

# Oral Health Research Review

Making Education Easy

Issue 11 – 2011

## In this issue:

- OSFMD for GAP
- Reducing caries incidence in younger schoolchildren
- Toothbrush bristle arrangement does not affect performance
- Fluid intake and dental caries in Australian children
- Antimicrobials as mechanical and antiseptic therapy for GAP
- Preterm birth and periodontopathic *P. gingivalis*
- Systemic adverse reactions to LAs
- Respiratory and periodontal diseases are associated
- Green tea improves oral health
- CPP-ACP remineralises artificial early enamel lesions in vitro



Oral Health Research Review is also made available to Dental Hygienists through the kind support of the New Zealand Dental Hygienists' Association

## Welcome to issue 11 of Oral Health Research Review.

This edition includes two papers on generalised aggressive periodontitis (GAP), one looking at the benefits of one-stage full-mouth disinfection (OSFMD) and the other exploring the role of systemic adjunctive antimicrobial therapy. Another paper reports on systemic adverse reactions with local anaesthetics (LAs), and the relationship between periodontal and respiratory diseases is explored.

We hope you enjoy this issue's selection, and we welcome your comments and feedback.

Kind regards,

**Jonathan Leichter D.M.D**

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## One-stage full-mouth disinfection as a therapeutic approach for generalized aggressive periodontitis

**Authors:** Aimetti M et al

**Summary:** This study in 27 patients with advanced GAP found that OSFMD was associated with improvements in all parameters assessed, including whole-mouth probing depth (PD; from 4.2 to 2.8mm) and clinical attachment level (from 4.5 to 3.4mm). There was also a 61% decrease from baseline in the number of sites with PD  $\geq$ 5mm, with PD reductions of 1.5mm and 2.5mm in moderate and deep pockets, respectively. At 6 months, 40% of moderate sites and 27% of deep sites were free of pathogens.

**Comment (JL):** GAP is defined as a rapidly progressive disease affecting otherwise healthy individuals, and causing pronounced episodic and rapid destruction of periodontal tissues. Treatment has generally consisted of oral hygiene instructions and subgingival instrumentation for a 4- to 6-week period. The aim of this study was to evaluate the efficacy of the OSFMD strategy after a 6-month period, both clinically and microbiologically. Twenty-seven patients were included in this study, making it the largest of the five OSFMD studies carried out to date. Patients underwent a session of supragingival scaling and polishing and received OHI after their initial screening. The OSFMD carried out 1 week later consisted of full-mouth subgingival scaling and rootplaning, brushing of the tongue with 1% chlorhexidine gel and two mouthrinses with 0.2% chlorhexidine solution for 1 minute each. All pockets were irrigated three times with a 1% chlorhexidine gel. Within the limitations of this study, the conclusion drawn after data analysis was that OSFMD may well be a viable approach in the treatment of GAP.

**Comment (RP):** The treatment regimen for this study would be difficult to realistically replicate, as it would be difficult to find compliant patients that could attend a dental clinic with such frequency. As noted in this research, "a strict recall program, combined with a careful self-performed plaque control, is of paramount importance in the success of therapy, particularly in highly susceptible patients". If this is achieved, then it seems OSFMD may be of some benefit, but that is a markedly high goal to aim for with the average patient. Also, with the absence of a control group in this study, it is difficult to tell whether the improved periodontal condition was due to the OSFMD or attributable to the scaling and root planing on its own.

**Reference:** *J Periodontol* 2011;82(6):845-53

<http://www.joponline.org/doi/abs/10.1902/jop.2010.100468>

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## Mixed dentition cavitated caries incidence and dietary intake frequencies

**Authors:** Chankanka O et al

**Summary:** This study in 198 children with primary and mixed dentition found that 37% developed new cavitated caries between the ages of 5 and 9 years. Significant associations were seen in a multivariate analysis between new cavitated caries and: i) both noncavitated and cavitated caries experience at age 5 years (odds ratios 2.67 [p=0.03] and 3.39 [p=0.004], respectively); ii) greater frequency of processed starch consumption for snacks (3.87 [p=0.07]); iii) older age (1.68 [p=0.04]); and iv) less frequent toothbrushing (p=0.001).

**Comment (JL):** The children included in this 4-year longitudinal study were mostly Caucasian, of predominantly high socioeconomic status and had a low-to-moderate disease level. This, unfortunately, serves to limit the study's generalisability. Subjects were in the primary and mixed dentition stages, had completed at least two diet diaries (one prior to starting school and one after) and were examined for caries at age 5 years and again at 9 years by the same trained and calibrated examiners. Daily toothbrushing frequency and composite fluoride intakes were also determined. The authors found that >75% of the children regularly drank carbonated drinks, and that consumption of sweetened cereal was common. Daily toothbrushing was a strong preventive factor in this group. Their conclusions were consistent with other studies in this age group – snack-time intake of processed starches, toothbrushing and SES are all variables associated with caries. Their suggestions are also not unique – the use of fluoridated toothpaste and dietary counselling could decrease the risk of new cavitated caries in young school-aged children.

**Comment (RP):** This study, while done on a small sample size and from a narrow scope of society (all from quite high socioeconomic status), does reinforce the importance of addressing associated factors when treating patients. As mentioned in this study, by the time caries are clinically visible in the mouth, there has been significant damage to the integrity of the tooth structure. The aim for oral health providers is to have some influence on the modifiable factors that affect the caries process, thus preventing irreversible damage from occurring. Diet is one of these factors that the oral health provider may be able to influence. Effective dietary counsel, alongside thorough oral hygiene instruction, can change the whole course of the caries process in an individual.

**Reference:** *Pediatr Dent* 2011;33(3):233–40

<http://www.ingentaconnect.com/content/aapd/pd/2011/00000033/00000003/art00009>

## Clinical evaluation of three toothbrush models tested by schoolchildren

**Authors:** Stroski ML et al

**Summary:** Three different toothbrush bristle arrangements (same plane with straight arrangement, different planes with straight arrangement and different planes with straight and circular arrangement) were compared in 27 children. The three types provided similar results for all oral hygiene and gingival bleeding parameters investigated and had similar degrees of wear.

**Comment (JL):** Are the fancy toothbrushes we constantly see advertised any better than their simpler predecessors or is it all just a marketing ploy to separate us, and our patients, from our hard-earned money? The changes in design include the use of different materials, bristle arrangements, angles and shapes of the head. The aim of this study was to determine if these differences contribute to an increase in the effectiveness of brushing. Do innovative brushes perform any better than their conventional counterparts? Twenty-seven volunteers, aged 9–10 years old, took part. The study involved a 21-day conventional brush period, followed by three experimental periods each lasting 15 days. Children brushed three times a day, and all children used the three experimental brushes. Oral hygiene and gingival bleeding indices were determined after the initial 21 days, and at the beginning and end of each experimental period. Results showed that bristle arrangement had little influence on oral hygiene status and all the brushes were capable of effectively removing dental biofilm. This study shows no justification for purchasing a more expensive model of toothbrush for children.

**Comment (RP):** The sale of dental aids is a huge business. It seems that oral health can indeed become quite perplexing in the clever world of marketing. The average consumer can be completely baffled by the claims of various marketing campaigns, and can find it very difficult to make an informed decision on the merits of one toothbrush versus another. This study found there was little difference in efficacy between the lower- versus higher-end manual toothbrushes of one particular brand. How a toothbrush is used is the most important factor affecting efficacy of toothbrushes. Good oral hygiene instruction is where the real benefit is.

**Reference:** *Int J Dent Hyg* 2011;9(2):149–54

<http://onlinelibrary.wiley.com/doi/10.1111/j.1601-5037.2010.00476.x/abstract>

## Contemporary fluid intake and dental caries in Australian children

**Authors:** Lee JG & Breatly Messer LJ

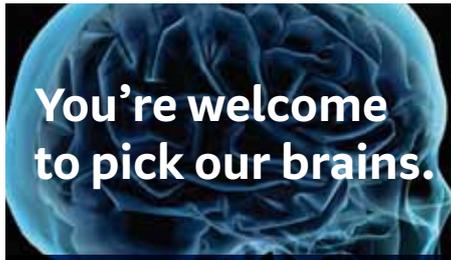
**Summary:** The authors of this paper note that Australian children's caries rates are again on the increase, despite widespread water fluoridation. They discussed possible reasons, with particular emphasis on increased consumption of sweetened drinks. They emphasise the need for caries risk assessment for all children, with appropriate information and guidance supplied to parents along with the readily-implemented caries risk assessment tools that are now available. They also recommend the dissemination of public health information regarding the deleterious effects sweetened drink consumption have on dentition (as well systemic diseases), and they emphasise the importance of restricting sweetened drinks and foods for sale in schools.

**Comment (JL):** Changes in societal behaviours in the last 30 years have increased availability and access to fast food, processed foods and sweetened drinks. In Australia, it has been reported that 80% of 12–17 year olds consumed sugared drink weekly, with 10% drinking >1L daily and 35% drinking 750mL daily. As children move from childhood through to adolescence, their fluid intake shifts from dairy products to carbonated drinks. Not only are there associations between sweetened drinks and caries, these drinks can also promote erosion as they contain phosphoric, carbonic and citric acids. One of the highlights of this article is a table listing recommendations for reducing the cariogenicity and erosivity of sweet drinks. The authors also discussed the association between sweetened drink intake and increasing bodyweight. Clinical recommendations include the assessment of sweetened drink intake in caries risk assessments, the discussion of sweetened drinks frequency and timing as risk factors for caries and erosion with patients and parents, and referral to a dietician if necessary.

**Comment (RP):** This paper provides a good overall review of the current research available relating to the rise of dental caries in Australian children and its association with the intake of sugary drinks. Of particular importance here in NZ is the rise in child obesity and other related childhood illnesses. Once again, the importance of taking thorough assessments and accurately assessing the caries risk for each and every patient is highlighted.

**Reference:** *Aust Dent J* 2011;56(2):122–31

<http://tinyurl.com/AustDentJ-56-122>



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## Systemic antimicrobials adjunctive to a repeated mechanical and antiseptic therapy for aggressive periodontitis

**Authors:** Varela VM et al

**Summary:** Patients with GAP received either amoxicillin 500mg and metronidazole 250mg three times daily for 10 days (n=18) or placebo (n=17) after full-mouth disinfection and staged scaling and root planing in this 6-month RCT. Mean probing depth (PD) reduction and clinical attachment level (CAL) gain at sites with initially moderate PD at 6 months were significantly greater in the antibiotic recipients (p<0.03). There were no between-group differences for mean reductions and mean gains for PD and CAL, respectively, initially ≥7mm. While antibiotic recipients had more sites with ≥2mm improvement culminating in ≤4mm or fewer sites that worsened ≥2mm and remained >4mm at 3 months, the differences at 6 months were not significant.

**Comment (JL):** Treatment of patients with GAP is challenging. The ideal therapeutic outcome is often not achieved, leaving the patient at high risk of premature edentulism and its social consequences. Studies have shown that GAP is more frequent in low-income, non-white individuals, with smoking as a risk indicator. These patients present with high amounts of plaque and calculus and deep pockets. This two-armed, parallel-grouped, double-masked, placebo-controlled RCT studied the benefits of adding systemic antimicrobial therapy to repeated mechanical instrumentation, oral hygiene instruction and home use of a 0.12% chlorhexidine solution. The sample size was small, with only 35 patients meeting inclusion criteria. The antibiotics regimen used in the test group of 18 individuals was amoxicillin plus metronidazole three times daily for 10 days. Results showed that all participants showed similar improvements over time. Although the use of systemic antibiotics brought additional benefits in the short term, at the 6-month mark, there were no differences in PD reductions or CAL gains. Considering the side effects of antibiotics and their worldwide overuse, the benefit of adding them to the treatment regimen appears questionable.

**Comment (RP):** This study reinforced the importance of effective regular oral hygiene instruction and the need to follow-up on patients' progress. The design of this study appeared to be very thorough, effectively clinically treating GAP. However, as the authors alluded to, there was inadequate oral hygiene instruction given following treatment. The outcomes may have been better had the initial follow-up appointments been done at 6 weeks to review healing and reinforce homecare, rather than leaving the patients for 3 months. Self-assessment was used as the monitoring tool during this timeframe, which is often of little qualitative benefit.

**Reference:** *J Periodontol* 2011;82(8):1121-30

<http://www.joonline.org/doi/abs/10.1902/jop.2011.100656>

### Independent commentary by Jonathan Leichter DMD, Cert Perio (Harvard).

Dr Leichter is currently Senior Lecturer in the Department of Oral Sciences at the University of Otago. Dr Leichter joined the faculty after 20 years in fulltime private practice in New York and Boston, 18 of which were spent in specialist practice limited to periodontology and implant dentistry. Trained at Tufts University and obtaining his specialist training at Harvard University, he has been actively involved in clinical dental implant practice since 1984. Since 2002, he has supervised and mentored postgraduate students in periodontology, endodontics and prosthodontics. His research interests and publications are in the field of periodontology, dental trauma and laser applications in dentistry.

### Independent commentary by Rachel Perrott – DipDentHyg.

After graduating from the University of Otago, Rachel worked in private practice setting up hygiene clinics in two West Auckland practices. Shifting to part-time hygiene work, she is presently raising a family while studying early childhood development. She plans to further her study into the area of health promotion.

## The possible mechanism of preterm birth associated with periodontopathic *Porphyromonas gingivalis*

**Authors:** Hasegawa-Nakamura K et al

**Summary:** These researchers detected *Porphyromonas gingivalis* in the chorionic tissues of six of 23 hospitalised high-risk pregnant women, including two each with threatened preterm labour, multiple pregnancies and placenta previa. Toll-like receptor (TLR)-2 mRNA expression was increased while TLR-4 mRNA expression remained unchanged following stimulation of chorion-derived cells with *P. gingivalis* lipopolysaccharide. *P. gingivalis* lipopolysaccharide induced interleukin (IL)-6 and IL-8 production in chorion-derived cells, but such production was reduced in TLR-2 gene-silenced chorion-derived cells.

**Comment (JL):** Previous studies by these authors, among others, have shown that pregnant women diagnosed with threatened premature labour are in worse periodontal condition and have higher serum levels of IL-8 and IL-1β than their normal counterparts. The aim of this study was to investigate the presence of *P. gingivalis*, a periodontopathic bacterium, in the chorionic tissues of pregnant women who had been hospitalised for high-risk pregnancy. Oral examinations and the collection of subgingival plaque and saliva were carried out in the second trimester of pregnancy, and chorionic tissues were obtained after delivery. Of the 23 women enrolled in the study, *P. gingivalis* was found by PCR in six chorionic tissue samples, and in either the subgingival plaque or saliva of three of these women. There was no significant association between the detection of *P. gingivalis* in the chorionic tissues and gestational age of delivery or neonatal bodyweight. The authors suggest that future large-scale studies are needed to further explore this possible association.

**Comment (RP):** This study was comprised of a very small study group, only six women had *P. gingivalis* in the chorionic tissue samples, and it was not conclusive that the bacteria originated from the oral cavity. The authors suggested that *P. gingivalis* can be detected in the chorionic tissues of hospitalised high-risk pregnant women and that *P. gingivalis* lipopolysaccharide induces IL-6 and IL-8 production via TLR-2 in chorion-derived cells. Further research examining the exact link between pathogenic factors and host responses in pregnant women needs to be undertaken to understand the complexity of this relationship.

**Reference:** *J Periodont Res* 2011;46(4):497-504

<http://onlinelibrary.wiley.com/doi/10.1111/j.1600-0765.2011.01366.x/abstract>

## Severe adverse reactions to dental local anaesthetics: systemic reactions

**Authors:** Sambrook PJ et al

**Summary:** This analysis of adverse drug reaction reporting data for LAs revealed an incidence of prilocaine-associated adverse reactions of 70%, while this agent's market share is <20%. The authors also noted a tendency for systemic adverse reactions to be classified as 'allergic' reactions (which is rarely the case), with syncope, cardiovascular and CNS reactions more likely. Prilocaine and articaine have also been associated with methaemoglobinaemia.

**Comment (JL):** LAs are the most commonly administered drug in dental practice and, although systemic adverse reactions to LAs are thankfully uncommon, a review of the prevention and acute care is always worthwhile. It has been estimated that true immunological adverse reactions occur in approximately 1% of all adverse systemic reactions. The authors analysed all suspected adverse reactions that had been reported to the Office of Product Review of the Therapeutic Goods Administration in Australia from 1973 to 2008. Of interest is that 70% of the 221 severe adverse reactions found involved prilocaine, which has <20% share of the market. Adverse reactions include syncope, CNS responses, cardiovascular problems, methaemoglobinaemia and a range of allergic reactions. Anaphylaxis is very rare, with an estimated incidence of 1 in 22 million LA injections. Distinctive clinical features usually include pruritus, flat-skin erythema, urticaria and angio-oedema. It is important that the management of adverse reactions includes both prevention and immediate treatment if collapse occurs. Medical and dental histories must include adverse reactions to LAs, and any suspicious reactions should be investigated by a specialist immunologist/allergist.

**Comment (RP):** True allergy to LAs is very rare. Of the 11 million cartridges administered each year in Australia, the chance of an anaphylactic reaction occurring is 1 in 22 million. True anaphylaxis can occur with the only sign being hypotension, so it is imperative that the dental provider is acutely monitoring patients during and after administration of LAs. Prilocaine has been involved in 70% of the reported cases of severe reactions to LAs. Lidocaine showed a low amount of adverse reactions, especially considering its prevalence in dentistry. Most adverse reactions to LAs involve syncope as a result of anxiety and fear. Reassurance can effectively minimise patient anxiety and fear. LAs are best administered in the supine position, and any adverse effects should be appropriately dealt with and reported.

**Reference:** *Aust Dent J* 2011;56(2):148-53

<http://onlinelibrary.wiley.com/doi/10.1111/j.1834-7819.2011.01316.x/abstract>

### Association between respiratory disease in hospitalized patients and periodontal disease

**Authors:** Sharma N & Shamsuddin H

**Summary:** This cross-sectional study found that simplified oral hygiene and gingival indices, gingival inflammation, pocket depth and clinical attachment levels were worse among 100 patients hospitalised with respiratory disease than 100 matched controls. Among the patients with respiratory disease, low versus high income was associated with a 4.4-fold increased risk of periodontal disease, and among controls, clinical attachment levels were significantly greater among smokers than nonsmokers.

**Comment (JL):** It has been hypothesised that dental plaque can serve as a reservoir for respiratory pathogens, with poor oral health playing a role in respiratory infections. These begin when the lower airway epithelium is contaminated by micro-organisms from either aerosolised droplets or oral secretions. The authors of this paper compared a group of 100 hospitalised patients with respiratory disease with a group of 100 age-, sex- and race-matched healthy controls. Gingival index, plaque index, simplified oral hygiene index, clinical attachment level and probing depth were used as measures of oral health. Although the study had several limitations, such as its cross-sectional design and confounding of the association by shared risk factors such as smoking, the authors concluded that their findings substantiate an association between respiratory and periodontal diseases. They suggest that we may be able to play a significant role in preventing respiratory disease by both preventing and treating periodontitis and by educating our patients regarding the risks of poor oral health.

**Comment (RP):** Previous research has shown that periodontal infection is a probable risk factor for various systemic diseases, including pulmonary disease. Due to respiratory disease (like periodontal disease) being a multifactorial disease in origin, this study was not able to further define a causal relationship between poor oral health and respiratory disease. Smoking was noted as being a confounding factor that affects both periodontal disease and respiratory disease. The conclusion of the study is relevant to oral health providers – the need for rigorous plaque control and treatment of oral infections, particularly in high-risk groups, is highly justified.

**Reference:** *J Periodontol* 2011;82(8):1155–60

<http://www.joonline.org/doi/abs/10.1902/jop.2011.100582>

### A pilot study of the role of green tea use on oral health

**Authors:** Awadalla HI et al

**Summary:** These investigators explored the potential for green tea to improve oral health in 25 participants who rinsed with a 2% green tea-containing preparation for 5 minutes. Both *Streptococcus mutans* counts and pH in both saliva and plaque were significantly changed after rinsing with the green-tea preparation, as was gingival bleeding index (GBI).

**Comment (JL):** This pilot study assessed the possible protective factors of green tea in 25 subjects aged 21–46 years with caries, gingivitis and/or periodontitis. *S. mutans* counts in saliva and plaque, plaque pH and GBI were the parameters used to determine the effect of a 5-minute rinse with 2% green tea. There were statistically significant decreases in *S. mutans* count pre- and postrinsing in both saliva and plaque, an increase in plaque pH and a reduction in GBI. Green tea contains a variety of catechins and has antimicrobial and antibacterial properties. It has also been found to inhibit the growth of *S. mutans*. This is not the first green tea study that has been carried out. As could be expected, some are in agreement with this study while others have shown nonstatistical differences. If a future study with an adequate sample size could show that green tea does indeed improve oral health, this may provide us with a cost-effective prevention measure that could be used in mouthwashes or incorporated into toothpastes.

**Comment (RP):** The search for natural remedies and cures for dental disease continues. While there has been conflicting research in this area of the dental benefits of green tea, the findings in this pilot study are statistically significant, so it does seem further research is warranted. Whether this eventuates in a tangible benefit to those in deprived countries with limited access to dental healthcare is another matter. Green tea as a drink is widely available and commonly drunk around the world; however, having access to dentifrices and mouthwashes containing the specific amounts needed to provide therapeutic benefits may not make oral health any more affordable or accessible.

**Reference:** *Int J Dent Hyg* 2011;9(2):110–6

<http://onlinelibrary.wiley.com/doi/10.1111/j.1601-5037.2009.00440.x/abstract>

### Remineralization effects of casein phosphopeptide-amorphous calcium phosphate crème on artificial early enamel lesions of primary teeth

**Authors:** Zhang Q et al

**Summary:** Produced enamel specimens with artificial early lesions were randomised to *in vitro* treatment with casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) crème (test intervention), 500 ppm NaF solution (positive control) or distilled, deionised water (negative control). Surface microhardness was increased to a significantly greater extent by CPP-ACP than by NaF, and enamel morphology differed in each group.

**Comment (JL):** Demineralisation and remineralisation are the dynamic processes in caries initiation, progression and reversal, and can be measured as changes in the enamel surface microhardness. Regulating this balance is the key to the prevention of early childhood caries, the most common oral disease of children. This *in vitro* study evaluated the effect that CPP-ACP crème has on artificial early lesions of primary tooth enamel. Sectioned specimens from extracted primary lower incisors were immersed in a demineralising solution for 48 hours, after which the enamel surface microhardness was measured. The specimens were then divided into three groups – a distilled and deionised water group, a CPP-ACP group and a 500 ppm NaF group. Artificial saliva was used as a remineralising solution. The remineralisation process was carried out twice a day for 30 days. Results were based on surface microhardness values and SEM examinations, and showed that the CPP-ACP crème was effective in remineralising the early enamel lesions a little more effectively than the 500ppm NaF. These results must be interpreted with caution, as there may well be differences *in vivo* as the oral cavity has its own unique dynamic and complex biological system.

**Comment (RP):** The dynamic complex system biological system in the oral cavity is impossible to precisely replicate *in vivo*. With this in mind, this *in vitro* study found that CPP-ACP was slightly more effective than 500 ppm NaF in remineralising early enamel lesions of primary teeth. The design of this study required CPP-ACP and NaF to be used twice a day and left undisturbed for 5 minutes each time. These specifications would not be able to be replicated *in vivo*, and patient compliance would be a significant issue. Also, current recommendations in NZ for children at risk of dental decay are to use toothpaste with 1000 ppm NaF. This would obviously be more effective than the 500 ppm NaF used in comparison with CPP-ACP in this study.

**Reference:** *Int J Paediatr Dent* 2011;21(5):374–81

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-263X.2011.01135.x/abstract>

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