Appraising the true value of Decision – Making Process for Tooth Retention or Extraction

by Prof Dr med dent Liviu Steier

A vila et al. state that the decision tree introduced “…was developed upon available scientific literature”. This last phrase may be misleading to the general dental practitioner.

The author of the current paper has written this paper to avoid confusion among the profession.

Scientific papers published in peer reviewed journals should have a similar framework:

• Introduction – to emphasise the topic / question / hypothesis raised by the paper.
• Methods – to explain the approach, topic / question that should be highlighted.
• Conclusions – to conclude if results / findings / answer of the question introduced are applicable to.

Accumulation of knowledge today is based on what information is supplied. Textbooks represent an excellent resource of information. They will mostly update you on different concepts, techniques, and approaches. Appraisal of procedures, techniques and concepts can be performed based on scientific papers published in peer reviewed journals. Correct, comprehensive and adequate appraisal of the literature is decisive for the outcome of contemporaneous papers.

When was the paper published?
The paper was published in Volume 80 of The Journal of Periodontology in 2009. It is of major importance for the general practitioner with limited time availabilities and a restrained access to the literature to be offered updated complex decision taking instruments.

Where was the paper published?
The paper has been published in the official organ of the American Academy of Periodontology. The review methodology of this journal guarantees the highest professional confidence.

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What is the goal?
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Where has this paper been published?
Fast on-going research has expanded multiple fold treatments options in modern Dentistry: Biotissue - and Biofilm engineering, three dimensional diagnosis (radiology), CAD CAM technique as well as dental materials ensure more support for diseased hard and soft tissue. Reviewing treatability in the context of disease stadium was the major goal of the paper.

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- *Journal of Periodontology* - 57
- *Journal of Clinical Periodontology* - 24
- International Journal of Periodontics and Restorative Dentistry - 1
- *Annals of Periodontology* - 1
- *Australian Endodontic Journal* - 1
- *European Journal of Endodontics* - 1
- *American Journal of Orthodontics* - 1
- *General Dentistry* - 1
- *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology* - 2
- *Acta Odontologica Scandinavica* - 2
- *Dental Clinics of North America* - 1
- *Journal of Dental Research* - 1
- *Compendium of Continuing Education Dentistry* - 5
- *Current Opinion in Dentistry* - 1
- *American Journal of Orthodontics* - 1
- *Dental Trauma* - 1
- *General Dentistry* - 1
- *American Journal of Orthodontics* - 1
- *International Journal of Maxillofacial Surgery* - 1
- *International Journal of Oral Implantology* - 1
- *Pharmacotherapy* - 1
- *Journal of Oral Pathology and Medicine* - 2
- *Journal of Endodontics* - 1
- *Clinical Anatomy* - 1
- *Clinical Investigation* - 1
- *Contemporary Dental Practice* - 1
- *Clinical Anatomy* - 1
- *American Journal of Endodontics* - 1
- *Current Opinion in Endodontics* - 1
- *Oral Maxillofacial Surgery* - 1
- *Oral Pathology, Oral and Maxillofacial Pathology* - 1
- *Archives of Oral Biology* - 1
- *American Journal of Orthodontics and Dentofacial Orthopedics* - 1
- *European Journal of Endodontics* - 1
- *Journal of Dental Research* - 1
- *Journal of Endodontics* - 1
- *Journal of Endodontic Practice* - 1
- *American Journal of Orthodontics* - 1
- *European Journal of Endodontics* - 1
- *American Journal of Orthodontics* - 1
- *American Journal of Orthodontics* - 1

The authors successfully managed to build a first decision tree for the general practitioner when appraising the question: "to save or to extract?"
A prevention-based approach

Mhari Coxon looks at moving your practice to prevention-based dentistry as best practice

We are witnessing a change in the way we practice dentistry. Patients are becoming more proactive and want to be aware of the steps they can take to maintain their oral health. The dental team needs to be supportive and informed in order to provide a holistic approach to care. This involves being proactive in the prevention of dental problems and being able to show patients the benefits of prevention over treatment.

Changing attitudes

Dentistry has been a “see the problem, name the problem, fix the problem” profession for a very long time. We were conditioned to look for problems, but now we are being asked to look at prevention. This means that we need to be able to show patients the benefits of prevention and how it can improve their overall health.

With growing evidence showing common sense links with our systemic health (if you had an inflamed, suppurating, bacteria covered area on your arm the size of an egg you would expect to feel ill so why would it not be the same for the same size lesion in the mouth?) and our oral health we as a profession need to improve our prevention led practice. This is clearly best practice.

“But we do it already” I hear you all cry. “You are reinventing the wheel Mhari!” If this was the case then the incidence of periodontal disease and caries in the population would be decreasing, as would the incidence of litigation against dental professionals in relation to periodontal issues and undiagnosed caries. It is not easy to look at what we are not doing and seek to improve but it is the only way we, as clinicians and as practices can develop and progress.

The right foundations

The first time your patient spends time in your practice will affect how they feel about treatment and how happy they will be at the end of treatment. How much information you glean from them can determine the level of success with each client. In my opinion, supported by its success in the aesthetic zone, the Laser-Lok 3.0 comes with a broad array of prosthetic options making it the perfect choice for high profile cases.

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ent’s behavioural change and treatment acceptance. Do you think saying “you have some gum problems and the hygienist will see you for a scale and polish” conveys a preventative message? Does that show that the patient has to make a commitment to their treatment by supporting with their home routine? Or does it make it sound as though the patient has a “problem” that you have “named” that the hygienist will “fix” and so the cycle continues. Our principal talks about the gums and bone as the foundation to any dental work and without solid foundations he can’t work. He also explains how the biggest health benefit we can give patients is their oral health assessment and advice programme, which always follows an examination and is precursor to any further treatment. If you as “The Dentist” are telling them they need this then they will feel it has some value and are more likely to be open to advice from your team.

**Communication prevention**

So, how do we change our patient’s behaviour? By changing our own behaviour of course. If what we were saying RIGHT now in practice worked, then almost all our patients would be regular maintenance patients with a good level of understanding of their health and stability in their oral health for the majority. If this is not the case then what have you got to lose by trying something new? Communication at that initial examination can make all the difference. It doesn’t need to be a long session, you just have to fine tune how you talk and listen to your patients. Some good rules are:

- If you ask a question, REALLY listen to the answer...and don’t interrupt!! (harder than it sounds, I know)
- Ask about the patient’s knowledge about the topic you wish to discuss. This can open up the discussion in a non-confrontational manner.
- Be positive...but realistic about their treatment needs.
- Ask the patient if what you have said makes sense to them. Are you sure they understand the message you are trying to convey?
- Praise the talents of your team. “Sell” their care to your patient and watch as your treatment acceptance increases with little effort.

**A picture speaks 1000 words**

Every working environment is different and has restrictions, but preventative dental care is very cost-effective so we do not have an excuse as a profession. For those with good budget to change the practice dynamics, you will save time and increase compliance with the addition of a microscope. This should be linked to a live screen so the patient can see what you see. Taking a sample of your patient’s plaque and showing them what is growing there is very powerful and motivating. Backing this up with a few photos of inflamed gum or early decay with an explanation can be all it takes to get that oral health advice appointment booked.

**Be positive**

We all respond better to positive suggestion as a rule and so how we discuss this with the patients can affect their attitude towards their health and your team’s part in it. I do not like to be lectured or scolded by anyone - an automatic wall comes up; so why would I use this method with my patients. Yes there are “problems” in their mouths. Yes you can “name” those problems. But you and your team cannot “fix” their problems. You can help the patient to find solutions and attain and maintain health. This is ultimately more beneficial than fixing the problem then trying to modify the behaviour. That is like feeding the donkey the carrot and then asking it to carry the load.

**So to summarise:**

Use your team to glean information and discuss patient needs, fears and expectations; Question the patient gently to develop conversation about their health; Emphasise the importance of prevention in dental health and the benefits of this; Show your patients what is happening; Be positive, explain that they can make a difference with their home routine; “Sell” your team and their part in preventative care in the practice.

Obviously, if the patient is immediate pain or risk then this should be dealt with. Otherwise resist carrying out treatment until the preventative routine has been introduced.

For any questions please email me at mhari.coxon@cpdfordcep.co.uk

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Mobile: 07500 769 613

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Application of PAD in clinical dentistry and the literature evidence

Liviu Steier takes a closer look at Photo Activated Disinfection and its uses in differing areas of clinical dentistry

Spread of antibiotic resistance among pathogenic bacteria is alarming the medical science. Inappropriate prescription of antibiotics in the dental profession could add to this. Oral bacterial infection can commonly be considered of local origin. Several attempts have been undertaken in dentistry to try and maintain antimicrobial treatment regimens restricted locally.

The combination of dyes and visible light has proven to kill microorganisms about 100 years ago. Harmless dyes sensitive to light are delivered locally (soft and hard tissue) and exposed to light at certain predetermined wavelength are highly successful in disinfection. Key is presence of oxygen to excited state of the Photosensitiser enhancing transfer of electrons to the ground state of molecular oxygen resulting in reactive oxygen like singlet oxygen and hydroxyl radicals. The latest two have lethal effect on pathogenic microorganisms. The process described is called photo activated disinfection when related to dentistry. Resistance to Photo Activated Disinfection (PAD) has been researched in periodontology but could not be induced artificially (Lauro et al. 2002).

Dai et al. (2009) reviewed literature on Photodynamic therapy (PDT) in regards to localised infections. Key points of interest were:

- Photosensitisers and their interaction with different bacterial strains.
- Photodynamic therapy at different tissue structures.

As a result one can state that bactericidal action was achieved by neutral or cationic PS molecules on Gram positive flora when compared to cationic in combination with non cationic ones on Gram negative (Nitzan et al. 1992, Merchat et al. 1996,). Santamaria et al. (1972) listed more than 400 compounds demonstrating photosensitising properties. Usacheva et al. has proven in 2001 that: “TB exhibits a greater bactericidal activity than MB against most bacteria in dark and light conditions.”


Photo-activated disinfection provides proven high level disinfection for the treatment of root canals, periodontal disease, peri-implantitis and caries, eliminating 99.99% of all species of oral bacteria, on demand, in a matter of seconds.

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Mesel and Kocher identified in their review 2005 the “pre-
requisites and further demands” in regards to PAD in Periodon-
tology: suitability of the photo-
sensitising dyes, optimisation of efficacies, determination of irradi-
ation device as well as exposure
time, etc.

Today PAD can be regarded
as a helpful adjutant in biofilm management. Its in-
dication in clinical dentistry varies from Cariology to Peri-
implantitis covering Endo-
dontics and Periodontology.

Application in Perio
Use of PAD in Periodontology is multifaceted as an adjutant af-
after non-surgical or in conjunc-
tion with surgical approaches.

Interestingly, Azarpazhooh et al (2010) performed a system-
atic review and meta analysis for the use of PAD in Periodon-
tology and concluded: “PDT as an independent treatment or as an adjunct to SRP was not superior to control treatment of SRP. Therefore, the routine use of PDT for clinical manage-
ment of periodontitis cannot be recommended.”

Once one understands the mechanism of action of PAD, as briefly discussed above, and starts to critically appraise the systematic review performed by the group of Azarpazhooh et al. a major shortcoming becomes evident – there was no appraisal of the studies includ-
ed, in regards of suitable selec-
tion of photosensitiser, adequate light source and timing. Cor-
rect conclusion would have re-
flected to the kind of PS used and the question if photobiological principles of light have been disregarded.

It is sad to admit that even applying the highest crite-
rion for appraisal according to the Cochrane library one may generate confusing con-
clusions if authors are not fa-
miliar with the review topic.

In 2009, Ramos de Oliveira et al. managed to demonstrate a statistically significant reduc-
tion in TNFα a level 50 days fol-
lowing treatment when PAD used without SRP. Similar re-
sults were achieved by Braham et al.(2009).

An in vivo study by Si-
gusch et al. (2010) showed that the adjuvant application of the described PDT method is appropriate to reduce peri-
odontal inflammatory symp-
toms and to successfully treat infection with F. nucleatum.

The results of Allen et al. (2007) using Toluidine blue “in-
dicate that PDT may be an effec-
tive alternative to conventional modalities in the treatment of periodontal disease.”

Andernæs et al. (2007) com-
pared the use of Pad to SRP and concluded that “Within the lim-
its of the present study, it can be con-
cluded that SRP combined with photodisinfection leads to significant improvements of the investigated parameters over the use of SRP alone.”

Mianezzi de Almeida et al. (2008) performed a periodontal bone loss in rats by ligature and treated with PAD. Their conclusion: “PDT may be an effective alternative for control of bone loss in inflammation areas in periodontitis.” Kimerik et al. (2003) researched the lethal action of Toluidine blue as PS on Porphyromonas Gingivalis and concluded “The results of this study show that Toluidine blue-mediated lethal photosen-
sitisation of P. gingivalis is pos-
sible in vivo and that this results in decreased bone loss. These findings suggest that photody-
namic therapy may be useful as an alternative approach for the antimicrobial treatment of periodontitis.”

Application for treatment of Peri-implantitis
Hayek et al. (2005) published a study comparing conventional therapy versus PAD for treat-
ment of ligature induced peri-
implantitis in dogs. They con-
cluded that the non invasive PAD technique could be used to reduce pathological microw-
ganism in peri-implantitis.

Shibli et al. (2005) examined the efficacy of PAD applica-
tion alone in ligature induced peri-implantitis in dogs and concluded that complete elimination of pathogens was achieved in some cases.

Dörthudak et al. (2001) re-
searched microbial decontami-
nation on peri-implantitis af-
fected IMZ implants in vivo and identified a significant reduction

Baron et al (2000) reviewed 29 papers on regenerative meth-
ods in regards to regenera-
tion of peri-implantitis affected sites and concluded: “Of all tested treatment methods, the combination of guided bone regeneration and augmenta-
tion with demineralised freeze-
dried bone resulted in the most
favorable results regarding bone gain and reosseointe-
gration.”

Application in Cariology
Williams et al (2002) researched the bactericidal efficacy of Tolu-
idine blue and variable energy on Streptococcus mutans. The results were extremely encour-
gaging: “The system was highly effective in killing TBO-treated Streptococcus mutans NCTC 10449 in stirred planktonic suspension, killing at least 109 cfu/ml. Anti bacterial action in-
creased as the delivered energy dose increased.”

The study of Lima et al. (2009) “evaluated the effect of PACT (Photodynamic anti-
microbial therapy) on dentine car-
des produced in situ.” They came to the following conclusions: “PACT was effective in killing oral microbiomass present in dentine cavities produced in situ and may be a useful technique for eliminating bacteria from dentine carious lesions before restoration.”

Steier et al. researched the efficacy of PAD borvine root ca-
nal dentine previously infected with Enterococcus Faecalis mo-
monic lia Biofilm.

Especially with today’s trends of minimistic inter-
vention and using adhesive dentistry the use of PAD may prevent excessive hard tissue re-
moval and help maintain great amounts of dentin. Major ben-
efict of course is the conservation on tooth vitality.

Application in Endodontics
An in vivo study performed by Bonsor et al. (2006) concluded that “Results indicate that the use of a chelating agent acting as a cleaner and disrupter of the biofilm and photo-activated disinfection to kill bacteria is an effective alternative to the use of hypochlorite as a root canal cleaning system.”

Another in vivo study pub-
lished as well in 2006 by the group of Bonsor researched the ability of PDT to compliment conventional RCT disinfection and concluded that “The PAD system offers a means of de-
stroying bacteria remaining af-
after using conventional irrigants in endodontic therapy.”

Williams et al. (2006) tested the efficacy of PAD on Fusob-
bacterium nucleatum, Pepto-
 streptococcus micros, Prevotella intermedia and Streptococcus intermedius and concluded that “PAD killed endodontic bacteria at statistically significant levels compared to controls.”

Garez et al. (2008), in an in vivo study, researched the “Antimicrobial Effects of Pho-
todynamic Therapy on Patients with Necrotic Pulps and Per-
apical Lesion” and their results suggested that “the use of PDT added to endodontic treatment leads to an increase in number of bacterial load and may be an appropriate approach for the treatment of oral infections.”

The research hypothesis of Bergmans et al. (2007) was: “To test the hypothesis that photo-
activated disinfection (PAD) has a bactericidal effect on patho-
gens inoculated in root canals, with emphasis on biofilm for-
mation/destruction.” Their con-
clusions were: Photo-activated disinfection is not an alternative but a possible supplement to the existing protocols for root canal disinfection as the interaction between light (diode laser) and associated dye (TBO) provides a broad spectrum effect.”

The research goal of Garrez et al. (2008) was “To compare the effectiveness of antimicrobi-
al photodynamic therapy (PDT), standard endodontic treatment and the combined treatment to eliminate bacterials biofilms present in infected root canals.”

Their results: “Endodontic therapy alone reduced bacterial bioluminescence by 90 per cent while PDT alone reduced biolu-
minescence by 95 per cent. The combination reduced biolumi-
nescence by >98 per cent, and importantly the bacterial re-
growth after 2 months after treatment was much less for the combination (P<0.0005) than for either single treatment.”
The in vitro study of Soukos et al. (2006) ended with the conclusion that “PDT may be developed as an adjunctive procedure to kill residual bacteria in the root canal system after standard endodontic treatment.”

Pinheiro et al. (2007) study was on “evaluate photodynamic therapy in deciduous teeth with necrotic pulp by means of fully quantifying viable bacteria, before and after instrumentation and after the use of photodynamic therapy”. They concluded that “Photodynamic therapy is recommended as adjunct therapy for microbial reduction in deciduous teeth with necrotic pulp.”

When using Methylene blue as PS, Fimple et al. (2008) concluded “that PDT can be an effective adjunct to standard endodontic antimicrobial treatment when the PDT parameters are optimised.”

The research group around Lim (2009), calling the PAD process “Light Activated Disinfection” (LAD) used “biofilms of Enterococcus faecalis at two different stages of maturation” and extracted teeth. The results of the study showed “Sodium hypochlorite and improved LAD showed the ability to significantly inactivate bacteria in four-day-old biofilms when compared to the control and LAD (p < 0.05). Inactivation of bacteria from deeper dentine was higher in improved LAD than sodium hypochlorite. In four-week-old biofilms, a combination of chemomechanical disinfection and improved LAD produced significant bacterial killing compared to either chemomechanical disinfection or improved LAD alone.”

Souza et al (2010) compared the efficacy of Methylene blue and Toluidine blue as an adjuvant in root canal disinfection. Their conclusions were “These in vitro results suggest that PDT with either MB or TB may not exert a significant supplemental effect to instrumentation/irrigation procedures with regard to intracanal disinfection. Further adjustments in the PDT protocol may be required to enhance predictability in bacterial elimination before clinical use is recommended.” It may be noted that the culture media for E. faecalis may play a role in the different outcomes.

Based on current knowledge and evidence the author suggests the implementation of PAD in root canal disinfection once conventional protocol completed.

Conclusion
PAD is not at all a new concept. It has proven its efficacy in action over almost the last hundred years. New microbiologic knowledge is continuously compensated with advanced research in light emitting sources. Intensive work is committed into the identification process of correlating adequate PS to specific bacterial infection, enhancing dye penetration, adjusting light exposure time, etc.

On the other side numerous new applications arise. Confirming treatment efficacy is a demanding and highly time-, resource- and finance-consuming process. Rewards are amazing taking under consideration the huge added benefits in regards of antibiotic resistance.

The in vitro study of Soukos et al. (2006) ended with the conclusion that “PDT may be developed as an adjunctive procedure to kill residual bacteria in the root canal system after standard endodontic treatment.”

Pinheiro et al. (2007) study was on “evaluate photodynamic therapy in deciduous teeth with necrotic pulp by means of fully quantifying viable bacteria, before and after instrumentation and after the use of photodynamic therapy”. They concluded that “Photodynamic therapy is recommended as adjunct therapy for microbial reduction in deciduous teeth with necrotic pulp.”

When using Methylene blue as PS, Fimple et al. (2008) concluded “that PDT can be an effective adjunct to standard endodontic antimicrobial treatment when the PDT parameters are optimised.”

The research group around Lim (2009), calling the PAD process “Light Activated Disinfection” (LAD) used “biofilms of Enterococcus faecalis at two different stages of maturation” and extracted teeth. The results of the study showed “Sodium hypochlorite and improved LAD showed the ability to significantly inactivate bacteria in four-day-old biofilms when compared to the control and LAD (p < 0.05). Inactivation of bacteria from deeper dentine was higher in improved LAD than sodium hypochlorite. In four-week-old biofilms, a combination of chemomechanical disinfection and improved LAD produced significant bacterial killing compared to either chemomechanical disinfection or improved LAD alone.”

Souza et al (2010) compared the efficacy of Methylene blue and Toluidine blue as an adjuvant in root canal disinfection. Their conclusions were “These in vitro results suggest that PDT with either MB or TB may not exert a significant supplemental effect to instrumentation/irrigation procedures with regard to intracanal disinfection. Further adjustments in the PDT protocol may be required to enhance predictability in bacterial elimination before clinical use is recommended.” It may be noted that the culture media for E. faecalis may play a role in the different outcomes.

Based on current knowledge and evidence the author suggests the implementation of PAD in root canal disinfection once conventional protocol completed.

Conclusion
PAD is not at all a new concept. It has proven its efficacy in action over almost the last hundred years. New microbiologic knowledge is continuously compensated with advanced research in light emitting sources. Intensive work is committed into the identification process of correlating adequate PS to specific bacterial infection, enhancing dye penetration, adjusting light exposure time, etc.

On the other side numerous new applications arise. Confirming treatment efficacy is a demanding and highly time-, resource- and finance-consuming process. Rewards are amazing taking under consideration the huge added benefits in regards of antibiotic resistance.
Fig 14 – (a&b) The roots were split in halves, then SEM/BSE observations were made along the divided halves starting from the canal wall through the tubules. The length of action of PAD and physiological test of bacterial inhibition-mediated effects of two groups with PAD treatment and control group with a barometric on the whole length of the tubules. SEM 30,000x – a - control, b - PAD.

Fig 15 – (a&b) A cross-sectional view of the dentinal tubules a - before PAD activation (control group) b - after PAD activation – SEM 10000x.

Fig 16 – (a) The root was split in halves, SEM/BSE observations were made along the divided halves starting from the canal wall through the tubules. PAD activation led to a length of 20 Mm; c - PAD activation – dentinal tubules free of the bacteria to its whole length; b - PAD activation – small number of e faecalis invading the tubules, with dentinal tubules free of the bacteria to a length of 20 Mm; c - PAD activation – dentinal tubules free of the bacteria to its whole length.

Fig 17 – Example of PAD used in endo-therapy.

Fig 18 – (a) A cross-sectional view of the dentinal tubules a - before PAD activation (control group) b - after PAD activation – SEM 10000x.

Fig 19 – (a&b) The roots were split in halves, then SEM/BSE observations were made along the divided halves starting from the canal wall through the tubules. The length of action of PAD and physiological test of bacterial inhibition-mediated effects of two groups with PAD treatment and control group with a barometric on the whole length of the tubules. SEM 30,000x – a - control, b - PAD.
Interdental Cleaning: the path to better oral hygiene for patients
Helmut Nissen discusses the next generation of cleaning products

One of the most important parts of the job of any dental practitioner is the education of their patients with regards to maintaining a good oral care regime. Some of the most important parts of the mouth in this respect are the interdental areas, which experts agree are an ideal breeding ground for pathogenic bacteria and a high-risk area for the development of caries. The self-care regimens taught by practitioners are crucial in the prevention of gum disease, but patients can struggle to maintain their good work outside of the dentist’s office and often slip back into bad habits. Worryingly, the British Dental Health Foundation now estimates that a mere 21 per cent of the British public use dental floss.

In recent years, researchers have amassed a body of evidence to substantiate claims about the links between oral and other diseases, including, but not limited to, diabetes, cardiovascular disease, dementia and strokes. In trials conducted by the Northern Manhattan Stroke Study (NOMAS) links between oral infection and the onset of a stroke have been examined. Seventy eight people of mixed ethnicity (Caucasian, Hispanic and Afro-American) who resided in the same community and had never suffered strokes, received detailed oral examinations. These included measurement of probing depth and attachment loss at six sites per tooth as well as an ultrasound measurement of the carotid arteries. It was duly noted that those with the most severe periodontal disease also showed the greatest thickening of the arteries. These results remained consistent, even when known cardiovascular risk factors were accounted for, including hypertension, diabetes, and cholesterol levels. It has been noted that many patients contract some kind of infection shortly before suffering a stroke, and this provides a link between periodontal disease and cardiovascular disease. The results suggest that infections such...
as can cause chronic inflammation and activation of T-Lymphocytes, leading to plaque formation and lesions in the coronary arteries. Further thickening of the arterial walls can severely increase the possibility of stroke or heart disease.

**Interproximal Cleaning**

With evidence for the connection between oral health and general cardiovascular diseases, mounting and recent studies have focused on the effects of daily use of a fluoride-based gel with chlorhexidine (0.2 per cent sodium fluoride (900ppm) and 0.2 per cent chlorhexidine digluconate), applied with an interdental brush.

The University College of Health Sciences, Kristianstad, with the Department of Cardiology, Goteburg University in Sweden, carried out a double-blind crossover design trial, which used an active gel as well as a placebo. In this trial, 15 healthy patients with at least four open approximal spaces in the pre-molar/molar region were chosen from the Department of Periodontology in Kristianstad and clinical parameters were registered at eight approximal tooth surfaces: Plaque index after using a disclosing solution, pocket depth, sulcus bleeding index and gingival fluid flow using a periodontoscope. Participants were asked to use the gel after brushing, applying it with an interdental brush twice a day, ensuring that each interproximal space was cleaned twice. Results were expressed as mean values at three points within the trial – on days 0, 7, and 21. From the very beginning of the trial a noticeable improvement was shown in all four parameters. The study concluded that three weeks of interdental brushing combined with an interdental gel could significantly improve oral health as well as helping to prevent the build up of plaque.

Those patients predisposed to plaque and caries are known to benefit from a dual action formula created to strengthen and desensitise tooth surfaces and help maintain oral hygiene. For these patients a product that lists fluoride as an active ingredient and posts the anti-bacterial properties of chlorhexidine (CHX) can help prevent the build up of bacteria.

Using interdental gels and brushes can also be beneficial as these will help the patient access those ‘hard to reach’ areas. Using a product containing bacteria fighting CHX will allow the fluoride to work to better effect, but patients would be well advised to use a non-abrasive formula to protect the tooth enamel from demineralisation.

A dual acting gel can be an ideal accompaniment to interdental brushes for oral hygiene issues of varying types and severity. It may be appropriate for practitioners to recommend an interdental cleaning product based on fluoride and supported by the antibacterial properties of CHX. Interdental gels are excellent products for the effective support of your patients’ interdental care regime and specially formulated, dual-action gels can provide patients with a convenient and effective ‘take-home’ method of cleaning interdental spaces.

That traditional interdental cleaning is no longer a priority for patients is obvious from the statistics cited by the British Dental Health Foundation, but many practitioners have high hopes that the next generation of cleaning products now available will encourage the British public to improve their dental hygiene. If these products can successfully motivate the masses, we may see a dramatic improvement in dental health into the coming decade.

**About the author**

Helmut Nissen International Marketing & Sales Manager Helmut has been working for over 20 years in the health and oral care market and is dedicated to establishing strong brands based on real user benefits.

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The use of antiseptic mouthwashes as a secondary line of defence against the onset of periodontal disease has been in existence for approximately 40 years.

In addition to conventional brushing, mouthwashes offer a number of significant advantages for patients, helping to control the oral pathogens that lead to problems like halitosis, dental caries and of course, dental plaque biofilm formation.

However, for patients with manual dexterity issues who may find brushing difficult, as well as those recovering from implant or endodontic surgery, an antiseptic mouthwash may be vital in maintaining good oral health and/or preventing the onset of infection.

Numerous clinical studies have sought to establish the effectiveness of the active ingredients commonly found in mouthwashes, including chlorhexidine (CHX), cetlyl pyridinium chloride and plant extracts such as essential oils and chlorophyll in controlling the spread of supragingival plaque and gingivitis. Overall, it has been shown that mouthwashes containing chlorhexidine are by far the most proficient in controlling sub-gingival plaque, eradicating oral fungi and reducing the bleeding and inflammation associated with gingivitis when compared to other antimicrobial agents, including hydrogen peroxide. 1, 2, 3, 4, 5

Chlorhexidine is a highly effective bactericide, thanks to its capacity to set up chemical links with the anionic groups such as phosphates and sulphates found in the cell wall of bacteria, leading to an increase in cellular permeability and thereby destabilising the bacterial cell, ultimately leading to its destruction or eradication during brushing. 6

Although considered to be the ‘gold standard’ of chemical antiseptic agents,7 there are a few limitations and drawbacks that go along with using this otherwise highly effective ingredient.

One of the main disadvantages of using chlorhexidine is its tendency to cause staining on the teeth, especially in the inter-proximal areas and the mucous membranes on the back of the tongue, as well as the lead to discoloration of dental restorations and prostheses. This is caused by the chemical interaction of tooth-bound chlorhexidine and leftover chromogens from food or beverages and is known as the Maillard reaction.

New Look, New Products!

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- Low abrasion

Results from stain removal study conducted at Bristol University on Beverly Hills Formula toothpaste over a 5 minute treatment period
The efficacy of chlorhexidine is also significantly diminished by its interaction with several anionic compounds found in detergents such as sodium lauryl sulfate (SLS) that are commonly added to toothpaste.13 This means that in general, patients need to wait for a full 30 minutes after brushing before rinsing in order to get the full benefits out of their chlorhexidine mouthwash. However, the use of SLS-free toothpaste can help patients get around this issue, even getting a double dose of CHX when using an SLS-free paste containing Chlorhexidine. Many chlorhexidine-based mouthrinses also contain alcohol, which has been known to cause irritation of the oral mucosa, leading to a stinging or burning sensation in the mouth. Currently, over-the-counter brands of mouthwash can contain anything between 18- and 26 per cent alcohol. Whilst there have been suggestions of a link between the alcohol content and oral cancer, a critical analysis of literature14 has failed to find evidence of a direct causal link and so far, the studies have been inconclusive.

However, the same study also concluded that there is no evidence that alcohol improves the effectiveness of anti-plaque agents.14 As demand for non-alcoholic mouthwashes has increased, the need to develop effective chlorhexidine-based mouthwash products with reduced negative side effects has become ever greater. Addressing this demand, several manufacturers have risen to the challenge to develop an alcohol-free chlorhexidine mouthwash.

In an effort to rectify the problems associated with chlorhexidine, several studies have looked at alternatives such as combining agents (ie sodium fluoride and cetyl pyridinium chloride) with CHX. There is evidence to suggest that, when used together in low concentrations, the combination of CHX and fluoride provide added benefits to patients, including the prevention of caries and the remineralisation of teeth. 

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