isolated from human breast milk and has anti-microbial properties.
 - *L. reuteri* ATCC PTA 5289 was isolated from human saliva and is the anti-inflammatory strain; it inhibits inflammatory cytokines.
- Clinical studies have shown that:

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- L. reuteri as an adjunct to SRP, it reduces the total number of oral bacteria and the number of obligate anaerobes
- L. reuteri ATCC PTA 5289 has a strong inhibitory effect on periodontal pathogens, such as:
 - Fusobacterium nucleatum,
 - Porphyromonas gingivalis,
 - Prevotella intermedia,
 - Actinobacillus actinomycetemcomitans, in vitro.

Probiotic Patient Selection

- Healthy
- Gingivitis
- Periodontitis
- Implants
- Halitosis
- Caries
- Orthodontic
- Black line stain
- Safe for diabetes, pregnancy and many more patients

- 1) Burton JP, Chilcott C, Moore CJ et al. *J Appl Microbiol.* 100: 754-64 (2006); Burton JP, Chilcott C, Tagg J. *Oral Dis* 11(S1): 29-31 (2005); Burton JP, Wescombe PA, Moore CJ et al. *Appl Environ Microbiol* 72: 3050-53 (2006)
- 2) Stensson M, Koch G, Coric S, Abrahamsson TR, Jenmalm MC, Birkhed D, Wendt LK. Oral administration of *Lactobacillus reuteri* during the first year of life reduces caries prevalence in the primary dentition at 9 years of age. *Caries Res.* 2014;48(2):111-7. doi: 10.1159/000354412. Epub 2013 Nov 29. PMID: 24296746.
- 3) Martin-Cabezas R, Davideau JL, Tenenbaum H, Huck O. Clinical efficacy of probiotics as an adjunctive therapy to non-surgical periodontal treatment of chronic periodontitis: a systematic review and meta-analysis. *J Clin Periodontol.* 2016 Jun;43(6):520-30. doi: 10.1111/jcpe.12545. Epub 2016 May 7. PMID: 26970230.
- 4) Garban F, Guyard A, Labussière H, Bulabois CE, Marchand T, Mounier C, Caillot D, Bay JO, Coiteux V, Schmidt-Tanguy A, Le Niger C, Robin C, Ladaïque P, Lapusan S, Deconinck E, Rolland C, Foote AM, François A, Jacquot C, Tardivel R, Tiberghien P, Bosson JL; Evaluation of the Efficacy of Platelets Treated With Pathogen Reduction Process (EFFIPAP) Study Group. Comparison of the Hemostatic Efficacy of Pathogen-Reduced Platelets vs Untreated Platelets in Patients With Thrombocytopenia and Malignant Hematologic Diseases: A Randomized Clinical Trial. *JAMA Oncol.* 2018 Apr 1;4(4):468-475. doi: 10.1001/jamaoncol.2017.5123. PMID: 29392283; PMCID: PMC5885167.

What is your Protocol?

Current Options in my office	Protocol of my dreams...

