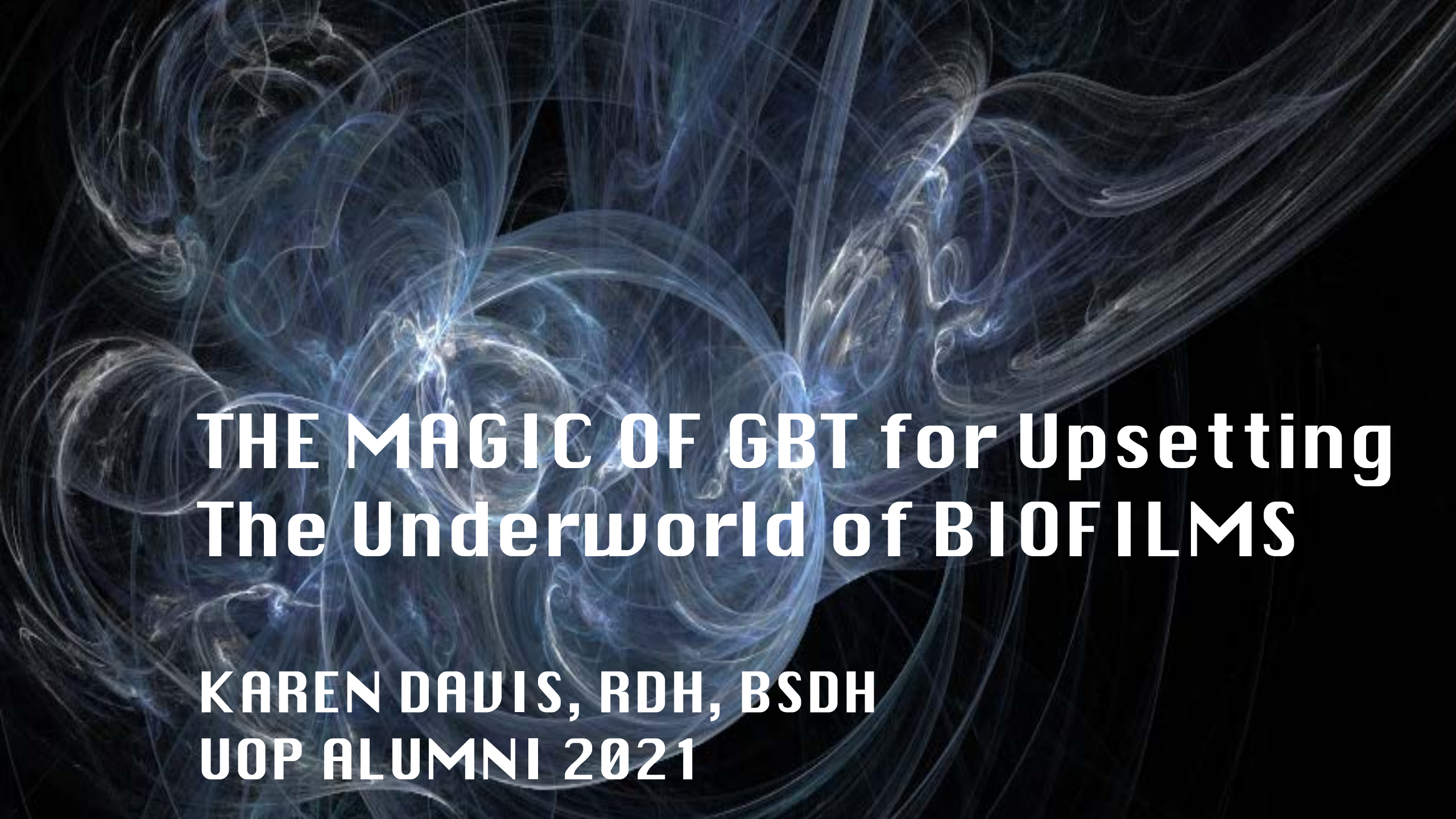

THE MAGIC OF GBT for Upsetting The Underworld of BIOFILMS

KAREN DAVIS, RDH, BSDH
UOP ALUMNI 2021


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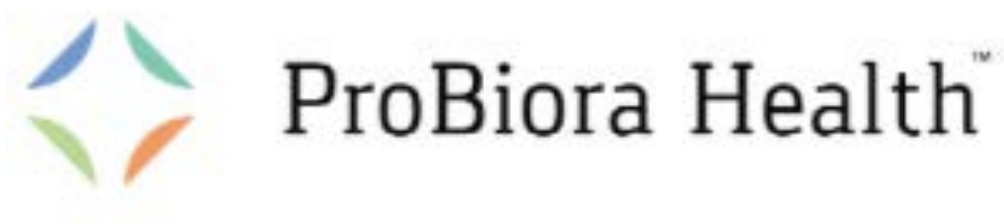
EMS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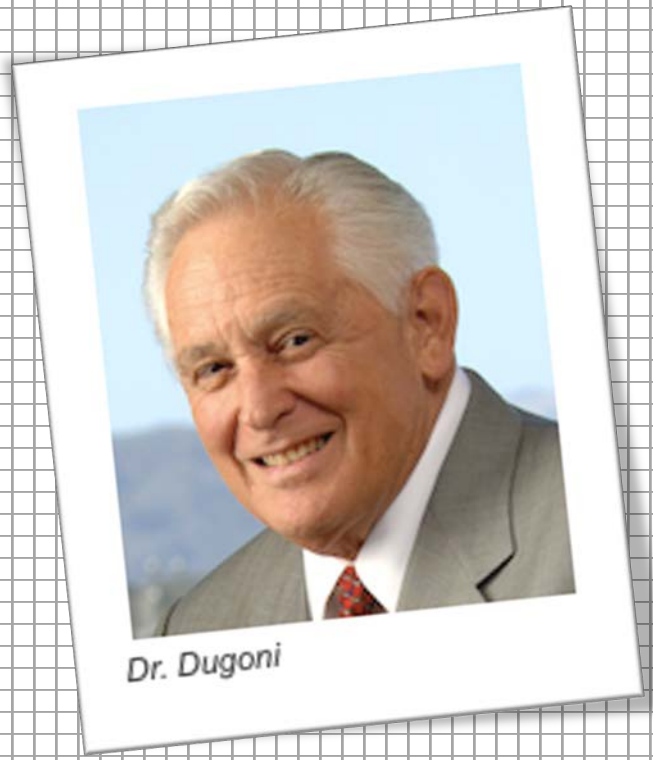


Dr. Dugoni

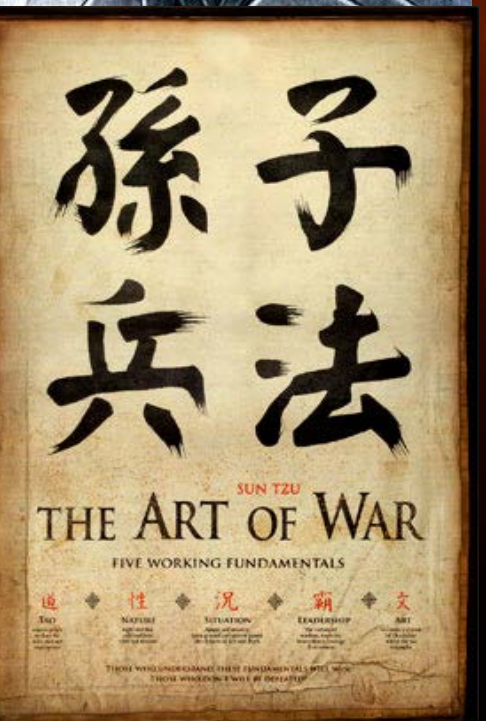
Dr. Dennis Shinbori

Thank you!

Never accept the following logic:
we're doing it this way because that's how we've always done it, or we're not doing it because we've never done it…

Barry Gibbons, Former CEO, Burger King

1. What is your role in Dentistry?



Dysbiotic Biofilm

If you know the enemy better than you know yourself
the outcome of the battle has already been decided

SUSCEPTIBLE HOST

JPHE JOURNAL OF PUBLIC HEALTH AND EMERGENCY
AN OPEN ACCESS JOURNAL FOR HIGH-QUALITY RESEARCH IN PUBLIC HEALTH AND EMERGENCY MEDICINE

Periodontal disease is the 12th most prevalent pathology in the world

Prevalence has increased 34% during past 3 decades

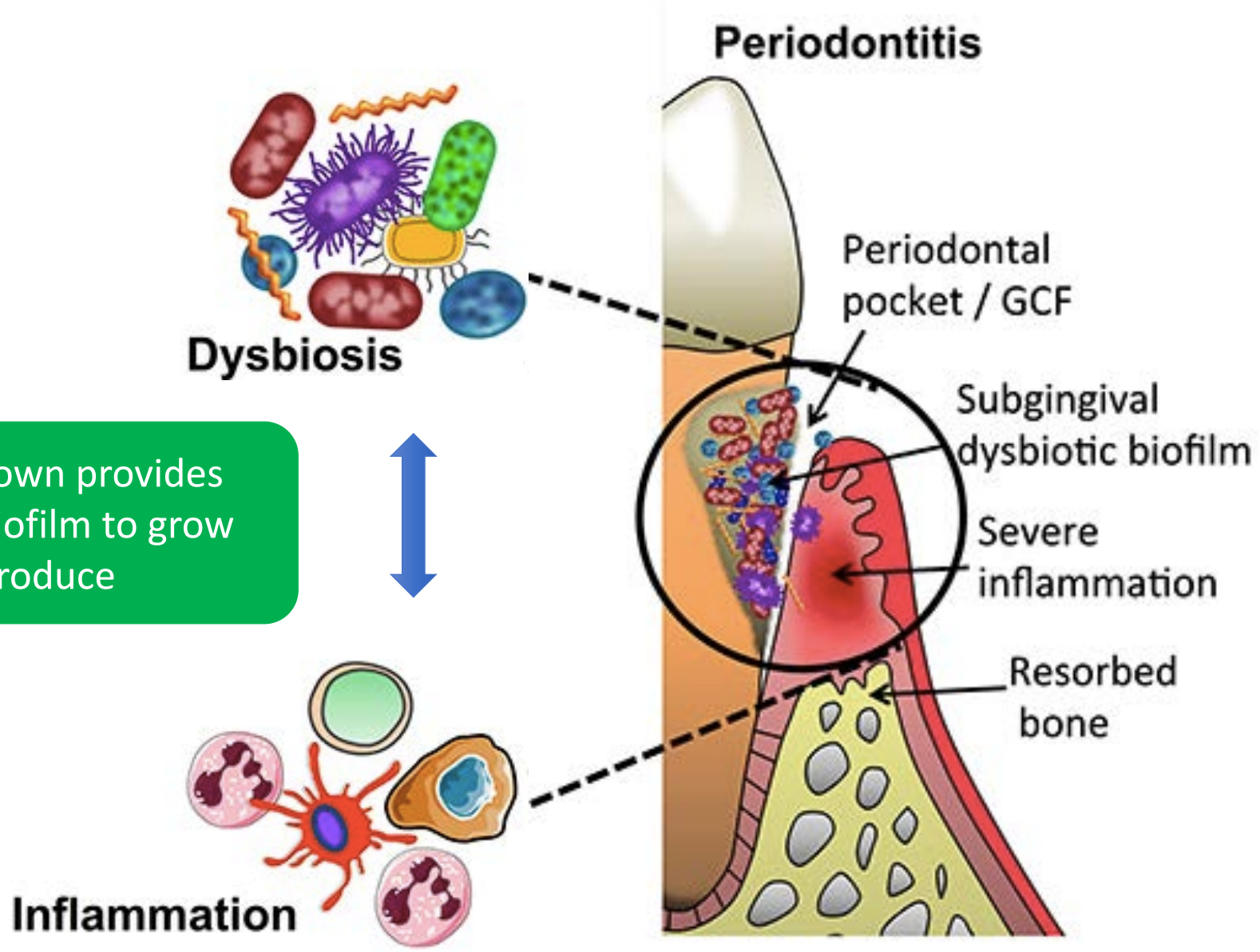
Risk is 67% higher in people 65 years and older

Nocini R, Lippi G, Mattiuzzi C. Periodontal disease: the portrait of an epidemic. J Public Health Emerg 2020;4:10DOI: 10.21037/jphe.2020.03.0

Keystone pathogens evade the host response & orchestrate a shift creating an imbalance of the biofilm

Tissue breakdown provides nutrients for biofilm to grow and reproduce

Imbalance promotes growth of pro-inflammatory pathogens, increasing inflammation and release of pro-inflammatory cytokines



Lamont, R.J., Koo, H. & Hajishengallis, G. The oral microbiota: dynamic communities and host interactions. *Nat Rev Microbiol* **16,** 745–759 (2018). https://doi.org/10.1038/s41579-018-0089-x Adapted from original image available on Open Access.

The imbalance of periodontal pathogens and accessory microorganisms activates an innate immune response (first-responders) and adaptive immune response (second responders) creating an abundance of pro-inflammatory cytokines.


Immune response ignites a cascade of events in response to inflammation that begins as protective, but becomes destructive in susceptible hosts
Host is altered by behavioral, environmental & genetic factors

Periodontology 2000, Vol. 69, 2015, 7–17
Printed in Singapore. All rights reserved

PERIODONTOLOGY 2000

Periodontology 2000

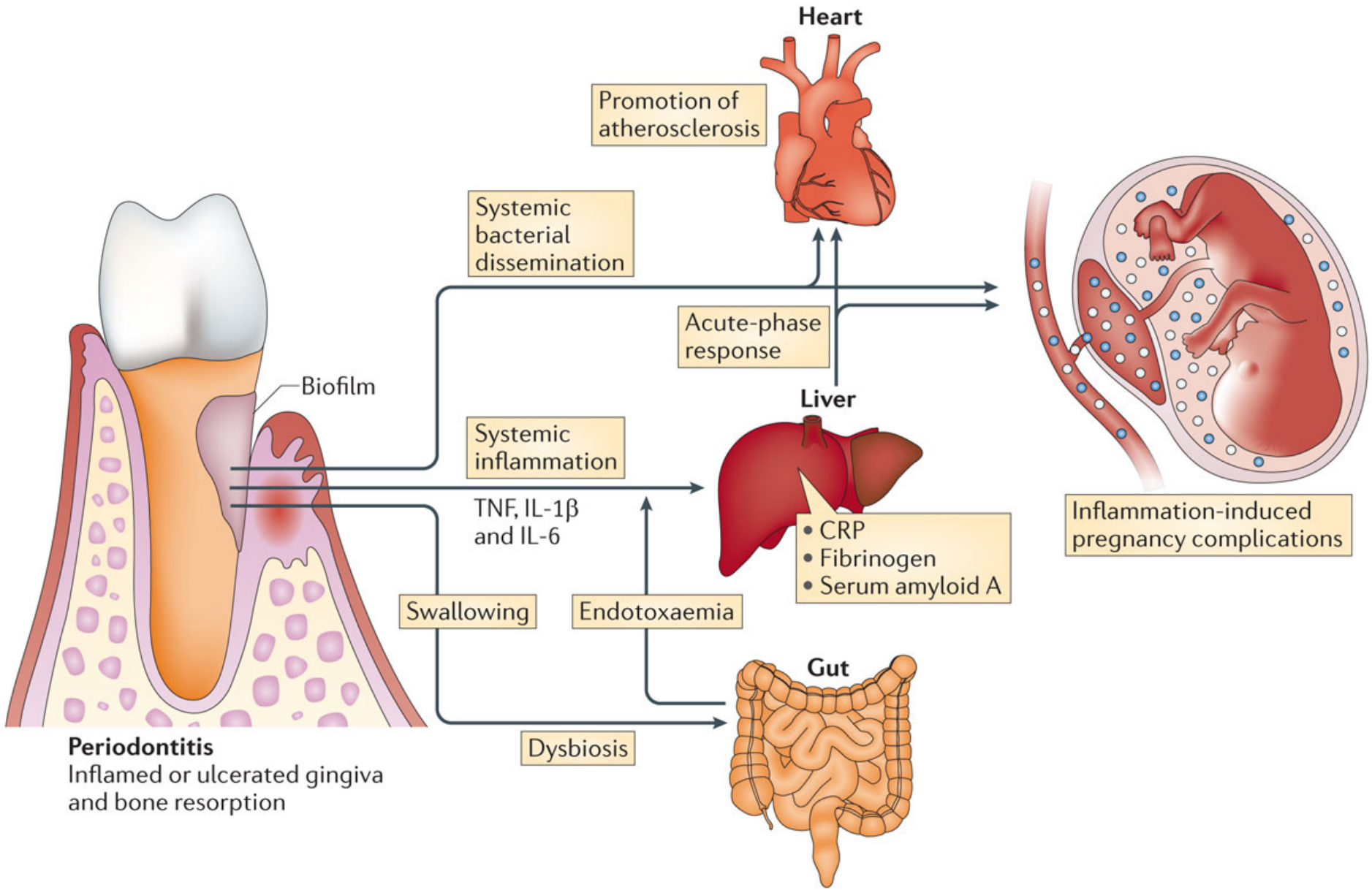
Molecular aspects of the pathogenesis of periodontitis

JOERG MEYLE & IAIN CHAPPLE

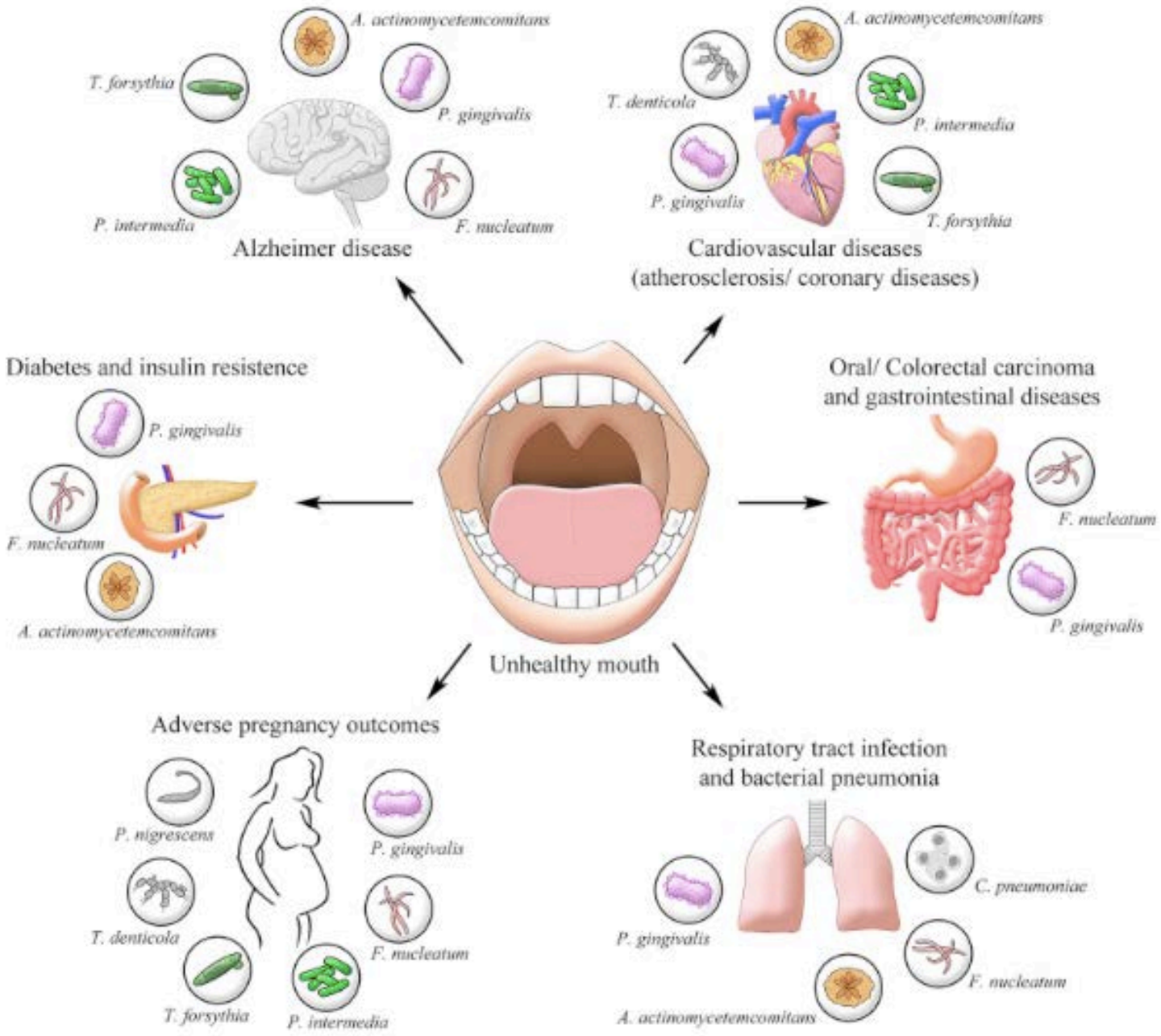
Increase in cytokines essentially becomes "metastatic inflammation"

Intervention to remove disease-promoting biofilm required to drive down inflammation

Periodontology 2000, 2015



Nature Reviews | Immunology

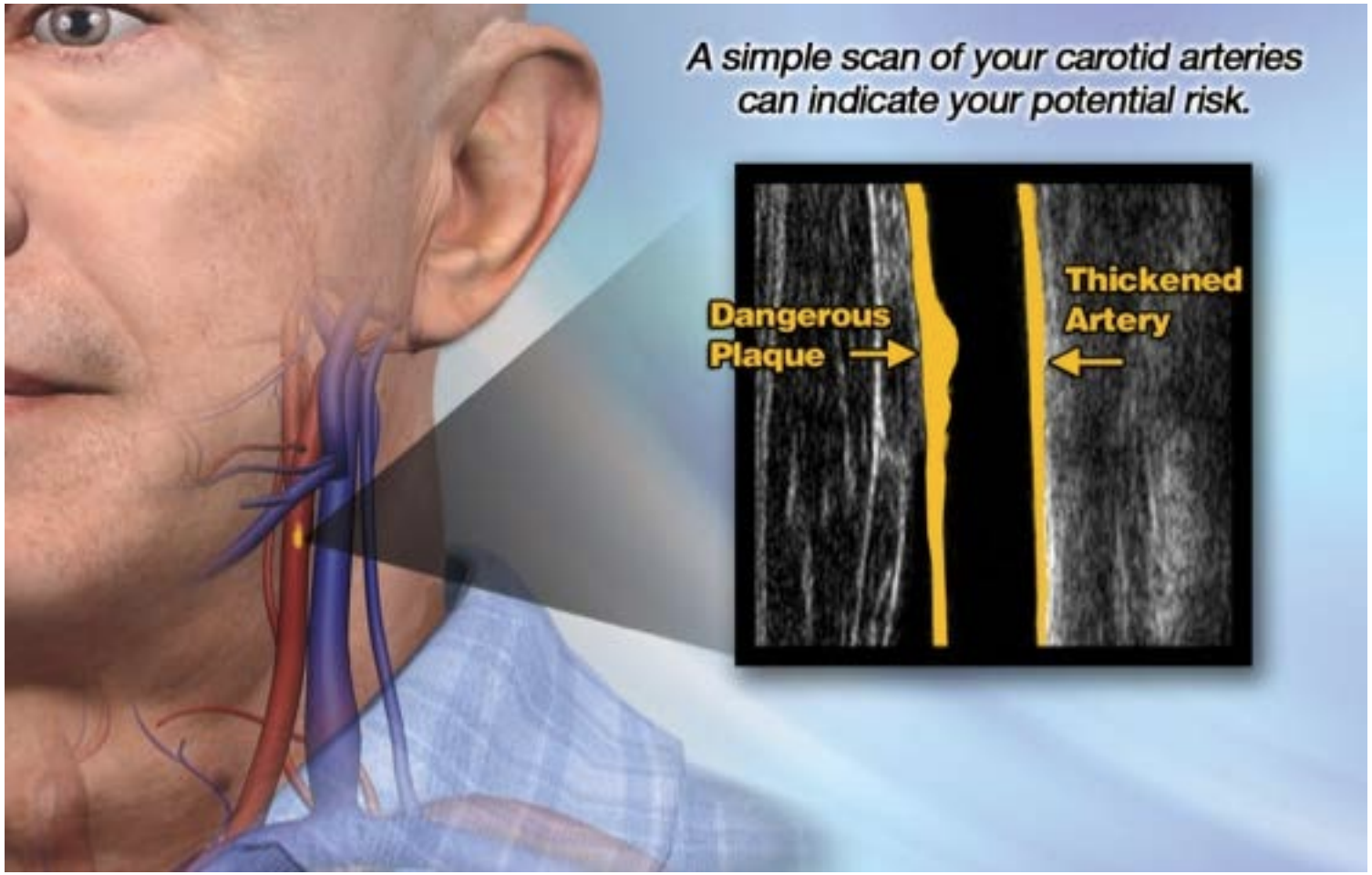


Direct & Indirect Impact

"Recent epidemiological, clinical and experimental studies support the relationship between bacteremia or inflammation due to periodontal disease and systemic disease."

Bui FQ, Almeida-da-Silva CLC, Huynh B, Trinh A, Liu J, Woodward J, Asadi H, Ojcius DM. Association between periodontal pathogens and systemic disease. Biomed J. 2019 Feb;42(1):27-35. doi: 10.1016/j.bj.2018.12.001. Epub 2019 Mar 2. PMID: 30987702; PMCID: PMC6468093. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6468093/pdf/main.pdf Accessed February 25. 2021

Carotid Intima-Media Thickness Test CIMT



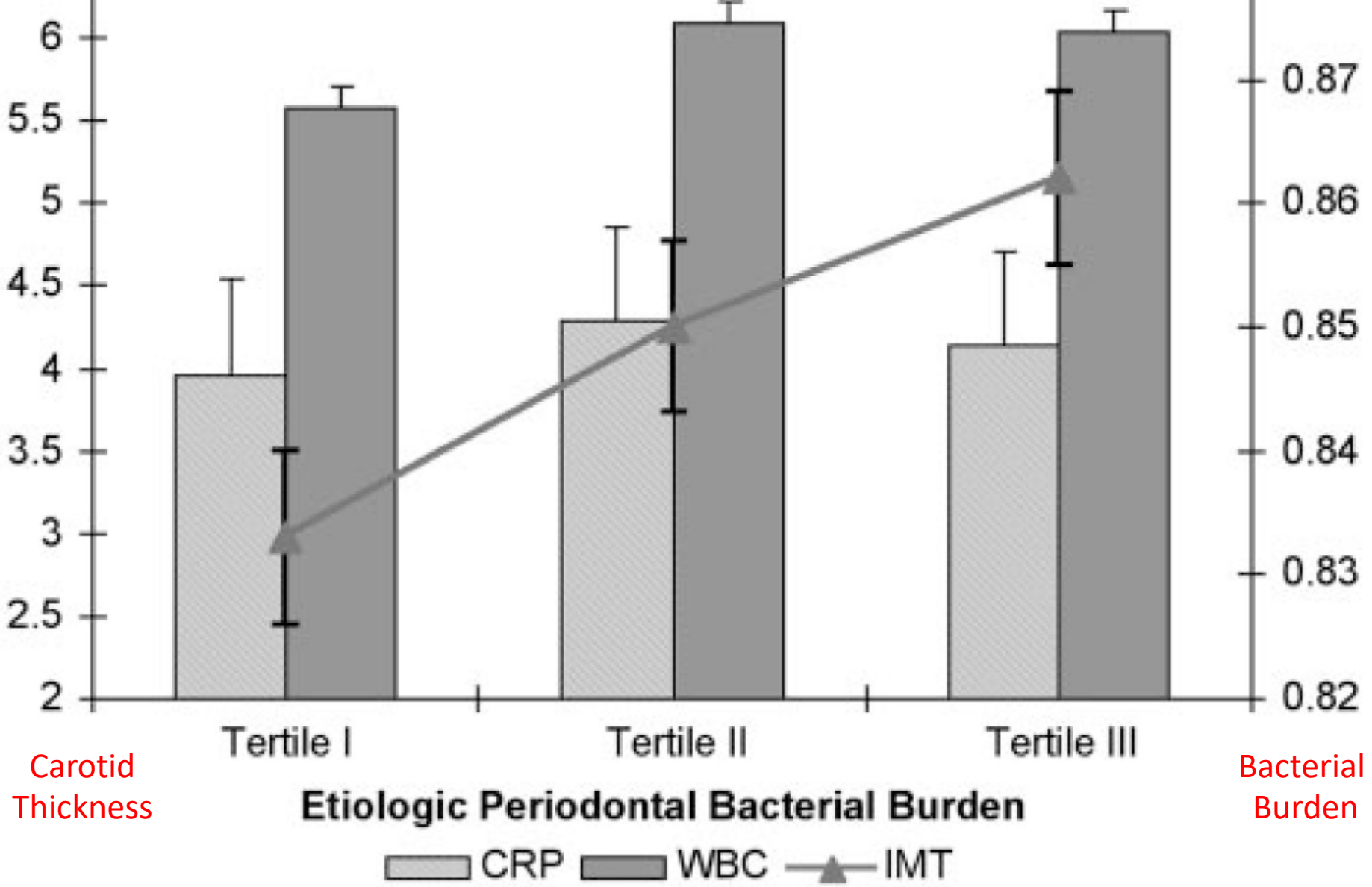
Published in final edited form as:
Circulation. 2005 February 8; 111(5): 576. doi:10.1161/01.CIR.0000154582.37101.15.

Periodontal Microbiota and Carotid Intima-Media Thickness:

The Oral Infections and Vascular Disease Epidemiology Study (INVEST)

Moïse Desvarieux, MD, PhD, **Ryan T. Demmer, MPH**, **Tatjana Rundek, MD, PhD**, **Bernadette Boden-Albala, DrPH**, **David R. Jacobs Jr, PhD**, **Ralph L. Sacco, MD, MS**, and **Panos N. Papapanou, DDS, PhD**
From the Division of Epidemiology (M.D., R.T.D., D.R.J.), School of Public Health, and Department of Medicine (M.D.), Medical School, University of Minnesota, Minneapolis, Minn; Departments of Neurology (T.R., B.B.-A., R.L.S.), Columbia University College of Physicians and Surgeons and Sociomedical Sciences (B.B.-A.) and Epidemiology (M.D., R.L.S.), Mailman School of Public Health, Columbia University, New York, NY; and Division of Periodontics (P.N.P.), Columbia University School of Dental and Oral Surgery, New York, NY.

Conclusions—Our data provide evidence of a direct relationship between periodontal microbiology and subclinical atherosclerosis. This relationship exists independent of C-reactive protein.



0.03 increase in CIMT correlated to 2-3 times increased risk for MI or coronary death

420 patients
3 year follow-up

5008 subgingival samples

DNA of 11 periodontal pathogens

RESULTS: CIMT progressed in a direct and dose responsive manner to bacterial burden

ORIGINAL RESEARCH

Changes in Clinical and Microbiological Periodontal Profiles Relate to Progression of Carotid Intima-Media Thickness: The Oral Infections and Vascular Disease Epidemiology Study

Moïse Desvarieux, MD, PhD; Ryan T. Demmer, PhD, MPH; David R. Jacobs, Jr, PhD; Panos N. Papapanou, DDS, PhD; Ralph L. Sacco, MD, MS; Tatjana Rundek, MD, PhD

Background—No prospective studies exist on the relationship between change in periodontal clinical and microbiological status and progression of carotid atherosclerosis.

Methods and Results—The Oral Infections and Vascular Disease Epidemiology Study examined 420 participants at baseline (68±8 years old) and follow-up. Over a 3-year median follow-up time, clinical probing depth (PD) measurements were made at 75 766 periodontal sites, and 5008 subgingival samples were collected from dentate participants (average of 7 samples/subject per visit over 2 visits) and quantitatively assessed for 11 known periodontal bacterial species by DNA-DNA checkerboard hybridization. Common carotid artery intima-medial thickness (CCA-IMT) was measured using high-resolution ultrasound. In 2 separate analyses, change in periodontal status (follow-up to baseline), defined as (1) longitudinal change in the extent of sites with a ≥3-mm probing depth (Δ% PD≥3) and (2) longitudinal change in the relative predominance of bacteria causative of periodontal disease over other bacteria in the subgingival plaque (Δetiologic dominance), was regressed on longitudinal CCA-IMT progression adjusting for age, sex, race/ethnicity, diabetes, smoking status, education, body mass index, systolic blood pressure, and low-density lipoprotein cholesterol and high-density lipoprotein cholesterol. Mean (SE) CCA-IMT increased during follow-up by 0.139±0.008 mm. Longitudinal IMT progression attenuated with improvement in clinical or microbial periodontal status. Mean CCA-IMT progression varied inversely across quartiles of longitudinal improvement in clinical periodontal status (Δ%PD≥3) by 0.18 (0.02), 0.16 (0.01), 0.14 (0.01), and 0.07 (0.01) mm (*P* for trend<0.0001). Likewise, mean CCA-IMT increased by 0.20 (0.02), 0.18 (0.02), 0.15 (0.02), and 0.12 (0.02) mm (*P*<0.0001) across quartiles of longitudinal improvement in periodontal microbial status (Δetiologic dominance).

Conclusion—Longitudinal improvement in clinical and microbial periodontal status is related to a decreased rate of carotid artery IMT progression at 3-year average follow-up. (*J Am Heart Assoc.* 2013;2:e000254 doi: 10.1161/JAHA.113.000254)

Key Words: atherosclerosis • infection • inflammation • periodontal • progression

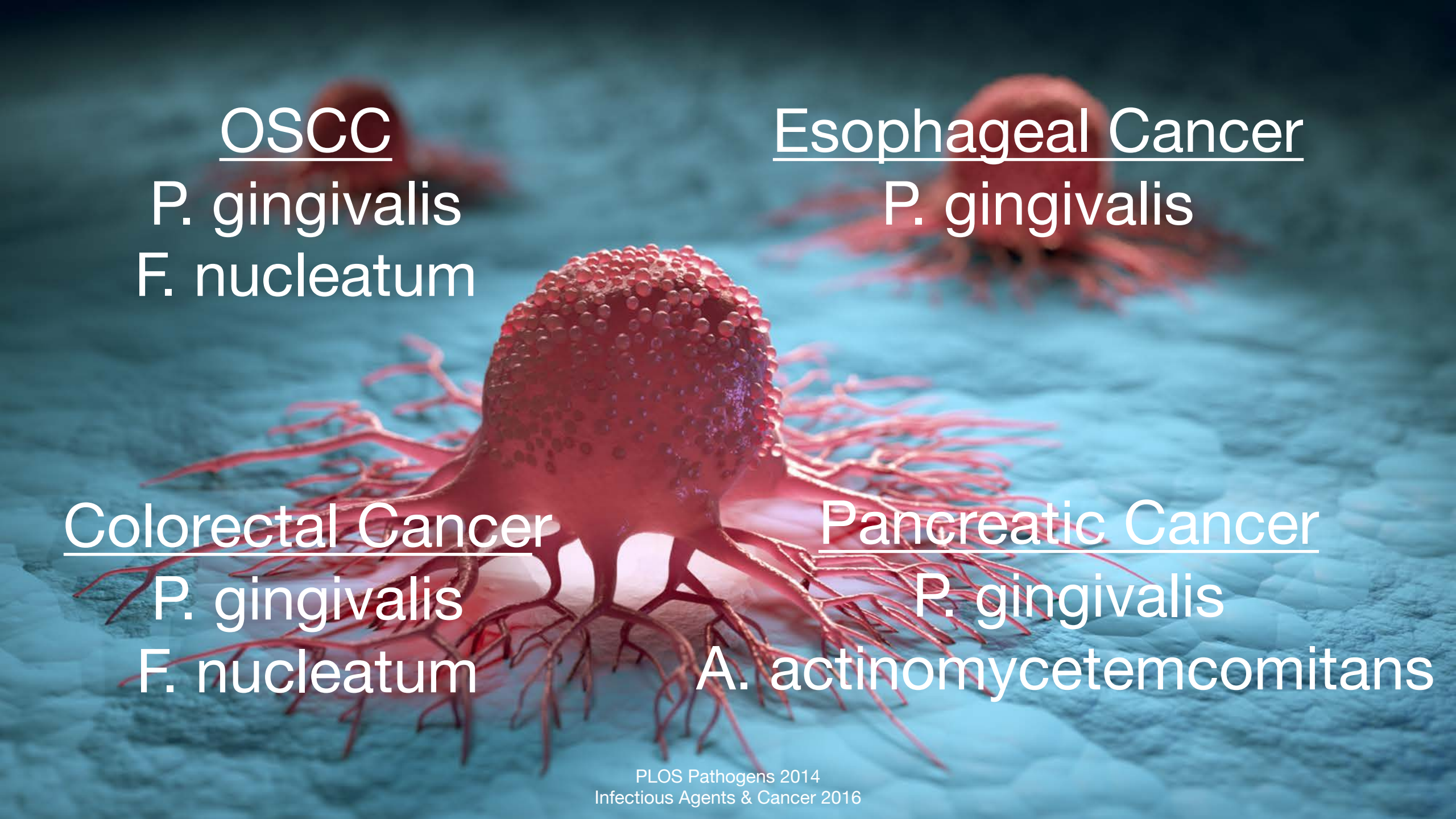
Studies have linked periodontal disease (clinical manifestation of chronic periodontal infections and inflammation) to both cardiovascular disease (CVD) and atherosclerosis.[1–5] The clinical evidence was extended to serological studies linking elevated periodontal bacteria antibody titers to atherosclerotic vascular disease,[6–10] and we have reported cross-sectional evidence of greater carotid intima-media thickness with increasing proportion of "etiologic" periodontal bacteria in the subgingival plaque.[11] One unanswered question is evaluating the relationship between temporal change in chronic periodontal infections levels and subclinical atherosclerosis progression. No prospective studies exist on the parallel evolution of chronic low-grade infections, including periodontal infections, and subclinical vascular disease. Prospective studies of this nature are important for establishing or refuting causality, thus, filling a critical gap, as recently summarized in an American Heart Association statement regarding the association between periodontal disease and atherosclerotic vascular disease.[12]

The Oral Infections and Vascular Disease Epidemiology Study (INVEST) was specifically designed to study the hypothesis that periodontal infections predispose to accelerated

From the Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, NY (M.D., R.T.D.); INSERM U738 Paris (M.D.); Ecole des Hautes Etudes en Santé Publique, Rennes, France (M.D.); Division of Epidemiology and Community Health, School of Public Health, University of Minnesota, Minneapolis, MN (D.R.J.); Department of Nutrition, University of Oslo, Oslo, Norway (D.R.J.); Division of Periodontics, Section of Oral and Diagnostic Sciences, College of Dental Medicine, Columbia University, New York, NY (P.N.P.); Department of Neurology, Miller School of Medicine, University of Miami, Miami, FL (R.L.S., T.R.).

Correspondence to: Moïse Desvarieux, MD, PhD, Department of Epidemiology, Mailman School of Public Health, Columbia University, 722 W 168th Street, Room 525, New York, NY 10032. E-mail: mdesvarieux@columbia.edu

Received April 26, 2013; accepted August 16, 2013.



PLOS Pathogens 2014
Infectious Agents & Cancer 2016

More studies are needed to elucidate mechanisms whereby periodontal pathogens or ensuing inflammation cause or contribute to systemic disease. Nonetheless, **it is already clear that management of periodontal disease and proper oral care can positively effect MORBIDITY, MORTALITY and HEALTH CARE COSTS associated with non-oral systemic diseases.**

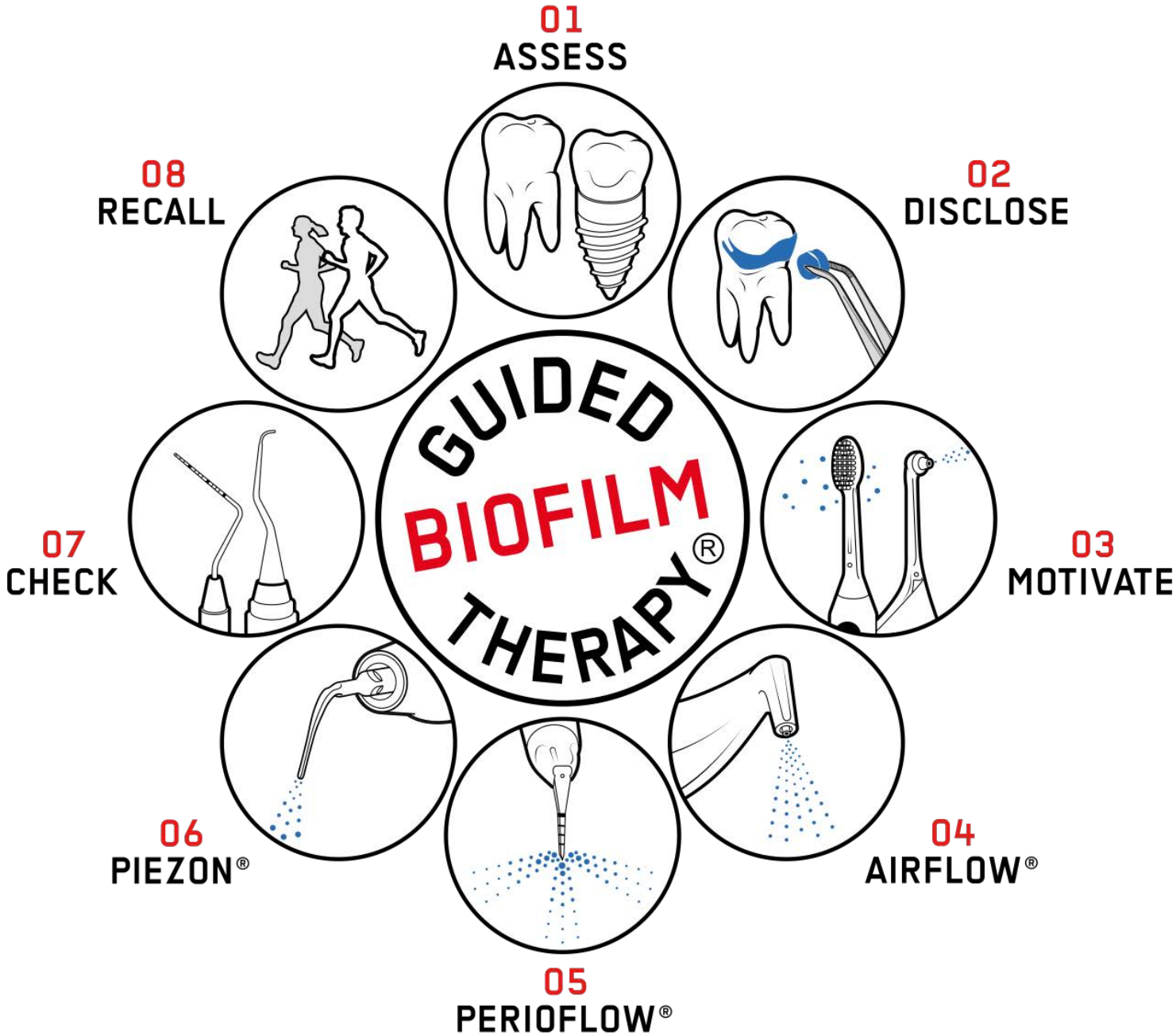
Biomedical Journal 2019

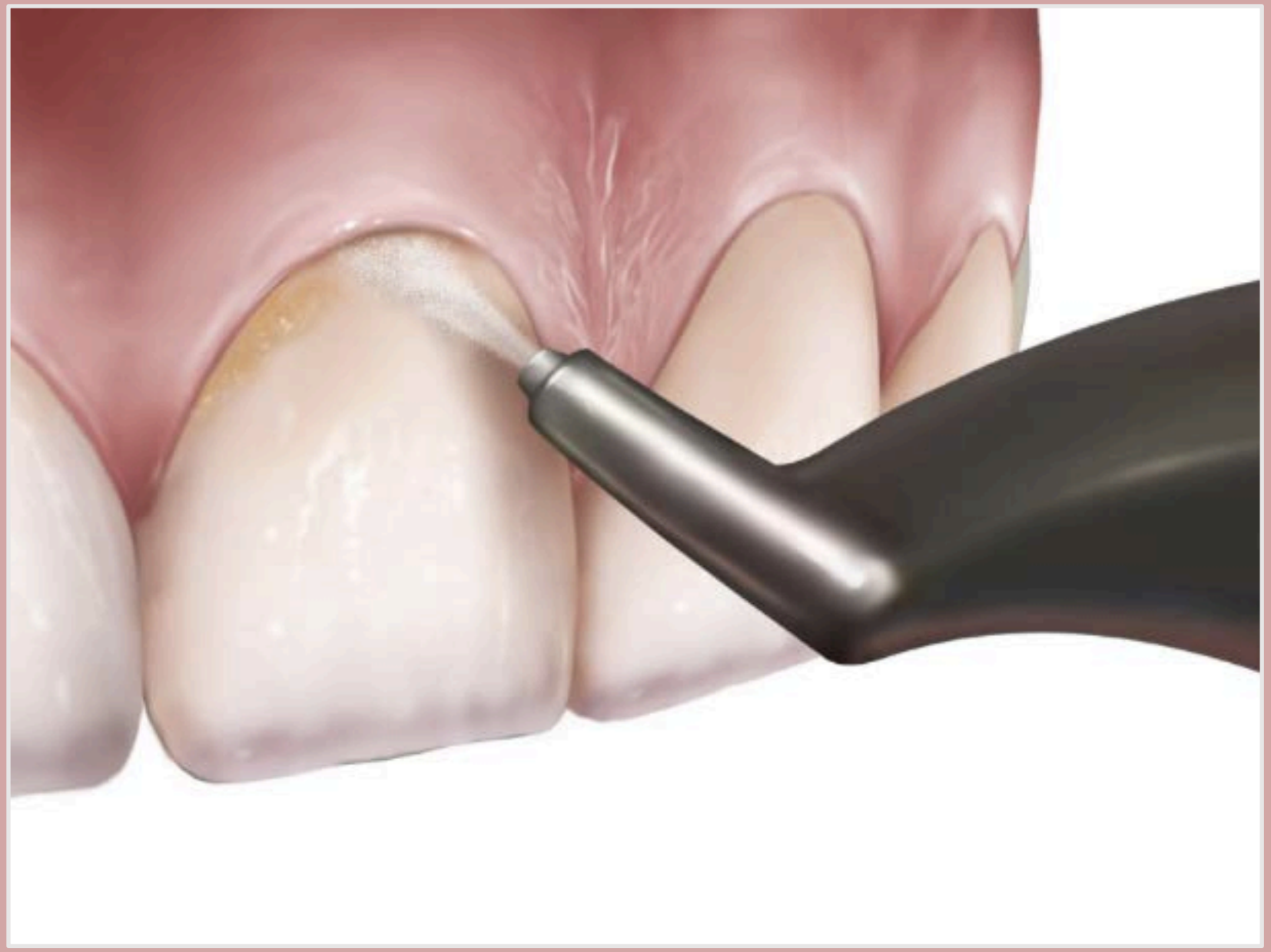
If pathogenic, dysbiotic biofilm is a driver of oral and systemic disease...

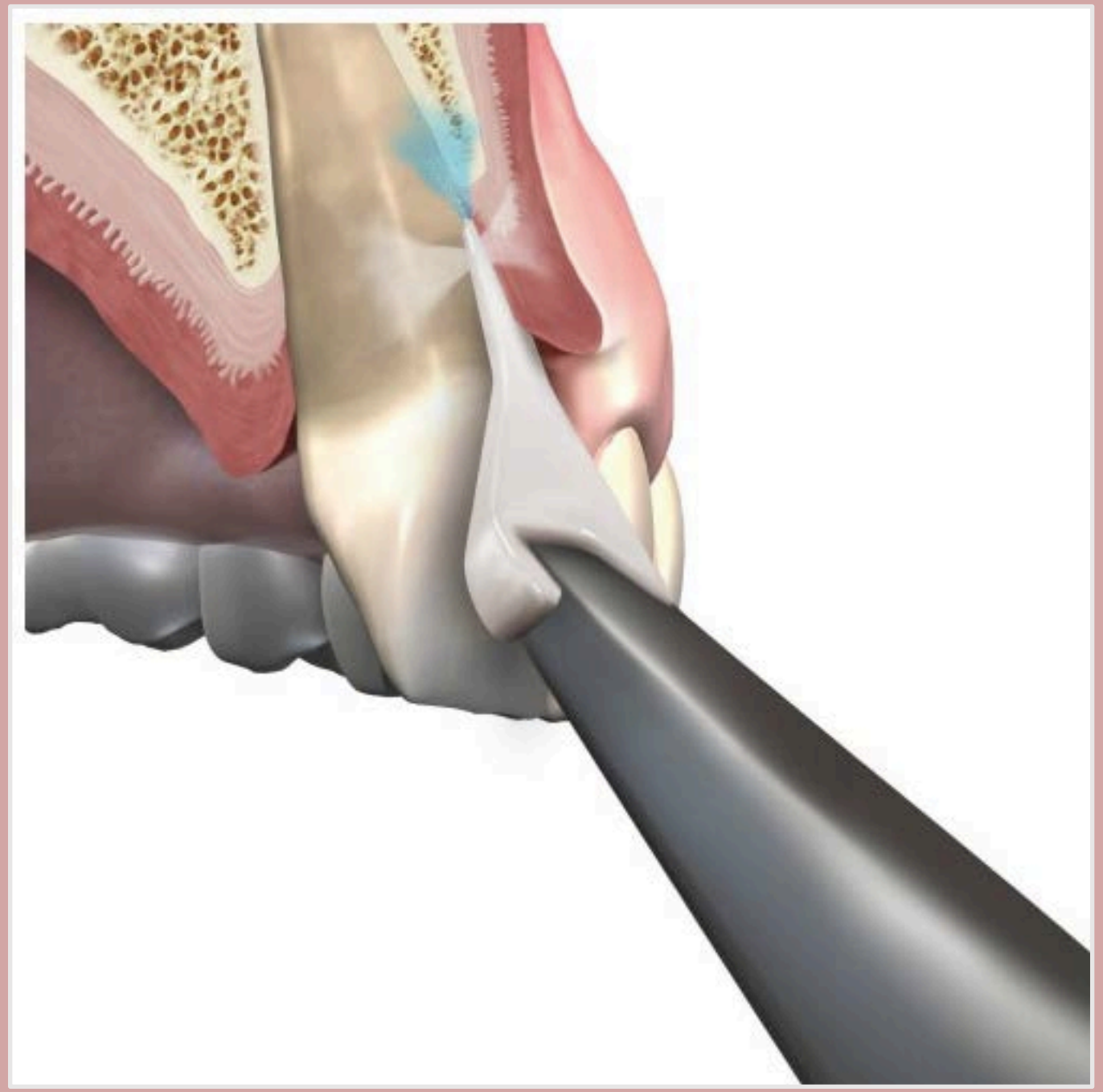
Is it time we shift our focus?

Is it time we shift our methods?

2. What do you know about Guided Biofilm Therapy?


01
ASSESS
02
DISCLOSE
03
MOTIVATE
04
AIRFLOW®
05
PERIOFLOW®
06
PIEZON®
07
CHECK
08
RECALL
GUIDED
BIOFILM
THERAPY®





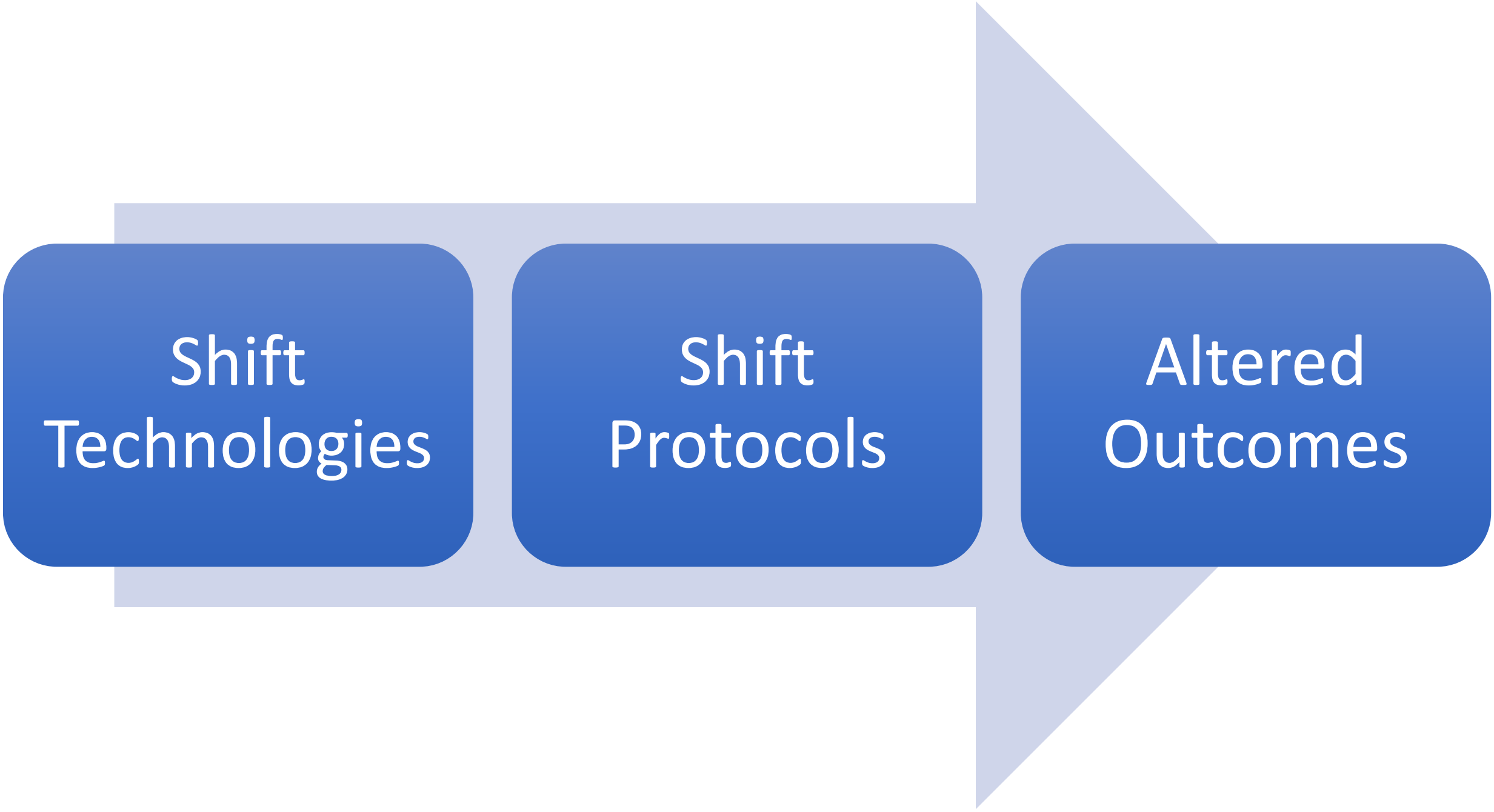
Low-Abrasive Powders

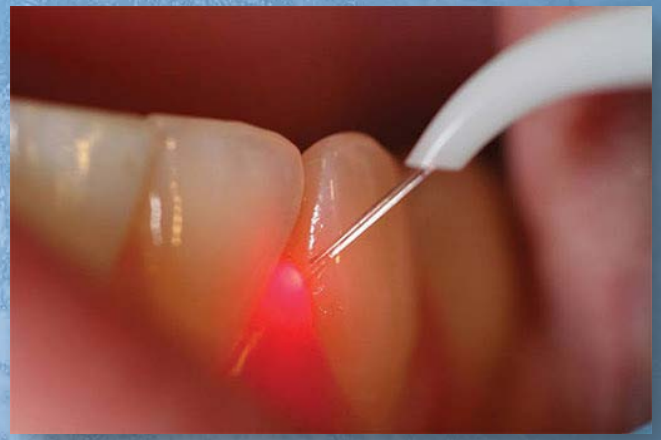
Glycine

25µm

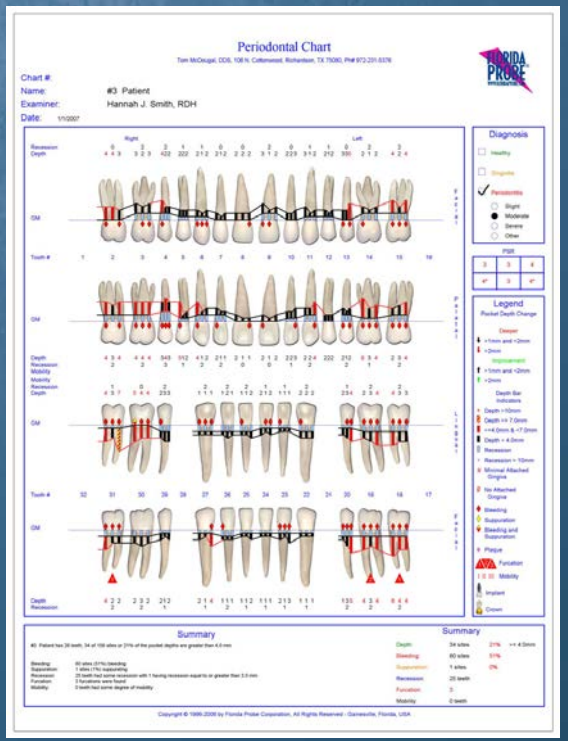
Erythritol

14µm


Shift Technologies
Shift Protocols
Altered Outcomes



why?


Periodontal Chart
Chart #:
Name: #3 Patient
Examiner: Hannah J. Smith, RDH
Date:
Diagnosis
Legend
Summary
Summary


mouthwatch

Magical

Not Magical

AIRFLOW® Prophylaxis Master

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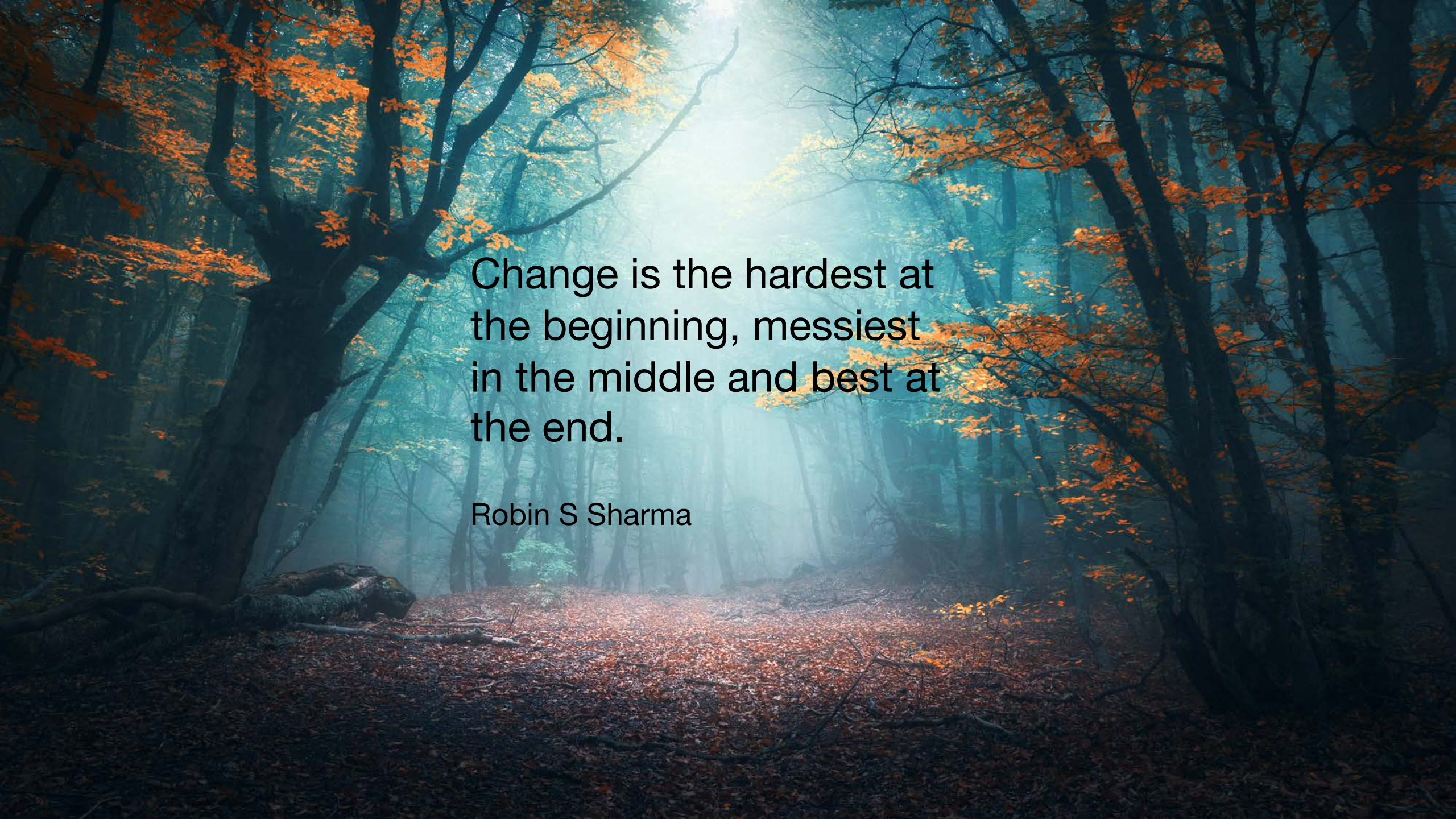
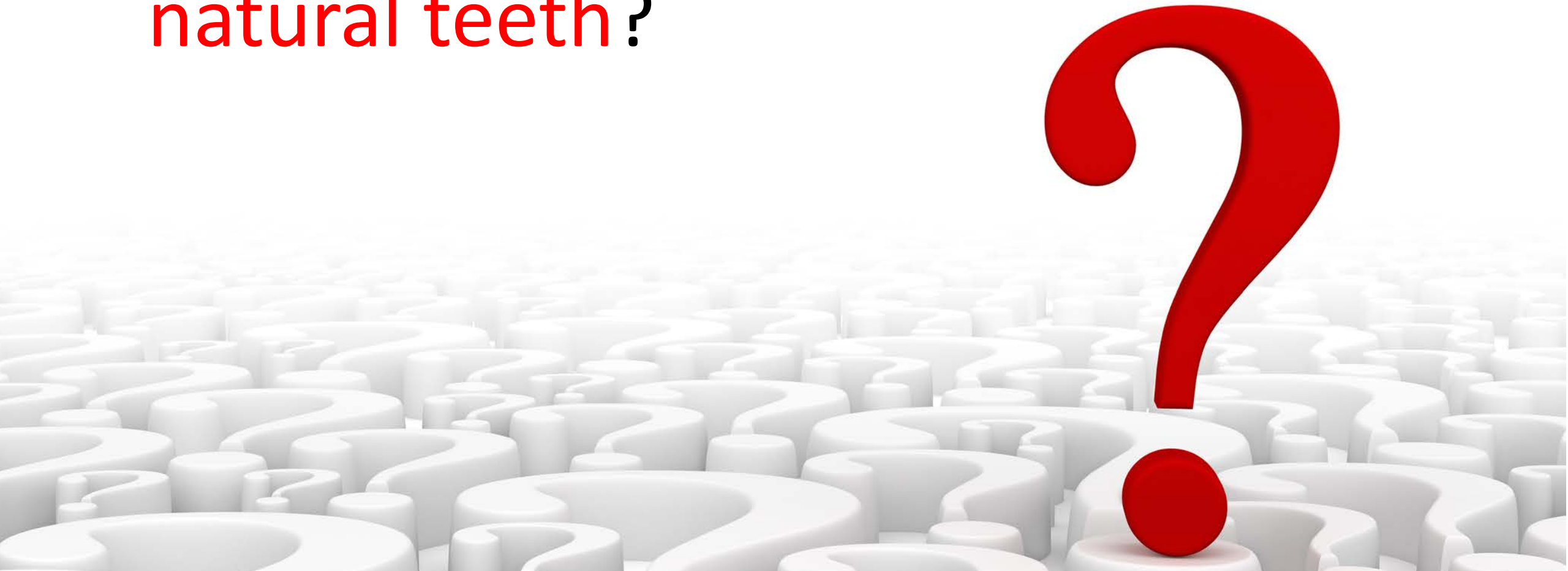
- Large powder chambers
- 360-degree Bluetooth wireless foot pedal
- 30% Boost feature for harder deposits or stain
- Touch panel to customize the power levels


Change is the hardest at the beginning, messiest in the middle and best at the end.
Robin S Sharma

3. How are you currently removing dysbiotic biofilm subgingivally from natural teeth?

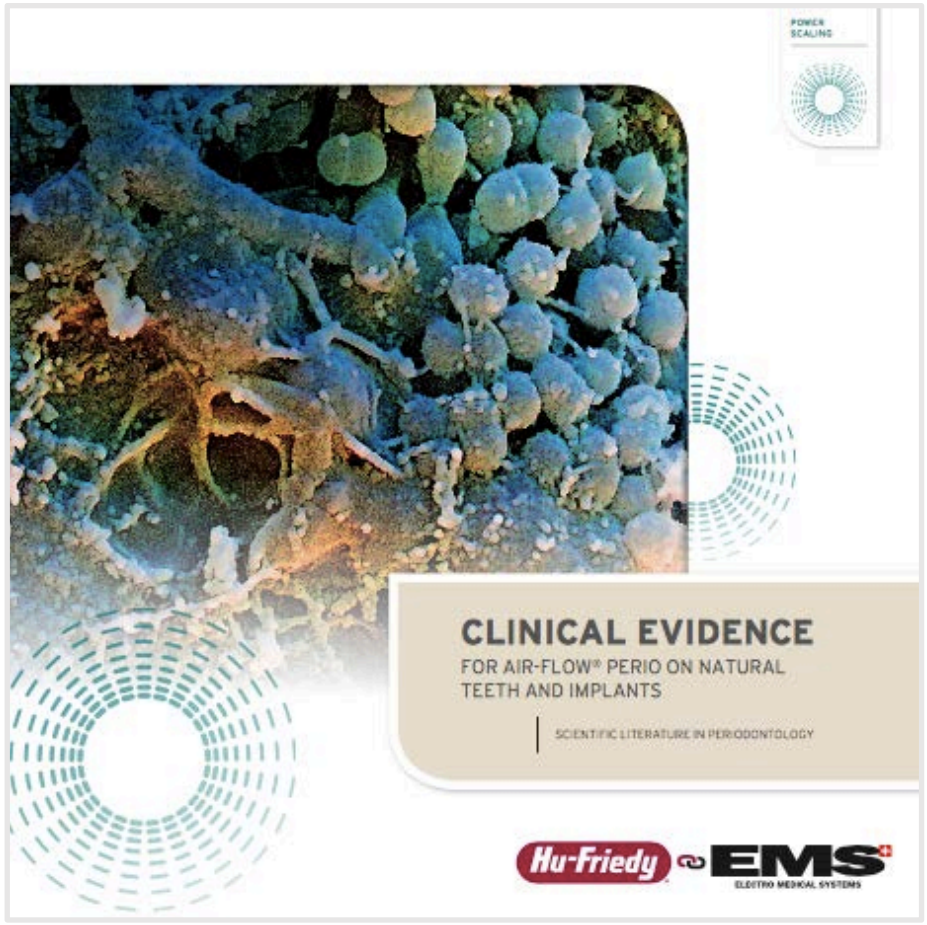


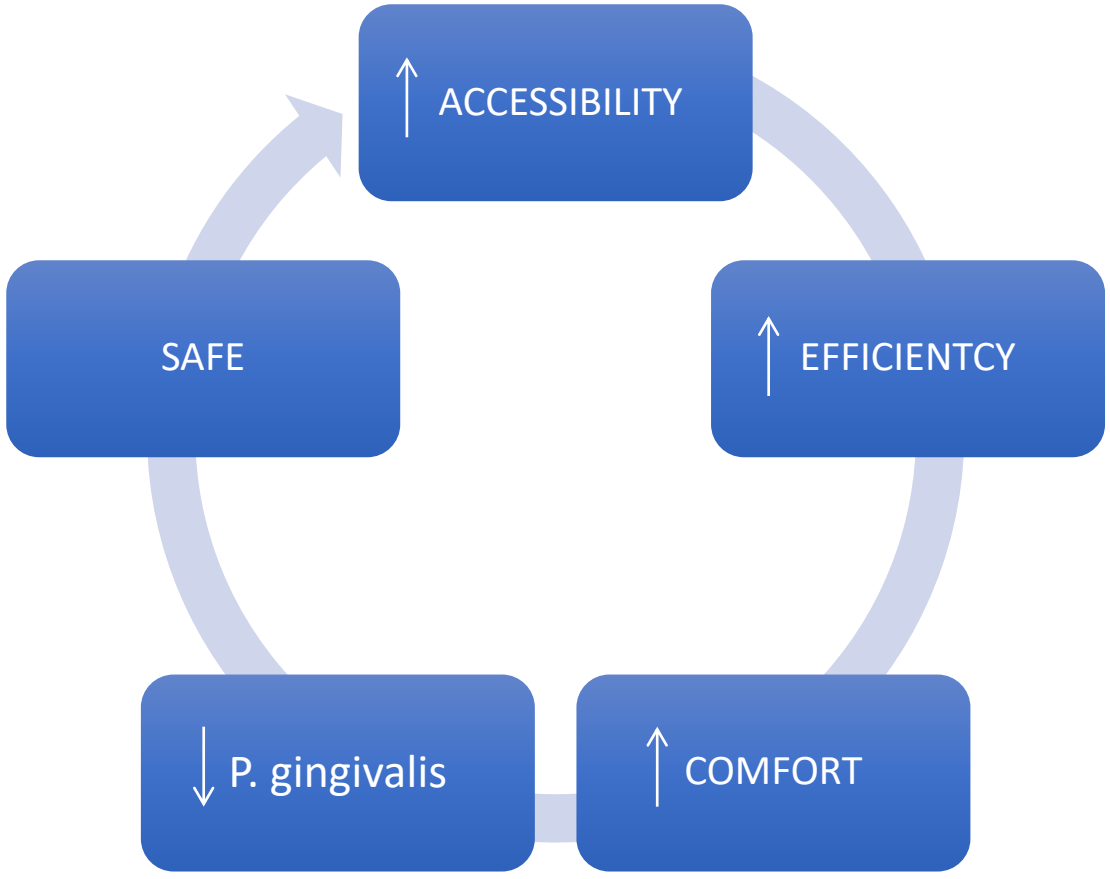
4. How are you currently removing dysbiotic biofilm subgingivally from implants?

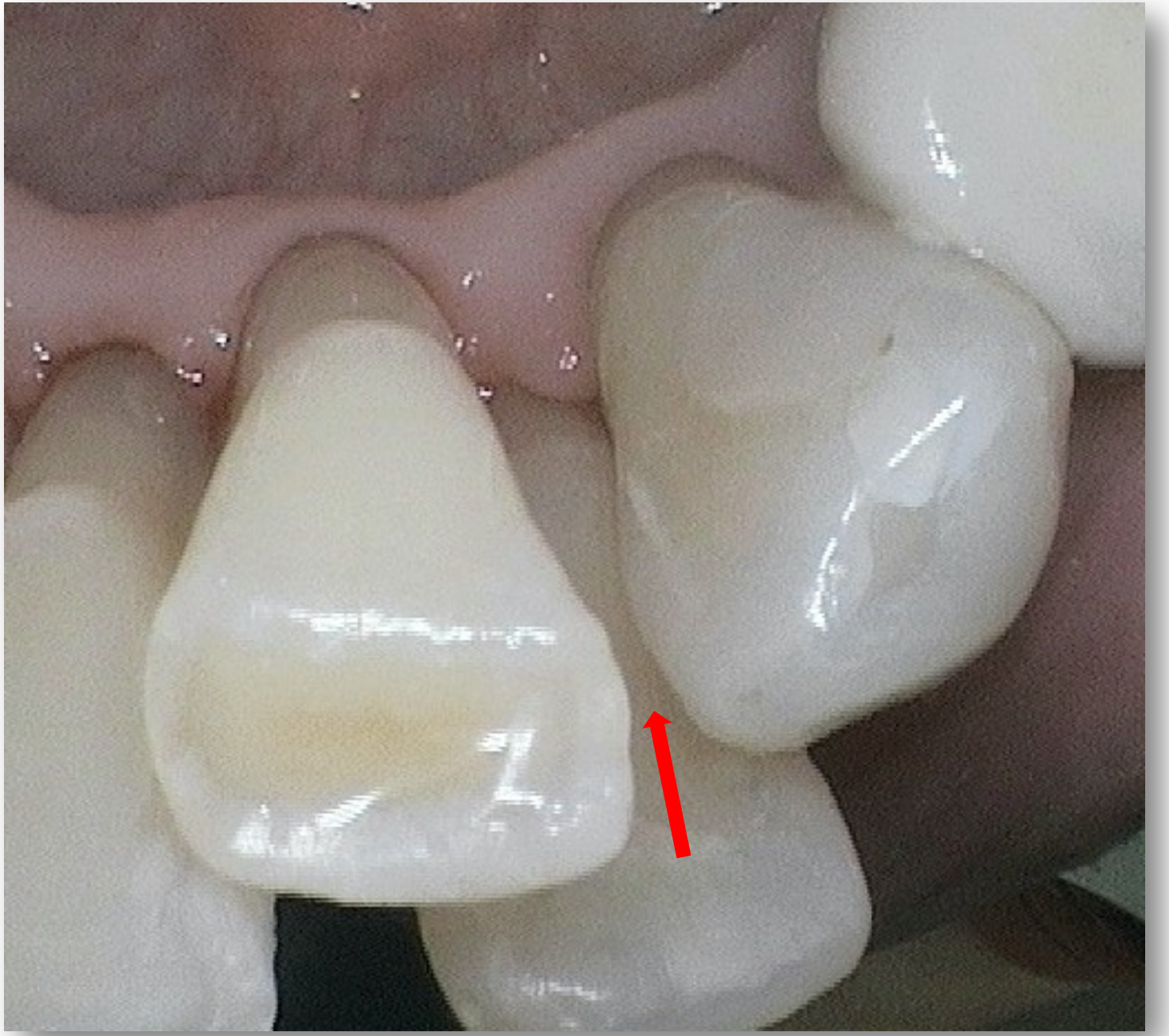
Why Remove Biofilm First?

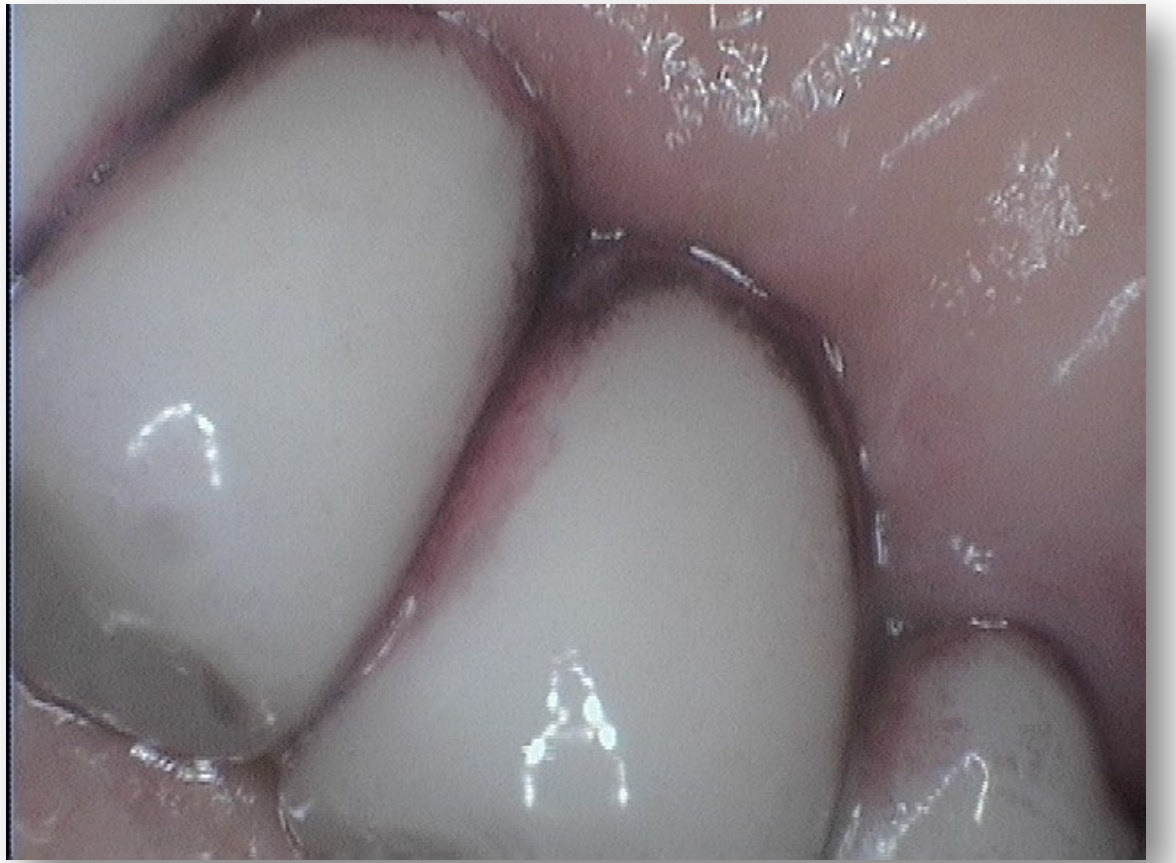
A Paradigm Shift in Mechanical Biofilm Management? Subgingival Air Polishing: A New Way to Improve Mechanical Biofilm Management in the Dental Practice

Quintessence International 2013










Courtesy of Dr. Gleb Aseev

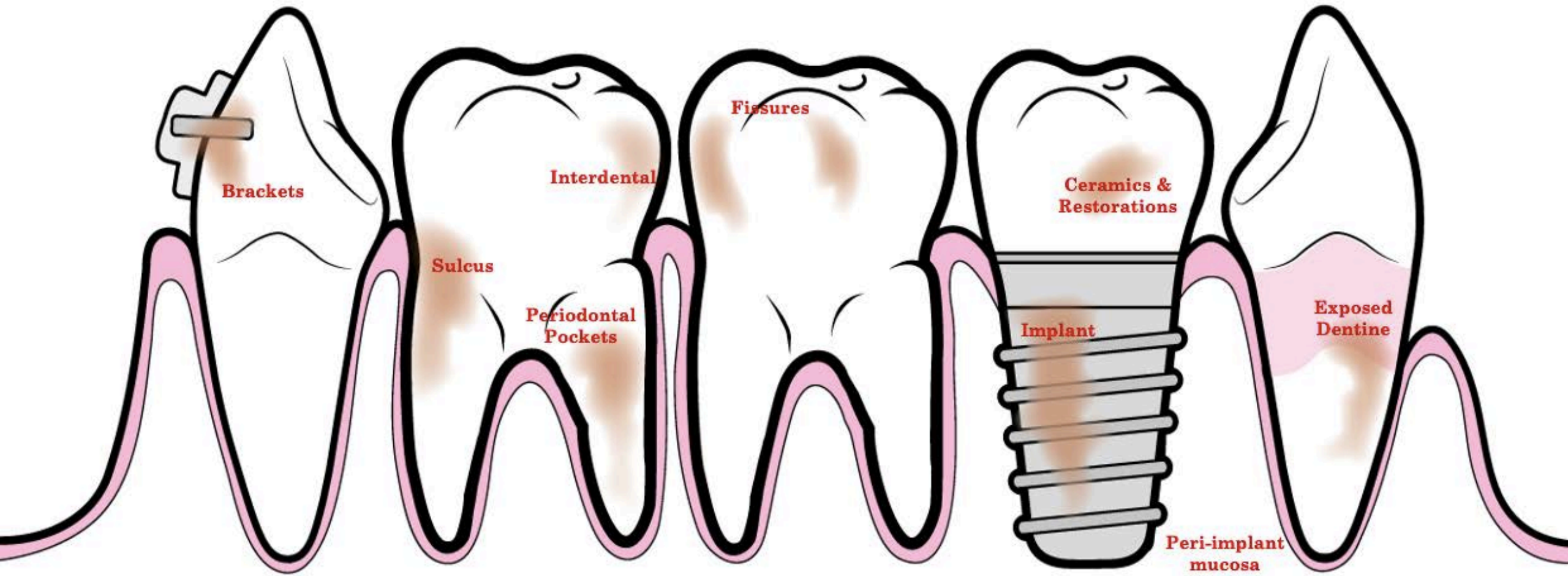

Courtesy of Dr. Gleb Aseev

AIRFLOW

GUIDED BIOFILM THERAPY®

REMOVE STAINS, BIOFILM AND YOUNG CALCULUS

EMS


Brackets
Interdental
Fissures
Ceramics &
Restorations
Sulcus
Periodontal
Pockets
Implant
Exposed
Dentine
Peri-implant
mucosa

Subgingival Debridement Efficacy of Glycine Powder Air Polishing

Thomas F. Flemmig,*† Marc Hetzel,‡ Heinz Topoll,‡ Joachim Gerss,§ Ingo Haeberlein,‖ and Gregor Petersilka†¶

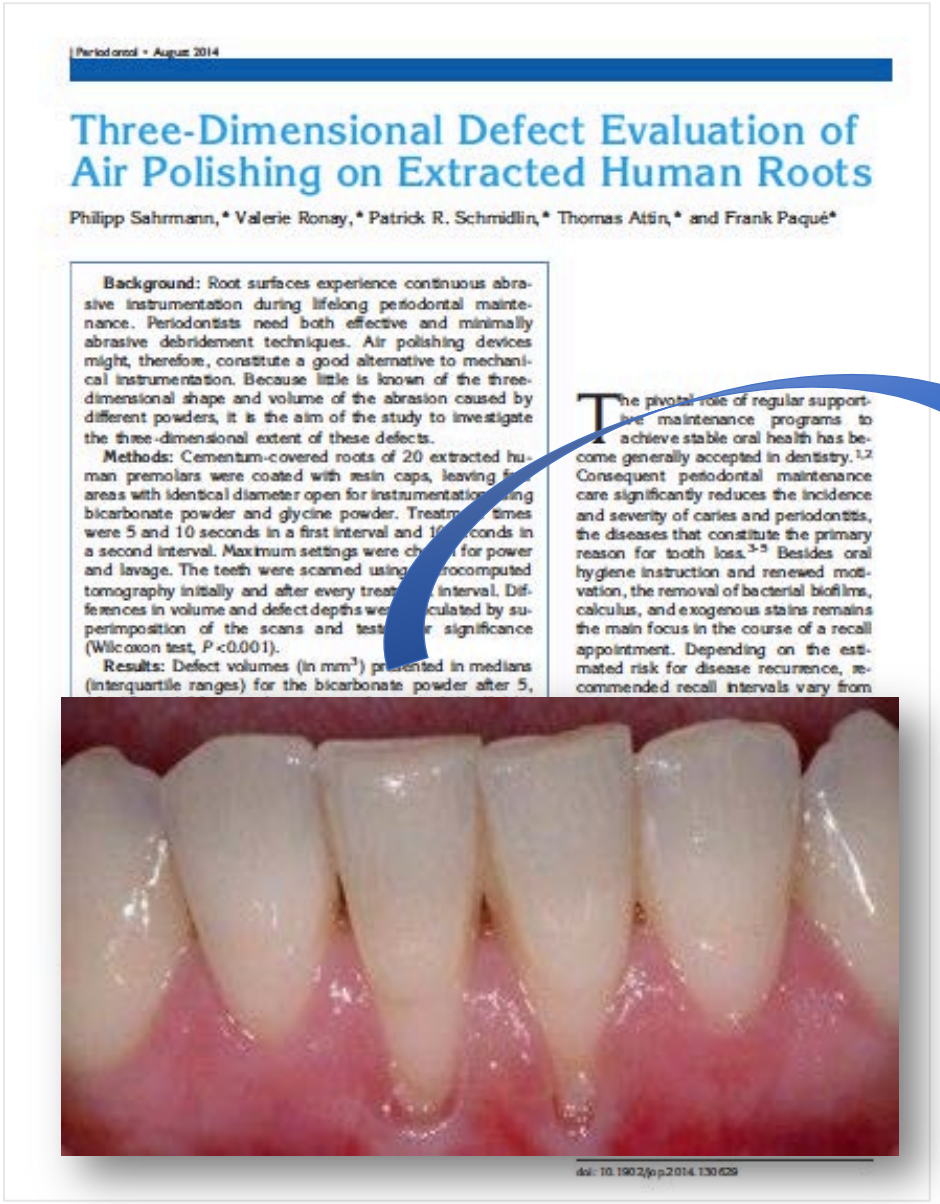
SPT.[7] It also indicates that the requirements for subgingival instrumentation in initial and supportive periodontal therapy are distinct with respect to abrasiveness. In initial therapy, highly abrasive instruments such as curets or sonic or ultrasonic scalers are needed for the ablation of hard and tenacious subgingival calculus. In SPT, the abrasiveness of the instrumentation method used should ideally be just high enough for biofilm removal, but low enough to mitigate any deleterious effects to the tooth surfaces and adjacent soft tissues. Abrasion on tooth surfaces might become substantial over time when the cumulative effects of repeated instrumentation in SPT are considered.[8-11]

With the goal of establishing an efficient and safe technique for subgingival biofilm removal in SPT, a low-abrasive glycine powder[#] was developed for use in commercially available injection abrasive water jets.

MATERIALS AND METHODS

Participants

Sixty patients ≥18 years of age with severe periodontitis were recruited from a private periodontal specialty practice. For inclusion into the study, subjects needed to have at least one tooth with a PD ≥6 mm on one or more sites and a prognosis deemed to be hopeless. Sufficient crown structure was needed so that the extraction could be achieved solely by the use of forceps to avoid contact with the subgingival root surface during the extraction procedure. Excluded were all patients <18 years of age, pregnant women, patients taking immune suppressive drugs or having received radiation therapy in the head and neck region, and patients with a coagulation disorder, cardiovascular disease, or infectious disease. All patients included into the study signed an informed



Three-Dimensional Defect Evaluation of Air Polishing on Extracted Human Roots

Philipp Sahrmann,* Valerie Ronay,* Patrick R. Schmidlin,* Thomas Attin,* and Frank Paqué*

Background: Root surfaces experience continuous abrasive instrumentation during lifelong periodontal maintenance. Periodontists need both effective and minimally abrasive debridement techniques. Air polishing devices might, therefore, constitute a good alternative to mechanical instrumentation. Because little is known of the three-dimensional shape and volume of the abrasion caused by different powders, it is the aim of the study to investigate the three-dimensional extent of these defects.

Methods: Cementum-covered roots of 20 extracted human premolars were coated with resin caps, leaving ... areas with identical diameter open for instrumentation ... bicarbonate powder and glycine powder. Treatm... times were 5 and 10 seconds in a first interval and 1... conds in a second interval. Maximum settings were ch... for power and lavage. The teeth were scanned using ... tocomputed tomography initially and after every treat... interval. Differences in volume and defect depths we... culated by superimposition of the scans and test... significance (Wilcoxon test, $P < 0.001$).

Results: Defect volumes (in mm^3) p... ted in medians (interquartile ranges) for the bicarbonate powder after 5,

The pivotal role of regular supportive maintenance programs to achieve stable oral health has become generally accepted in dentistry.[1,2] Consequent periodontal maintenance care significantly reduces the incidence and severity of caries and periodontitis, the diseases that constitute the primary reason for tooth loss.[3-5] Besides oral hygiene instruction and renewed motivation, the removal of bacterial biofilms, calculus, and exogenous stains remains the main focus in the course of a recall appointment. Depending on the estimated risk for disease recurrence, recommended recall intervals vary from

doi: 10.1902/jop.2014.130629

5 seconds sodium bicarb, considerable surface defects

10 seconds of glycine, no defects

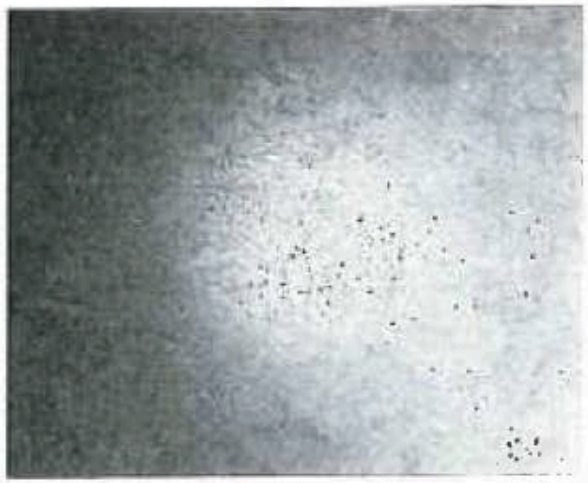
"For exposed roots, sodium bicarbonate cannot be recommended"

Sahrmann P, Ronay V, Schmidlin PR, Attin T, Paque F. Three dimensional defect Evaluation of air polishing on extracted human roots. Journal of Periodontology 2014;85;1107-1114

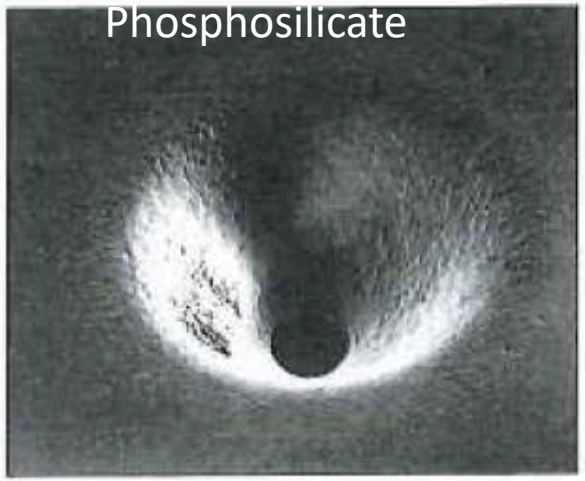
Hybrid Composite

5a. Dentsply sodium bicarbonate

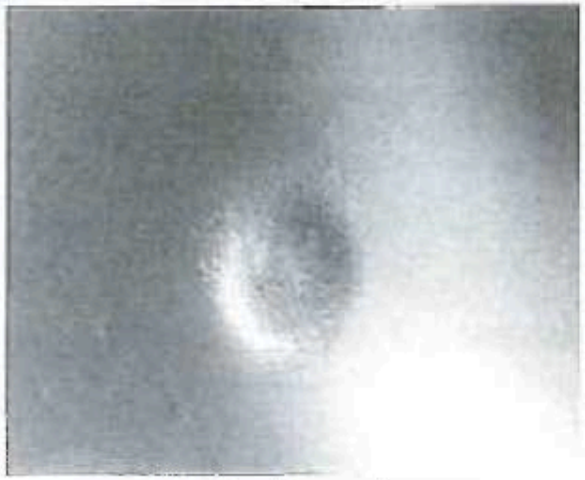
5b. Dentsply aluminum trihydroxide



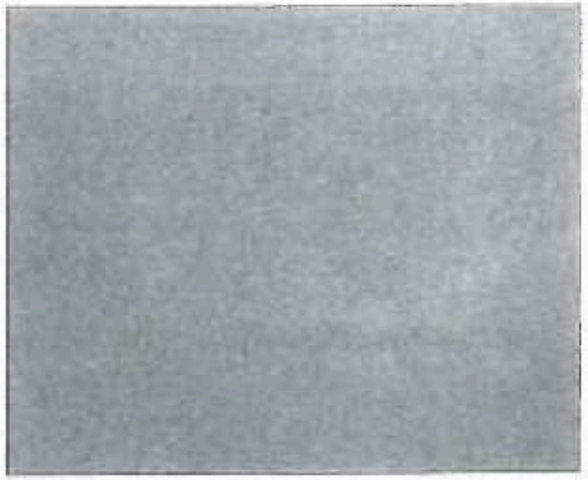
5c. EMS sodium bicarbonate



5d. Osspray calcium sodium phosphosilicate



5e. KaVo calcium carbonate



5f. EMS glycine

Journal of Clinical Dentistry 2014

Periodontol • November 2014

Biofilm Removal and Antimicrobial Activity of Two Different Air-Polishing Powders: An In Vitro Study

Lorenzo Drago,*† Massimo Del Fabbro,†§ Monica Bortolin,† Christian Vassena,* Elena De Vecchi,* and Silvio Taschieri†§

Background: Biofilm removal plays a central role in the prevention of periodontal and peri-implant diseases associated with microbial infections. Plaque debridement may be accomplished by air polishing using abrasive powders. In this study, a new formulation consisting of erythritol and chlorhexidine is compared with the standard glycine powder used in air-polishing devices. Their in vitro antimicrobial and antibiofilm effects on *Staphylococcus aureus*, *Bacteroides fragilis*, and *Candida albicans* are investigated.

Methods: Biofilm was allowed to grow on sandblasted titanium disks and air polished with glycine or erythritol-chlorhexidine powders. A semiquantitative analysis of biofilm by spectrophotometric assay was performed. A qualitative analysis was also carried out by confocal laser scanning microscopy. Minimum inhibitory concentrations and minimum microbicidal concentrations were evaluated, together with the microbial recovery from the residual biofilm after air-polishing treatment.

Results: The combination of erythritol and chlorhexidine displayed stronger antimicrobial and antibiofilm activity than glycine against all microbial strains tested.

Conclusion: Air polishing with erythritol-chlorhexidine seems to be a viable alternative to the traditional glycine treatment for biofilm removal. *J Periodontol 2014;85:e363-e369.*

KEY WORDS

Anti-infective agents; biofilms; dental polishing; erythritol; peri-implantitis; periodontitis.

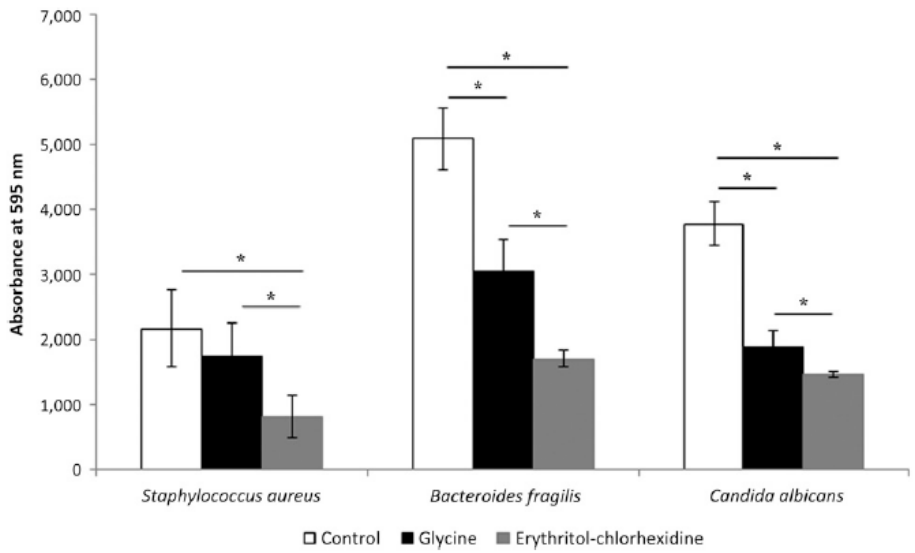
* Laboratory of Clinical Chemistry and Microbiology, Scientific Institute for Research, Hospitalization and Health Care (IRCCS); Galeazzi Orthopaedic Institute; Milan, Italy.
† Laboratory of Technical Sciences for Laboratory Medicine, Department of Biomedical Sciences for Health, University of Milan, Milan, Italy.
‡ Dental Clinic, IRCCS, Galeazzi Orthopaedic Institute.
§ Department of Biomedical, Surgical and Dental Sciences, University of Milan.

Subgingival biofilm removal is a fundamental part of periodontal therapy. Microbial biofilms are populations of microorganisms that are clustered at an interface (mostly solid–liquid) and usually enclosed within an extracellular polymeric matrix.[1] Periodontitis and peri-implantitis are bacterial infections associated with a complex microbiota of the dental biofilm that induce a local and systemic inflammatory response, leading to periodontal or peri-implant tissue breakdown.[2] Hand instruments and sonic or ultrasonic scalers may be used for debridement, though their use can be challenging and time consuming and may cause root damage over time.[3-6] Biofilm removal may also be achieved through the use of air-polishing devices.[7-10] However, conventional air polishing by means of water and sodium bicarbonate can be extremely abrasive to root cementum and dentin.[11-13] A less aggressive method using the amino acid glycine has been shown to induce minimum tooth and implant surface alterations while still removing biofilm with efficacy in vitro and in vivo.[14-18] In addition, this method has been used in the treatment of peri-implantitis and has been shown to be safe and provide good clinical results.[19,20]

More recently, erythritol was also adopted for use in air-polishing devices. Erythritol is a natural sugar alcohol produced by the reduction of erythrose.[21] It is

doi: 10.1902/jop.2014.140134

Erythritol PLUS powder is a valuable alternative to glycine

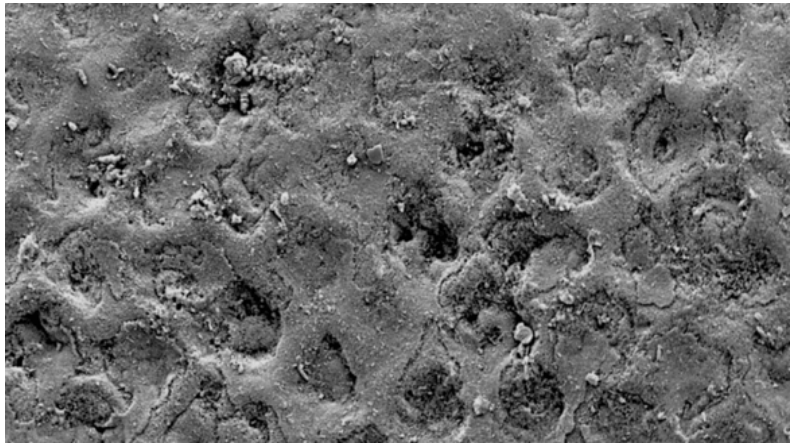


Drago L, Del Fabbro M, Bortolin M, Vassena C, De Vecchi E, Taschieri S. Biofilm removal and antimicrobial activity of two different air-polishing powders: an in vitro study. Journal of Periodontology. 2014;Nov;85(11):e363-9

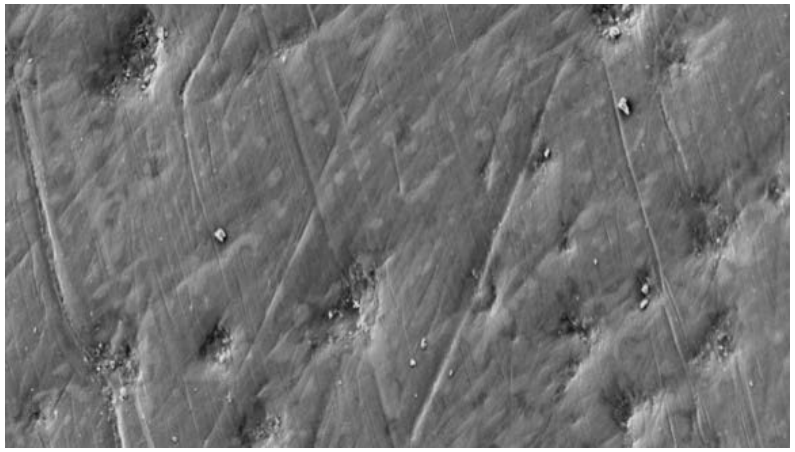
AIRFLOW PLUS

58% SMALLER / 37% HARDER THAN GLYCINE = FASTER BIOFILM/STAIN REMOVAL
LESS EFFORT

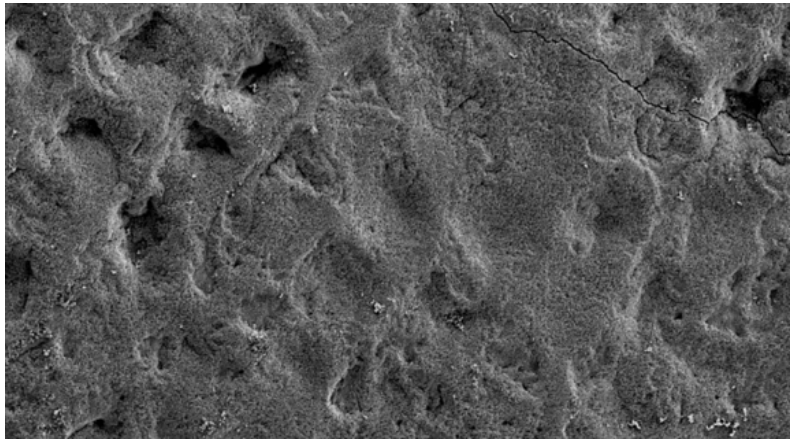
- Enhanced Biofilm/stain Removal
- Anti-bacterial
- Reduced biofilm formation/ adhesion
- Anti-cariogenic Neutral pH 7



BIOFILM ON ENAMEL



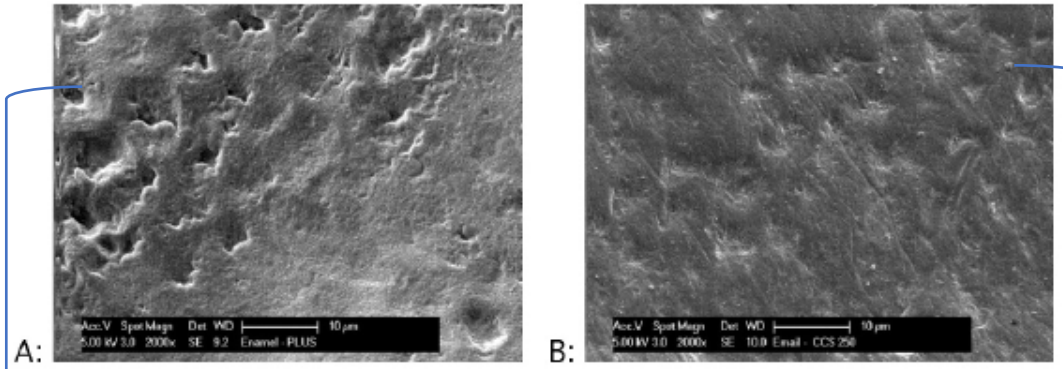
EMAMEL FOLLOWING
POLISHING WITH PASTE



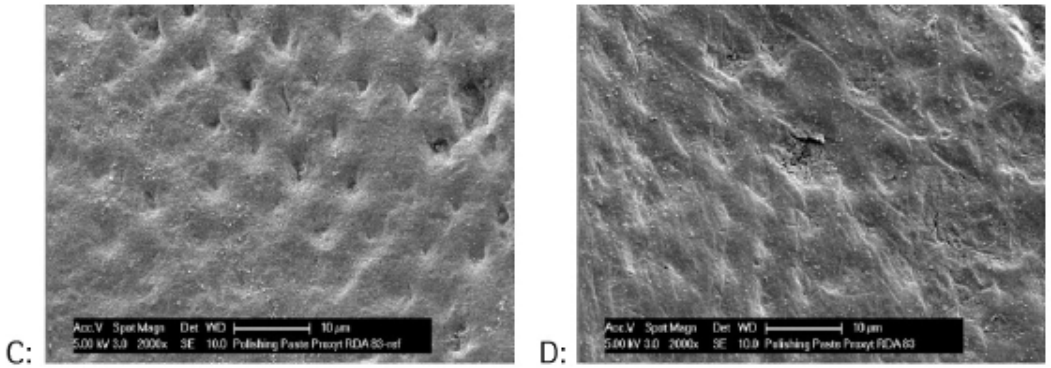
ENAMEL FOLLOWING
AIRFLOW
PLUS POWDER

Journal of Clinical Dentistry 2016

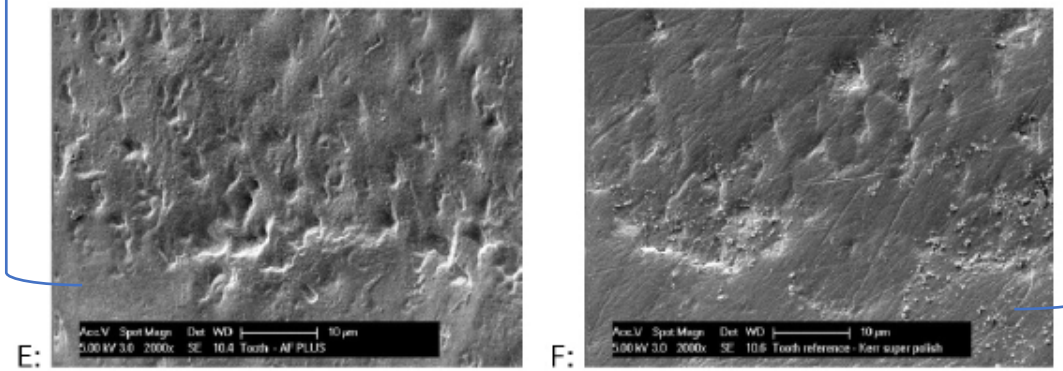
PLUS
POWDER
1/3 of time



RDA 250



RDA 83



RDA 10

POLISHING
PASTE

"Initial, or annual procedure only"

Journal of Clinical Dentistry 2016

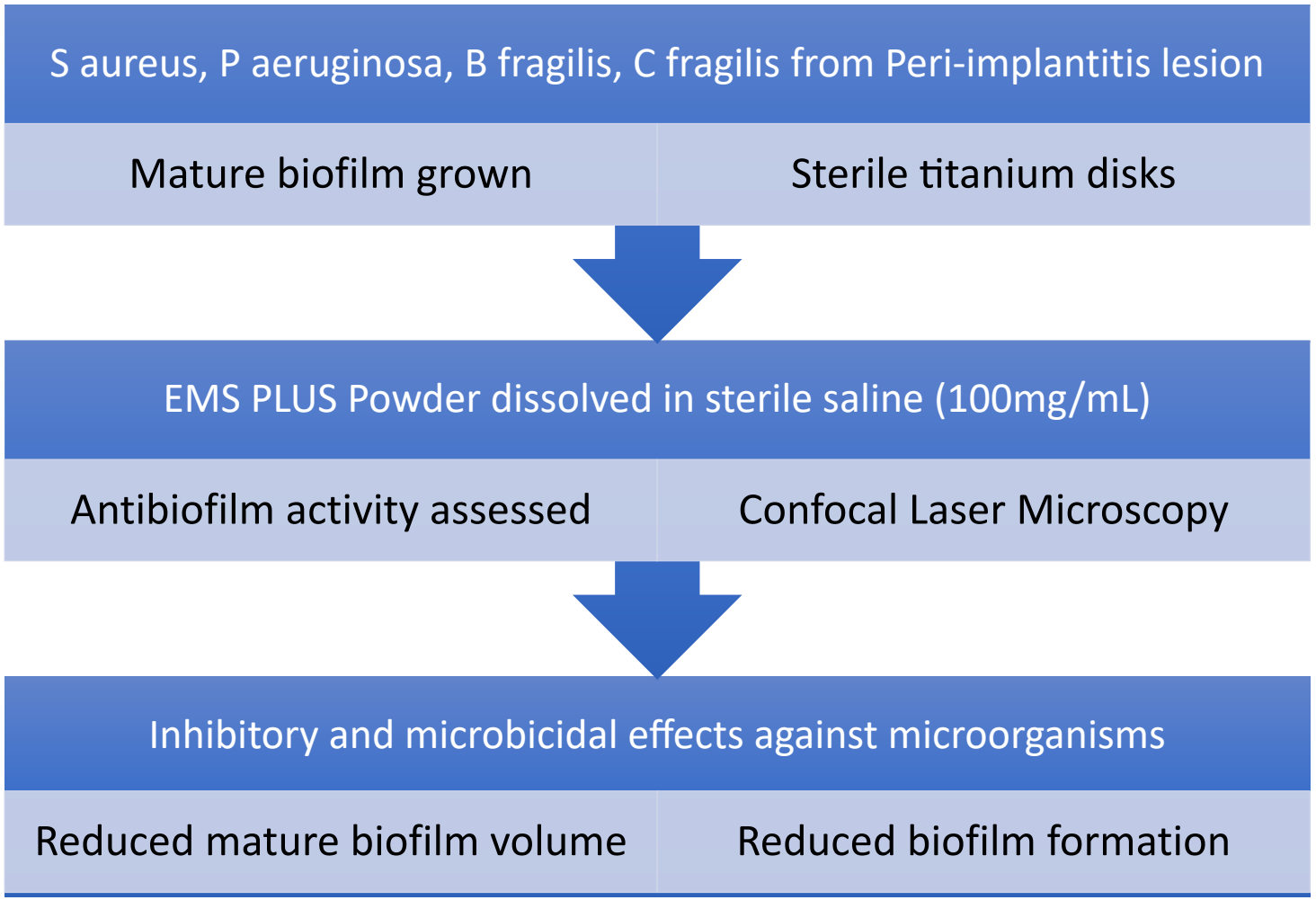
How is erythritol anticariogenic?

INHIBITS the growth of S mutans

Reduces ADHESION of S mutans on Smooth surfaces

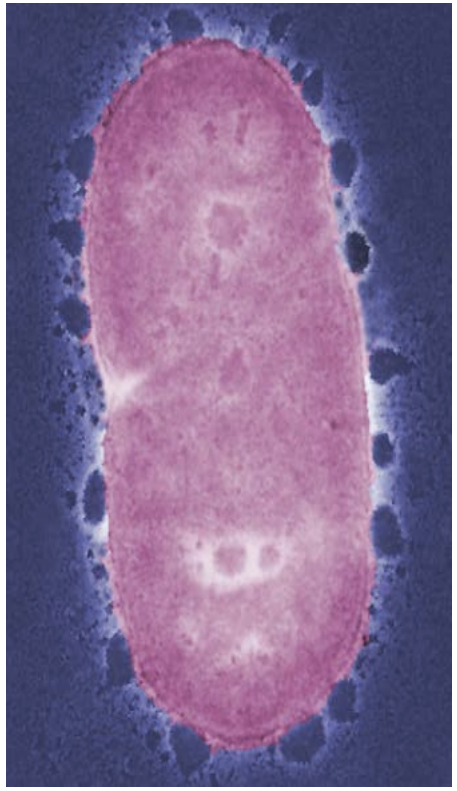
Park YN, Jeong SS, Zeng J, et al., Anti-cariogenic effects of erythritol on growth and adhesion of Streptococcus mutans. Food Science and Biotechnology 2014;vol. 23, no.5.1587 – 1591

Anti-biofilm Activity of PLUS Powder

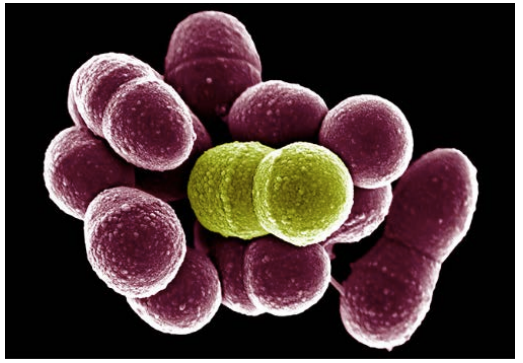


Drago L, Bortoli M, Taschieri S, De Vecchi E, Agrappi S, et.al. Erythritol/Chlorhexidine combination reduces microbial biofilm and prevents its formation on titanium surfaces in vitro. Journal of Oral Pathology & Medicine 2016. Doi: 10.111/jop.12536

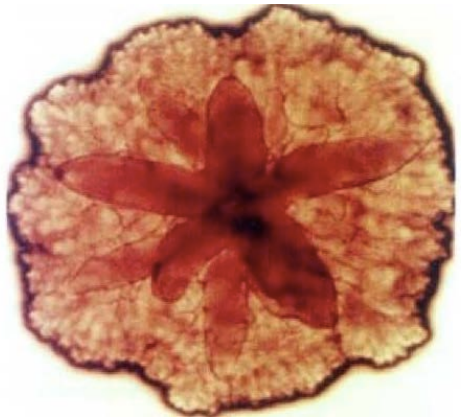
Erythritol has inhibitory effect on key pathogens, in vitro



Porphyromonas gingivalis



streptococcus gordonii



Aggregatibacter actinomycetemcomitans

E.Hashino, M.Kuboniwa, S.A.Alghamdi, M.Yamaguchi, R.Yamamoto.Erythritol alters microstructure and metabolomic profiles of biofilm composed of streptococcus Gordinii and Porphyromonas gingivalis. Molecular Oral Microbiology, 2013, 435-451

Effect of Essential Oil and Chlorhexidine Mouthwashes on Gingival Fibroblast Survival and Migration

Ioannis Tsourounakis,* Angela A. Palaiologou-Gallis,* Diana St
and Thomas E Lallier†‡

EO displayed no detectable detrimental effects on human gingival and PDL fibroblasts, whereas CHX reduced both cell migration and long-term survival

Background: Chemical plaque control is the most commonly recommended means of oral hygiene after periodontal surgery. Commercially available mouthwashes contain a variety of active ingredients that have bactericidal properties but may potentially be toxic to the host cells. The goal of this in vitro study is to investigate the effect of commercially available mouthwashes on the survival and migratory capacity of human fibroblasts.

Methods: Human gingival and periodontal ligament (PDL) fibroblasts were treated with commercially available mouthwashes that contained either chlorhexidine (CHX) or essential oils (EO) as the active ingredient. Each mouthwash was tested over a range of concentrations for its ability to affect fibroblast survival and migration, as well as long-term effects on cell viability.

One of the main goals after periodontal surgical therapy is to provide access that will allow the patient and the dentist to perform proper oral hygiene for daily plaque control. Immediately after periodontal surgery, mechanical cleaning should be avoided because of patient sensitivity and to allow undisturbed healing. Therefore,

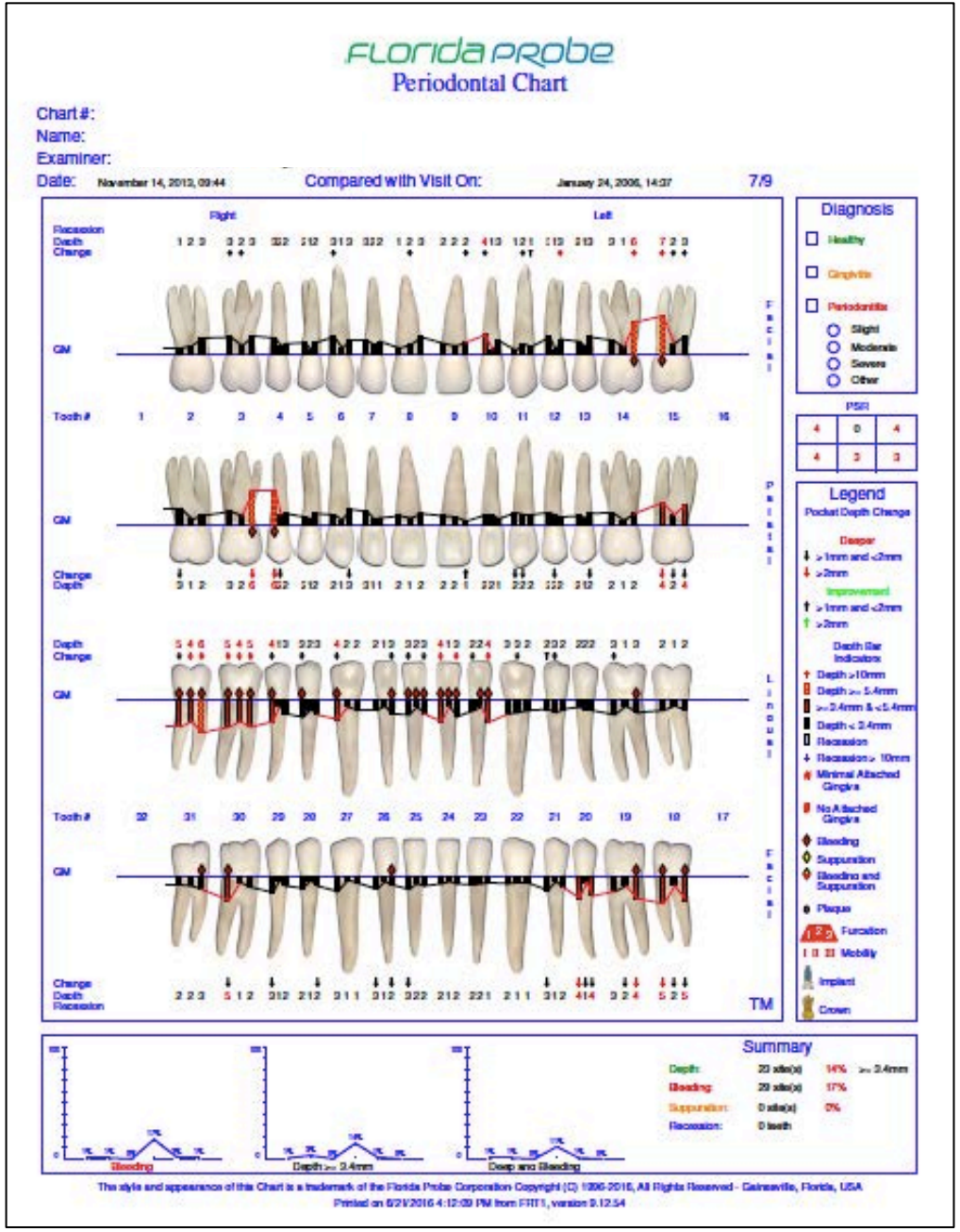
Cetylpyridinium Chloride (CPC) instead of Chlorhexidine (CHX)

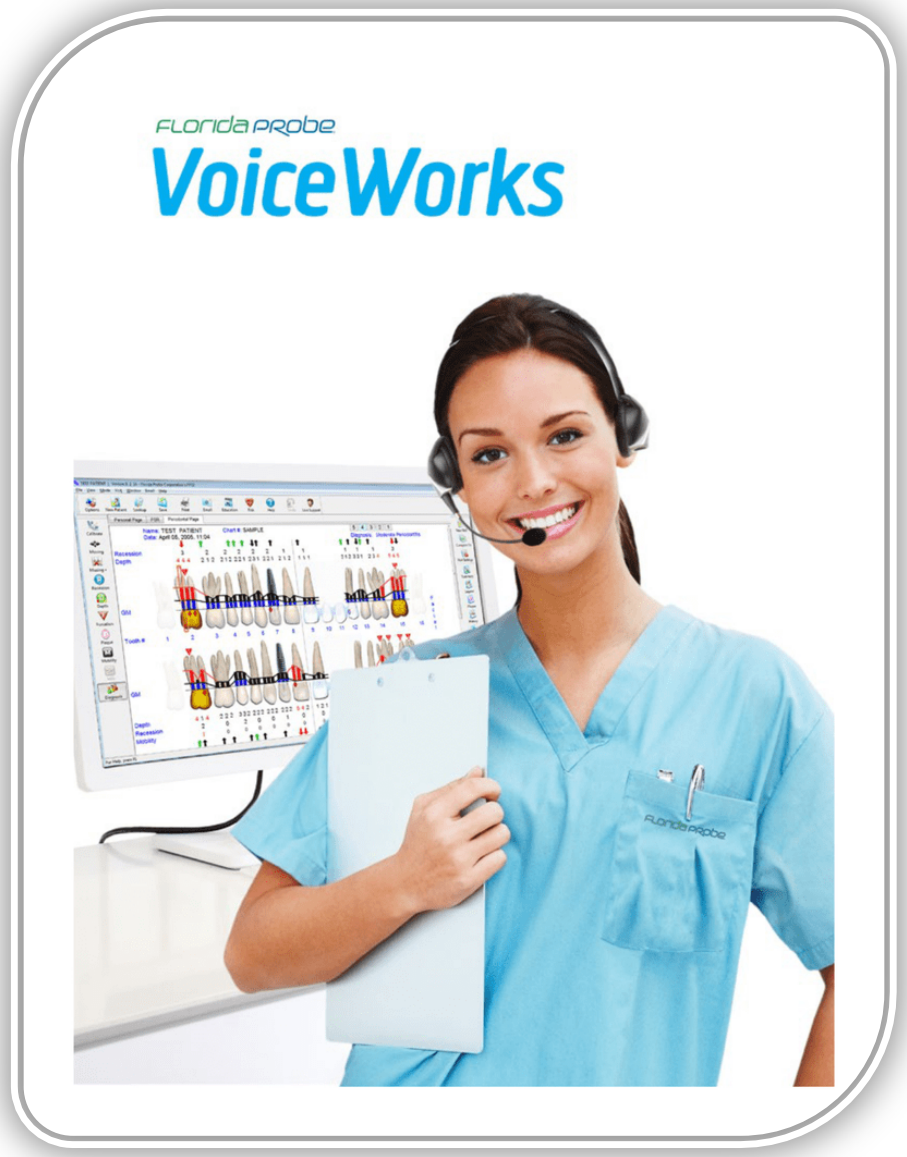
AIRFLOW Subgingival Biofilm Removal

Angulation (Toward the gingival margin) 3 – 5mm from the tooth

Movement (Continuous, sweeping; not pumping)

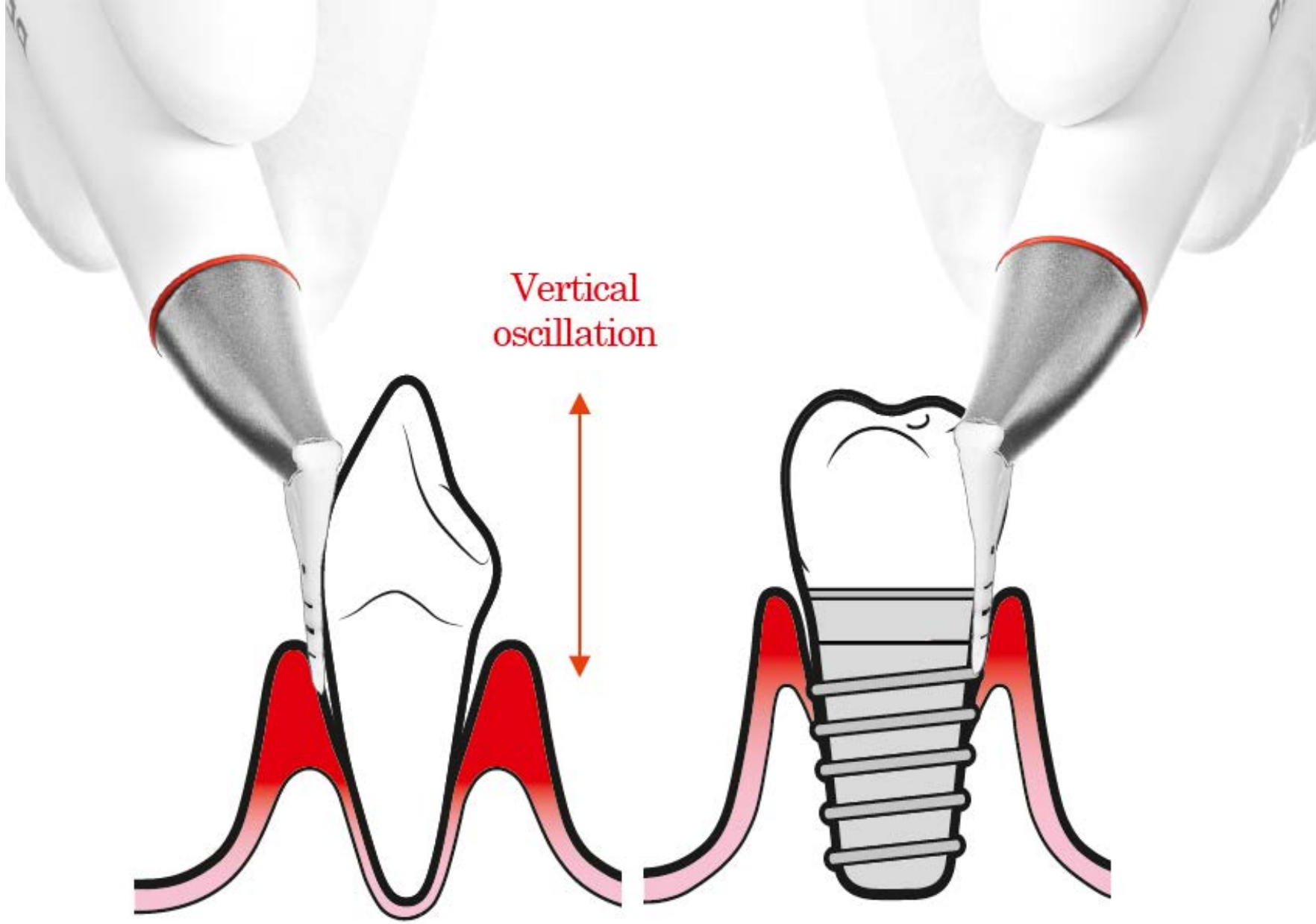
PERIOFLOW® for Deeper Pockets





Floridaprobe.com

HOW DO YOU THINK PATIENTS REACT TO THIS TYPE OF PERIODONTAL ASSESSMENT?


Vertical
oscillation

Jentsch et al. BMC Oral Health (2020) 20:364
https://doi.org/10.1186/s12903-020-01363-5

BMC Oral Health

RESEARCH ARTICLE Open Access

Adjunctive air-polishing with erythritol in nonsurgical periodontal therapy: a randomized clinical trial

Holger F. R. Jentsch[1*], Christian Flechsig[2], Benjamin Kette[2] and Sigrun Eick[3]

Abstract

Background: This study was aimed to investigate if the adjunctive use of erythritol air-polishing powder applied with the nozzle-system during subgingival instrumentation (SI) has an effect on the outcome of non-surgical periodontal treatment in patients with moderate to severe periodontitis.

Methods: Fourty-two individuals with periodontitis received nonsurgical periodontal therapy by SI without (controls, n = 21) and with adjunctive air-polishing using nozzle + erythritol powder (test, n = 21). They were analyzed for the clinical variables BOP (primary outcome at six months), probing depth (PD), attachment level, four selected microorganisms and two biomarkers at baseline, before SI as well as three and six months after SI. Statistical analysis included nonparametric tests for intra- and intergroup comparisons.

Results: In both groups, the clinical variables PD, attachment level and BOP significantly improved three and six months after SI. The number of sites with PD ≥ 5 mm was significantly lower in the test group than in the control group after six months. At six months versus baseline, there were significant reductions of *Tannerella forsythia* and *Treponema denticola* counts as well as lower levels of MMP-8 in the test group.

Conclusions: Subgingival instrumentation with adjunctive erythritol air-polishing powder does not reduce BOP. But it may add beneficial effects like reducing the probing depth measured as number of residual periodontal pocket with PD ≥ 5 mm when compared with subgingival instrumentation only.

Clinical relevance: The adjunctive use of erythritol air-polishing powder applied with the nozzle-system during SI may improve the clinical outcome of SI and may reduce the need for periodontal surgery.

Trial registration The study was retrospectively registered in the German register of clinical trials, DRKS00015239 on 6th August 2018, https://www.drks.de/drks_web/navigate.do?navigationId=trial.HTML&TRIAL.

Keywords: Periodontitis, Subgingival instrumentation, Clinical variables, Subgingival microorganisms, Erythritol, Biomarker

At 6 months versus baseline Adjunctive use of PERIOFLOW with Erythritol PLUS Powder with SRP:

- decreased pocket depths >5mm
- decreased levels of T. forsythia & T. denticola
- lowered MMP-8 levels

significantly more than controls with SRP only

Jentsch, H.F.R., Flechsig, C., Kette, B. *et al.* Adjunctive air-polishing with erythritol in nonsurgical periodontal therapy: a randomized clinical trial. *BMC Oral Health* **20,** 364 (2020). https://doi.org/10.1186/s12903-020-01363-5

PERIOFLOW Subgingival Biofilm Removal

Vertical movement inside the pocket with PERIOFLOW tip

5 second application in deep pockets

Supportive Periodontal Therapy Patients

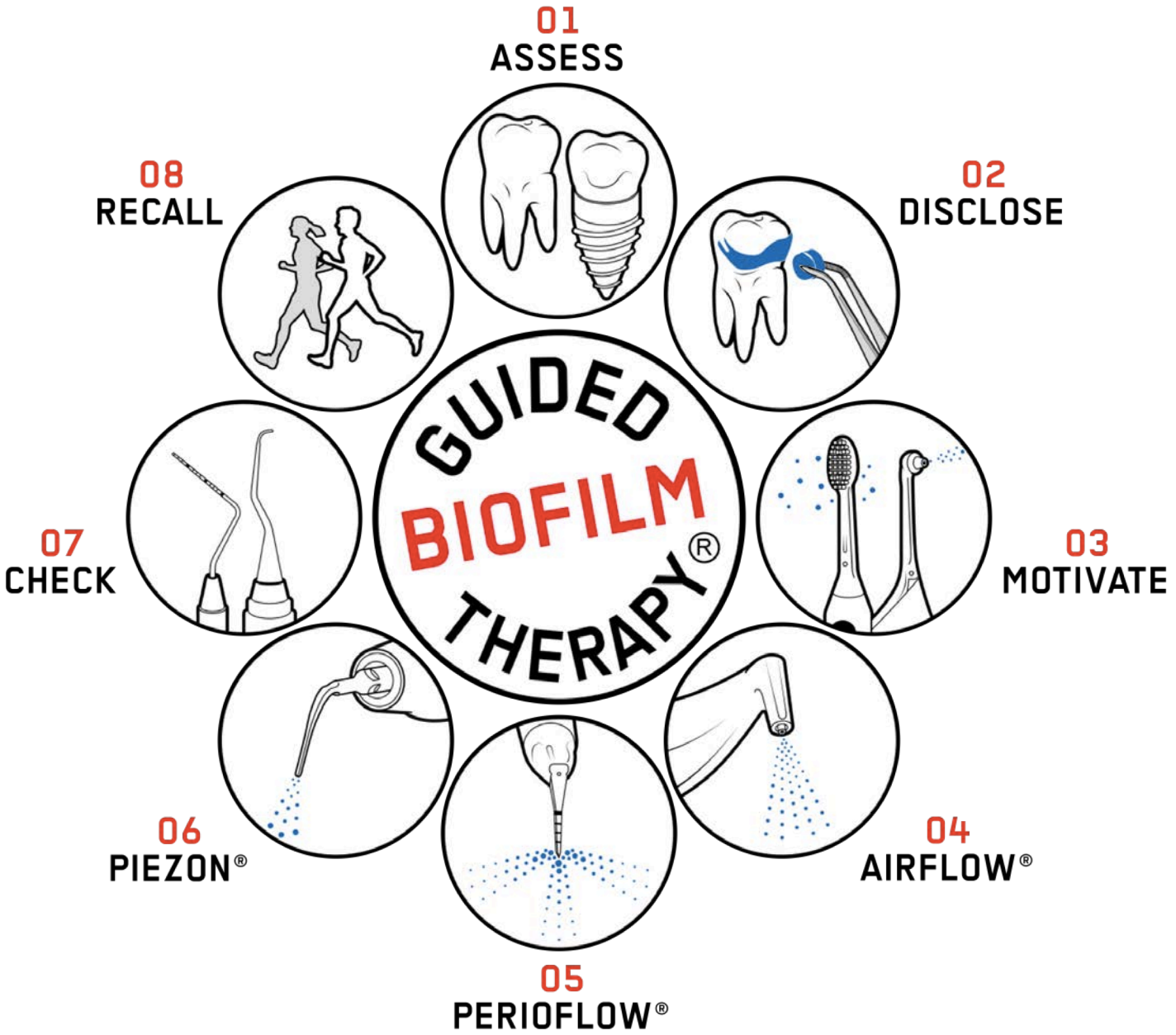
MOST COMMON INTERVAL FREQUENCY?

LOCALIZED SUPRAGINGIVAL CALCULUS PRESENT?

GENERALIZED SUBGINGIVAL CALCULUS PRESENT?

GENERALIZED SUBGINGIVAL BIOFILM PRESENT?

EXPOSED ROOT SURFACES & RESTORATIVE MATERIALS?



Preservation

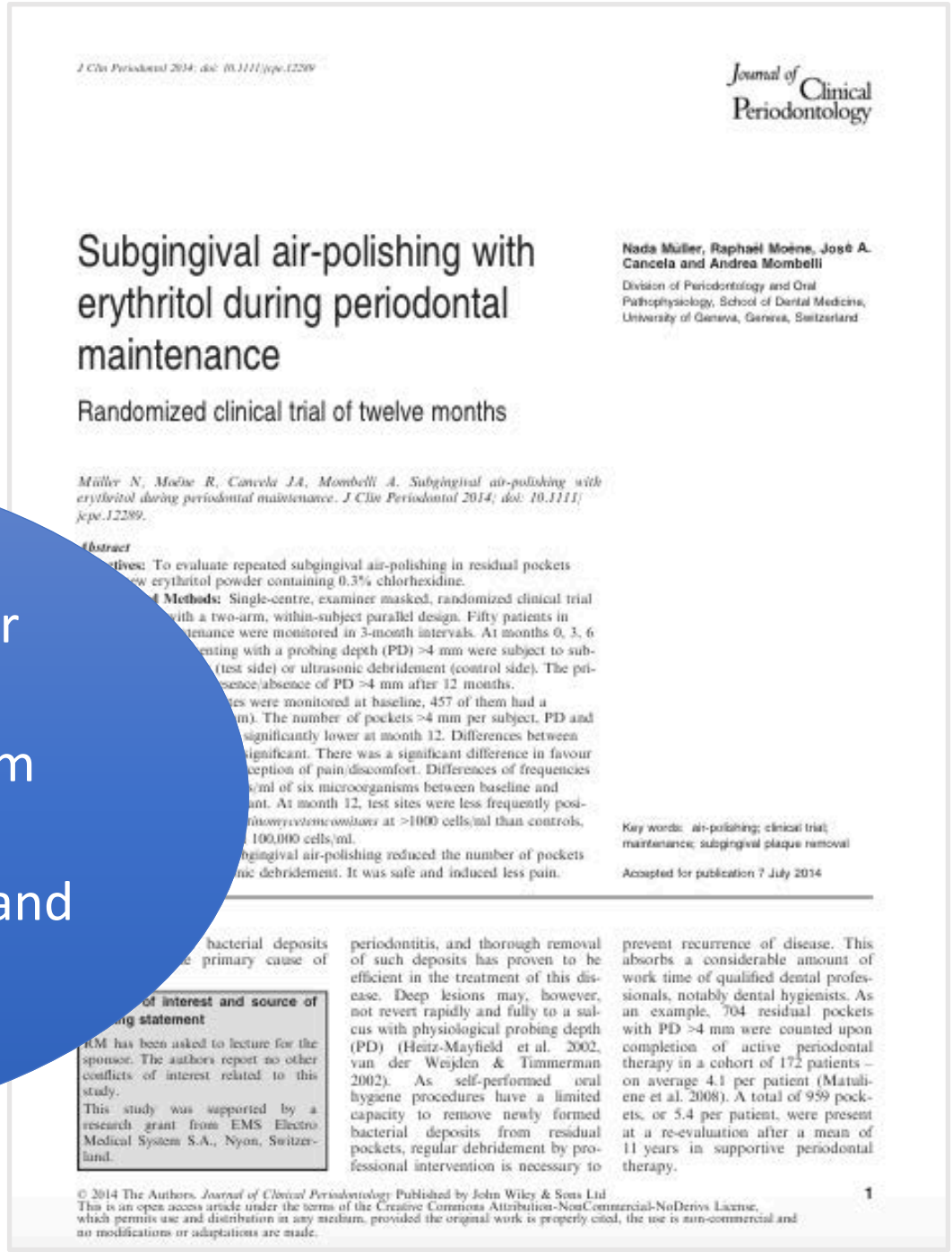
Preference

Efficiency

With PM, do you need to scale every tooth, every pocket?

457 sites >4mm
Baseline, 3, 6, 9,12 months
229 Air Polishing
228 Ultrasonic Debridement

Repeated subgingival air polishing reduced the number of pockets >4mm similar to ultrasonic debridement. It was safe and induced less pain.



J Clin Periodontol 2014; doi: 10.1111/jcpe.12289

Journal of Clinical Periodontology

Subgingival air-polishing with erythritol during periodontal maintenance

Randomized clinical trial of twelve months

Nada Müller, Raphaël Moëne, José A. Cancela and Andrea Mombelli
Division of Periodontology and Oral Pathophysiology, School of Dental Medicine, University of Geneva, Geneva, Switzerland

Müller N, Moëne R, Cancela JA, Mombelli A. Subgingival air-polishing with erythritol during periodontal maintenance. J Clin Periodontol 2014; doi: 10.1111/jcpe.12289.

Abstract

...ctives: To evaluate repeated subgingival air-polishing in residual pockets ...w erythritol powder containing 0.3% chlorhexidine.

... Methods: Single-centre, examiner masked, randomized clinical trial ...ith a two-arm, within-subject parallel design. Fifty patients in ...tenance were monitored in 3-month intervals. At months 0, 3, 6 ...enting with a probing depth (PD) >4 mm were subject to sub- ... (test side) or ultrasonic debridement (control side). The pri- ...sence/absence of PD >4 mm after 12 months.

...es were monitored at baseline, 457 of them had a ...m). The number of pockets >4 mm per subject, PD and ... significantly lower at month 12. Differences between ...significant. There was a significant difference in favour ...ception of pain/discomfort. Differences of frequencies .../ml of six microorganisms between baseline and ...ant. At month 12, test sites were less frequently posi- ...tive for ... at >1000 cells/ml than controls, ... 100,000 cells/ml.

...gingival air-polishing reduced the number of pockets ...ic debridement. It was safe and induced less pain.

Key words: air-polishing; clinical trial; maintenance; subgingival plaque removal

Accepted for publication 7 July 2014

... bacterial deposits ... primary cause of ...

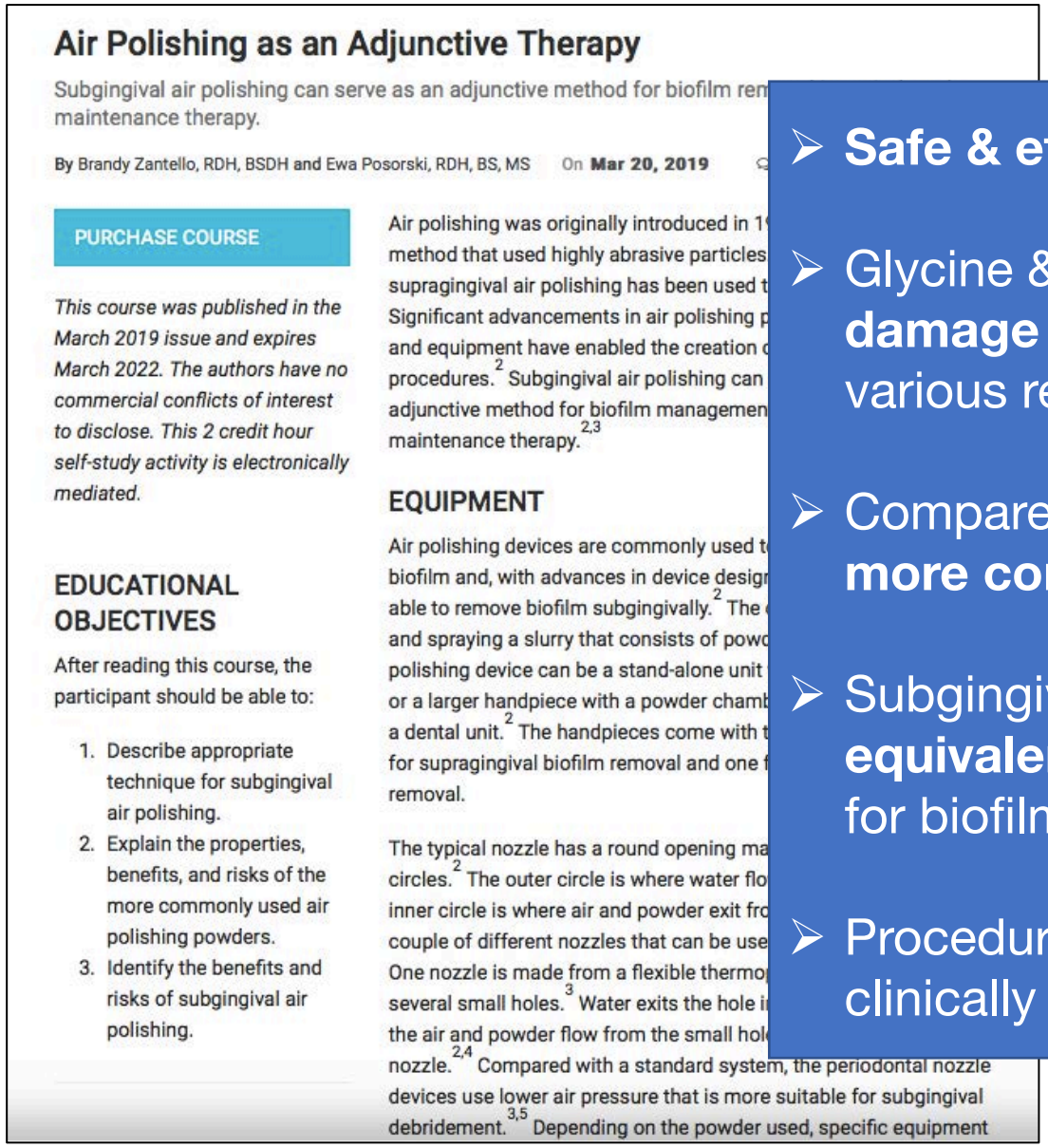
... of interest and source of ...g statement

...RM has been asked to lecture for the sponsor. The authors report no other conflicts of interest related to this study.

This study was supported by a research grant from EMS Electro Medical System S.A., Nyon, Switzerland.

periodontitis, and thorough removal of such deposits has proven to be efficient in the treatment of this disease. Deep lesions may, however, not revert rapidly and fully to a sulcus with physiological probing depth (PD) (Heitz-Mayfield et al. 2002, van der Weijden & Timmerman 2002). As self-performed oral hygiene procedures have a limited capacity to remove newly formed bacterial deposits from residual pockets, regular debridement by professional intervention is necessary to prevent recurrence of disease. This absorbs a considerable amount of work time of qualified dental professionals, notably dental hygienists. As an example, 704 residual pockets with PD >4 mm were counted upon completion of active periodontal therapy in a cohort of 172 patients – on average 4.1 per patient (Matuliene et al. 2008). A total of 959 pockets, or 5.4 per patient, were present at a re-evaluation after a mean of 11 years in supportive periodontal therapy.

THE JOURNAL OF PROFESSIONAL EXCELLENCE
Dimensions
OF DENTAL HYGIENE



Air Polishing as an Adjunctive Therapy

Subgingival air polishing can serve as an adjunctive method for biofilm rem
maintenance therapy.

By Brandy Zantello, RDH, BSDH and Ewa Posorski, RDH, BS, MS On **Mar 20, 2019**

PURCHASE COURSE

This course was published in the March 2019 issue and expires March 2022. The authors have no commercial conflicts of interest to disclose. This 2 credit hour self-study activity is electronically mediated.

EDUCATIONAL OBJECTIVES

After reading this course, the participant should be able to:

1. Describe appropriate technique for subgingival air polishing.
2. Explain the properties, benefits, and risks of the more commonly used air polishing powders.
3. Identify the benefits and risks of subgingival air polishing.

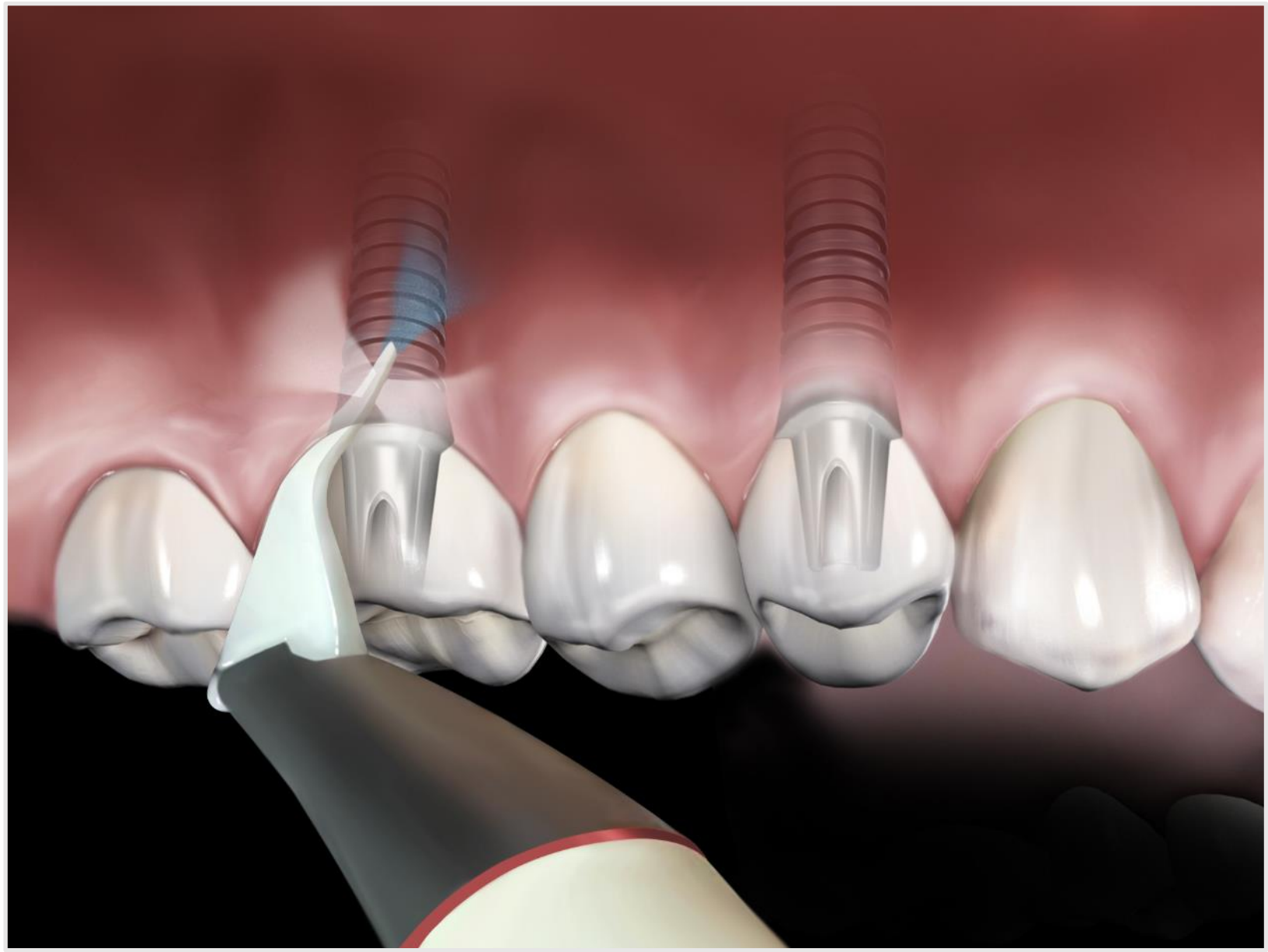
Air polishing was originally introduced in 1
method that used highly abrasive particles
supragingival air polishing has been used t
Significant advancements in air polishing p
and equipment have enabled the creation o
procedures.[2] Subgingival air polishing can
adjunctive method for biofilm managemen
maintenance therapy.[2,3]

EQUIPMENT

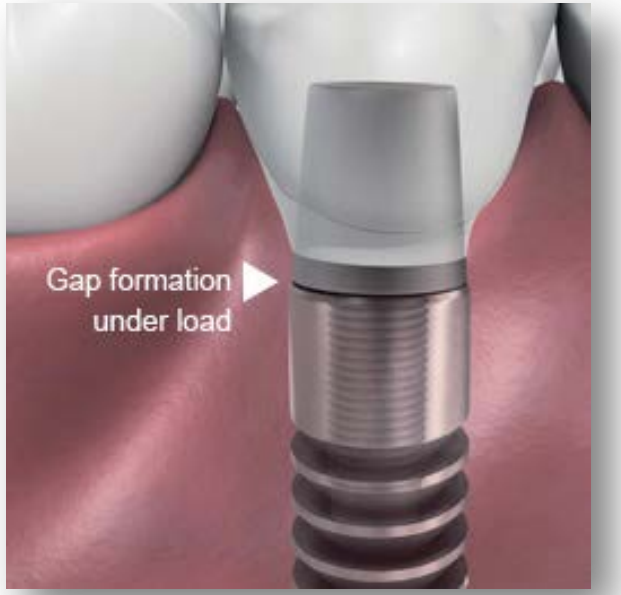
Air polishing devices are commonly used t
biofilm and, with advances in device desig
able to remove biofilm subgingivally.[2] The
and spraying a slurry that consists of powd
polishing device can be a stand-alone unit
or a larger handpiece with a powder chamb
a dental unit.[2] The handpieces come with t
for supragingival biofilm removal and one f
removal.

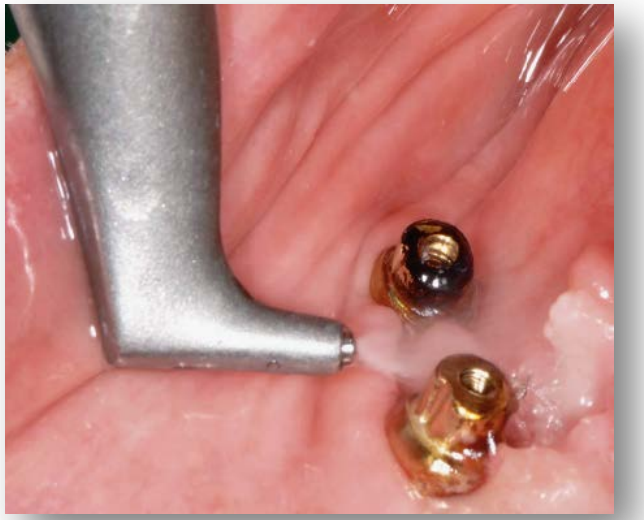
The typical nozzle has a round opening ma
circles.[2] The outer circle is where water flo
inner circle is where air and powder exit fro
couple of different nozzles that can be use
One nozzle is made from a flexible thermo
several small holes.[3] Water exits the hole i
the air and powder flow from the small hol
nozzle.[2,4] Compared with a standard system, the periodontal nozzle devices use lower air pressure that is more suitable for subgingival debridement.[3,5] Depending on the powder used, specific equipment

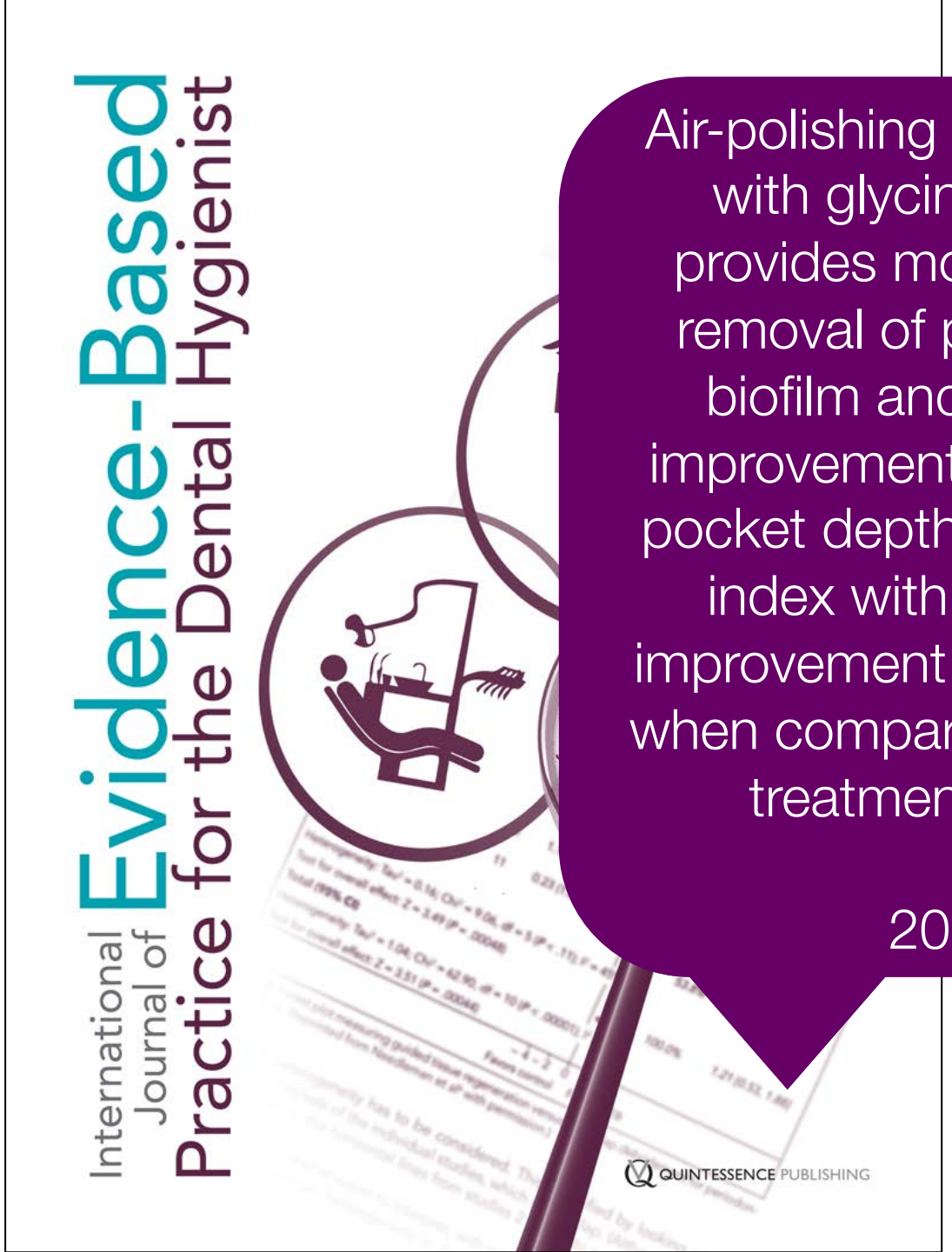
- **Safe & effective**
- Glycine & erythritol consistent results showing **less potential damage** to the gingiva, oral mucosa, cementum, dentin & various restorative materials
- Compared to traditional methods, air polishing appears to be **more comfortable f**or PM patients
- Subgingival air polishing for shallow and deep pockets are **equivalent or superior** to hand or ultrasonic instrumentation for biofilm removal
- Procedures are generally **preferred by patients** and produce clinically favorable results



Peri-Implantitis / Mucositis / Biofilm Removal

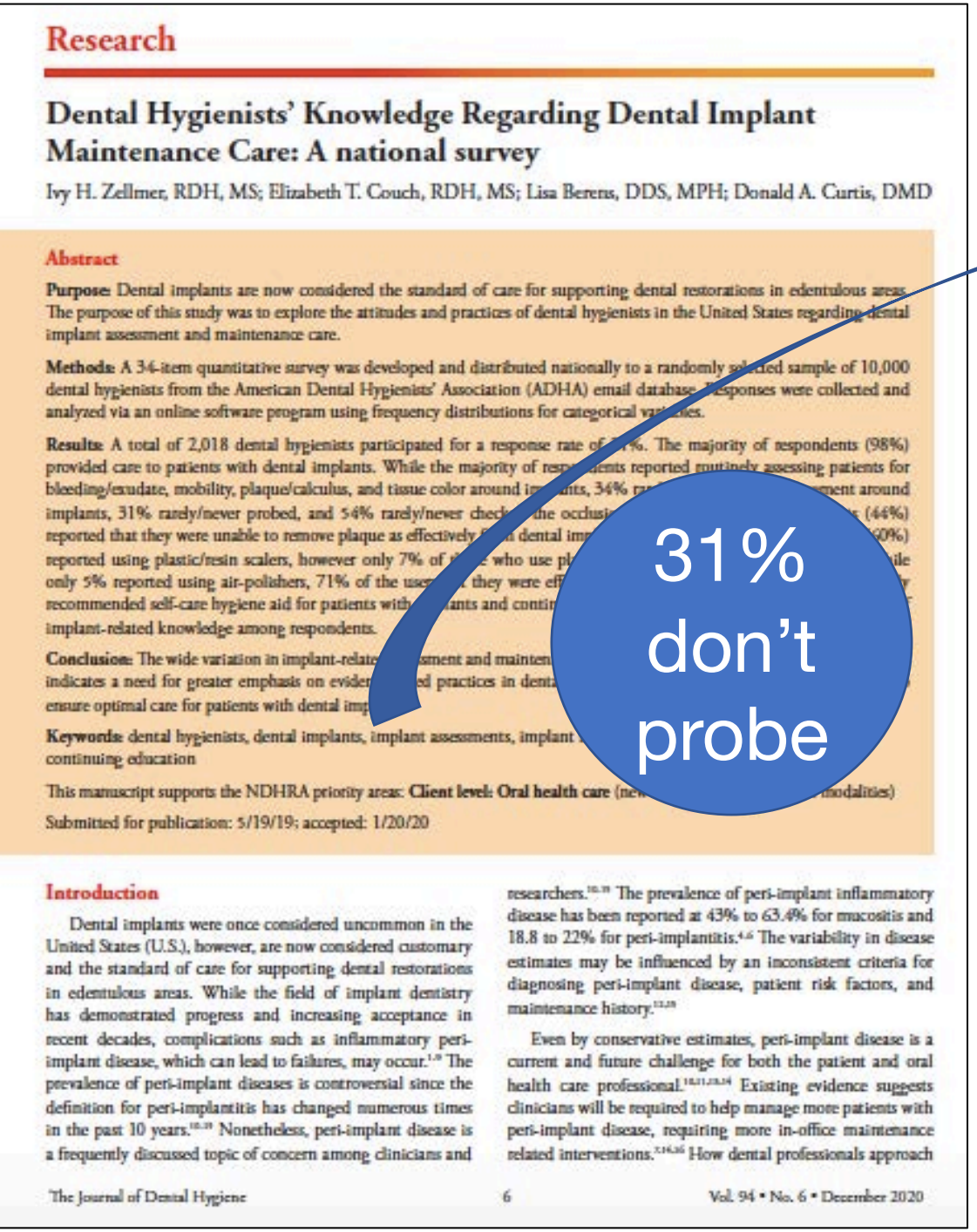






Air-polishing debridement with glycine powder provides more effective removal of peri-implant biofilm and a greater improvement in bleeding, pocket depth, and plaque index with sustained improvement for 6 months when compared to manual treatment + CHX

2016



Research

Dental Hygienists' Knowledge Regarding Dental Implant Maintenance Care: A national survey

Ivy H. Zellmer, RDH, MS; Elizabeth T. Couch, RDH, MS; Lisa Berens, DDS, MPH; Donald A. Curtis, DMD

Abstract

Purpose: Dental implants are now considered the standard of care for supporting dental restorations in edentulous areas. The purpose of this study was to explore the attitudes and practices of dental hygienists in the United States regarding dental implant assessment and maintenance care.

Methods: A 34-item quantitative survey was developed and distributed nationally to a randomly selected sample of 10,000 dental hygienists from the American Dental Hygienists' Association (ADHA) email database. Responses were collected and analyzed via an online software program using frequency distributions for categorical variables.

Results: A total of 2,018 dental hygienists participated for a response rate of 21%. The majority of respondents (98%) provided care to patients with dental implants. While the majority of respondents reported routinely assessing patients for bleeding/exudate, mobility, plaque/calculus, and tissue color around implants, 34% rarely/never assessed bone level around implants, 31% rarely/never probed, and 54% rarely/never checked the occlusion. Most respondents (44%) reported that they were unable to remove plaque as effectively from dental implants as from natural teeth (60%) reported using plastic/resin scalers, however only 7% of those who use plastic scalers felt they were effective. While only 5% reported using air-polishers, 71% of the users felt they were effective. Respondents recommended self-care hygiene aid for patients with implants and continuing implant-related knowledge among respondents.

Conclusion: The wide variation in implant-related assessment and maintenance indicates a need for greater emphasis on evidence-based practices in dental hygiene education to ensure optimal care for patients with dental implants.

Keywords: dental hygienists, dental implants, implant assessments, implant maintenance, continuing education

This manuscript supports the NDHRA priority areas: **Client level: Oral health care** (new modalities)

Submitted for publication: 5/19/19; accepted: 1/20/20

Introduction

Dental implants were once considered uncommon in the United States (U.S.), however, are now considered customary and the standard of care for supporting dental restorations in edentulous areas. While the field of implant dentistry has demonstrated progress and increasing acceptance in recent decades, complications such as inflammatory peri-implant disease, which can lead to failures, may occur.[1,2] The prevalence of peri-implant diseases is controversial since the definition for peri-implantitis has changed numerous times in the past 10 years.[10-12] Nonetheless, peri-implant disease is a frequently discussed topic of concern among clinicians and researchers.[10-12] The prevalence of peri-implant inflammatory disease has been reported at 43% to 63.4% for mucositis and 18.8 to 22% for peri-implantitis.[4,5] The variability in disease estimates may be influenced by an inconsistent criteria for diagnosing peri-implant disease, patient risk factors, and maintenance history.[12,13]

Even by conservative estimates, peri-implant disease is a current and future challenge for both the patient and oral health care professional.[10,11,13,14] Existing evidence suggests clinicians will be required to help manage more patients with peri-implant disease, requiring more in-office maintenance related interventions.[7,14,15] How dental professionals approach

31% don't probe

2000+ RDH surveyed

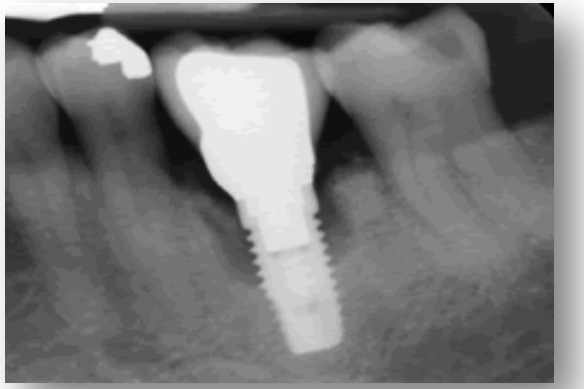
44% reported unable to remove plaque biofilm from implants as effectively as natural teeth

Majority (60%) using plastic scalers; only 7% felt they were effective

Only 5% using air polishing w/ glycine; but 71% felt is was very effective

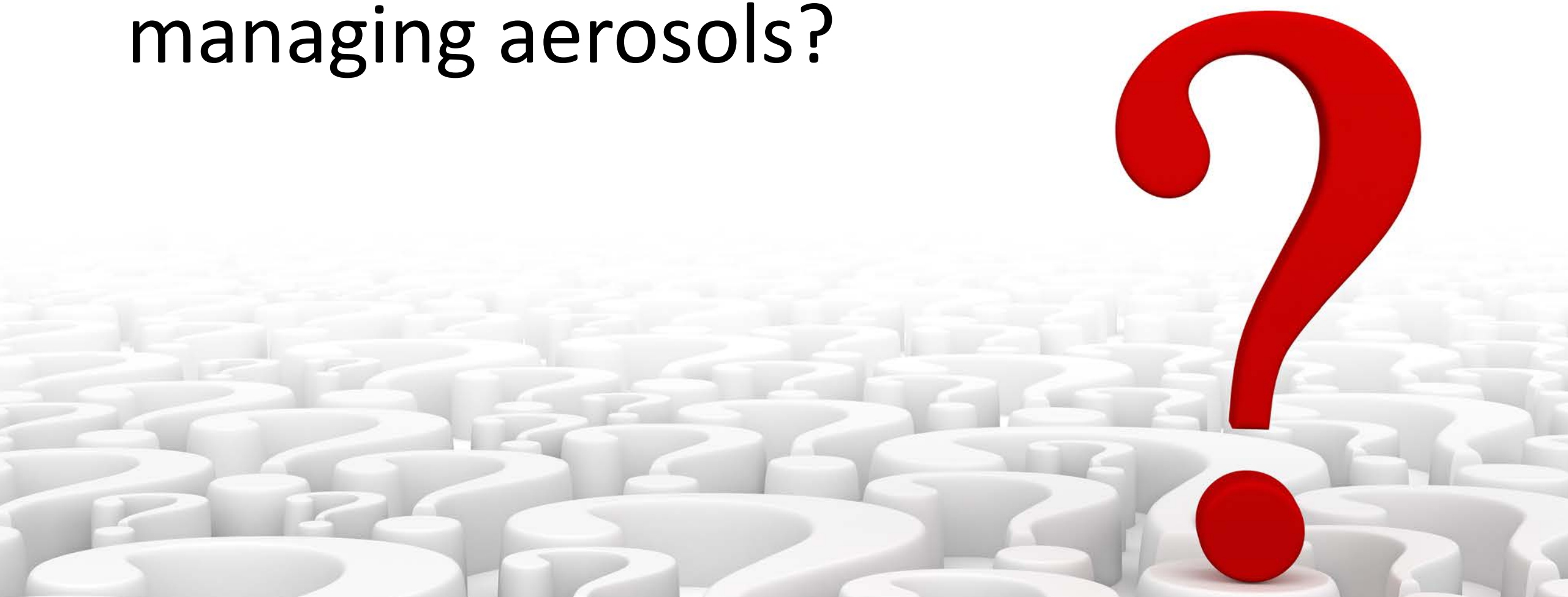
Zellmer IH, Couch ET, Berens L, Curtis DA. Dental hygieniests' knowledge regarding dental implant maintenance care: A nationa survey. J Dent Hyg. 2020 Winter;94(6):6-15. https://pubmed.ncbi.nlm.nih.gov/33376117/

14 times more likely to develop peri-implantitis



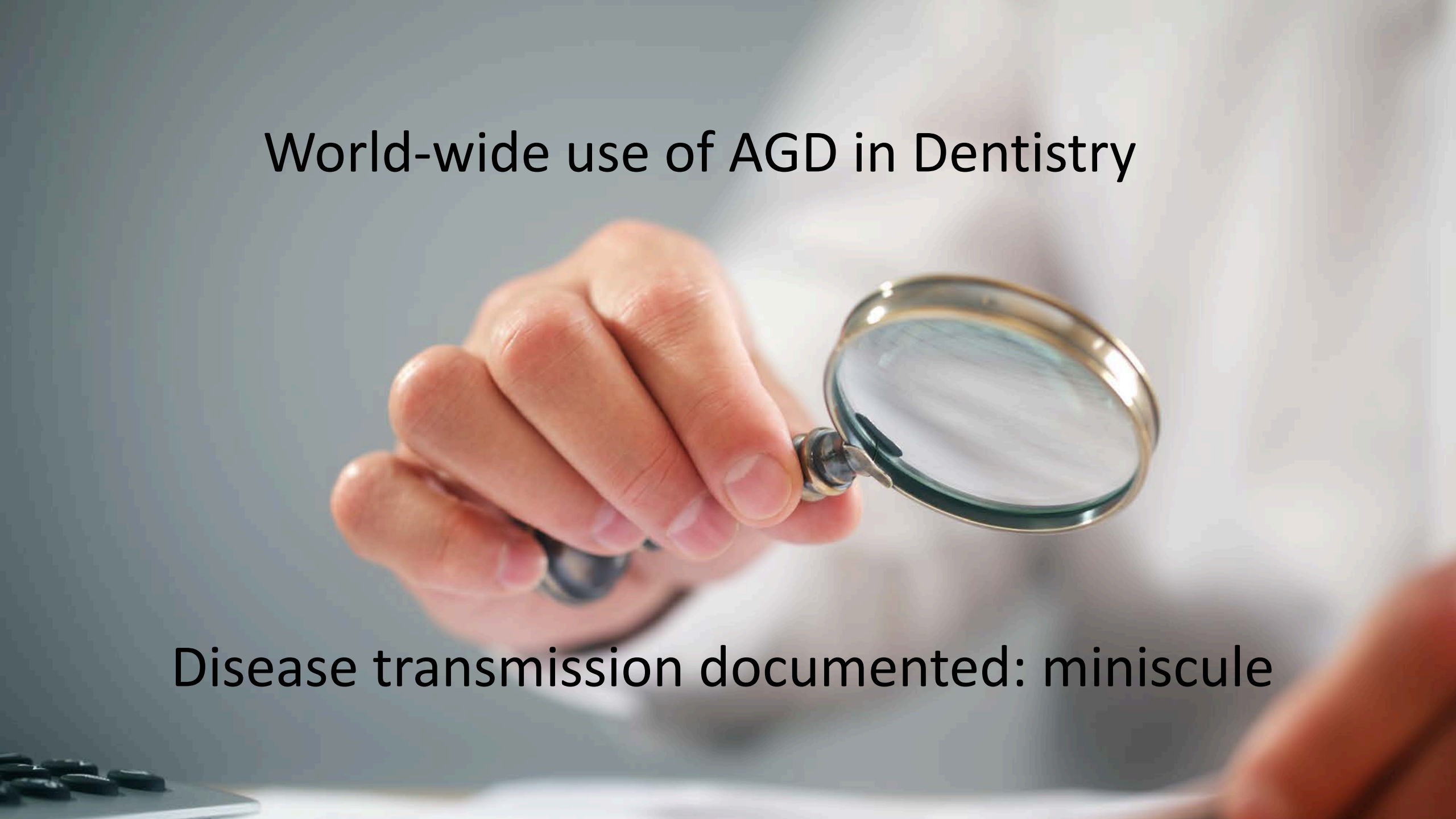
Ferreira S, Silva G, Cortelli J, et al. Prevalence and Risk variables for peri-implant disease in Brazilian subjects. J Clin Periodontol.2006 Dec;33:929-35.

5. If you are utilizing aerosol-generating devices how are you managing aerosols?



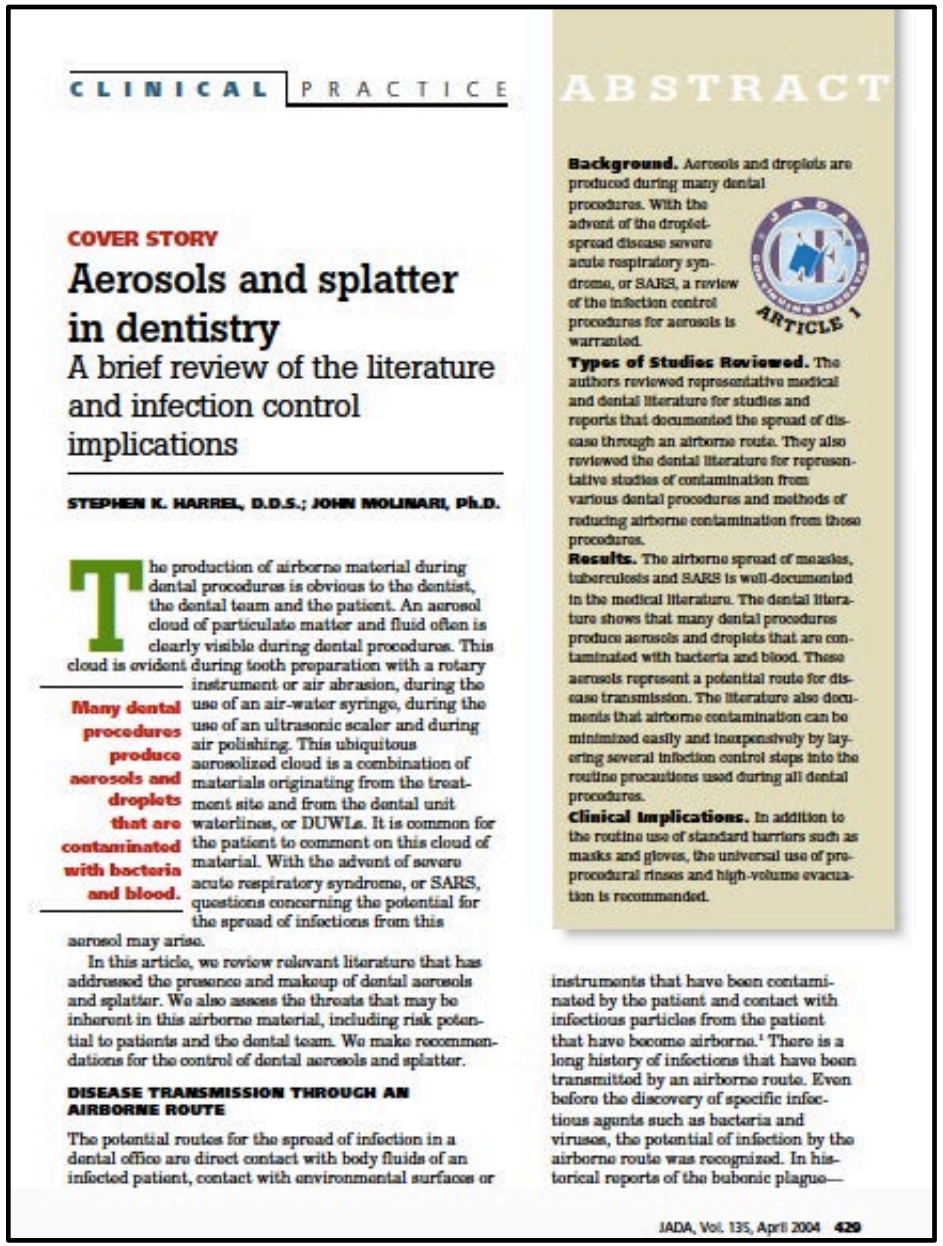

CORONAVIRUS
COVID-19
WAKE-UP CALL
FOR INFECTION CONTROL!

World-wide use of AGD in Dentistry



Disease transmission documented: miniscule


ASSESS
CONTROL
RISK
MITIGATION
IDENTIFY
REDUCE



CLINICAL PRACTICE

COVER STORY

Aerosols and splatter in dentistry

A brief review of the literature and infection control implications

STEPHEN K. HARRELL, D.D.S.; JOHN MOLINARI, Ph.D.

ABSTRACT

Background. Aerosols and droplets are produced during many dental procedures. With the advent of the droplet-spread disease severe acute respiratory syndrome, or SARS, a review of the infection control procedures for aerosols is warranted.

Types of Studies Reviewed. The authors reviewed representative medical and dental literature for studies and reports that documented the spread of disease through an airborne route. They also reviewed the dental literature for representative studies of contamination from various dental procedures and methods of reducing airborne contamination from those procedures.

Results. The airborne spread of measles, tuberculosis and SARS is well-documented in the medical literature. The dental literature shows that many dental procedures produce aerosols and droplets that are contaminated with bacteria and blood. These aerosols represent a potential route for disease transmission. The literature also documents that airborne contamination can be minimized easily and inexpensively by layering several infection control steps into the routine precautions used during all dental procedures.

Clinical Implications. In addition to the routine use of standard barriers such as masks and gloves, the universal use of pre-procedural rinses and high-volume evacuation is recommended.

ARTICLE 1

The production of airborne material during dental procedures is obvious to the dentist, the dental team and the patient. An aerosol cloud of particulate matter and fluid often is clearly visible during dental procedures. This cloud is evident during tooth preparation with a rotary instrument or air abrasion, during the use of an air-water syringe, during the use of an ultrasonic scaler and during air polishing. This ubiquitous aerosolized cloud is a combination of materials originating from the treatment site and from the dental unit waterlines, or DUWLs. It is common for the patient to comment on this cloud of material. With the advent of severe acute respiratory syndrome, or SARS, questions concerning the potential for the spread of infections from this aerosol may arise.

Many dental procedures produce aerosols and droplets that are contaminated with bacteria and blood.

In this article, we review relevant literature that has addressed the presence and makeup of dental aerosols and splatter. We also assess the threats that may be inherent in this airborne material, including risk potential to patients and the dental team. We make recommendations for the control of dental aerosols and splatter.

DISEASE TRANSMISSION THROUGH AN AIRBORNE ROUTE

The potential routes for the spread of infection in a dental office are direct contact with body fluids of an infected patient, contact with environmental surfaces or instruments that have been contaminated by the patient and contact with infectious particles from the patient that have become airborne.[1] There is a long history of infections that have been transmitted by an airborne route. Even before the discovery of specific infectious agents such as bacteria and viruses, the potential of infection by the airborne route was recognized. In historical reports of the bubonic plague—

"At this time, it is impossible to determine the exact infection risk represented by aerosolized material."

"No single approach or device can minimize the risk of infection to dental personnel or patients completely. A single step will reduce the risk of infection by a certain percentage, another step added to the first step will reduce the remaining risk, until such time as the risk is minimal. This can be described as a layering of protective procedures."

Harrell SK, Molinari J. Aerosols and splatter in dentistry. A brief review of the literature and infection control implications. Journal of the American Dental Association, 2004: 135: 429-437.

STEPS IMPERATIVE DURING A PANDEMIC FOR RDH/PATIENT SAFETY

PRE-SCREEN PATIENTS	DENTAL UNIT WATER-LINE SAFETY
HAND HYGIENE	INCREASED PPE: N95 MASKS, SHIELDS, GOWNS, FOLLOW DONNING/DOFFING PROTOCOLS
MASKS FOR ALL TEAM	PRE-RINSE
REMOVE EXTRANEOUS ITEMS	USE OF HVE DURING AGP
BARRIERS AND DISINFECTANTS	AIR PURIFIERS/FOGGERS
MINIMIZE TOUCH ZONES	IMMUNIZATIONS & NEEDLE STICK PREVENTION

ADDITIONAL CONSIDERATIONS TO MITIGATE AEROSOLS

REDUCE POWER & WATER

Healing response
essentially the same
whether ultrasonic scaler
is operated at
high or moderate power.

Chapple ILC, Walmsley AD, Saxby MS, Moscrop H. Effect of instrument power setting during ultrasonic Scaling upon treatment outcome. Journal of Periodontology 1995; 66: 756-760

ULTRASONIC SCALING: AEROSOL OR DRIP FROM THE TIP? WHAT DOES THE EVIDENCE SAY?

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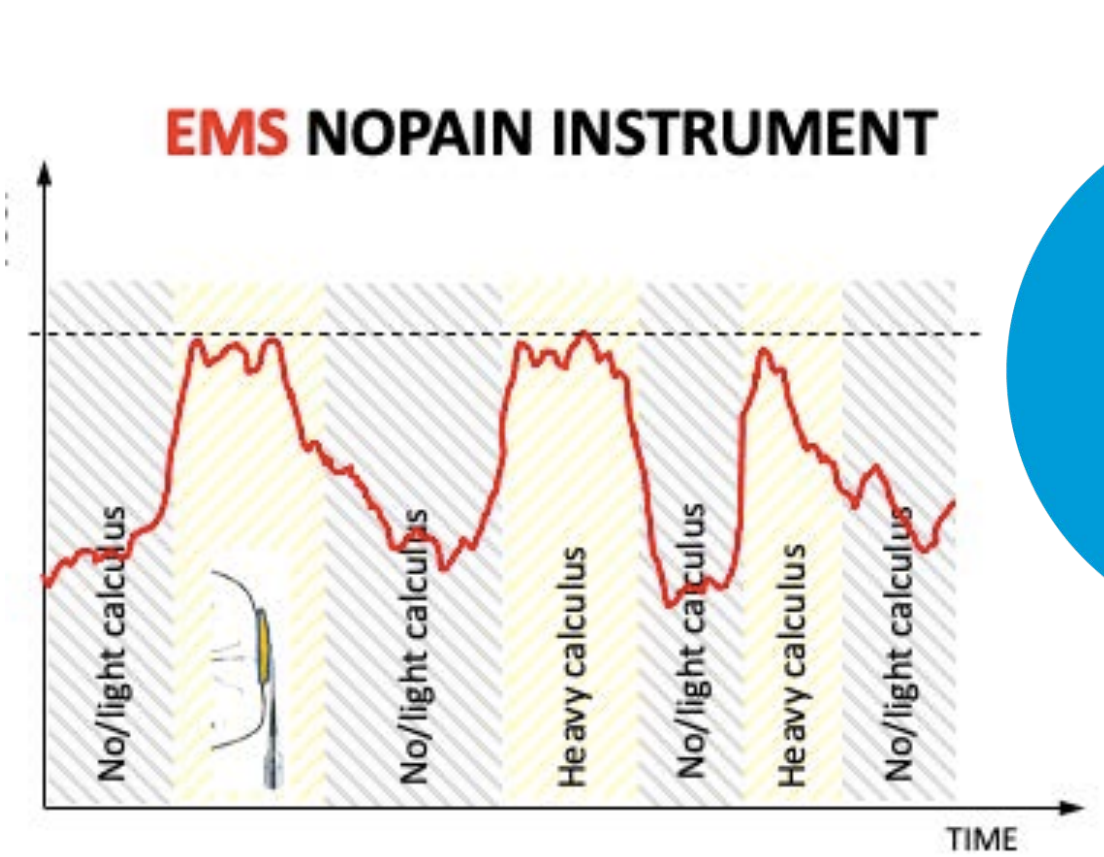
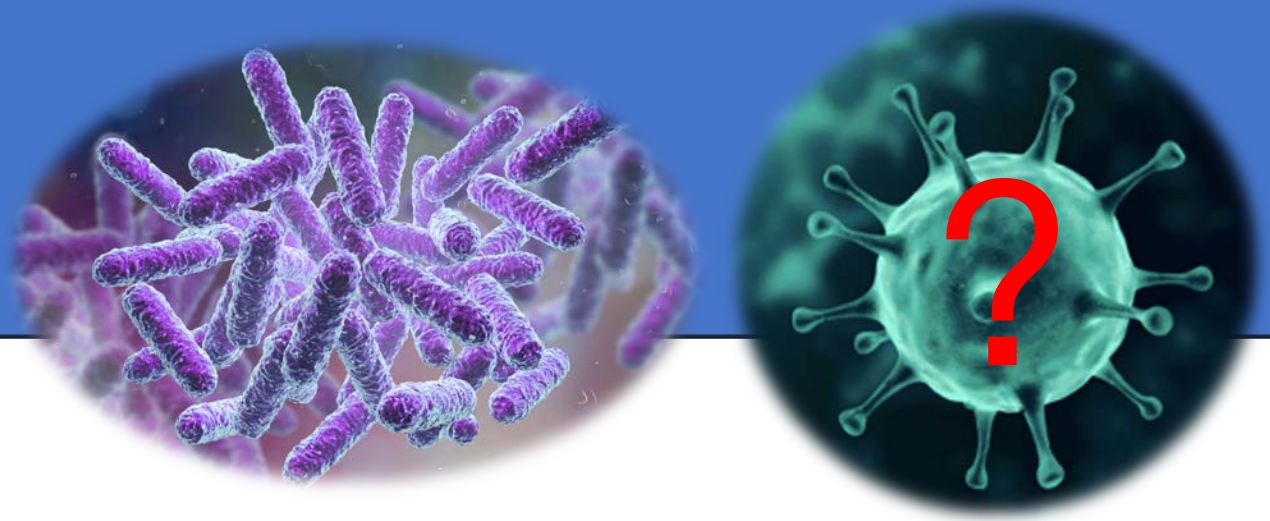


90-98% REDUCTION with HVE



Harrel SK, Barnes JB, Rivera-Hidalgo F. Reduction of aerosols produced by ultrasonic scalers. *J Periodontol*. 1996;67:28-32. (In vitro)

Jacks ME. A laboratory comparison of evacuation devices on aerosol reduction. *J Dent Hyg.*2002;76:202-206. (In vitro)

Klyn SL, Cummings DE, Richardson BW, Davis RD. Reduction of bacteria-containing spray produced during ultrasonic scaling. *Gen Dent.* 2001;49(6):648-652. (In vivo)

The usual HVE used in dentistry has a large opening (usually 8 millimeters or greater) and is attached to an evacuation system that will remove a large volume of air (up to 100 cubic feet of air per minute)

Harrell SK, Molinari J. Aerosols and splatter in dentistry. A brief review of the literature and infection control implications. Journal of the American Dental Association, 2004: 135: 429-437.

Aerosol generation and control in the dental operatory: An *in vitro* spectrometric study of typical clinical setups

Fruzsina Kun-Szabó, Dorottya Gheorghita, Tibor Ajtai, Szabolcs Hodovány, Zoltán Bozóki, Gábor Braunitzer, Márk Ádám Antal

Published: February 4, 2021 • https://doi.org/10.1371/journal.pone.0246543

Abstract

Dental turbines and scalers, used every day in dental operatories, feature built-in water spray that generates considerable amounts of water aerosol. The problem is that it is not exactly known how much. Since the outbreak of COVID-19, several aerosol safety recommendations have been issued—based on little empirical evidence, as almost no data are available on the exact aerosol concentrations generated during dental treatment. Similarly, little is known about the differences in the efficacy of different commercially available aerosol control systems to reduce in-treatment aerosol load. In this *in vitro* study, we used spectrometry to explore these questions. The time dependent effect of conventional airing on aerosol concentrations was also studied. Everyday patient treatment situations were modeled. The test setups were defined by the applied instrument and its spray direction (high-speed turbine with direct/indirect airspray or ultrasonic scaler with indirect airspray) and the applied aerosol control system (the conventional high-volume evacuator or a lately introduced aerosol exhaustor). Two parameters were analyzed: total number concentration in the entire measurement range of the spectrometer and total number concentration within the 60 to 384 nm range. The results suggest that instrument type and spray direction significantly influence the resulting aerosol concentrations. Aerosol generation by the ultrasonic scaler is easily controlled. As for the high-speed turbine, the efficiency of control might depend on how exactly the instrument is used during a treatment. The results suggest that scenarios where the airspray is frequently directed toward the air of the operatory are the most difficult to control. The tested control systems did not differ in their efficiency, but the study could not provide conclusive results in this respect. With conventional airing through windows with a standard fan, a safety airing period of at least 15 minutes between treatments is recommended.

Aerosol generated by the ultrasonic scaler is easily controlled

[Aerosol generation and control in the dental operatory: An *in vitro* spectrometric study of typical clinical setups] Kun-Szabó F, Gheorghita D, Ajtai T, Hodovány S, Bozóki Z, et al. (2021) Aerosol generation and control in the dental operatory: An *in vitro* spectrometric study of typical clinical setups. PLOS ONE 16(2): e0246543. https://doi.org/10.1371/journal.pone.0246543

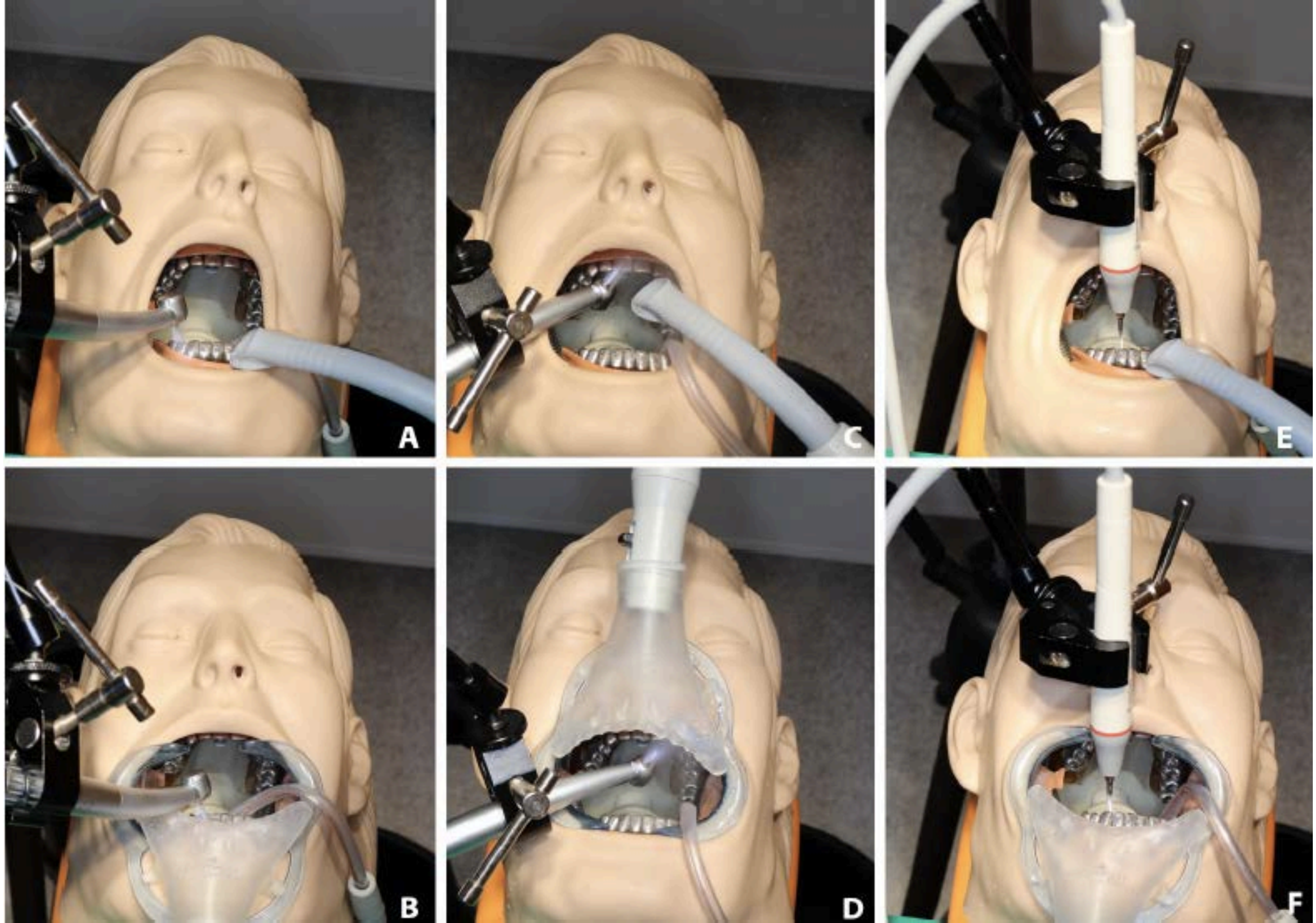

A
B
C
D
E
F

Table 1. The results of the measurements.

SETUP	*TNC* (mean ±SD, 1/cm^3)	*TNC 60–384* (mean ±SD, 1/cm^3)
IS-HVE	626.4±87.1	351.5±24.2
IS-AE	1951.1±120.5	864.5±136.7
DS-HVE	8530.5±1639	4557.9±2575.5
DS-AE	4742.3±407.1	2189.5±174.6
US-HVE	621.3±249.4	240.4±76.0
US-AE	509.8±27.9	188.1±25.8
Baseline	696.6±94.3	243.3±28.1

TNC: total number count, *TNC 60–384*: total number count within the range 60 nm– 384 nm. Conventions regarding the study setups are the same as in Figs 1 and 2. Baseline: values measured at the beginning of the day, after 12 hours' airing. Means and standard deviations in each group come from 3 consecutive measurements (N = 3, see Test Measurements).

https://doi.org/10.1371/journal.pone.0246543.t001

Save Flow Saliva Ejector

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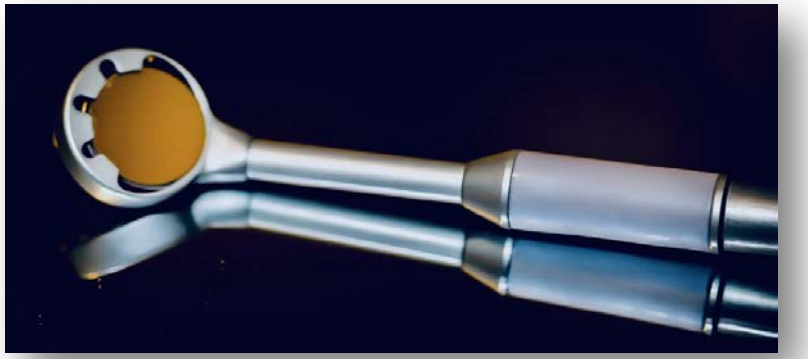


Nu-Bird

Ivory Re-Leaf

ErgoFinger

Isolite

DryShield

Mr. Thirsty

VacStation

Sentry 300

CareShield

The use of external HVE significantly reduced the aerosol particle count (in vitro)

A clinical study measuring dental aerosols with and without a high-volume extraction device

Adam Nulty,*[1,2] Chris Lefkaditis,[3] Patrik Zachrisson,[4] Quintus Van Tonder[5] and Riaz Yar[6]

Key points

- With the use of an external high-volume extraction (HVE) device during aerosol generating procedures, there is a significant increase of PM2.5- and PM10-sized particle count from the use of micromotor high-speed, air turbine high-speed, slow-speed and ultrasonic handpieces.
- With the use of an external HVE device, PM1-sized particle count, which would pass through an N95 or N99 mask, remained moderately stable throughout the procedures.
- The use of an external high-volume suction device reduced the aerosol particle count of all sizes significantly.

Abstract

Introduction External high-volume extraction (HVE) devices may offer a way to reduce any aerosol particulate generated.

Aims The aim of this study was to measure the particle count during dental aerosol generating procedures and compare the results with when a HVE device is used.

Design A comparative clinical study measuring the amount of PM1, PM2.5 and PM10 aerosol particulate with and without the use of an external HVE device was undertaken.

Materials and methods In total, ten restorative procedures were monitored with an industrial Trotec PC220 particle counter. The intervention was an external HVE device.

Main outcome methods The air sampler was placed at the average working distance of the clinicians involved in the study – 420 mm.

Results In the present study, aerosol particulate was recorded at statistically significantly increased levels during dental procedures without an external HVE device *versus* with the device.

Discussion The null hypothesis was rejected, in that significant differences were found between the results of the amount of aerosol particle count with and without a HVE device.

Conclusion If the results of the present study are repeated in an *in vivo* setting, an external high-volume suction device may potentially show a lower risk of transmission of viral particulate.

Nulty A, Lefkaditis C, Zachrisson P, Van Tonder Q, Yar R. A clinical study measuring dental aerosols with and without a high-volume extraction device. Br Dent J. 2020 Nov 20:1–8. doi: 10.1038/s41415-020-2274-3. Epub ahead of print. PMID: 33184481; PMCID: PMC7658616.

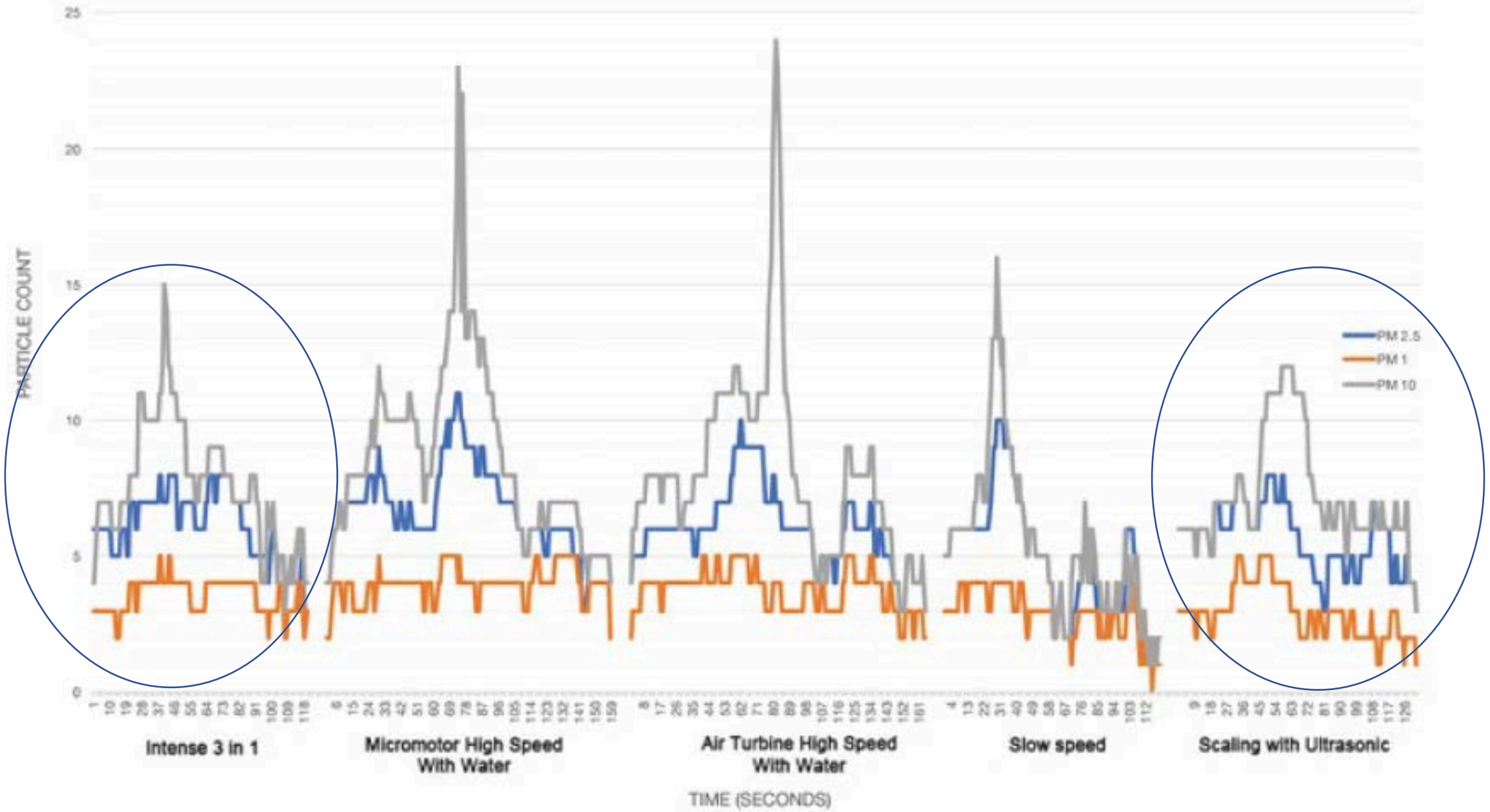


Fig. 1 Aerosol generation without high-volume suction used

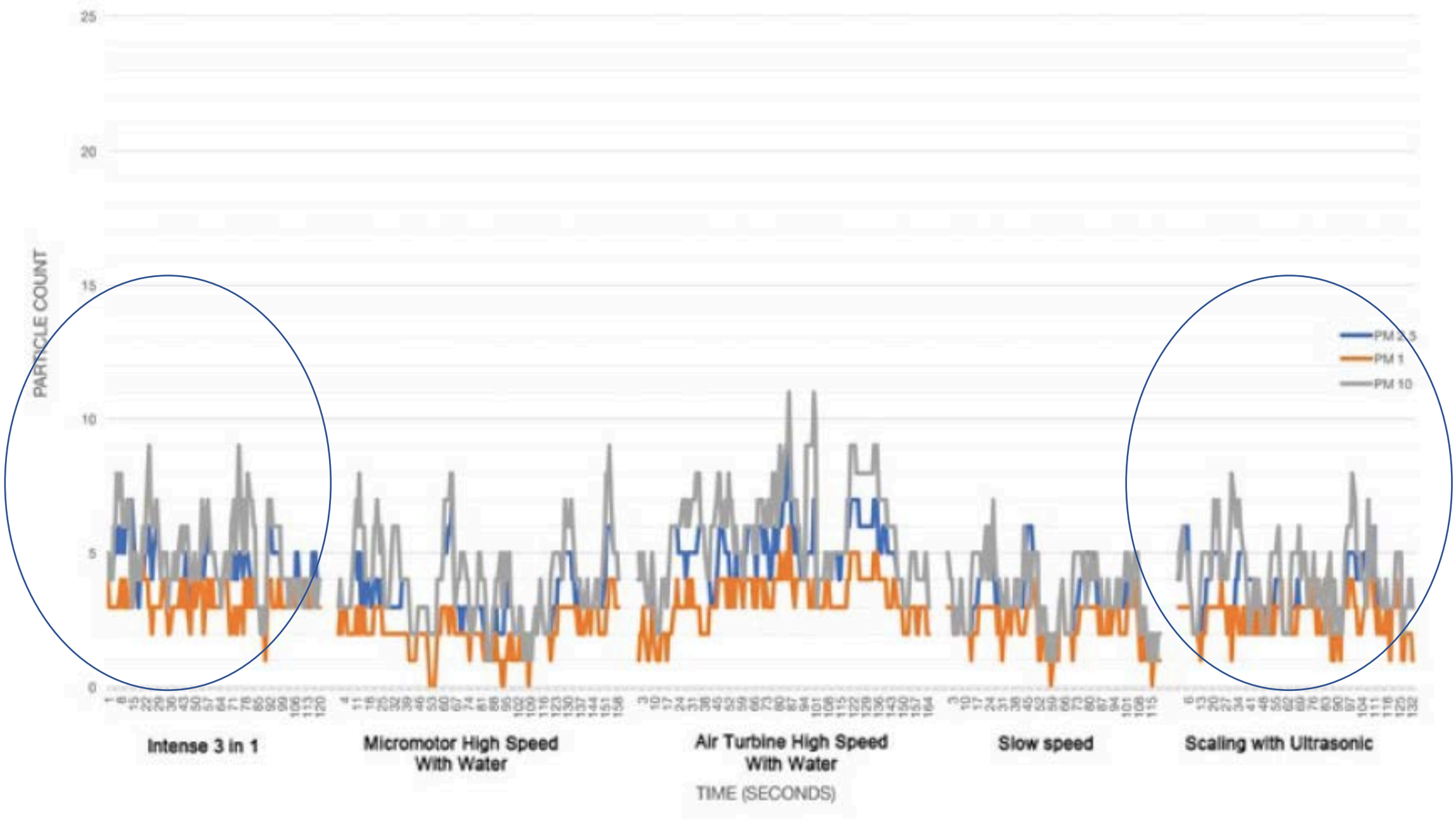


Fig. 2 Aerosol generation with high-volume suction used

Quantitative measurements of aerosols from air-polishing and ultrasonic devices: (How) can we protect ourselves?

Manuela Kaufmann [1], Alex Solderer [1], Andrea Gubler [1], Florian J Wegehaupt [1], Thomas Attin [1], Patrick R Schmidlin [1]

Affiliations + expand

PMID: 33320905 PMCID: PMC7737972 DOI: 10.1371/journal.pone.0244020

Free PMC article

Abstract

Aim: To assess the distribution and deposition of aerosols during simulated periodontal therapy.

Methods: A manikin with simulated fluorescein salivation was treated by four experienced dentists applying two different periodontal treatment options, i.e. air-polishing with an airflow device or ultrasonic scaling in the upper and lower anterior front for 5 minutes, respectively. Aerosol deposition was quantitatively measured on 21 pre-defined locations with varying distances to the manikins mouth in triplicates using absorbent filter papers.

Results: The selected periodontal interventions resulted in different contamination levels around the patient's mouth. The highest contamination could be measured on probes on the patient's chest and forehead but also on the practitioner's glove. With increasing distance to the working site contamination of the probes decreased with both devices. Air-polishing led to greater contamination than ultrasonic.

Conclusion: Both devices showed contamination of the nearby structures, less contamination was detected when using the ultrasonic. Affirming the value of wearing protective equipment we support the need for universal barrier precautions and effective routine infection control in dental practice.

Kaufmann M, Solderer A, Gubler A, Wegehaupt FJ, Attin T, Schmidlin PR. Quantitative measurements of aerosols from air-polishing and ultrasonic devices: (How) can we protect ourselves? PLoS One. 2020 Dec 15;15(12):e0244020. doi: 10.1371/journal.pone.0244020. PMID: 33320905; PMCID: PMC7737972.

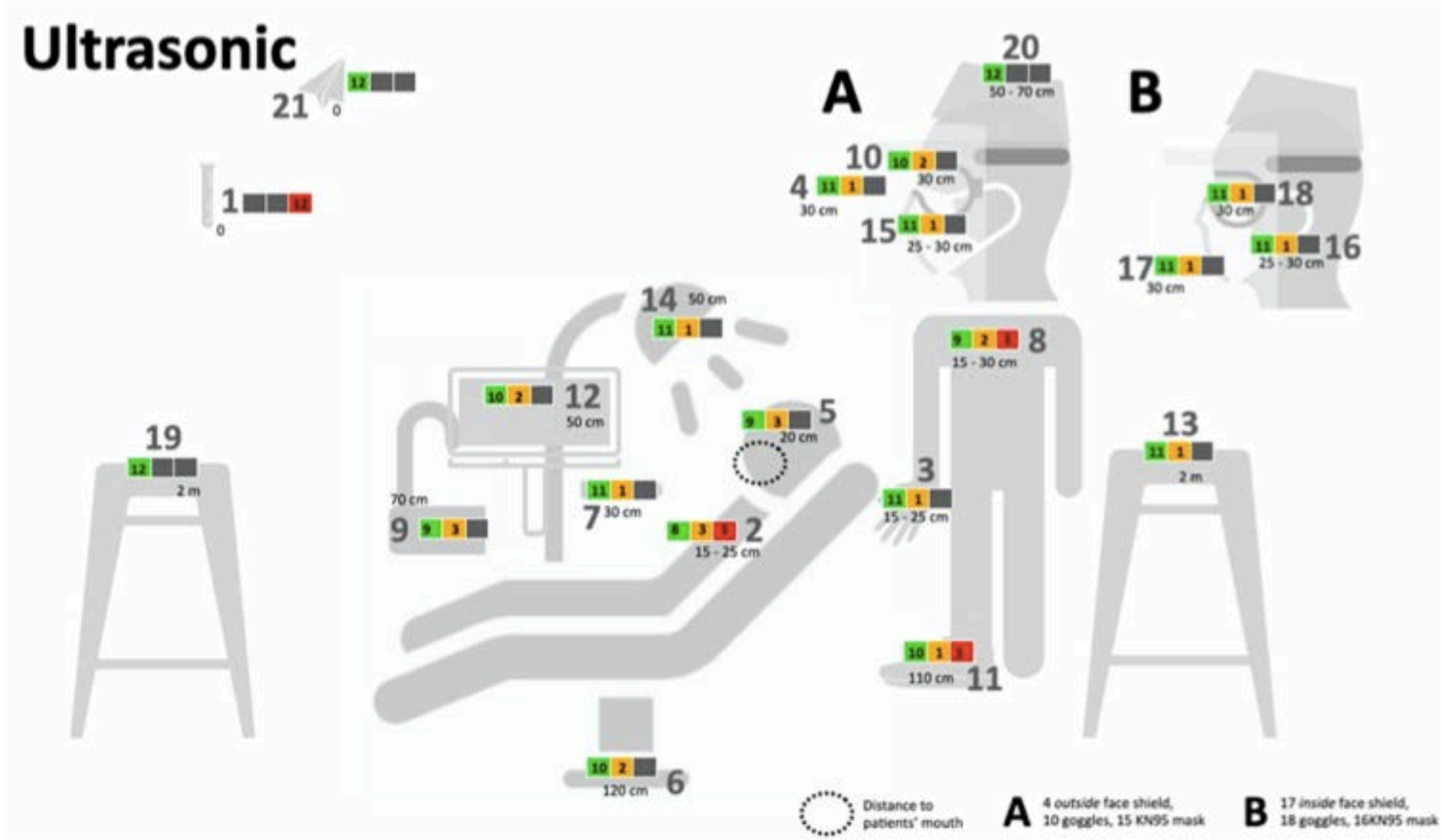
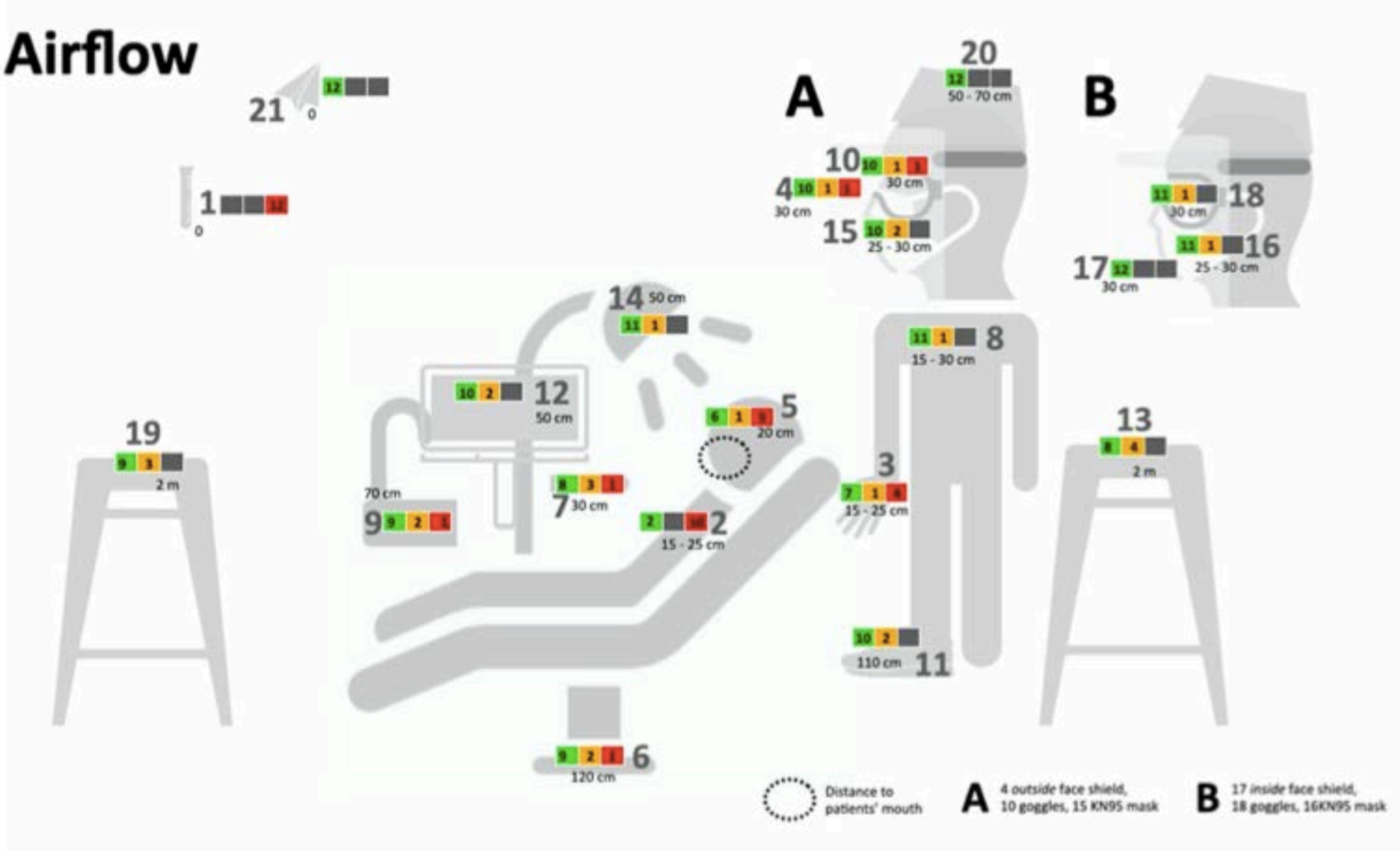
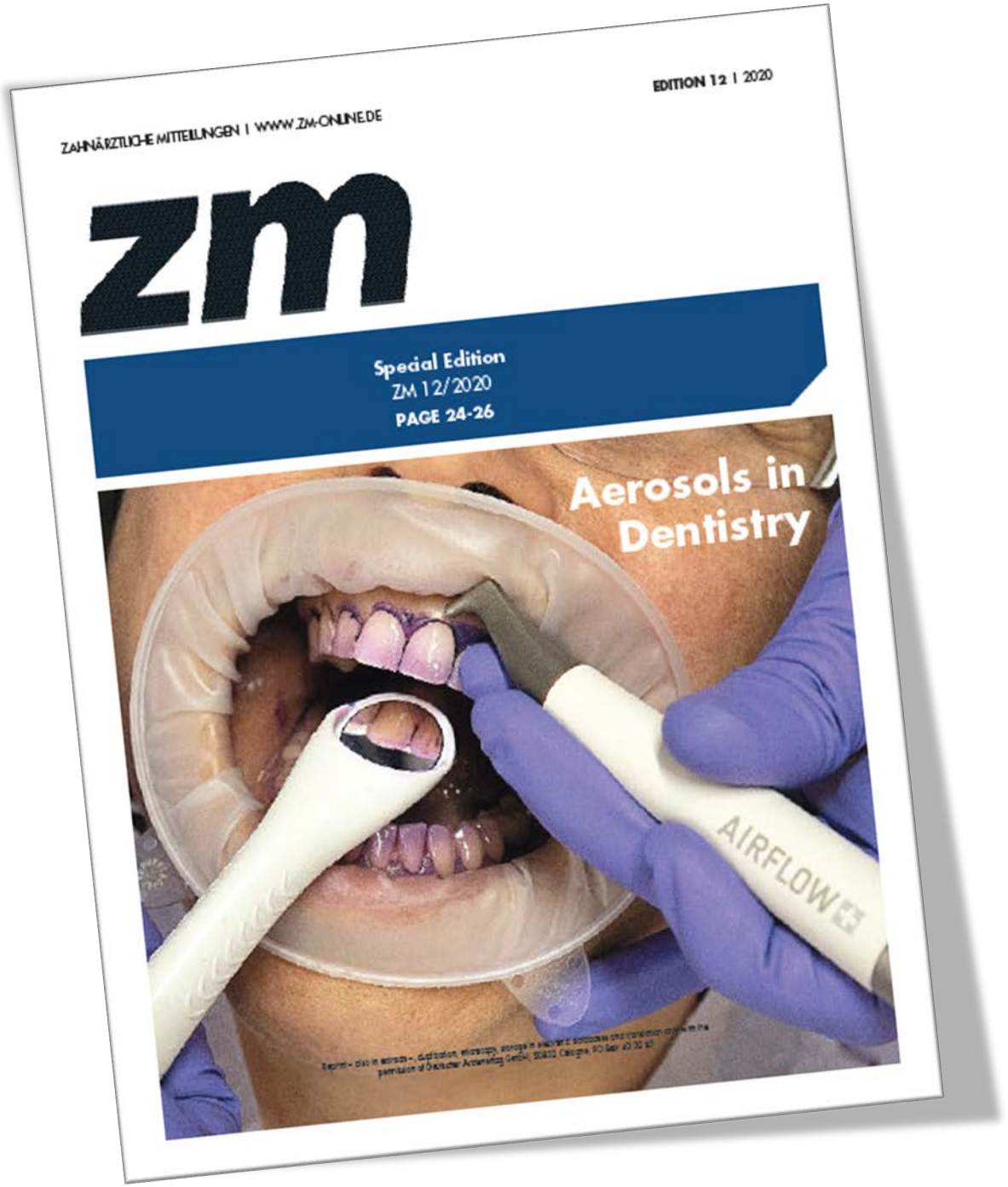


Fig 2. Clinical practice set-up and sample localization. Contamination in respect to the location is shown in a small traffic-light (according to Table 1). a) Airflow b) Ultrasonic.

https://doi.org/10.1371/journal.pone.0244020.g002



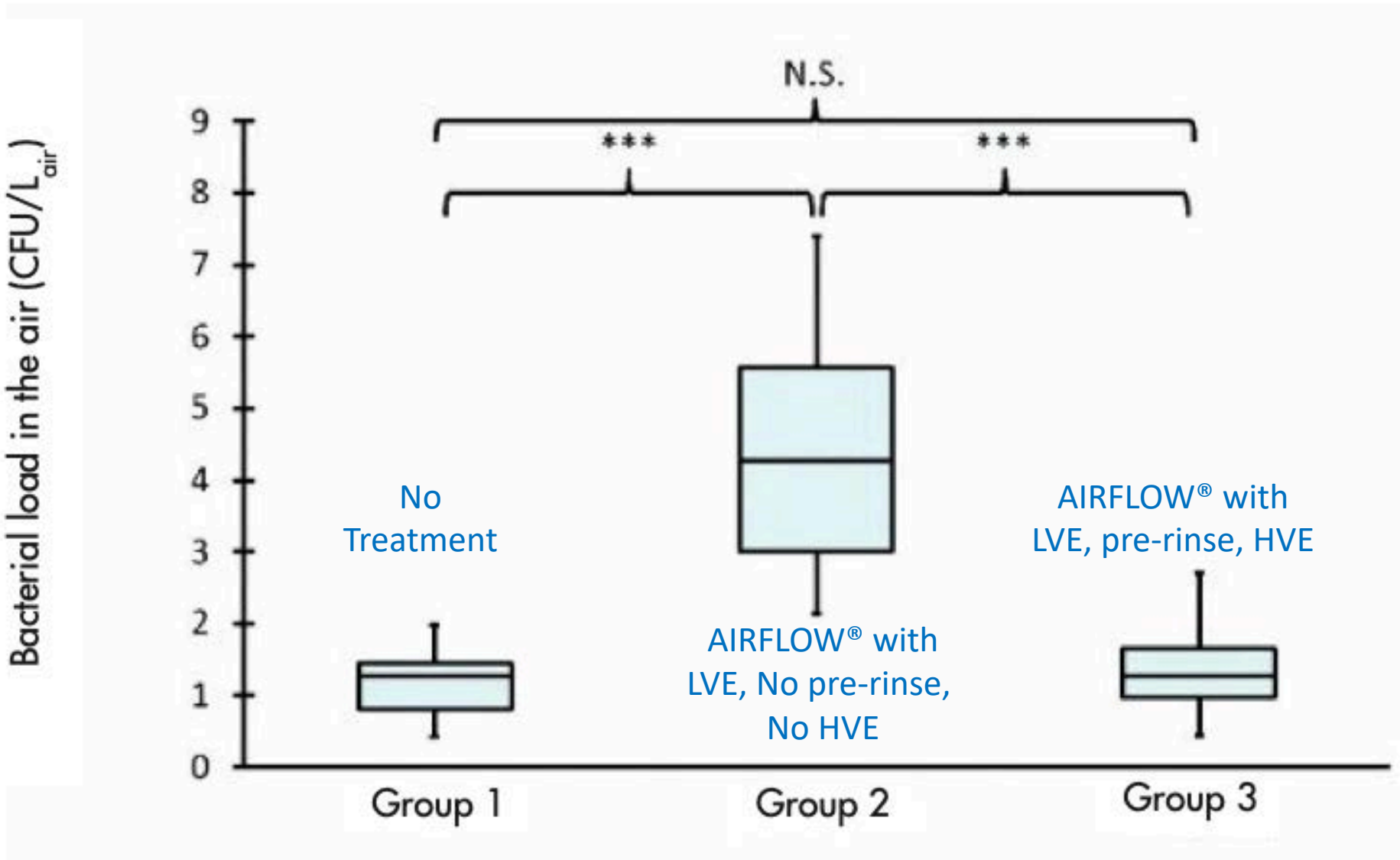
https://doi.org/10.1371/journal.pone.0244020.g002



10 minutes of AIRFLOW® treatment with Erythritol PLUS powder

Donnet M, Mensi M, Bastendorf KD, Lussi A. Aerosols in Dentistry . ZM 2020;12:24-64

Bacterial load in the air (CFU/L_{air})




MAX
AIRFLOW MAX

Ivoclar OptraGate

1. *ESTIMATE THE DISTANCE OF MOUTH CORNERS..*

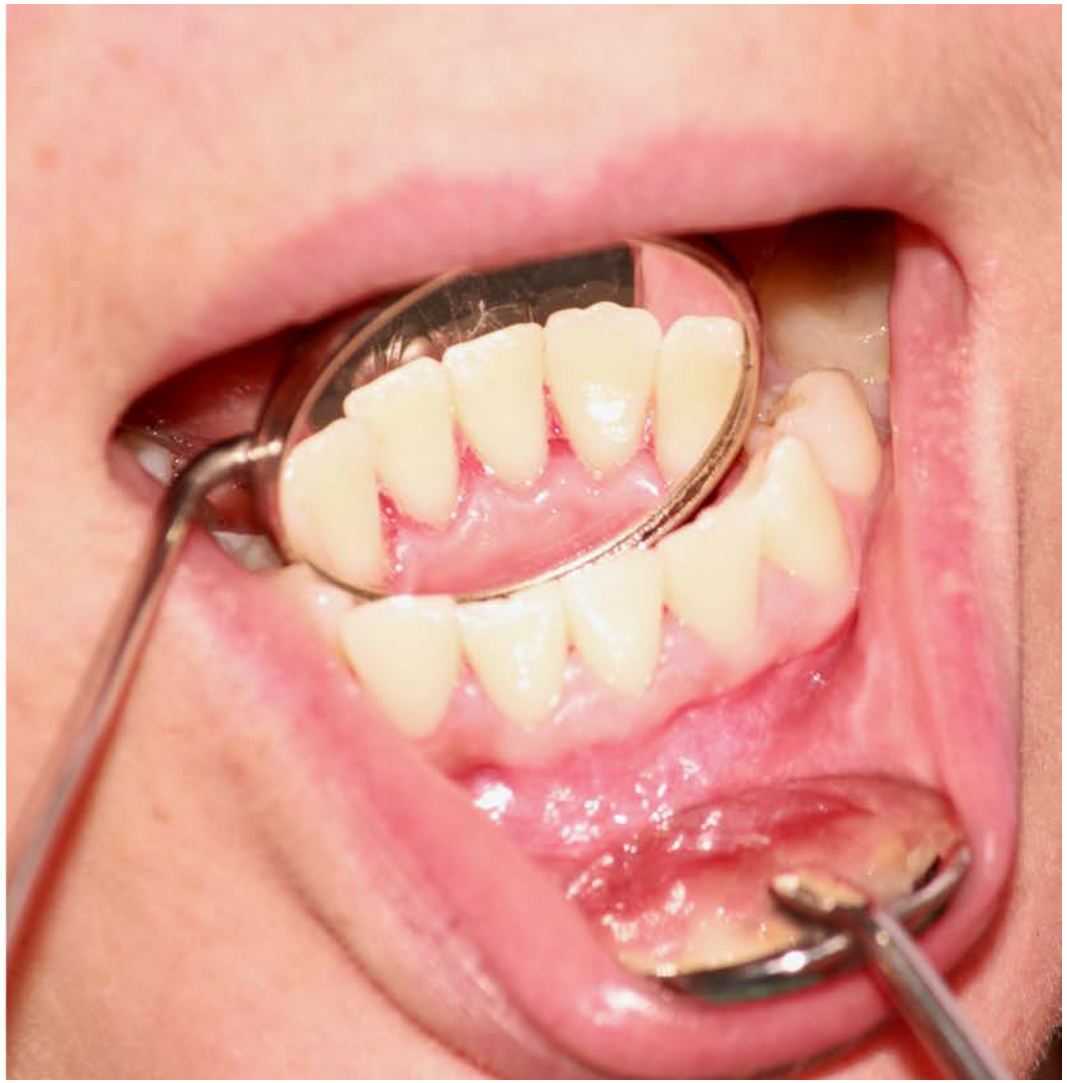
Distance corners of mouth ≈ approx. 4.5 cm
Size JUNIOR

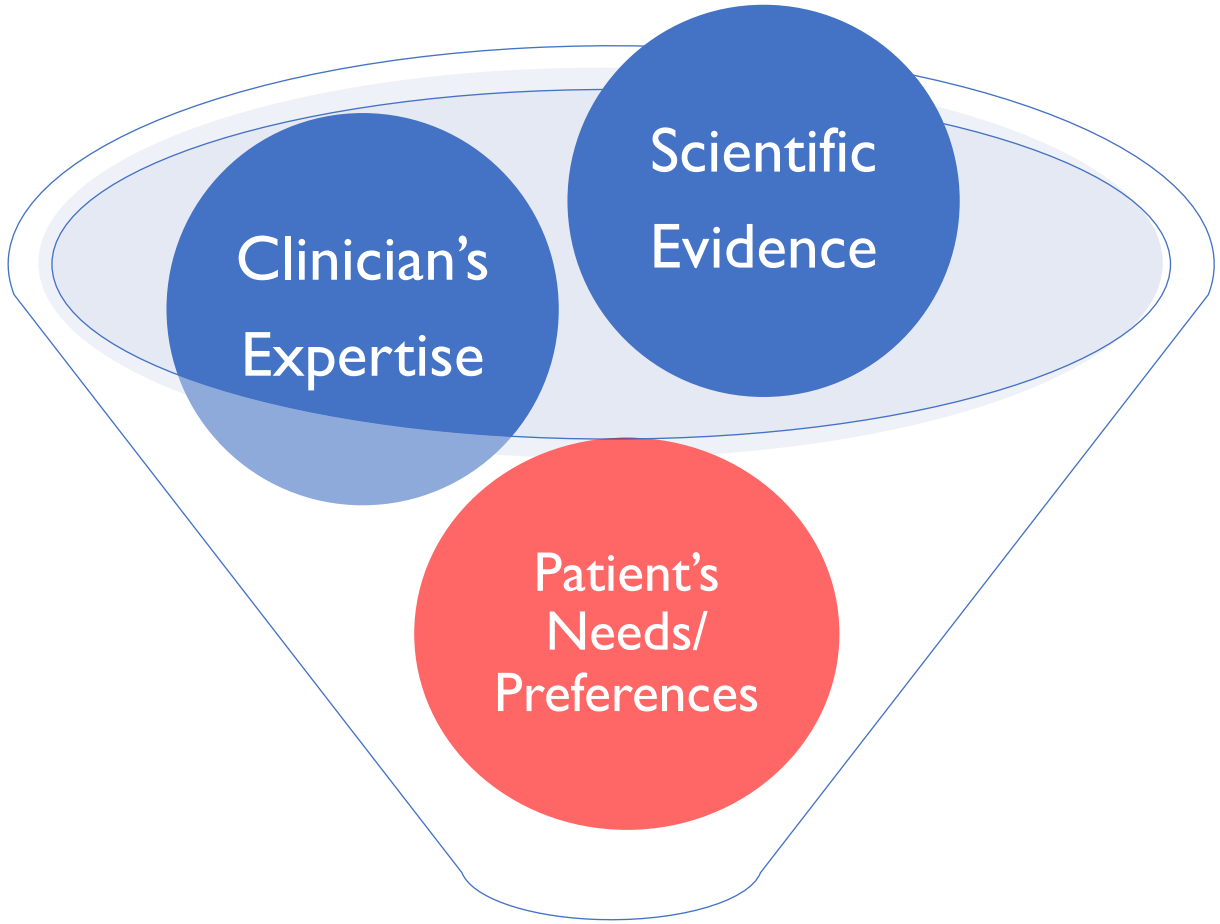
Distance corners of mouth ≈ approx. 6 cm
Size SMALL

Distance corners of mouth ≈ approx. 7 cm
Size REGULAR

2. *.. WITH THE ORIENTATION MARKS ON THE OPTRAGATE FOIL-PACKAGE*

3. *.. INSERT THE CORRECT SIZE*





Evidence-Based Dentistry and Optimal Patient Outcomes

Periodontology 2000, Vol. 71, 2016, 113–127
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PERIODONTOLOGY 2000

Periodontology 2000

Ultrasonic vs. hand instrumentation in periodontal therapy: clinical outcomes

Ranjitha Krishna & Jamie A. De Stefano

Periodontal disease

The initial culprits in periodontal disease are an array of periodontal pathogens that can trigger dysregulated immune and inflammatory responses in host periodontal tissues, causing bone and periodontal attachment loss (81, 125). Associated with the development of periodontitis are endogenous and environmental factors, such as poor oral hygiene, smoking, stress, obesity, genetic variation and diabetes and other systemic diseases (157). One goal of periodontal nonsurgical therapy is to reduce the amount of tooth-associated biofilms and their biological products, such as endotoxins, antigens, enzymes and other tissue-irritating substances (54). This can be accomplished through changing the subgingival environment by scaling and root planing or by root debridement, with or without local delivery of antimicrobials and/or antiseptics, and/or the use of adjunctive systemic antimicrobials. This initial therapy usually does not target the microbial communities associated with other extracellular or intracellular mucosal niches within the mouth, or systemic colonies (84, 92). Although studies have shown saliva, cheek, tongue, tonsillar crypts and the palatal surface microbial colonies as additional sources of cross-infection to the periodontium within an individual, or among individuals (43, 45, 168, 171), nonsurgical therapy infrequently involves treating the whole mouth, or the whole body, or treating others in close oral contact with the patient, in an effort to control reinfection (11, 12). A statistically significant correlation exists between the presence of disease and the quantity and bacterial composition of dental plaque (11, 41, 42, 100, 156). Along with bacteria, cytomegalovirus, Epstein–Barr virus, papillomaviruses and herpes simplex virus may contribute to the pathogenesis of periodontitis (152). Such dual infections have been shown to be associated with more severe periodontal disease, as herpesviruses in general can enhance cytokine release, and Epstein–Barr virus, along with cytomegalovirus, are associated with more severe forms of periodontitis (24, 97, 140). Molecular methods have also revealed the presence of archaea and fungi within the subgingival milieu (19, 143).

Halting the progression of gingivitis

Plaque-induced gingivitis is an inflammatory change caused by accumulation of a bacterial biofilm on the tooth surface adjacent to the gingival tissues (98) and is the most common oral disease in dentulous adults (102, 123). Several studies have shown that this commonly occurring plaque-induced gingivitis is a precursor of periodontitis (94). Hugoson et al. (68) observed, in a cross-sectional study conducted in Sweden over a 30-year period, that improvements in plaque control reduced the prevalence of both gingivitis and periodontitis.

According to the classic model proposed by Page & Schroeder (124), the development of gingivitis and its progression to periodontitis occurs in four stages. Clinical signs of gingivitis start to appear in the 'early lesion' (second stage). Up to the 'established lesion' (third stage), clinical signs of the disease can be reversed by disrupting and removing the microbial plaque biofilm.

The most predictable way of disrupting the microbial plaque, reducing inflammation around the gingival margins and thus preventing gingivitis, is by

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Ultrasonic debridement
significantly
more effective
than hand scaling
In microbial reduction
in Class II
and Class III
furcations.

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at moderate and severe
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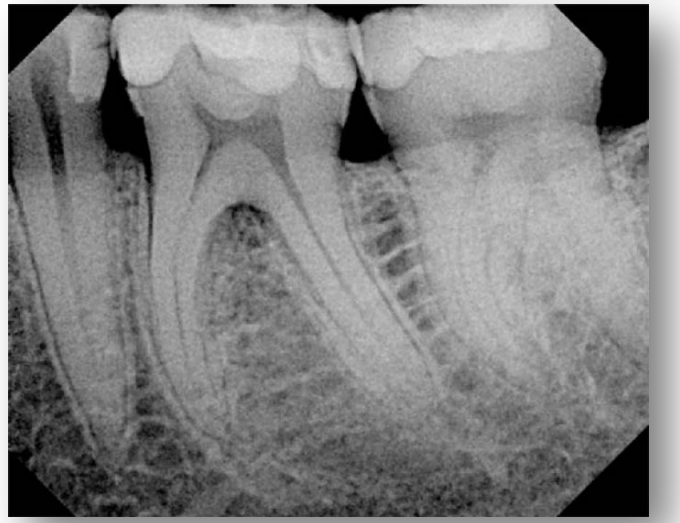
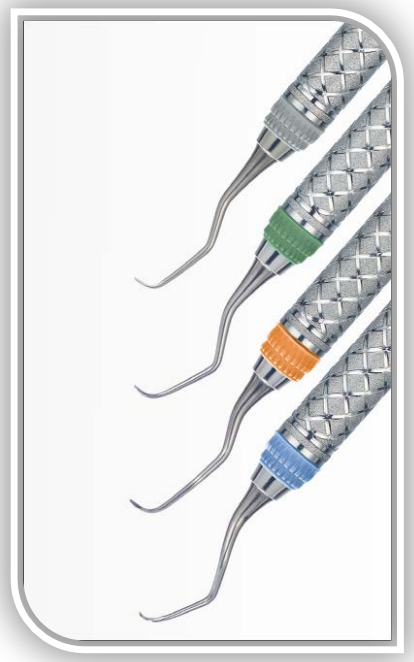


Krishna R, De Stefano JA. Ultrasonic vs. hand instrumentation in Periodontal therapy: clinical outcomes. Periodontology 2000, Vol 71, 2016, 113-127

- Improved access
- Saves 20-50% of time
- Improved comfort
- Equal healing response



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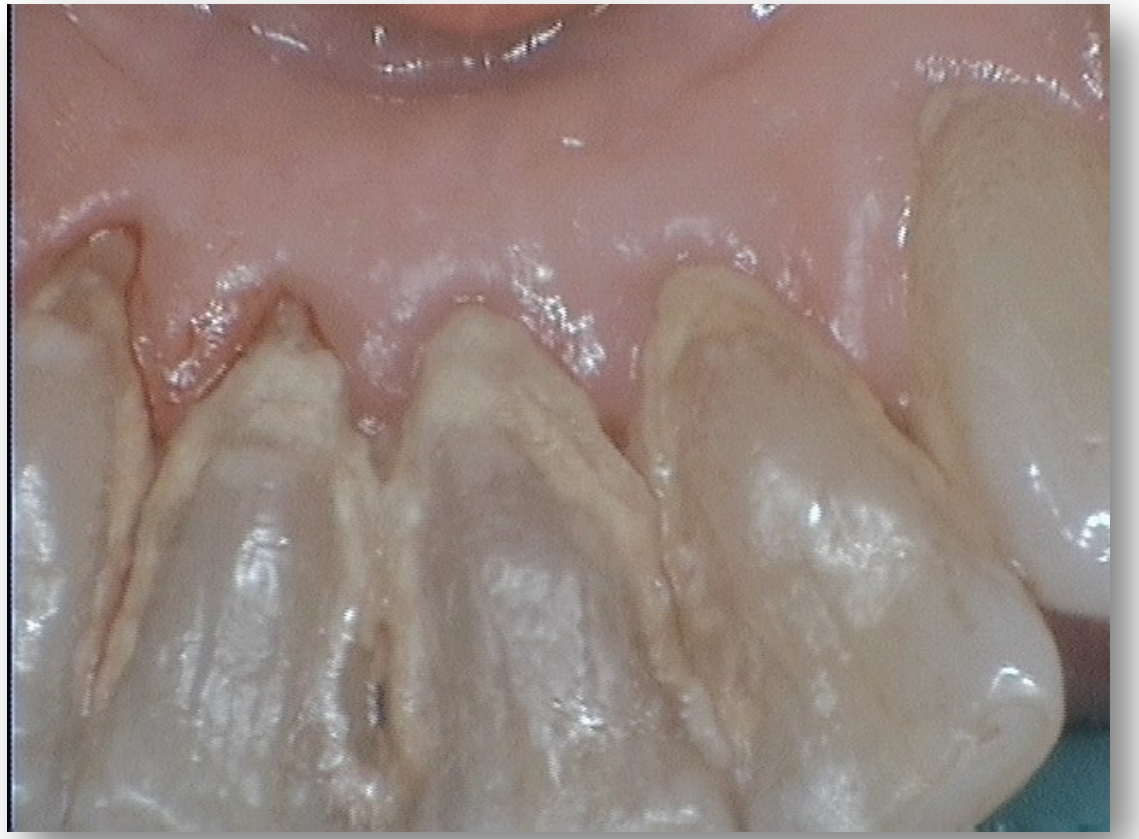

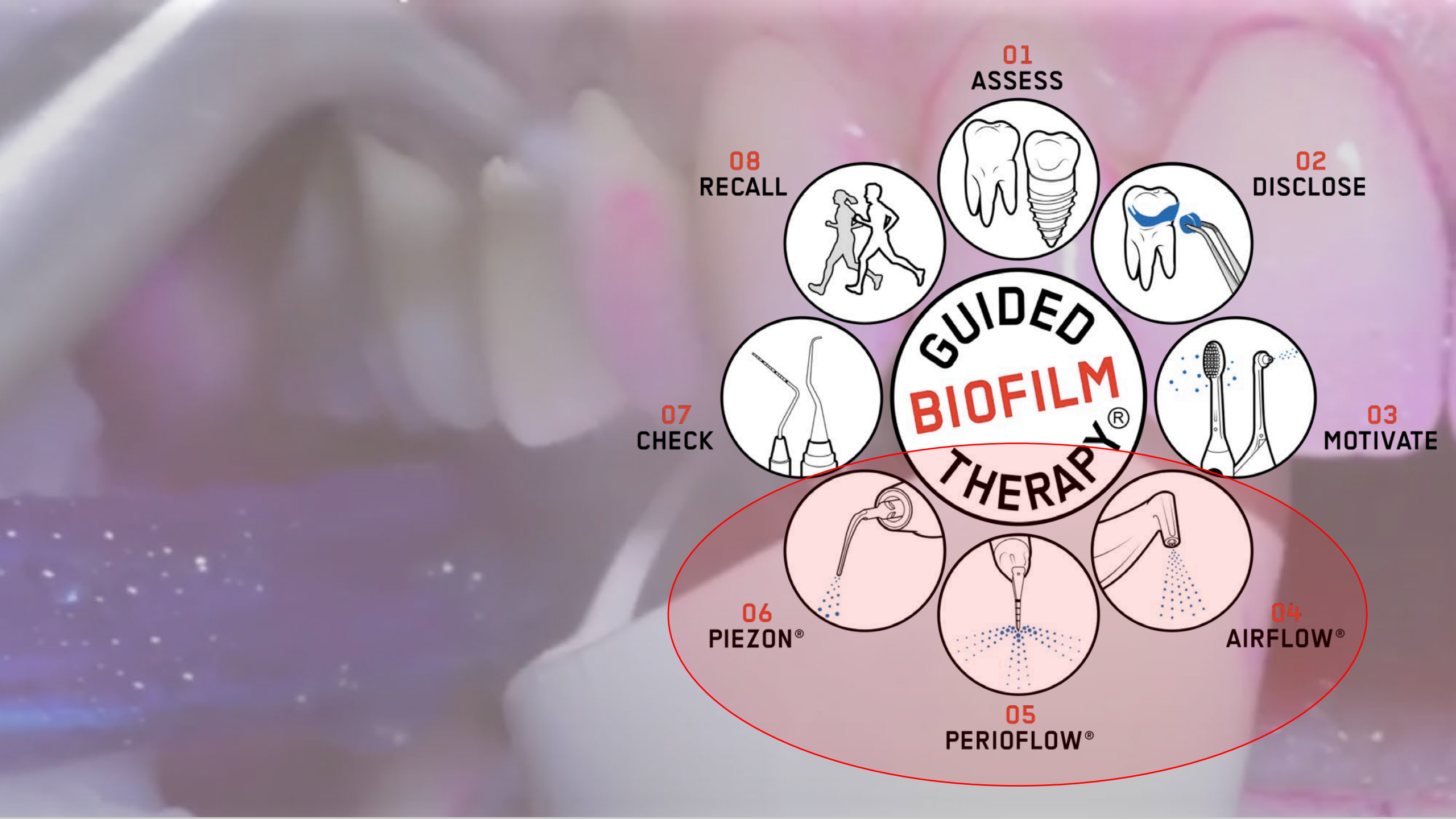
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PERIODONTOLOGY 2000

Periodontology 2000

Molecular aspects of the pathogenesis of periodontitis

JOERG MEYLE & IAIN CHAPPLE

Increase in cytokines essentially becomes "metastatic inflammation"

Intervention to remove disease-promoting biofilm required to drive down inflammation

Periodontology 2000, 2015

Controlling Disease Daily

Is there a toothpaste that can improve periodontitis?

Randomized, double blind, positive control clinical trial
65 subjects with Stage I and II periodontitis randomized
Dentifrice with 0.445% stannous fluoride (control)
COMPARED TO
Novel dental gel (LIVFRESH) with 2.6% EDTA (test)
No dental treatment provided during 6 month trial

- Mean PD reduction for test group: 1.16mm
- Mean PD reduction for control group: 0.93.mm
- Significantly less bleeding and inflammation in test compared to control

Kaur M, Geurs NC, Cobb CM, et al. Evaluating efficacy of a novel dentifrice in reducing probing depths in stage I and II periodontitis maintenance patients: A randomized, double-blind, positive controlled clinical trial. J of Periodontology. 2020. https://doi.org/10.1002/JPER.20-0721

6. Oral probiotics, Low-dose doxycycline, Low-dose hydrogen peroxide with custom-fit trays, Antioxidant gel?

COVER STORY

The effect of subantimicrobial-dose–doxycycline periodontal therapy on serum biomarkers of systemic inflammation

A randomized, double-masked, placebo-controlled clinical tri

Jeffrey B. P… hD; Hsi-ming Lee, PhD; R… epian, MD

Inflamma… ingly is r… clinically … factor in … progression … instability of … rotic plaques … with coronary … ease (CAD).[1] … regard, chron… titis is a com… inflammatory … increasingly … nized as havi… tion with, and p… causal relationship … CAD.[3,4] Therapeutic strate-gies that resolve inf… tion associated … these disease… affect CAD's … gression are … investigators … Women's Hea… clinical trial … favorable risk … file for hormo… ment therapy … mary prevent… Because CAD … cause of death … opausal wom… therapies to … temic inflam…

Results. In the intent-to-treat analysis across two years, SDD treatment reduced median high-sensitivity C-reactive protein (hs-CRP) by 18 percent (pri- … roteinase (MMP)-9 … -28.44; $P < .001$), … more than five … lipoprotein (HDL) … ; $P = .01$). … men significantly … P-9 and, among … DL cholesterol …

… mic inflammatory … termine whether … loping CAD. … igh-density … s; serum inflam-

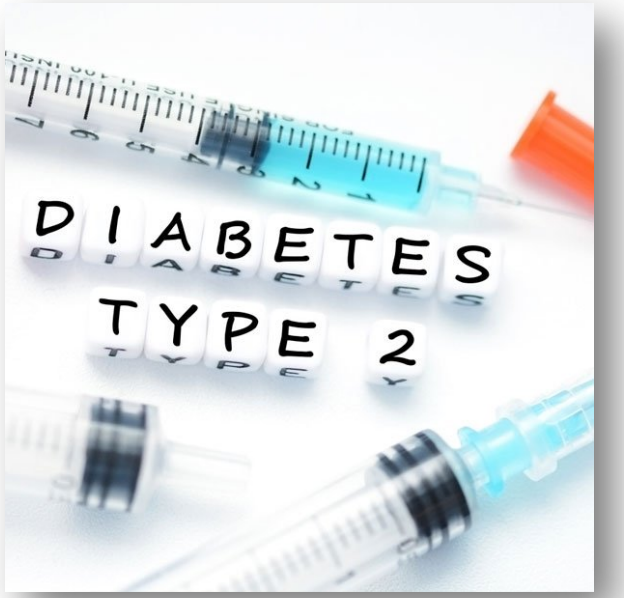
…0066027.

Dr. Payne is the … ment of Surgical Specialties, College … Address reprint requests to Dr. Payne.
Dr. Golub is a SUNY D… University, N.Y.
Dr. Stoner is an associate … fenses Center, Oklahoma City.
Dr. Lee is a research assistant … Department of Oral Biology and Pathology, School of Dental Medicine, Stony Brook University, N.Y.
Dr. Reinhardt is the BJ and Ann Moran Professor of Periodontology, Department of Surgical Specialties, College of Dentistry, University of Nebraska Medical Center, Lincoln.
Dr. Sorsa is a professor and chairman, Department of Cell Biology of Oral Diseases, Institute of Dentistry, University of Helsinki, and chief dentist, Department of Oral and Maxillofacial Diseases, Helsinki University Central Hospital.
Dr. Slepian is professor of medicine (cardiology) and biomedical engineering, Sarver Heart Center, and McGuire Scholar, Eller College of Management, University of Arizona, Tucson.

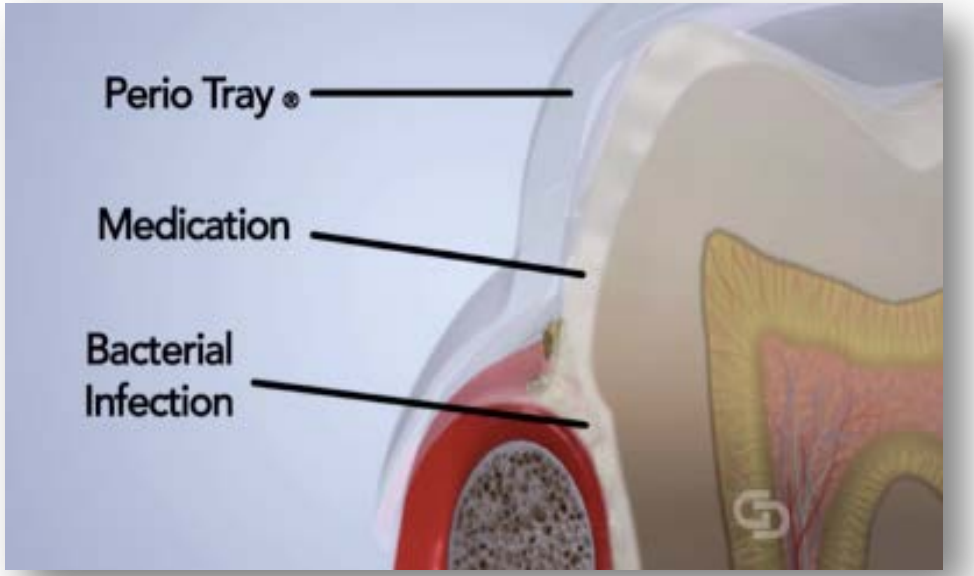
ARTICLE 1

128 Post-menopausal women with PD randomly assigned 2 SDD/daily (20 mg) or placebo 2 year assessment

Women on SDD significantly improved hs-CRP & MMP-9 & HDL



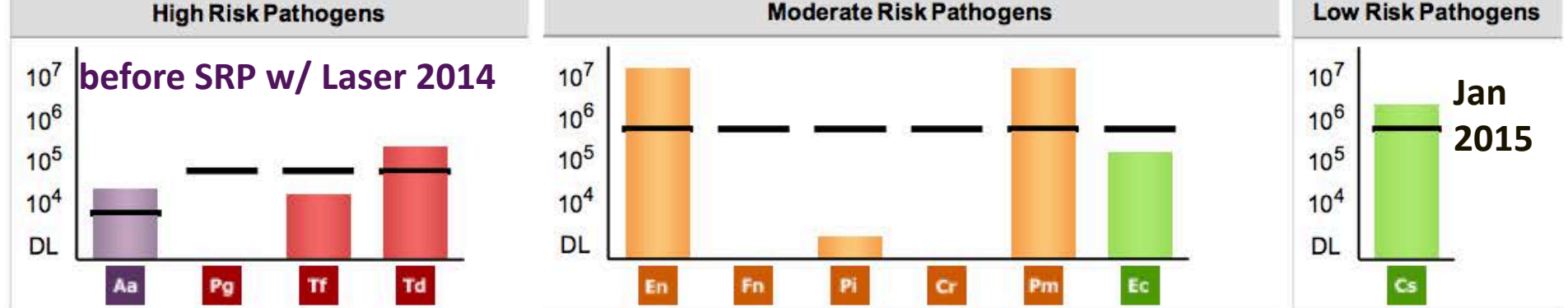
https://jada.ada.org/article/S0002-8177(14)62036-5/pdf
Accessed February 5, 2021

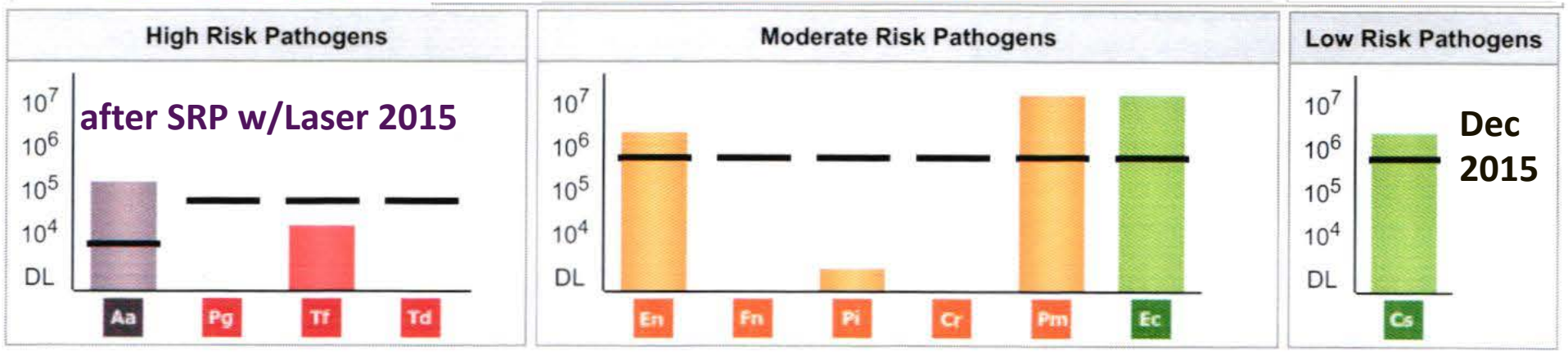


1.7% Hydrogen Peroxide shifted the anaerobic biofilm to an aerobic biofilm 6 – 12 months post therapy.

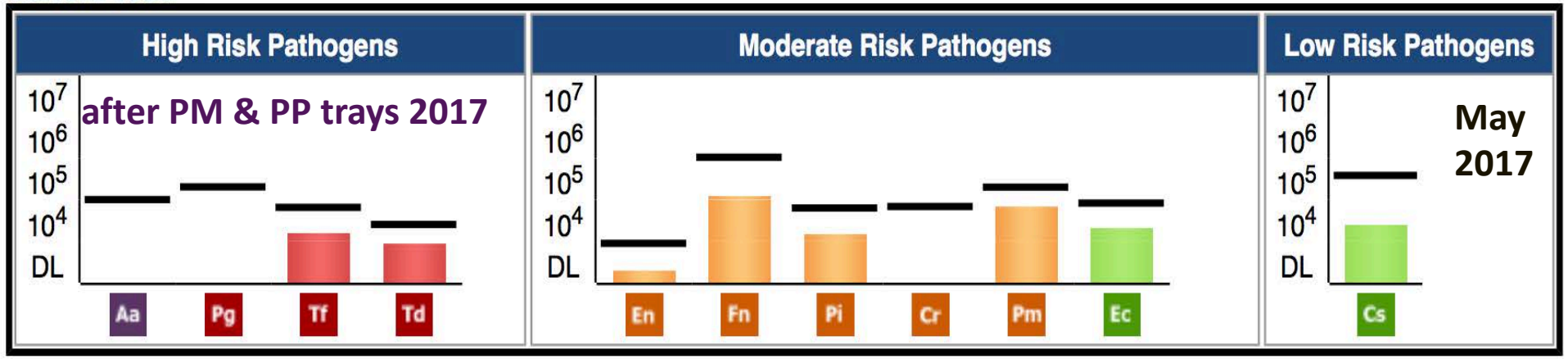
Less virulent biofilm = reduced Inflammatory response

Oral Biology & Dentistry 2017





Current Test:



(gingavalis,ochracea,sputigena)

periodontal pathogens. May increase temporarily following active therapy.

Test results provided by Kim Miller, RDH

Tf Tannerella forsythia — **Low** Very strong association with PD: common pathogen associated with refractory periodontitis.

ANTIBACTERIAL

- Menthol
- Thymol
- Xylitol

Purpose: Lower bacteria in oral environment

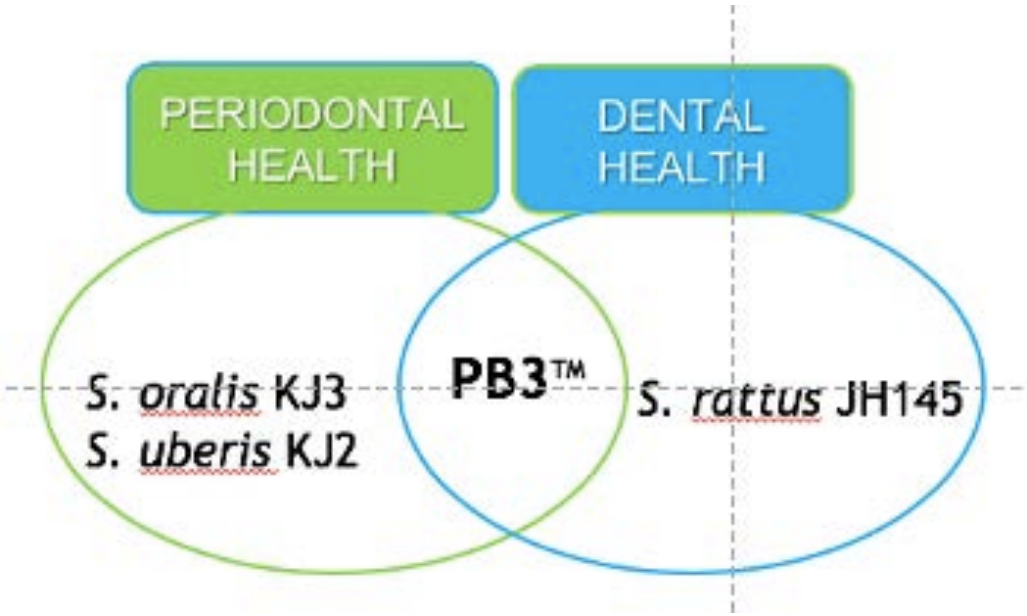
ANTIOXIDANT

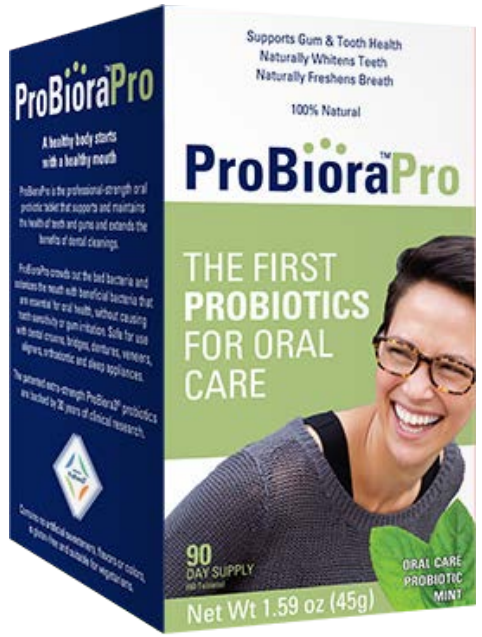
- Phloretin
- Ferulic

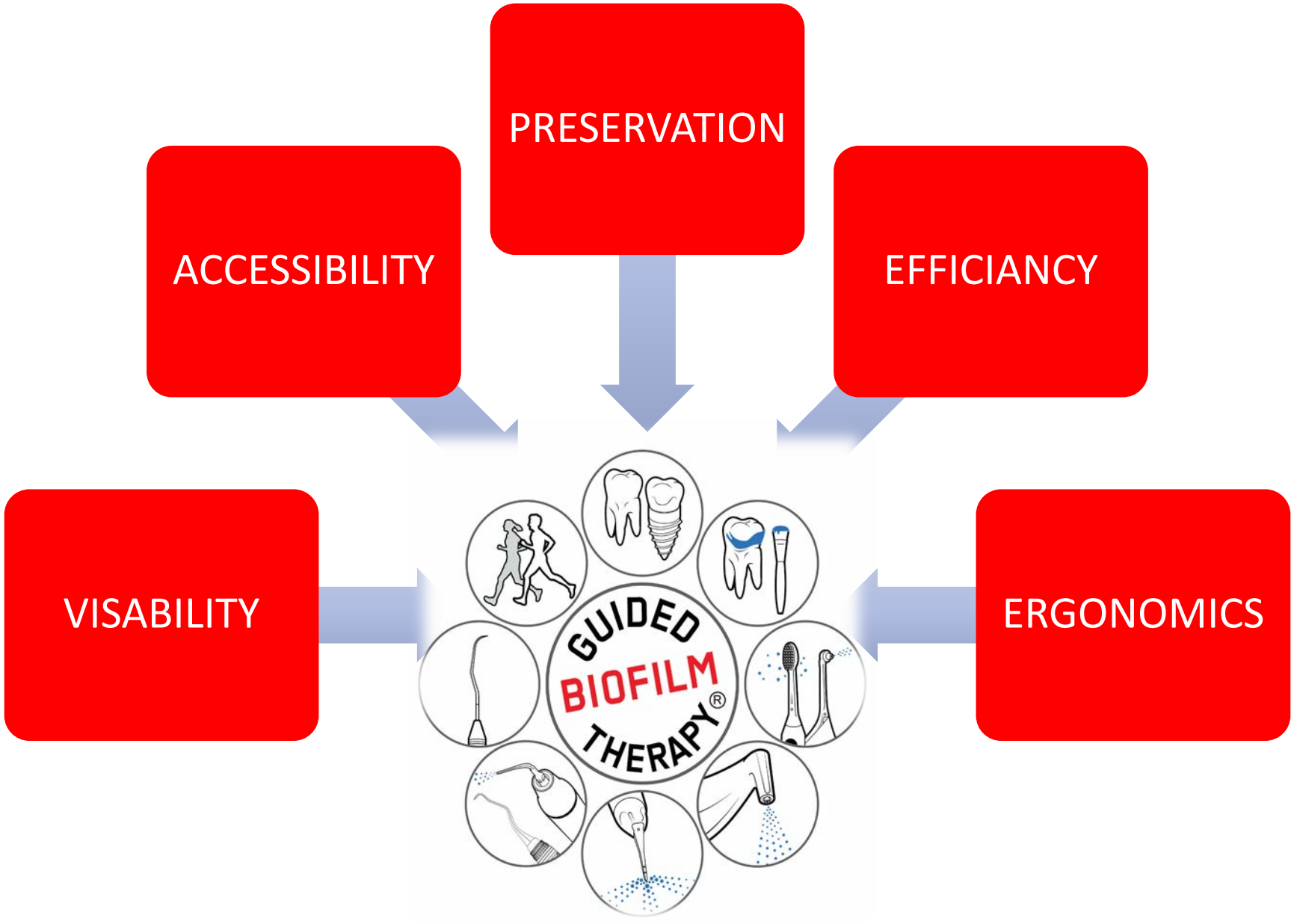
Purpose: Increase overall AO levels in saliva to manage inflammation


PERIOSCIENCES
HYDRATING
AO
Pro Toothpaste
Antioxidant gel toothpaste with targeted moisturizers to revitalize oral tissues
Net 3 fl oz / 90 ml
PERIOSCIENCES
HYDRATING
AO
ProRinse
Antioxidant oral rinse to freshen breath and moisturize oral tissues
Alcohol Free
PERIOSCIENCES
AO
ProVantage
Antioxidant infused dental gel for daily use on soft oral tissue

Replenish & Populate With Healthy Bacteria






PRESERVATION
ACCESSIBILITY
EFFICIANCY
VISABILITY
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GUIDED
BIOFILM
THERAPY®

Happy Patients!

7. How do you feel about the concept of Guided Biofilm Therapy after this program?


THE MAGIC OF GBT for Upsetting
The Underworld of BIOFILMS
Karen@karendavis.net