Colgate Sensitive Pro-Relief™ with Pro-Argin™ technology provides instant and long-lasting relief.

With regular use, it protects and prevents sensitivity from coming back. It also helps to strengthen gums and prevent gum recession, addressing a key cause of sensitivity.

For instant relief, apply the toothpaste directly to the sensitive tooth with a finger tip and massage gently for 1 minute up to twice a day.

*Venus poecaxium based sensitive toothpaste.
New Sensodyne® Rapid Relief

**ACTS FAST**
to help prevent moments like these

Help patients **BEAT SENSITIVITY PAIN FAST**

New Sensodyne® Rapid Relief is a unique formulation engineered for speed that supports accelerated occlusion of dentine tubules.¹ It provides clinically proven relief in just **60 seconds** after brushing sensitive areas, ²,³ giving patients long-lasting protection* from sensitivity and its impact on everyday life.⁴,⁵

*With twice-daily brushing


Date of preparation: February 2017, GCSAE/CHSEN0/0150/16(f)
Spring is here, finally.

While many of us are still enveloped in layers of clothing, spring has indeed sprung in most parts of the country. Although the Western Cape finds itself in the throes of a crippling drought, the flowers on the West Coast have made an appearance and created their own tapestry of beauty. September is Oral Health month, and for many, a time of regeneration and vitality; a time to clean the cobwebs and put winter behind us. As we spring clean our lives (and our teeth) it’s a good time to reflect on the status, achievements and the role of women in our society, as celebrated during August’s Women’s month. However, a cursory glance at the news will tell us that we have a long, long way to go – with stories of abuse and violence against women, gender inequality and gender discrimination abounding. No society can truly flourish if the women in that society are not recognised for their true worth.

Why is this important in terms of oral healthcare?

In this edition of the newsletter I would like to suggest we build on the link between these two themes. With a special nod towards Oral Health month, we’ll be working feverishly to heighten awareness of oral health through programmes focused on education and more. As invaluable as these programmes are, I believe they will only be truly effective if we direct our energies to prevention rather than treatment, and if we are going to be successful in this, we need to focus on women. Notwithstanding gender stereotyping, I think it’s generally correct to say that women are the primary care givers in most households. Invariably, it is a female (mother, granny, aunt, neighbour) who brings a child to the dental clinic or surgery. It is most often a woman who braves the cold, often travelling great distances, and sitting in long queues to wait for a dental professional to assist a child. It is most often a woman who holds a child’s hand as she leads him/her to our chair. It is most often a woman who quells their fear and anxiety and wipes their tears. It is most often a woman who listens to our report and then dutifully promises to implement the suggestions.

The fact that the dental caries rate remain alarmingly high in our country, clearly indicate disconnect between what we are doing in our chairs and what is happening at home. Perhaps we need to re-evaluate the efficacy of our role? Perhaps we should focus more on empowering the primary care giver, mostly women? By empowering those who raise children, and teaching them the importance and value of oral health, we can perhaps make a positive dent in the rate of dental caries. We must share this responsibility with those who spend the most time with our little patients. We see them, at best, twice a year. Very often by

Why is this important in terms of oral healthcare?

In this edition of the newsletter I would like to suggest we build on the link between these two themes. With a special nod towards Oral Health month, we’ll be working feverishly to heighten awareness of oral health through programmes focused on education and more. As invaluable as these programmes are, I believe they will only be truly effective if we direct our energies to prevention rather than treatment, and if we are going to be successful in this, we need to focus on women. Notwithstanding gender stereotyping, I think it’s generally correct to say that women are the primary care givers in most households. Invariably, it is a female (mother, granny, aunt, neighbour) who brings a child to the dental clinic or surgery. It is most often a woman who braves the cold, often travelling great distances, and sitting in long queues to wait for a dental professional to assist a child. It is most often a woman who holds a child’s hand as she leads him/her to our chair. It is most often a woman who quells their fear and anxiety and wipes their tears. It is most often a woman who listens to our report and then dutifully promises to implement the suggestions.

The fact that the dental caries rate remain alarmingly high in our country, clearly indicate disconnect between what we are doing in our chairs and what is happening at home. Perhaps we need to re-evaluate the efficacy of our role? Perhaps we should focus more on empowering the primary care giver, mostly women? By empowering those who raise children, and teaching them the importance and value of oral health, we can perhaps make a positive dent in the rate of dental caries. We must share this responsibility with those who spend the most time with our little patients. We see them, at best, twice a year. Very often by

then irreparable damage has already been done.

Renewed focus and energy must be placed on programmes that are effective in communicating our message to women, in a language they can understand. This is not only the task of the State or those who work in State institutions. This is OUR collective responsibility. This is what we signed up for. This is why we do what we do…to make a positive difference in the lives of others.

And thus, as the weather warms up and we shed the layers of winter clothing, let us also shed the layers of complacency, of apathy, of indifference. Let us not merely blame or pass the buck to others. Let us be tillers of fertile soil into which seeds of empowerment will be planted and be allowed to germinate and blossom.

Let this spring, and this Oral Health month, energise our spirit and renew our vigour and energy to create optimum awareness around Oral Health. Here’s to sun-filled days, much laughter, gaiety and EMPOWERMENT...
Winter evokes a thousand different feelings. For some it seems cheerless, while for others it’s the best time to do introspection and reflect on the warmth of human joy by connecting with others.

Of all the seasons, winter to me is the most clearly transitional. From the warm colours of autumn fading into grey to the underlying hope of spring patiently biding its time.

That’s the one thing we can be sure of about winter; no matter how cold and dark it is, spring will always arrive. Nothing really dies but is transformed into another state.

Life, of course, follows nature. This year the Oral Hygiene profession has been going through its own winter. For many of us it was a time to reflect on our profession and personalise considerations in terms of ideas and changes in the scope of our profession. Not a time of dispiritedness, but rather a transformation of oral hygiene into a knowledge generation, updating your professional qualifications and preparing for the spring of our profession.

The dental assistant profession has come far and I’m happy to announce that dental assistants have now had their profession recognised under the Health Professions Act.

The first dental assistants who registered under the limited registrations have completed their exams and are now registered as full dental assistants at the Health Professions Council of South Africa (HPCSA). Please ensure that the dental assistants working with you are registered, if not they have until 7 October to register under the limited registration and complete the Board exam. Please don’t let this be a missed opportunity.

The Scope of Practice for Oral Hygienists has been promulgated and the Professional Board for Dental Assisting Dental Therapy and Oral Hygiene (our new Board name) will apply to the Medicine Control Council for purchasing power of Local Anaesthetics, Whitening Products and Fluoride. OHASA will inform its members as soon as this has been promulgated.

The complaint that was sent to the HPCSA regarding the derogatory comments made by the BIG RED TOOTH website has been resolved; the PBDADTOH has sent a letter to the dentists involved and they have been requested to remove the statement and place an apology on the website for 14 days.

Our AGM will be held in Pretoria and hosted by the Gauteng Branch on 28 October 2017. Motions need to be submitted to Branch chairpersons by 20 September 2017. Voting will take place on the Medical Practice Consulting Website once motions are proposed.

To the Dental Traders, thank you for your presence at the Branch seminars and sponsorship towards growing the oral hygiene profession.

Finally, Maggie and Natalie attended the International Federation of Dental Hygienists’ Symposium on Social Responsibility, bringing home with them valuable lessons on the duty of Oral Hygienists to be less concerned with the state of the world as it is now and more with how it could and should be.

God Bless
Stella

Stella Lamprecht
OHASA president
1 PREAMBLE
As oral hygienists, we are a community of professionals devoted to the prevention of disease and the promotion and improvement of the public’s health. We are preventive oral health professionals who provide educational, clinical and therapeutic services to the public. We strive to live meaningful, productive, satisfying lives that simultaneously serve us, our profession, our society and the world. Our actions, behaviours and attitudes are consistent with our commitment to public services. We endorse and incorporate the Code into our daily lives.

2 PURPOSE
The purpose of a professional code of ethics is to achieve high levels of ethical consciousness, decision making and practice by the members of the profession. Specific objectives of the Oral Hygiene Code of Ethics are:
2.1 to increase our professional and ethical consciousness and sense of ethical responsibility;
2.2 to lead us to recognise ethical issues and choices and to guide us in making more informed ethical decisions;
2.3 to establish a standard for professional judgement and conduct, and
2.4 to provide a statement of the ethical behaviour the public can expect from us.

The Oral Hygiene Code of Ethics is meant to influence us throughout our careers. It stimulates our continuing study of ethical issues and challenges us to explore our ethical responsibilities. The Code establishes concise standards of behaviour to guide the public’s expectations of our profession and supports existing oral hygiene practice, laws and regulations. By holding ourselves accountable to meeting the standards stated in the Code, we enhance the public’s trust on which our professional privilege and status are founded.

3 KEY CONCEPTS
Our beliefs, principles, values and ethics are concepts reflected in the Code. They are the essential elements of our comprehensive and definitive code of ethics and are interrelated and mutually dependent.

4 BASIC BELIEFS
We recognise the importance of the following beliefs that guide our practice and provide context for our ethics:
4.1 the service we provide contributes to the health and well-being of society;
4.2 our education and licensure qualifies us to serve the public by preventing and treating oral disease and helping individuals achieve and maintain optimal oral health;
4.3 individuals have intrinsic worth, are responsible for their own health and are entitled to make choices regarding their health;
4.4 oral hygiene care is an essential component of overall healthcare;
4.5 all people should have access to healthcare, including oral healthcare, and;
4.6 we are individually responsible for our actions and the quality of care we provide.

5 FUNDAMENTAL PRINCIPLES
These fundamental principles, universal concepts and general laws of conduct provide the foundation for our ethics.

5.1 Universality
The principle of universality assumes that, if one individual judges an action to be right or wrong in a given situation, other people considering the same action in the same situation would make the same judgement.

5.2 Complementarity
The principle of complementarity assumes the existence of an obligation to justice and basic human rights. It requires us to act toward others in the same way they would act toward us if roles were reversed. In all relationships, it means considering the values and perspective of others before making decisions or taking actions affecting them.

5.3 Ethics
Ethics are the general standards of right and wrong that guide behaviour within society. As generally accepted actions, they can be judged by determining the extent to which they promote good and minimise harm. Ethics compel us to engage in health promotion/disease prevention activities.

5.4 Community
This principle expresses our concern for the bond between individuals, the community and society in general. It leads us to preserve natural resources and inspires us to show concern for the global environment.

5.5 Responsibility
Responsibility is central to our ethics. We recognise that there are guidelines for making ethical choices and accept responsibility for knowing and applying them. We accept the consequences of our actions or the failure to act and are willing to make ethical choices and publicly affirm them.

6 CORE VALUES
We acknowledge these values as general guides for our choices and actions.

6.1 Individual autonomy and respect for human beings
People have the right to be treated with respect. They have the right
to informed consent prior to treatment and they have the right to full disclosure of all relevant information so that they can make informed choices about their care.

6.2 Confidentiality
We respect the confidentiality of patient information and relationships as a demonstration of the value we place on individual autonomy. We acknowledge our obligation to justify any violation of a confidence.

6.3 Societal Trust
We value patient trust and understand that public trust in our profession is based on our actions and behaviour.

6.4 Nonmaleficence
We accept our fundamental obligation to provide services in a manner that protects all patients and minimises harm to them and others involved in their treatment.

6.5 Beneficence
We have a primary role in promoting the well-being of individuals and the public by engaging in health promotion/disease prevention activities.

6.6 Justice and Fairness
We value justice and support the fair and equitable distribution of healthcare resources. We believe all people should have access to high-quality, affordable oral healthcare.

6.7 Veracity
We accept our obligation to tell the truth and assume that others will do the same, and seek truth and honesty in all relationships.

7 STANDARDS OF PROFESSIONAL RESPONSIBILITY
We are obligated to practice our profession in a manner that supports our purpose, beliefs and values in accordance with the fundamental principles that support our ethics. We acknowledge that we have responsibilities to:

7.1 Patients;
7.2 Ourselves and Professionals;
7.3 Colleagues;
7.4 Employees and Employers;
7.5 The Oral Hygiene Profession;
7.6 Family and Friends;
7.7 The Community and Society; and
7.8 Scientific Investigation.●
Clinical Review

SAFETY ISSUES OF TOOTH WHITENING USING PEROXIDE-BASED MATERIALS

Y. Li*1 and L. Greenwall2

VERIFIABLE CPD PAPER

In-office tooth whitening using hydrogen peroxide (\(\text{H}_2\text{O}_2\)) has been practised in dentistry without significant safety concerns for more than a century. While few disputes exist regarding the efficacy of peroxide-based at-home whitening since its first introduction in 1989, its safety has been the cause of controversy and concern. This article reviews and discusses safety issues of tooth whitening using peroxide-based materials, including biological properties and toxicology of \(\text{H}_2\text{O}_2\), use of chlorine dioxide, safety studies on tooth whitening, and clinical considerations of its use. Data accumulated during the last two decades demonstrate that, when used properly, peroxide-based tooth whitening is safe and effective. The most commonly seen side effects are tooth sensitivity and gingival irritation, which are usually mild to moderate and transient. So far there is no evidence of significant health risks associated with tooth whitening; however, potential adverse effects can occur with inappropriate application, abuse, or the use of inappropriate whitening products. With the knowledge on peroxide-based whitening materials and the recognition of potential adverse effects associated with the procedure, dental professionals are able to formulate an effective and safe tooth whitening regimen for individual patients to achieve maximal benefits while minimising potential risks.

The use of hydrogen peroxide (\(\text{H}_2\text{O}_2\)) for tooth whitening can be traced back more than a century. The procedure was primarily practised only in dental practices until 1989 when Haywood and Heymann first introduced at-home tooth whitening. Due to its effectiveness and the increasing quest for whiter teeth by the general population, tooth bleaching has become a popular aesthetic dental procedure and an integrated part of dental practice.

The terms of tooth whitening and tooth bleaching have been used interchangeably both in the literature and clinical practice. The International Organization for Standardization (ISO) defines tooth bleaching as ‘removal of intrinsic or acquired discolorations of natural teeth through the use of chemicals, sometimes in combination with the application of auxiliary means’.\(^1\)

PAPER is an oxidative process that alters the light absorbing or light reflecting nature of the tooth structure, increasing its perception of whiteness. On the other hand, whitening is the process resulting in the material becoming similar in colour to a preferred or standard white regardless of the means used. In dental practice, mechanical approaches, such as polishing and brushing with abrasive-based prophylactic pastes and toothpastes, are used to remove extrinsic tooth surface stains subsequently providing a whitening effect. There are few safety concerns with these mechanical whitening materials, and this paper will review and discuss only tooth whitening using peroxide-based agents, therefore, the term bleaching instead of whitening is used throughout the remainder of the text.

ACTIVE INGREDIENTS AND APPLICATION MODALITIES

Current tooth bleaching materials almost exclusively use carbamide peroxide and \(\text{H}_2\text{O}_2\) as active ingredients in tooth bleaching regardless of in-office or at-home uses.\(^4\,5\) Chemically, carbamide peroxide is composed of approximately 3.5 parts of \(\text{H}_2\text{O}_2\) and 6.5 parts of urea, so that a bleaching gel of 10% carbamide peroxide provides around 3.5% \(\text{H}_2\text{O}_2\). Therefore, the true active ingredient for tooth bleaching is \(\text{H}_2\text{O}_2\). Typically, \(\text{H}_2\text{O}_2\) concentrations used for in-office bleaching range from 25% to 40%, while at-home formulations contain 3 to 9% \(\text{H}_2\text{O}_2\); however, there has been a trend in recent years to elevate the \(\text{H}_2\text{O}_2\) concentration in products for at-home bleaching, and those of up to 15% \(\text{H}_2\text{O}_2\) have now become available directly to consumers for home use.

The at-home tooth bleaching regimen was originally intended to be part of a complete dental procedure. The dentist conducts dental examinations to ensure no contraindications for bleaching, prescribes a treatment regimen, and monitors the progress for appropriate whitening effects without significant side effects.\(^6\,7\) However, the advantages of at-home bleaching, including ease of use, low cost, convenience and whitening efficacy, quickly promoted the growth of over-the-counter (OTC) bleaching products for home use.

Chlorine dioxide tooth whitening agents

Nowadays there are a wide variety of at-home bleaching products available to consumers in various forms including custom or preformed trays, brushes, or strips. Recent years have also shown an increase in procedures promising in-office results performed in non-dental settings such as mall kiosks, spas and cruise ships.\(^8\) While many OTC products have demonstrated safety and efficacy for consumers, other unregulated and unresearched materials and methods may potentially cause irreversible damage if used on a long-term basis. The products in cruise ships and beauty spas commonly use chlorine dioxide as the active ingredient positioned as a ‘safer’ alternative to hydrogen peroxide while avoiding local and state legislations regarding the use of hydrogen peroxide. In truth, these chlorine dioxide products are more harmful, having little if any safety studies and commonly coming with a pH of 2 to 3. The chlorine dioxide at 0.5% concentration applied to the teeth for 20 minutes in a chair side procedure with gingival protection applied by a beauty therapist has been shown to strip...
the enamel off the teeth (Fig. 1), reduce the enamel lustre (Fig. 2) and cause sensitivity. In the case depicted in Figure 1 the material used was chlorine dioxide and this was applied for 20 minutes onto the surface of the anterior teeth. The patient was then given a gel to take home and paint onto the teeth. Figure 1 shows how the enamel surface of the anterior teeth appears rough and has lost the appearance of lustre compared to that of the premolars and molars, which did not receive the treatment and appear normal. The left side of the teeth (not shown) showed the same appearance. The teeth became sensitive to cold, felt rough to the touch and easily picked up stain.

As a result of chlorine dioxide use, teeth are more prone to re-staining, develop a rough surface and become extremely sensitive. Further, the reduced enamel lustre appears irreversible, and there appears to lack effective measures to resolve the damage other than costly restorative means.6

MECHANISMS OF TOOTH BLEACHING

While tooth bleaching has become popular and millions of people have received the treatment during the last two decades, the mechanisms of tooth bleaching remain yet to be fully understood.3,6 The generally accepted mechanism involved in tooth bleaching is similar to that in textile and paper bleaching: free radicals, produced by H2O2, interact with pigment molecules to produce a whitening effect. It is hypothesised that H2O2 in bleaching gel produces free radicals while diffusing through enamel and dentine, breaking double bonds of pigment molecules and changing the pigment molecule configuration and/or size. Such changes alter the optical properties of tooth structure, creating the perception of a whiter tooth colour. This theory is also plausible in explaining the commonly observed shade rebounding shortly after the bleaching treatment, probably due to the reformation of the double bonds.

Besides the bleaching effect by free radicals, it is possible that there are nonbleaching effects during the bleaching process that help enhance the whitening effect, including the cleansing of the tooth surface. Enamel dehydration during the bleaching process may also result in a temporary whitening effect since enamel dehydration alone is capable of producing a significant, visible tooth shade reduction.9 Such whitening effect dissipates upon the rehydration of the enamel.

Bleaching efficacy can be influenced by patient factors (for example, age, gender and initial tooth colour), the bleaching material used (for example, type of peroxide compound, peroxide concentration and other ingredients), and application method (for example, contact time, application frequency, enamel prophylaxis before bleaching treatment). These factors not only contribute to the bleaching efficacy but also affect the subsequent stability of the achieved bleaching efficacy.5,10,11 Among these factors, the contact time of the bleaching material to enamel surface appears to be more influential than the others.10

SAFETY ISSUES OF TOOTH BLEACHING AND SOURCES OF CONCERNS

Safety concerns with tooth bleaching were initially raised with the rapid growth of at-home bleaching. The primary source of the safety concerns with tooth bleaching originated from the known toxicity of H2O2, especially its capability to produce free radicals, including hydroxyl radicals. Studies indicate that oxidative reactions of free radicals with proteins, lipids and nucleic acids, with the consequential potential pathological damage, may be associated with ageing, stroke and other degenerative diseases.14–16 The oxidative reactions and subsequent damage in cells by free radicals are believed to be the major mechanisms responsible for the observed toxicity of H2O2. Consequently, there were safety concerns with potential systemic adverse effects if the bleaching gel were to be ingested as well as local adverse effects on enamel, pulp and gingiva because of the direct contact of the gel with the tissues.17–20 The safety controversies over the peroxide-based tooth bleaching prompted not only scientific deliberations but also legal challenges to their use in dentistry.20–22

When used appropriately the exposure to H2O2, from bleaching treatment is minimal. During the in-office bleaching, the soft tissues are adequately protected using barrier materials and the gel is removed at the end of bleaching; little, if any, gel is left behind for possible ingestion. For at-home bleaching, the approximate carbamide peroxide dose for each at-home application was 90mg.2 Later report estimated an average of 502 mg bleaching gel per application used clinically for ten maxillary teeth (six anterior teeth plus four bicuspids).4 When both arches are being bleached, the average amount of the gel used is approximately 10g. For a bleaching gel containing 10% carbamide peroxide, the exposure dose would be 100 mg per application. Dahl and Becher23 estimated that approximately 10% of the applied bleaching gel may be consumed during the application. Therefore, for an individual of 60 kg body weight who receives at-home bleaching for both arches once daily, the exposure to the bleaching gel can be calculated at 167 mg/kg/day, and the exposure to carbamide peroxide through a gel containing 10% carbamide peroxide will be 0.167 mg/kg/day. A gel of 10% carbamide peroxide contains approximately 3.5% H2O2; consequently, the estimated H2O2 exposure is 0.058 mg/kg/day, or 3.48 mg H2O2 per day for an adult of 60 kg body weight.

The human body is equipped with various defensive mechanisms at cellular and tissue levels to prevent potential damage of H2O2 to cells and to repair any damage sustained. Enzymes such as catalase, SOD, peroxidase and selenium-dependent glutathione peroxidase, which exist widely in body fluids and tissues, including saliva, effectively metabolise H2O2.24 In fact, salivary peroxidase has been suggested to be the most important and effective defence in the human body against the potential adverse effects of H2O2.25 A study on infants, juveniles, adults, and adults with impaired salivary flow found rapid decomposition of H2O2 in dentifrices.24 After one-minute brushing with one gram of dentifrice, <2%
of the pre-brushing dose of H₂O₂ (30 mg) was detectable in the oral cavity of these subjects. This indicates that within one minute, the oral cavity is capable of eliminating >8 times of H₂O₂ used in a bleaching session with a gel of 10% carbamide peroxide. Therefore, if used appropriately the H₂O₂ exposure from bleaching is minimal; furthermore, it is essentially limited to the oral cavity and is incapable of reaching a systemic level to induce toxicity because of the effective metabolic defensive mechanisms.

With research efforts and accumulation of data over the last two decades, safety concerns with potential systemic toxicities of peroxide-based tooth bleaching have largely diminished. However, research efforts have continued to determine the safety of home use tooth bleeding, especially on the risk assessment, clinical relevancy of in vitro findings, and regulations and international standards. In Europe a new directive has been outlined for all countries in the EU30 and the United Kingdom enacted legislation to comply with the directive in October 2012. This directive states that up to 6% hydrogen peroxide may be given to consumers for tooth bleaching treatments at-home only after an examination and first treatment by a dentist. The British Dental Bleaching Society is trying to include the prohibition of the use of chlorine dioxide for bleaching teeth within the amendments to the directive.

POTENTIAL RISKS ASSOCIATED WITH TOOTH BLEACHING

While the systemic risks are no longer a primary safety issue for tooth bleaching, it is important to recognise its potential local adverse effects. In-office bleaching uses gels of high H₂O₂ concentrations that can cause tissue burns upon contact. This effect is shown in Figure 3 in which a gel of 25% H₂O₂ was applied to the teeth. In this case, the soft tissues were isolated with a light cure dam. The tissue ulceration is a chemical burn, which is sometimes referred to as ‘tissue blanching’. The best treatment for this is to act immediately by applying water on the area to neutralise the damage. If caught early the tissue changes to red after a minute or so then returns to the pink colour. However, if the power bleach gel is left on the soft tissue and gingiva for too long the ulceration takes much longer to resolve and the patient may suffer pain from the blistering for 1 to 2 weeks. The ulceration can be single or multiple. Vitamin E has been recommended for applying to the ulceration to help healing.

Some home-use bleaching requires continuous direct contact of the gel to enamel surface for up to 7 or 8 hours (overnight). The enamel-gel contact may also be repeated within the same day or daily for an extended period. When applied by consumers at home, unintended direct contact of the bleaching gel to gingiva may occur, and for some at-home systems such as strips, the gingival contact is inevitable. In addition, a user undertaking at-home bleaching may overuse the product that may aggravate the tissue due to extended contact with the gel. Tooth sensitivity and gingival irritation, though mostly transient and dissipating with time and which can be mitigated with proper usage protocol, are well documented adverse effects associated with tooth bleaching. Commonly known local risks associated with tooth bleaching include primarily tooth sensitivity, gingival irritation as well as potential adverse effects on enamel and restorative materials. The level of the risk depends on the quality of the bleaching gel, the techniques used, and the individual’s response to the bleaching treatment.

Tooth sensitivity

Tooth sensitivity to temperature changes is a commonly observed clinical side effect during or after the bleaching of vital teeth, with an incidence up to 50%. The sensation of the sensitivity often occurs during the early stages of treatment and usually persists for two to three days, and it is usually mild to moderate and transient. It appears that the sensitivity peaks on the third day of treatment, likely because this is when there is maximum saturation of oxygen inside the pulp. The development of tooth sensitivity does not appear to be related to the patient’s age or sex, defective restorations, enamel-cementum abrasion or the dental arch treated; however, the risk increases in patients who change the bleaching gel more than once a day.

The mechanisms of tooth sensitivity are not fully understood; however, it is believed that the sensation is possibly an indication of pulp response to H₂O₂ and free radicals. The assumption is largely based on in vitro studies showing that H₂O₂ in bleaching gel applied on the enamel surface is capable of penetrating through the enamel and dentine and reaching the pulp chamber. In general, these studies show that <30 μg of H₂O₂ may reach the dental pulp after applying gels of up to 12% H₂O₂ on the enamel surface for up to 7 hours. The amount of H₂O₂ detected in the pulp chamber tends to increase with the time and H₂O₂ concentration in the gel, but not proportionally. It has been suggested that an amount of 50,000 μg H₂O₂ is needed to inhibit pulpal enzymes, so that the detected amount of H₂O₂ penetrating into the pulp chamber in tooth bleaching does not appear to cause significant damage to pulp tissues. However, there is a lack of in vivo research on this topic, and long-term effects of such H₂O₂ exposure on pulp are yet to be determined. Therefore, practitioners should exercise caution and bleaching should not be performed on teeth with caries, exposed dentine, or defective restorations.

Tooth bleaching has been used for children and adolescents with success in most cases. So far there has been only one report of significant enamel damage in a teenager. However, practitioners are advised to take extra caution because of newly erupted teeth; closer monitoring and emphasis of compliance should be exercised to reduce the risk of abuse tendency. For practitioners in areas covered by the EU directive, it is imperative to observe the rule that tooth bleaching of individuals younger than 18 years of age is prohibited.

In addition, it is essential to assess any discoloured tooth for vitality. This is done by measuring the response to cold, normally with ethyl chloride and with electric pulp testing. A periapical radiograph is essential to assess that the discoloured tooth does not have an existing periapical radiolucency and is free
Gingival irritation

Gingival irritation is also a commonly observed clinical side effect in tooth bleaching. It may or may not occur with tooth sensitivity; the patient may be unable to differentiate gingival irritation from tooth sensitivity.46–53 The reported incidence of gingival irritation for at-home bleaching ranges from 5 to 50% in most studies. It is usually mild to moderate, occurring two to three days after using the bleaching gel and then dissipating. For most patients, gingival irritation is tolerable and is not a barrier to completing the treatment. When using the tray systems, an ill-fitted tray is usually the primary cause for the irritation. The problem is usually resolved by properly trimming the tray. The risk of gingival irritation appears to be related to the H₂O₂ concentration in the gel and the contact of the gel to the gingiva.

Gingival irritation associated with inoffice bleaching is mostly caused by a leaky or failed gingival barrier.46–47

The practitioner must check the barrier for signs of leakage, usually indicated by air bubbles, and the patient should be questioned for any discomfort during the bleaching treatment. The light cure barrier should cover all buccal gingival surfaces and should there be no visible pink gingiva showing. If tissue burn is detected (Fig. 3), the surface should be extensively rinsed with water until the whiteness is reduced. In more severe cases, a topical anaesthetic, limited movements and good oral hygiene will help the healing process. Vitamin E may be placed directly onto the surface of the chemical irritation to help healing of the area.54 In addition, the positioning of the light should not be too near the lips to prevent burning. The positioning of the bleaching light directly onto the retractor may cause the retractor to pull on the lower lip resulting in a tissue burn.

Potential adverse effects on enamel

The effect of bleaching on enamel has been evaluated primarily in three aspects: mineral loss, surface morphological changes, and alteration of surface microhardness; most enamel effect studies were conducted using in vitro systems.55–63 Overall data indicate that there is a loss of minerals during the bleaching treatment; however, this does not appear to constitute a significant risk because of the effective remineralisation mechanisms readily available in the oral cavity. Most scanning electron microscopy (SEM) and surface microhardness studies showed little or no changes of bleached enamel surface. On the other hand, several investigators reported alteration of enamel surfaces associated with bleaching. However, in most cases the observed alterations of enamel surface morphology varied among different products and were associated with products using acidic pre-rinses or gels of low pH. In addition, studies have demonstrated that some soft drinks and fruit juices (for example, orange, lemon and apple) can cause demineralisation and alteration of enamel surface morphology comparable to or greater than those reported for bleeding treatment. A six-month clinical study reported that daily use of a bleaching gel containing 10% carbamide peroxide for six months did not adversely affect the surface morphology of human enamel.55

To date, there is no clinical evidence of adverse enamel effects in the dentist-monitored at-home whiteners. However, two clinical cases were reported on significant damage of enamel with the use of OTC tooth whitening products.49,64

Potential adverse effect on restorations

A relevant safety concern is the mercury release from amalgam restorations during and after the bleaching.45–49 There is little dispute on mercury release associated with bleaching; however, the reported amount of mercury release varies greatly. The issue on potential health implication of released mercury remains controversial and requires further research. Because of the known toxicity of mercury, as a general rule it is not advisable to perform bleaching on patients whose teeth are extensively restored with amalgams. While the adverse effects of tooth bleaching on restorative materials are not considered as direct health risks, the consequences can be significant to the quality and longevity of the restoration. Numerous studies have reported that tooth bleaching may adversely affect physical and/or chemical properties of restorative materials, including increased surface roughness, crack development, marginal breakdown, release of metallic ions, and decreases in tooth-to-restoration bond strength.56–57 The adverse effects of bleaching on bonding strength have been well documented. A plausible mechanism is the inhibition of polymerisation of bonding agent by residual oxygen formed during the bleaching. Similar effects are also applicable to other resin-based restorative materials that require in situ polymerisation. The post-bleaching inhibitory effects on the polymerisation dissipate with the time, and an interval of two weeks is found to be adequate to avoid such adverse effects.

SUMMARY

In-office tooth bleaching has been a part of dental practice for many years. With the data accumulated over the last two decades, at-home bleaching has also become an accepted and integrated procedure in dentistry. Accumulated data indicate no significant, long-term health risks associated with professional at-home tooth bleaching using 10% carbamide peroxide gels, which is equivalent to 3.5% H₂O₂. Therefore, when used appropriately, tooth bleaching is safe and effective. As with any dental procedures, tooth bleaching involves risks. An appropriate usage protocol can effectively mitigate the potential risks. Tooth sensitivity and gingival irritation can occur in a significant portion of the patients, although in most cases they are mild to moderate and transient. When gels of high H₂O₂ concentrations such as those for in-office bleaching, are used without adequate gingival protection, severe mucosal damage can occur. Such a risk can be prevented by using adequate gingival protection. Although rare, significant adverse effects are possible with inappropriate application, abuse, or the use of inappropriate at-home bleaching products. H₂O₂ is capable of producing various toxicological effects; practitioners need to recognise potential risks and exercise appropriately to mitigate adverse consequences.

So far, few data are available on the safety of OTC at-home bleaching that simulates the intended application mode of these products. The safety of bleaching performed at mall kiosks, salons, spas and cruise ships is of particular concern because the procedures are similar to inoffice bleaching but performed by individuals with no formal dental training.

To minimise potential risks and maximise benefits, tooth bleaching under the supervision of a dental professional is strongly recommended. A recent case report illustrates the importance of the role of dental professionals in tooth bleaching treatment.72 A patient of dark tooth shade associated with dentinogenesis imperfecta received a carefully planned and executed bleaching regime. It was a clinical success after a long-term (4.5 months), home use by the patient of a bleaching gel containing 14% H₂O₂. The comprehensive clinical examination of
the dentition and gingiva, custom-designed at-home bleaching regimen, detailed instructions, and monitoring of the bleaching progress with adjustments helped to ensure the safe and satisfactory whitening outcome.

REFERENCES


The preparation of this article was supported by Philips Oral Healthcare.
THE CONSEQUENCES OF TONGUE PIERCING ON ORAL AND PERIODONTAL TISSUES

Ioannis Plastargias1,2 and Dimitra Sakellari1
1 School of Dentistry, Aristotle University of Thessaloniki, GR-54124 Thessaloniki, Greece
2 School of Dental Medicine, University of Connecticut, Farmington, CT 06030, USA

Correspondence should be addressed to Dimitra Sakellari; dimisak@med.auth.gr
Received 29 September 2013; Accepted 19 November 2013; Published 29 January 2014

Copyright © 2014 I. Plastargias and D. Sakellari. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This paper is discussing the potential consequences that may arise by the implementation of piercing in the oral cavity and is also categorizing the consequences according to their extent and severity. Furthermore, this paper is reviewing some possible oral hygiene methods that can prove to be auxiliary in decreasing the potential complications arising from oral piercing. This literature review is based on articles published from 1985 to 2012.

INTRODUCTION

Body piercing involves the puncturing of specific places of the body in which metallic adornments are installed. Piercing in the oral cavity has gained a rapid interest among the youth in the western world. This interest may be attributed to several contributing factors. According to Kustner et al., the principal reason is the zest of the youth for being in style and in fashion. Other factors may include religion, traditional issues, rituals, or the feeling of being a member of a social group or even the feeling of superiority above the other members of the social “caste”2. As stated by Simr et al., self-expression, expression of independence of spirit, amelioration of the body and of sensuality3–5, and daring are contributing factors as well6. In their study it is also mentioned that oral piercing has been speculated to have healing results on depression. As a result it is postulated that the traumatic psychological events are correlative to piercing7. It has also been presented in studies that the practice of oral piercing is perceived as an aloof and bizarre behavioral pattern by society. This is a reason why the majority of patients who present to the dental office and use to wear piercings often take them off before the clinical session7. As a result, edema of oral soft tissues may be attributed to preexisting oral piercing that cannot be seen by the dentist though8.

The overall purpose of this paper is to review the potential complications caused by oral piercings as they are analyzed in the literature. This paper also suggests some ways of improving the oral hygiene of the people who wear piercings and it suggests some methods of ameliorating the negative consequences of piercings.

GENERAL LITERATURE DATA ON ORAL PIERCINGS

There are some popular oral piercing spots: it is a general rule that the most common form of piercing is the barbell type piercing and the mostly pierced oral site is the tongue. It has been reported that the tongue is often pierced in the midline and more specifically in the median lingual sulcus, albeit some piercings are performed on the dorsolateral site of the tongue anterior to the lingual frenum9. Other reports in the literature suggest that only 45% out of 108 patients were pierced at their tongue and that only 5% of these patients combined a tongue piercing and a labret piercing. Other reports also suggest that the labiomental groove is another popular spot of piercing10. The anterior side of the tongue is also reported as a piercing spot.

Oral piercings come in some popular shapes: regarding the shape of the piercings, the most common shape of the tip of the piercing presented is the ball-shaped one (94% of the cases) with cone-shaped being the next (4% of the cases) and cylindrical being the least popular, with only 2% of the presented cases. The material used for the fabrication of piercings is titanium (65%), steel (25%), acrylic (6,3%) and niobium (5%)11.

It is also crucial to examine the sociological viewpoint of the piercees: from a sociological point of view, most of the participants had middle school level of education (46% compared to 37% of the population) and elementary school (50%), most of them were smokers, they were frequent consumers of alcohol, and they applied satisfactory oral hygiene by brushing their teeth two times a day12.

PERIOPERATIVE AND POSTOPERATIVE CONSEQUENCES

In a case series report a young female patient was described who had her tongue pierced and showed gingival recessions with no symptoms at the lingual surface of the mandibular central incisors. She presented with reasonable oral hygiene and probing depths, whilst her gingiva were erythematous (moving to the alveolar mucosa) with partly white appearance at the gingival margin13. The symptoms described above imply the negative repercussions of tongue piercing, including gingival recession and erythematous gingiva on the periodontal tissues.

Categorization of the Complications according to their Acute or Chronic Nature.

In a review paper by Campbell et al., the sequelae of piercing were categorized into acute and chronic and the postoperative complications of oral piercing were analyzed. Trauma of the mucosa may include immediate responses for example, pain, swelling, hemolymphadenitis, sarcoid-like formations, granulomas, and scar tissue formation. Short shanks may result in overgrown tissues, whereas long shanks may result in hyperplastic tissue reaction and the presence of plaque and tartar.
Intraoral piercings seem to be the culprit for the formation of hypertrophic keloid tissue, characterized by the production of an interstitial mucinous material on the collagen of connective tissue. Streptococcal pharyngitis, unpleasant itching sensation, and eczematous skin rash have also been reported as systemic complications.

### Categorization of the Consequences according to the Nature of the Tissue Involved

#### Consequences to the Tissues: Damage to the hard tissues of the mouth has been suggested.

In 1997, DiAngelis was the first to state that tongue piercings contribute to abrasion resulting in cold sensitivity at the lower first molar teeth as a result of the cracked-tooth syndrome. Tongue jewellery, habitual biting or chewing of the device, barbell stem length, the size of the ornament attached to the barbell, and the type of material used in it may all cause trauma to the teeth. This trauma may involve the enamel, the dentin, or even the pulp.

Moreover, four cases have been reported that showed fracture of some cusps of the teeth. In a tongue piercing case report of German soldiers who were only included in the clinical examination, it has been cited that the pierced group exhibited more carious teeth than the nonpierced group ($P<0.001$), more enamel fissures ($P<0.001$), more enamel cracks ($P<0.001$), and more recession specifically at the lingual surfaces of mandibular anterior teeth ($P<0.001$). Opposed to this important difference is the ratio of groove-shaped abrasions that is almost the same in both groups.

#### Consequences to the Soft Tissues: Damage to the soft tissues has been presented as well.

The most prominent aftermath of piercing is gingival recession that is measured by using Miller’s classification of marginal tissue recession. Gingival recession is usual on the labial aspect of the lower central incisors, scar on the skin from the removed labrette in the midline of lower lip, and irritation of the skin around the ring in lower lip.

Moreover, irritation of the skin around the opening of the mouth has been observed along with redness and light swelling, caused either by saliva flowing or contact allergy. Inchingoli has grouped the complications to immediate and delayed ones. Some effects after piercing include persistent mucosal atrophy, erythematous palatal mucosa, transient alteration in taste, and leakage of blood and serum. In a case report Antoszewski et al. have detected a lip piercing that had caused decubitus and necrosis of the mucous membrane. The explanation to this finding was that the mucous membrane is more prone than the skin to mechanical injuries. Necrosis occurred at the place of oral vestibule and brought about embedding of the stud into the tissues of the lip.

### Categorization of the Complications according to Their Systemic Severity

#### Local Infections

Farah et al. have categorized the infections caused by oral piercing into local and systemic when detailing the infections. They have also stated that it is the most frequent consequence of oral piercing. Local infections may be attributed to the accumulation of dental plaque and calculus at the sites of piercing.

#### Systemic Infections

Systemic infections, on the other hand, are caused by microorganisms (which are common in the oral cavity) that enter the systemic blood circulation and this could prove to be detrimental to immunocompromized people. Lick et al. have mentioned some contributing factors to infective endocarditis. They have cited rheumatic heart disease, congenital deformities, hypertrophic cardiomyopathy, mitral valve prolapse associated with murmur, and mitral calcification. Some life-risk situations have been reported including the development of cerebral brain abscesses and Ludwig’s angina. López-Jornet et al. in their case series and review of oral and facial piercings underline the possibility of infection by infectious diseases such as Hepatitis B, C, D, and G, possibly HIV infection, tetanus, and tuberculosis. It was estimated that the time a piercing is worn is relative to the periopathogenic strength of the oral flora that inhabits the tongue piercings. Aggregatibacter actinomycetemcomitans has been frequently detected.

### Consequences to the Oral Health according to the DMF Index

Regarding the DMF index, no statistically important discrepancies were evident between the groups about dental health. However, it is stated that the number of students in this particular study of Campbell et al. was small and thus the statistical differences cannot easily be detected. This specific study was the first to count salivary flows and compare them with a control group. More specifically, increased rates of flow were found in 63% of the students in comparison to 26% of the controls.

4. **AWAreness of the General Population Regarding the Sequelae of Tongue Piercing and of the Means of Reducing These Consequences**

It has been pointed out in a plethora of articles that a statistically great proportion of the population which has undergone the procedure is not aware neither of the potential drawbacks of piercing nor of the possible ways of handling the possible problems that may arise from piercing. Levin et al. in their study state that 225 (57.8%) of the participants in this study were clueless.
of the drawbacks of having an oral piercing. According to Antoszewski et al., some authors have suggested that the staff that performs piercings should be better informed in order to perform better practice. It could mean that the staff shall pay meticulous attention in taking a sufficient medical history for the dental but also for the medical scientific community in the near future.

Techniques are not always successful. It will definitely be a challenge not only from acquiring such piercings because reconstructive and regenerative prevent these negative consequences and to inform and to prevent patients of the reviews and case reports that have been published concerning this issue from oral piercings. Oral piercing is not harmless at all. In fact, the vast majority receive enough scientific background regarding piercing techniques. Dentists patients are not quite satisfactorily informed about the drawbacks and plausible a potential piercee to the decision of wearing oral piercing. Nevertheless, according to Levin et al., more techniques could be mentioned besides those that are mentioned above, which include the removal of piercing when inflammation is present, the application of local debridement of tissues, the use of antibiotics, and the application of chlorhexidine mouth rinse.

CONCLUSION

Overall, oral piercing is a trend that has emerged again in the last decade in the West and it is evident mostly among young members of society. Many etiological factors have been suggested in the scientific literature which conduce a potential piercee to the decision of wearing oral piercing. Nevertheless, patients are not quite satisfactorily informed about the drawbacks and plausible consequences of oral piercing. In addition, practitioners are not satisfactorily informed either, as they do not use decontamination techniques nor do they receive enough scientific background regarding piercing techniques. Dentists should be informed as well and should be more prepared to recognize such patients, their oral situation, and ways of preventing the consequences deriving from oral piercings. Oral piercing is not harmless at all. In fact, the vast majority of the reviews and case reports that have been published concerning this issue have agreed that oral piercings pose both a hazardous direct and indirect risk to the soft and hard oral and perioral tissues and they may even pose life-threatening risks. The connection between tongue piercing and periodontal problems has been proved to be evident (mostly because the barbell acts as a harbor for dental biofilm) and it is without a doubt a challenge for dentists to prevent these negative consequences and to inform and to prevent patients from acquiring such piercings because reconstructive and regenerative techniques are not always successful. It will definitely be a challenge not only for the dental but also for the medical scientific community in the near future.

The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES


PERIODONTAL DEBRIDEMENT: STILL THE TREATMENT OF CHOICE

Connie L. Drisko, DDS

ABSTRACT
Periodontal debridement (PD) remains a gold standard for the treatment of inflammatory periodontitis.

Background/Purpose
The evidence base regarding the causal relationship between oral biofilm and the host inflammatory response to the etiology of periodontal disease has substantially increased over the years. What has not changed significantly during that time is the conservative manner in which the disease can be treated with periodontal debridement (PD). Since dental hygienists, in particular, specialize in providing these procedures it is important to evaluate the evidence that supports periodontal debridement as a primary and fundamental treatment modality.

Method
An extensive narrative literature review that included systematic reviews, examined traditional PD, the use of adjuncts to enhance PD and newer PD procedures to determine what are the best practices for achieving optimal clinical outcomes.

Conclusion
Compared to surgical therapy, PD results in maintenance of attachment levels over time, but is not as effective in the initial reduction of probing depths in deep pockets. Sustained release local drug delivery agents have some modest adjunctive effects when used with PD, as do systemic antibiotics in aggressive periodontitis cases. Reported analyses of the long term effects of chemotherapeutic agents usually do not extend beyond a few months to a year. While laser therapy is still under investigation it remains as a potential PD therapy. New instruments being refined to better visualize the root surface either non-surgically or with mini papilla reflection flaps, hold promise for the future when they become more affordable and accessible. Despite the development of new technology, it still appears that periodontal debridement (PD) remains the gold standard for the treatment of inflammatory periodontitis.

INTRODUCTION
Periodontal debridement (scaling and root planing) is the thorough mechanical removal of biofilm and calculus from periodontally diseased root surfaces. It is the basis for the treatment of all inflammatory periodontal diseases and remains the requisite gold standard for initial therapy in non-surgical and surgical treatment. It does not seem to matter whether the root is treated with hand or power-driven instrumentation or a combination; both are successful in the hands of skilled clinicians.1-3

Table 1. Effect of SRP on probing depths and attachment gains in shallow, moderate and deep pockets

<table>
<thead>
<tr>
<th>PD</th>
<th>PD reduction (mm)</th>
<th>CAL gain (mm)</th>
<th>Recession (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–3 mm</td>
<td>0.03</td>
<td>20.34</td>
<td>20.31</td>
</tr>
<tr>
<td>4–6 mm</td>
<td>1.29</td>
<td>0.55</td>
<td>0.74</td>
</tr>
<tr>
<td>$7 mm</td>
<td>2.16</td>
<td>119</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Cobb CM, AAP World Workshop, 1996

Systematic reviews and meta-analysis support the efficacy of periodontal debridement for reversing or controlling inflam- matory periodontal disease by reducing bleeding on probing, probing depths and increasing attachment levels.6,7 Therefore, PD is the first line treatment choice in all pocket depths (Figure 1). Periodontal debridement, or scaling and root planing, is shown to reduce probing depths about 1–2 mm in moderate and deep pockets and increase attachment levels about 0.5–2 mm in moderate to deep pockets1-6 (Table 1). Scaling does cause some attachment loss in shallow pockets so clinicians are cautioned not to over-instrument shallow pockets.9

Surgery Versus Non-surgery
Many meta-analyses and systematic reviews have addressed the question of whether to treat periodontitis with surgery or non-surgery. In reality, most
practitioners use a combination of therapies for each patient. For moderate to advanced periodontitis cases some areas of the mouth are likely to be surgenerized while non-surgical therapies are more appropriate for other areas. Non-surgical periodontal debridement compared to surgical therapy holds up very well over time, particularly in shallow and moderately deep pockets. Deeper pockets may initially respond better to surgical therapy with increased probing depth reduction and attachment gain. However, longitudinal studies have shown that long term, periodontal debridement combined with regular maintenance is a viable and predictable treatment for maintaining attachment levels in most diseased sites regardless of initial probing depths. Pocket depths are maintained with non-surgical therapy at a similar level to surgical treatment over time but generally are maintained with equal or less recession and attachment loss than surgically treated sites, particularly in shallow and moderate depths.

ADJUNCTIVE THERAPIES

It is noteworthy that the refinement of periodontal instrumentation designs and methodologies, the introduction of power-driven scalers and slimmer ultrasonic tips, and perhaps more recently the use of lasers for root detoxification has only marginally enhanced the clinician’s ability to effectively decontaminate the pocket and to remove microbial deposits from the root surfaces. As seen in Figure 1 periodontal debridement with hand and ultrasonic devices is the minimal therapy required in most, if not all, treatment protocols for inflammatory periodontal disease.

Local Delivery

If there is significant edema and exudate, then consideration of adjunctive use of antimicrobials in the ultrasonic lavage during initial debridement, such as 0.5% povidone iodine, can be utilized. Povidone iodine is a potent antiseptic, bactericidal and anti-fungal, and exhibits some substantivity. Although the data to support this ultrasonic bactericidal debridement technique is mixed, it has been part of the author’s protocol for thirty years and is justified as an effective way to reduce aerosol contamination produced by the power-driven instrumentation. It has also been shown to result in a modest reduction in probing depths when used as a rinse in conjunction with periodontal debridement.

The adjunctive use of chlorhexidine (CHX) rinses, irrigation and subgingival gels (along with full mouth debridement compared to regular quadrant scaling alone) has been explored and found to be of some adjunctive benefit to PD. However, the magnitude of additional benefit is small in comparison to that realized by PD alone.

Sustained Release Delivery

Unfortunately none of the sustained release locally delivered chemotherapeutic agents available to date fulfill the wish for the magic potion, or “periodontal pixie dust.” Antimicrobial/antiseptic agents have been shown in meta-analyses and systematic reviews to serve as adjuncts to PD. However their effect is minimal, adding only tenths of a millimeter additional attachment gain and probing depth reduction.

None of these chemotherapeutic agents surpass peridontal debridement as a monotherapy. There is also still some uncertainty about the cost to benefit ratio for the patient and the lack of well-defined protocols for their use.

Using locally delivered antimicrobials in addition to thorough periodontal debridement will likely result in an additional 0.3–0.5 mm of probing depth reduction and an additional 0.5–1 mm of attachment level gain. While not a profound improvement in clinical parameters, if Phase 1 of periodontal debridement is not completely successful, then use of locally delivered sustained release antimicrobials should be considered at re-evaluation.

This is especially recommended for isolated sites that are greater than 4 mm and continue to bleed upon probing (Figure 2). When there is generalized bleeding upon probing and many pockets deeper than 4 mm, the use of systemic antibiotics and/or host modulation therapies may be indicated (see Figure 2).

Systemic Antibiotics

The patient seen in Figure 3 who was diagnosed with generalised aggressive periodontitis complicated by poor glycemic control and an abnormally high fasting glucose of 400 dl/per ml fell in this category of severe aggressive periodontitis. In this case, full mouth ultrasonic bactericidal debridement was performed using 0.5% povidone iodine lavage in an ultrasonic device in one appointment. Evidence supports the use of systemic antibiotics (discussed in more detail below), particularly with aggressive periodontitis patients such as this 34 year old African American diabetic female.

Three hundred fifty mg each of amoxicillin and metronidazole were prescribed 3 times a day for 8 days. Substantial reductions in inflammation and probing depths were seen at 2 weeks post debridement. Interestingly, the patient transferred to another periodontist after initial therapy because she did not like the resultant recession and spaces between her teeth due to the reduction of the inflammation.

Post-debridement Recession

Recession is a reality in nearly all sites following debridement (Table 1) so patients must be forewarned of the likelihood of some recession, particularly when the tissues are highly inflamed and edematous as seen in the 56 year old male treated by full mouth debridement and reevaluated at 4 weeks (Figure 4). He experienced significant post-debridement recession and hypersensitivity and was very wary of continuing treatment. Since he had multiple residual probing depths well over 5 mm that bled on probing, surgical treatment of his posterior quadrants was planned and performed. After treating the right upper and lower posterior quadrants with osseous surgery, the patient refused surgical therapy on the left side of his mouth because of increasingly significant hypersensitivity. Fortunately, at 1 year post-surgery, there were no residual pockets remaining on the non-surgical side (L), therefore further surgery was not required. This case is a good reminder that in some situations, patience is
warranted, especially when the post-operative hypersensitivity is fairly profound. Putting the patient on regular maintenance including high concentration NaFl dentifrice use for hyper-sensitivity was a valuable way to evaluate his healing potential following periodontal debridement.

Laser Therapies
The efficacy of laser therapy has been subject to mixed results in clinical trials and systematic reviews. It is for these reasons that laser therapy is depicted as questionable in the decision tree seen in Figures 1 and 2. Authors have yet to reach complete agreement that laser use substantially surpasses the clinical improvement seen with hand and power-driven instrumentation alone. However, lasers hold promise in the treatment of periodontal pockets, most likely as an adjunct to PD. It is too early to discount their potential use in non-surgical pocket therapy. Yet, despite the confusing evidence to support their use, lasers are becoming more and more a part of periodontal therapy; this is especially the case in parts of the country where their use by dental hygienists is legal (see Low and Mott, Laser Technology to Manage Periodontal Disease: A Valid Concept? in this publication).

Part of our interest in laser therapy and other alternatives to PD is based on the desire for new innovative products and protocols that will make the taxing work of PD easier. New products are being developed with the goal of eliminating the need for PD, an eternal hope for a better approach. Yet, treating the advanced generalized periodontal disease as seen in Figure 5 still requires physical debridement. Without the mechanical removal of calculus and biofilm, any other treatment would have little if any effect on long term resolution of these periodontal lesions.

TREATMENT DECISION CHOICES
After examining the options, treatment decisions are based primarily on probing depth, loss of attachment and bleeding on probing (Figure 1). For the majority of periodontal patients, shallow pockets of 1–3 mm can be treated with self-administered plaque control following scaling and polishing. If pockets are greater than 4 mm and bleeding upon probing is present, then thorough periodontal debridement or more intense treatment regimens are in order. These might include the addition of ultrasonic bactericidal debridement followed by chlorhexidine rinses.

Some evidence indicates that combining local drug delivery and host modulation may provide added benefits to PD. Locally delivered antimicrobials may also improve clinical outcomes following periodontal debridement however,
Figure 6. a) 56 year old female; pre periodontal debridement; b) Mandibular left mirror view of prototype periodontal endoscope used for visualization during periodontal debridement. c) 3 weeks post-full mouth debridement with hand instrumentation, ultrasonic scaler with 5% povidone iodine lavage and visualization with a prototype periodontal endoscope. d) Lingual mirror view at 3 weeks post-full mouth debridement with hand instrumentation, ultrasonic scaler with 5% povidone iodine lavage and visualization with a prototype periodontal endoscope. e) Radiograph of mandibular left cuspid, tooth #22 in 56 year old female; Pre periodontal debridement. f) One year Post-operative radiograph #22 showing radiographic bone fill.
as with host modulation therapy, the magnitude of their additive effect is small compared to that achieved with PD alone. If, however, at reevaluation 4 weeks later, there are residual probing depths greater than 4 mm that bleed upon probing, then adjunctive therapies may be considered such as locally delivered antimicrobials, systemic antibiotics, or drugs such as low dose doxycycline that modulate the host response (Figure 2)\(^{31,40}\)

**A Newer Development**

Early trials of the adjunctive use of periodontal endoscopes (videoscopes) for better visualization of the root surface may be an innovative way to treat residual pockets in the future. The patient shown in Figure 6 had advanced generalized chronic periodontitis with probing depths ranging from 5 to 15 mm. This 56 year old female was a dental fears patient who had received inferior care for 20 years. The treating dentist told her that he wouldn’t clean her teeth because it would damage the enamel. Given her dental fears, her unfortunate experience with her dentist, and her inability to pay for surgical therapy, non-surgical therapy was the only treatment at that time she would accept. Prior to PD, the mid lingual and mesial of tooth #22 measured 11 mm and had copious bleeding upon probing and an epulis from a new ill-fitting removable partial denture. After initial ultrasonic bacterial debridement with 0.5% povidone iodine, a prototype of a periodontal endoscope was used to reassess residual pockets that bled on probing (Figure 6). Using the endoscope at re-evaluation allowed visualization and removal of subgingival deposits in a residual 6 mm bleeding pocket on the mid lingual and mesial of tooth #22. Within weeks, the pockets measured 3 mm with no bleeding upon probing. The periodontal healing potential and amount of radiographic bone fill is tremendous when thorough periodontal debridement results in pristine, clean roots. This periodontal endoscopic technology has been under further refinement for several years and will likely become the standard of care at sometime within the next ten years.\(^{41,42}\)

**LONG TERM EFFECTS OF ADJUNCTIVE ANTIBIOTIC THERAPY**

As mentioned earlier, the use of locally delivered and systemic pharmacotherapeutics have been shown to result in minimal to modest additional reductions in bleeding on probing, probing depths and increased attachment levels compared to PD alone\(^{43-45}\). However, there is little long term data available beyond 3–12 month results following adjunctive use of systemic antibiotics or locally delivered antimicrobials. When the use of systemic metronidazole (S-MET) was subjected to a meta-analysis of 8 clinical trials, the results suggested that using S-MET in conjunction with PD in greater than 4 mm pockets may be more beneficial than PD; however, these positive effects disappeared after 13 weeks. This analysis is typical of the many individual clinical trials reporting the beneficial effects of systemic antibiotics in addition to PD so clinicians should be very discerning about using systemic antibiotics in the treatment of chronic periodontitis.\(^{46,40}\)

Regardless of the type of antibiotics used, the clinical effect generally disappears over a period of 3–12 months. This is not to say one should not consider the selective use of adjunctive antimicrobials since it is well known that pathogens can penetrate into the cementum and dentin of the periodontally diseased root surfaces, into oral mucosa including the tongue and tonsil tissue, and the crevicular epithelium (Figures 7 and 8).\(^{46}\) Since viable bacteria have been seen within pocket epithelium, calculus, cementum and dentin, it is reasonable to target these tissue invading organisms with topical or systemic antimicrobials to more fully ‘sterilize’ the pocket and slow down the reinfestation of the sites.\(^{45}\) However, periodontitis is a chronic infection, and often needs to be retreated. Clinicians should be diligent about thoroughly reassessing the patient on a yearly basis and institute any repeat therapy as needed (Figure 9).

Depending on the severity of periodontitis, using systemic or locally delivered antimicrobials as part of the armamentarium is indeed justified when faced with getting control of the infection in an acute, severe, generalized chronic or aggressive periodontitis patient (Figures 3 and 6). It is critical that antibiotics not be used as stand-alone treatment and should always be accompanied by thorough PD.\(^{41}\)

**CONCLUSION**

Periodontal debridement is a safe, effective treatment for inflammatory periodontitis. Locally delivered antimicrobials may have a modest adjunctive effect when combined with periodontal debridement in improving clinical parameters. However, trying to bypass periodontal debridement by using locally delivered sustained release chemotherapeutic agents as a monotherapy is analogous to trying to lose weight without diet and exercise. Just like fad dieting, placing a chemotherapeutic agent in the infected pockets in lieu of thorough root debridement may get temporary short term results, but will not be sustainable.\(^{38}\) Crash dieting does not usually result in long term positive weight control any more than deleting root debridement results in long term control of periodontal disease.

Minimally invasive therapy (microsurgery) is becoming popular in medicine and dentistry. Periodontal microsurgical flaps are gaining popularity because they are less traumatic for the patient.\(^{50,51}\) It is expected that periodontal endoscopes will be used more frequently in the future to aid in the visualization of the root surface using very small access flaps that consist mainly of papilla reflection. When better visualization is affordable and easily accessible via a periodontal endoscope or ‘videoscope,’ it is almost assured that more dramatic...
positive clinical results will be observed resulting from the use of a high magnification tool subgingivally for root debridement.41

The treatment of choice for early to moderate chronic inflammatory periodontal disease, validated by decades of sound scientific evidence, is thorough periodontal debridement (PD).3 It is still the “gold standard” for removing subgingival plaque (biofilm) and calculus in the treatment of inflammatory periodontal disease. Some small benefits may be derived from adjunctive systemic antimicrobials in cases of aggressive periodontitis, but scarce data is available to determine the long term effects of systemic antibiotic use with PD or surgery beyond 3–12 months. It is hard to trump a thorough periodontal debridement.

Figure 8. a) SEM of cross section of dentin infected with bacterial in dentinal tubules shown as black dots (streaks); b) SEM of dentinal tubule surface with filamentous bacteria within dentinal tubules; c) SEM cross sectional view of dentinal tubule showing small round bacteria within dentinal tubules.

Figure 9. Scaling and root planing (*periodontal debridement) is the gold standard for initial therapy of inflammatory periodontitis. Sites that do not respond to periodontal debrident or remain above 6 mm in depth with bleeding upon probing, may need further treatment as indicated in the pyramid by the additional use of antimicrobial or host modulation therapy and/or surgery. At any time during maintenance there is additional loss of attachment or visible radiographic bone loss, the cycle of treatment shown above may need to be repeated in affected areas.
REFERENCES


Failure in local anaesthesia in dentistry is not uncommon and is in fact a feature of dental practice. Clinical success of local anaesthetics ranges roughly between 75% and 90%. The inferior alveolar nerve block records the highest failure rate compared with all other nerve blocks in the human body. Despite the problems in achieving local anaesthesia in Dentistry, there are few studies that have attempted to determine the mechanisms for these failures. In clinical practice incomplete anaesthesia can lead to a painful experience for the patient as well as being a frustrating encounter for the clinician, leading to about 10% of cases having to be postponed. An understanding of the reasons for failure could help to reduce its occurrence. Thus, the aim of this article is to discuss some of the possible causes of failure in local anaesthesia in Dentistry and to make recommendations which may minimize the problem.

FAILURE OF LOCAL ANAESTHETICS

Lack of success in obtaining complete anaesthesia in dentistry may be related to anatomical, physiological or psychological factors. Anatomical variations at the site of the injection, infection or inflammation at the injection site and medical or psychological problems with which the patient may present, can affect the anaesthetic outcome (patient related factors). Choice of anaesthetic agents, the use of vasoconstrictors and experience of the operator may also influence the success of local anaesthesia, factors related to the operator.

EFFECT OF ANATOMICAL CAUSES FOR ANESTHETIC FAILURES

An understanding of the variations in innervation to the teeth would help improve the dentist’s ability to induce profound local anaesthesia. The trigeminal nerve supplies sensory function to both the maxillary and mandibular teeth. The inferior alveolar nerve, a branch of the posterior division, supplies sensation to all the mandibular teeth on one side as well as to the mucosa of the lower lip and skin over the chin. However, simply blocking this nerve through the traditional inferior alveolar nerve block does not guarantee complete pulpal numbness in 30% of the patients. Using ultrasound-guided technique, Hannan et al. showed that a direct hit on the nerve does not guarantee complete pulpal anaesthesia in spite of obtaining 100% lip numbness. Thus, complete lip numbness does not necessarily indicate complete pulpal anaesthesia of the mandibular teeth and the accuracy of needle placement is not the primary reason for pulpal anaesthetic failure with this block. Accessory or supplementary nerve supply to the mandibular teeth, in addition to that from the inferior alveolar nerve, may be a plausible explanation for failed anaesthesia in mandibular teeth. Only 5.4% of patients have no accessory canals while the majority (81%) of patients have between two to six accessory canals. Gupta et al. found accessory foramina in the mandible in 94% of their cases. It may seem that having no accessory canals may be an exception as more often accessory canals can be found in the mandible. When these accessory canals transmit nerve fibres, local anaesthesia may fail as these branches passing through the accessory canals may provide an “escape pathway” for sensation. In addition to the inferior alveolar nerve in the mandible, the lingual nerve, the long buccal nerve, the nerve to mylohyoid, the auriculotemporal nerve and the cervical nerves have been implicated as possible accessory supplies of sensation to the mandibular teeth. The auriculotemporal nerve, a branch of the anterior division of the mandibular nerve, may send out filaments as it loops around the condyle. These may enter the lower jaw through a foramen located slightly above the mandibular foramen to supply the mandibular molar teeth (Figure 1). In this instance the dentist will need to inject slightly higher than the traditional inferior alveolar nerve target to be able to block the auriculotemporal nerve as well. Foramina present in the retromolar region may also provide entry points for filaments of the long buccal branch of the inferior alveolar nerve supplying innervation to the mandibular teeth (Figure 1). A long buccal block or mandibular buccal infiltration may be necessary for complete anaesthesia in such cases.

The mylohyoid nerve originates as a small posterior branch of the inferior alveolar nerve before the latter enters the mandibular foramen. The branch runs along the mylohyoid groove on the medial surface of the mandible to supply the mylohyoid and the anterior belly of the digastric muscles. Some sensory fibres could enter the mandible through the retromandibular foramina and provide innervation to premolar, canine and incisor teeth and occasionally the first mandibular molar. The presence of both Aδ fibres (afferent) and Aα fibres (efferent) in this nerve confirms its mixed nature. Studies indicate the mylohyoid nerve as an alternate “escape route” for pain in the mandibular teeth. To overcome accessory innervation from the mylohyoid nerve, the clinician can deposit anaesthetic solution higher in the pterygomandibular space or infiltrate on the lingual surface of the mandible adjacent to the tooth so as to block the nerve as it enters the mandible on the lingual aspect.

In the upper jaw the greater palatine and nasopalatine nerves may send sensory innervation to the maxillary teeth in which instance blocking of these nerves by injecting palatally will provide complete anaesthesia to the maxillary teeth.

SUPPLEMENTAL INJECTIONS

Occasionally traditional techniques of anaesthesia like infiltration and regional block injections may not provide successful anaesthesia especially in endodontics for the so-called inflamed pulp (hot tooth) or irreversible pulps. According to the American Association of Endodontics, a recent systematic review to evaluate the anaesthetic success rates of the inferior alveolar nerve block (IANB) injection technique alone or along with supplemental infiltration (SI) technique when used for pulpal anaesthesia of mandibular posterior teeth with irreversible pulps, indicated that none of the
and then to rotate the needle to face the bone to increase efficacy. The success rate recommended to commence with the bevel facing the root to facilitate penetration should face the root as this allows easier advancement of the needle. It is thus now face the alveolar wall increases the efficacy while Malamed advocates that the bevel previously assumed. Some authors suggest that placing the bevel of the needle to not through the periodontium by travelling down the length of the ligament, as was the periosteum, moving into crestal marrow spaces along vascular channels and anaesthetic fluid spreads along the outer surface of the alveolar plate and under the bone. The term intra-ligamentary or periodontal ligament anaesthesia may be misleading as the anaesthetic injected into the periodontal ligament provides pulpal anaesthesia by penetrating the cancellous bone through natural perforations (Figure 2). The anaesthetic fluid spreads along the outer surface of the alveolar plate and under the periosteum, moving into crestal marrow spaces along vascular channels and not through the periodontium by travelling down the length of the ligament, as was previously assumed. Some authors suggest that placing the bevel of the needle to face the alveolar wall increases the efficacy while Malamed advocates that the bevel should face the root as this allows easier advancement of the needle. It is thus now recommended to commence with the bevel facing the root to facilitate penetration and then to rotate the needle to face the bone to increase efficacy. The success rate when periodontal injection is used as a supplement to conventional IANB is 78%.

Intra-ossseous injection consists of introducing the local anaesthetic directly into periodiocal cancellous bone via specialized systems like Stabident (Fairfax Dental, USA) and X-Tip (X-Tip Technologies, USA). Success rates for conventional inferior alveolar nerve block with supplemental intraosseous injections ranged from 80% with the first injection and increased to 98% with a second intraosseous injection. Intraosseous injection can provide profound anesthesia for 60 minutes when used as a supplement in cases of failed IANB.

In approximately 5-10% of mandibular posterior teeth with irreversible pulps, supplemental injections, even when repeated, do not produce profound anaesthesia; pain persists when the pulp is entered. This is an indication for an intrapulpal injection. Onset is usually immediate and no special syringes or needles are required. The disadvantage is that the injection is painful.

CONCLUSION
Accessory nerve supply especially to the mandibular teeth seems to provide an “escape” route for pain and may contribute to failed anaesthesia in the dental chair. In these instances, the dental clinician needs to block these accessory nerve supplies to ensure complete anaesthesia for their patients.

REFERENCES
Currently, in general dentistry the most commonly used local anaesthetic agents are 2% lignocaine (Xyloject, Adcock Ingram; Xylesthesin, 3M) with 1:80000 adrenaline content, 3% mepivicaine (Carbocaine) without a vasoconstrictor and 4% articaine (Ubistesin 3M) with either 1:100000 or 1:200000 adrenaline concentration. The local anaesthetic molecule consists of three components: (a) lipophilic aromatic ring, (b) intermediate ester or amide chain, and (c) terminal amine. The aromatic ring improves lipid solubility. The nerve membrane consists of a double lipid layer and a protein layer and therefore the property of enhancing lipid solubility contributes to increased potency of the anaesthetic agent as more of the available drug can diffuse through the membrane. The benzene aromatic ring is replaced in articaine by a thioephene ring, which allows even greater lipid solubility and further penetration of an administered dose into the neurons. Local anaesthetics have protein-binding characteristics which determine the duration of anaesthesia. Affinity for plasma proteins corresponds to affinity for protein at the receptor site within sodium channels, prolonging the presence of the anaesthetic at the site of action. Agents that attach to the protein components of nerve membranes are also less likely to diffuse from the site of action and enter the systemic circulation, and therefore pose a lower systemic toxicity risk.

The intermediate chain can be either an amide or ester group; in general ester-containing local anaesthetic solutions are no longer packaged in dental cartridges. However, articaine is unique in this regard. It is classified as an amide according to its intermediate linkage, but also contains an ester side chain on its aromatic ring. It is the only amide anaesthetic containing an ester group, allowing hydrolysis by blood cholinesterase (biotransformation in the plasma) as well as in the liver (by hepatic microsomal enzymes). As a result, articaine has a half-life of only 20 minutes compared with 90 minutes for lignocaine that requires total hepatic clearance. Articaine is the only amide anaesthetic containing an ester group, allowing hydrolysis by blood cholinesterase (biotransformation in the plasma) as well as in the liver (by hepatic microsomal enzymes). As a result, articaine has a half-life of only 20 minutes compared with 90 minutes for lignocaine that requires total hepatic clearance.

Hence, articaine presents less risk for systemic toxicity during lengthy appointments compared with 90 minutes for lignocaine that requires total hepatic clearance. Articaine has a half-life of only 20 minutes compared with 90 minutes for lignocaine that requires total hepatic clearance. Thus, articaine is unique in this regard. It is classified as an amide according to its intermediate linkage, but also contains an ester side chain on its aromatic ring. It is the only amide anaesthetic containing an ester group, allowing hydrolysis by blood cholinesterase (biotransformation in the plasma) as well as in the liver (by hepatic microsomal enzymes). As a result, articaine has a half-life of only 20 minutes compared with 90 minutes for lignocaine that requires total hepatic clearance.

There seems to be conflicting research results regarding the advantage of 4% articaine over 2% lignocaine. It is difficult to demonstrate to a level of statistical significance (evidence-based medicine) in a clinical trial that 4% articaine is superior to any other amide local anaesthetic.

However, anecdotal reports claim that articaine:
1. works faster,
2. works better,
3. “I don’t miss as often,” and
4. “gets patients numb when other local anaesthetics fail.”

2% lignocaine and 4% articaine with 1:100000 adrenaline have similar properties for use in surgery and have demonstrated a good safety and tolerance profile.

On the other hand, articaine with 1:100000 adrenaline showed a higher success rate than lignocaine with 1:100000 adrenaline for buccal infiltration of mandibular molars but not when administered in the attempt to anaesthetize teeth with irreversible pulpitis. The efficacy of 4% articaine with 1:1000,000 adrenaline was similar to 2% lignocaine with 1:100,000 adrenaline for intra-ligamentary injections. In a study on patients with irreversible pulpitis the anaesthetic efficacies of articaine and lignocaine were similar for inferior alveolar nerve blocks. However, other studies have shown that infiltrations of 4% articaine with adrenaline offer better clinical performance than 2% lignocaine in terms of latency and duration of the anaesthetic effect, but have not demonstrated any statistically significant

**Table 1: Dosages of local anaesthetic and adrenaline.**

<table>
<thead>
<tr>
<th>Local anaesthetic agent</th>
<th>concentration of local anaesthetic</th>
<th>mg/cartridge (1.8ml)</th>
<th>maximum dose in mg</th>
<th>maximum dose in mg/kg</th>
<th>concentration of adrenaline</th>
<th>mg/cartridge (1.8ml) concentration of adrenaline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lignocaine</td>
<td>2%</td>
<td>36mg</td>
<td>300mg</td>
<td>4.4mg/kg</td>
<td>1.80000</td>
<td>0.023mg</td>
</tr>
<tr>
<td>Mepivicaine</td>
<td>3%</td>
<td>54mg</td>
<td>300mg</td>
<td>6.0mg/kg</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Articaine</td>
<td>4%</td>
<td>72mg</td>
<td>500mg</td>
<td>7.0mg/kg</td>
<td>1.00000</td>
<td>0.018mg</td>
</tr>
<tr>
<td>Articaine</td>
<td>4%</td>
<td>72mg</td>
<td>500mg</td>
<td>7.0mg/kg</td>
<td>1.20000</td>
<td>0.009mg</td>
</tr>
</tbody>
</table>

1.8ml to simplify calculations, leading also to an overestimation of the dosage, thereby promoting safety in limiting administration of the drug. Lignocaine 2% contains 36mg and articaine 4% contains 72mg of the drug per cartridge.

Each local anaesthetic has its own maximum recommended dose (MDR), expressed in mg/kg. Unfortunately, the mg/kg MDR for each drug varies in the literature from 4.4mg/kg to 6.6mg/kg. Recommended maximum doses for healthy adults (Table 1) for lignocaine 2% is 4.4mg/kg, for articaine 7mg/kg and for mepivicaine 6mg/kg with a ceiling dose approximate to those for a 70kg person.

Thus, the MDR of 2% lignocaine with adrenaline for a 15kg child = 15kg x 4.4mg/kg = 66mg maximum dose of lignocaine. Since a lignocaine/cartridge contains 36mg of the drug this equates to 1.5 cartridges. A general conservative “rule of 10” may be used as a general guideline for maximum dosages i.e. one cartridge per 10kg body weight (up to a maximum of 70kgs). Thus, the MDR for a 15kg child would be 1.5 cartridges lignocaine.

**CLINICAL EFFICACY OF ARTICaine VERSUS LIGNOCAINE**

There seems to be conflicting research results regarding the advantage of 4% articaine over 2% lignocaine. It is difficult to demonstrate to a level of statistical significance (evidence-based medicine) in a clinical trial that 4% articaine is superior to any other amide local anaesthetic.

However, anecdotal reports claim that articaine:
1. works faster,
2. works better,
3. “I don’t miss as often,” and
4. “gets patients numb when other local anaesthetics fail.”

2% lignocaine and 4% articaine with 1:100000 adrenaline have similar properties for use in surgery and have demonstrated a good safety and tolerance profile.

On the other hand, articaine with 1:100000 adrenaline showed a higher success rate than lignocaine with 1:100000 adrenaline for buccal infiltration of mandibular molars but not when administered in the attempt to anaesthetize teeth with irreversible pulpitis. The efficacy of 4% articaine with 1:100,000 adrenaline was similar to 2% lignocaine with 1:100,000 adrenaline for intra-ligamentary injections. In a study on patients with irreversible pulpitis the anaesthetic efficacies of articaine and lignocaine were similar for inferior alveolar nerve blocks. However, other studies have shown that infiltrations of 4% articaine with adrenaline offer better clinical performance than 2% lignocaine in terms of latency and duration of the anaesthetic effect, but have not demonstrated any statistically significant.
differences in anaesthetic efficacy.22,23 When the success of inferior alveolar nerve blocks were compared, articaine and lignocaine performed similarly.24 For infiltration articaine produced shorter onset and longer duration of pulpal anaesthesia than the lignocaine solution.25 Supplemental buccal infiltration with articaine was more effective than lignocaine in mandibular molars with irreversible pulps.26 This may be the result of a concentration effect or a greater diffusion of articaine. There was a high statistically significant difference between the articaine and lignocaine solutions when their efficacy was compared in maxillary buccal infiltrations in patients with irreversible pulps.27 The success of articaine after infiltration may be attributable to high lipid solubility and more molecules/ml injected when compared with lignocaine.28 For patients undergoing periodontal surgery, 4% articaine anaesthetic with 1:100,000 or 1:200,000 adrenaline provides excellent surgical pain control.29

In a systematic review articaine was shown to be more effective than lignocaine in achieving anaesthetic success in the first molar region. The drugs appear to have similar adverse effect profiles.30,31 Another meta-analysis study concluded that articaine had a probability of achieving anaesthetic success superior to that of lignocaine, with an odds ratio of 2.44 (95% confidence interval [CI], 1.59–3.76; P < 0.0001).28 The odds ratio for articaine increased to 3.81 (95% CI, 2.71–5.36; P < 0.00001) when the authors analysed only the data for infiltration: There was weaker, but still significant, evidence of articaine being superior to lignocaine for mandibular block anaesthesia, with an odds ratio of 1.57 (95% CI, 1.12–2.21; P = 0.009).32

SAFETY OF 4% LOCAL ANAESTHETIC

The apprehension that 4% articaine is related to adverse neurological effects like paraesthesia seem to stem from a retrospective study by Haas and Lernon.33,34 These authors reported that generally the incidence of paraesthesia is low but if paraesthesia does occur, it is significantly more likely to do so if either 4% articaine or prilocaine35 has been injected. Hence, it has been suggested that the use of these agents for infiltration be limited and to rather reserve their use in nerve blocks for failed attempts with other agents.1,3

Allegations that 4% local anaesthetics are associated with a greater risk of paraesthesia are based solely on anecdotal reports and have no scientific justification.36 Linking 4% local anaesthetic with an increased risk of neurotoxicity, and recommending that the use of articaine be avoided in mandibular nerve blocks is unjustified. Articaine is in fact a “safe and effective local anaesthetic” for Dentistry.1 To date, there has been no explanation that an inferior alveolar nerve block can, on a rare occasion, cause permanent nerve injury.37 Articaine is a safe and effective local anaesthetic drug to use in Dentistry.38

REFERENCES

21. Gabriella A, Gaffen AS, Lawrence P, Tenenbaum HC, Haas A, Lawrence HP, et al. Updated information and services including high resolution figures, can be found in the online version of this article at: J Am Dent Assoc. 2010;141:836–44.
Attending the Social Responsibility conference on 7–8 July 2017 in the beautiful city of Florence, Italy was a truly inspiring experience for my colleague Maggie Naidoo and I. The conference and subsequent workshop exposed us to expert global input on oral health and oral health strategies, as well as the opportunity to present our projects to oral/dental hygienists from around the world. I would like to share some of the highlights of the expert input.

Robyn Watson, the outgoing president of the IFDH welcomed delegates and highlighted the planning that was involved in making this workshop, a milestone for the IFDH, a reality.

The first speaker was Professor Raman Bedi who spoke about the role of the oral/dental hygienist as a change agent. He argued that oral health professionals need to embrace their role as leaders in oral health, stating that as professionals we have not explained the role of oral health to the right people. Putting oral health on the public agenda is our responsibility and as leaders we need to be highly skilled, good communicators and capable of driving new initiatives.

The bedrock of social responsibility according to Professor Bedi understands the notion of “Who is my neighbour”. Social responsibility is about an attitude of life, of being aware of social needs around us and therefore knowing our neighbours. In our South African context, we may ask the question who do we see as our neighbours. Is it the person living next to us who we have what we have, or does it include those marginalized in society such as the poor, the aged and refugees, among others? Professor Bedi suggested that by embedding leadership skills and social responsibility into the minds and hearts of dental professionals, we can create lasting legacies in social responsibility that would affect more communities. In so doing we would develop first class leaders and advocates for better oral health.

The concept of having a needs assessment, impact measurement, and personal reflection as basic requirements of oral health projects promotes a different vision for oral/dental hygiene as a profession. Professor Bedi used an analogy to illustrate this point as follows:

The second speaker was Professor Kenneth Eaton who is the chair of the

Platform for Better Oral Health in Europe. Professor Eaton started off by saying “it’s a rich man’s world” and we need to look at social responsibility in this context – that the mouth reflects society. The cost of treating dental caries is a strong motivator for prevention, again highlighting the role of the oral/dental hygienist.

Professor Eaton spoke extensively about the reliability of data; this included data on human resources in countries as well as data on oral health status. He made mention of a time when sharp probes were used in dental surveys, a practice that may have initiated cavitation of lesions. He also made reference to the use the ICDAS system which was of interest as it is a system that is now being taught to undergraduate students and oral hygienists returning for expanded functions in South Africa.

One aspect of his presentation of particular interest was the impact of inadequate oral hygiene on individuals in elder care. Professor Eaton referred to a period where 3000 British elderly died due to pneumonia developed during their stay in hospitals – more deaths than those as a result of road accidents during same period. Risk factors for patients who develop pneumonia in hospital include staff not practicing good hand hygiene, and patients’ mouths not being properly cleaned leading to inhalation of microorganisms. As South Africa has a growing ageing population, the oral care of elderly in hospitals and facilities of care may be a focus area for us as oral hygienists to explore.

Dr David Walker who is an honorary research fellow at the University of Sydney raised interesting questions in his presentation. In considering an oral health project one should ask the questions ‘is it high priority and why; is it doable; and is it socially responsible?’ He made reference to a ‘charity model where there is no obligation’ and a ‘rights based model where there is obligation’ on the part of the professional. Social responsibility defined as ‘the obligation to act for the benefit of society at large’ suggests an ethical framework with an entity (organization or volunteers) involved. As South African oral hygienists we need to develop a shared understanding of the notion of social responsibility to ensure we’re using a rights model when we term our projects social responsibility projects. I do not see that this excludes charity, just that we should be clear about the distinction if we wish to align with international standards of social responsibility.

Professor Wendell Evans who is the Colgate Chair, University of Sydney and World Health Organization (WHO) consultant, raised a number of interesting issues around prevention. Dental caries were classified by the WHO when there was a lesion but caries were initiated long before the lesion. He discussed a grading of an initial lesion that would allow the clinician to ‘track’ whether this lesion has healed or progressed, also indicating that there are protocols available for such grading. WHO guidelines that look at risk assessment for dental caries differently will be available soon as the current guidelines are considered by many to be cumbersome. This revised guideline sees risk as being determined by an early childhood caries (ECC) experience and plaque. Sugar exposure is used to determine the background for oral health education rather than risk.

According to Professor Evans, national surveys should include the three-year age group as one of the index ages. Prevention should include advocating the importance of primary teeth to mothers, using the WHO recommendations for infant feeding, limiting access to free sugar, and applying of fluoride varnish. The use of silver fluoride was mentioned and is apparently used commonly in many to be cumbersome. This revised guideline sees risk as being determined by an early childhood caries (ECC) experience and plaque. Sugar exposure is used to determine the background for oral health education rather than risk.

Platform for Better Oral Health in Europe. Professor Eaton started off by saying “it’s a rich man’s world” and we need to look at social responsibility in this context – that the mouth reflects society. The cost of treating dental caries is a strong motivator for prevention, again highlighting the role of the oral/dental hygienist.
Wanda Fedora, Vice-President of the IFDH, discussed the steps and challenges of starting a social responsibility programme. Her advice included knowing who your target group and team is, what you will be doing, where you will be working (as this influences your needs), and when you will be doing the project (as this influences and is influenced by your team and target group). Other factors such as local providers, obtaining necessary permission and sources of funding were discussed.

What was evident from all the discussions around projects was that whichever model one uses, the concepts of a needs assessment, impact evaluation and personal reflection were imperative. These are the basic criteria used in the evaluation of projects for the IFDH competition. This concept should also guide us as South African oral hygienists to always work within a guided framework. In as much as we do an assessment to guide patient care in the practice environment, we should do an assessment before any oral health education or promotion activity. This may be basic or comprehensive depending on the context. We need to assess the impact, which may be increased oral health literacy or awareness, better oral health practices, improved oral health status, or better oral health quality of life. The fact that planning of programmes is now included in our scope of practice is a further indicator that community-based interventions should be treated with the same rigour and evidence that we included in our scope of practice is a further indicator that community-based interventions should be treated with the same rigour and evidence that we apply to our practice environments.

I did a presentation on my project during the ‘Programme Overview Session’ where delegates from eight countries had the opportunity to present their projects. The presentations during this session and also the other sessions where colleagues presented their projects made me aware that we do not have to stand back as a country or as a profession. I did however find that our colleagues use a variety of media, networking and collaboration to advocate for their oral health issues – they take pride in making known what they are doing. This for me was a take home message. As Profession Bedi said: by advocating for better oral health as part of our promotion/education we can reach more communities.

Robyn Watson (IFDH President) did a short presentation of the IFDH Social Responsibility conference to be held in Korea in 2019. I would strongly encourage South African oral hygienists to think about attending this conference. Start saving now – no project is too big or too small to present. We need to showcase what we are doing in South Africa. Go onto the IFDH website and look at the possibilities!

I would like to conclude by saying this was an amazing experience. Oral hygienists irrespective of creed or country shared their expertise generously, were excited about our profession, and took time to listen to one another. The conference was brilliantly organized and allowed us to learn from experts, creating opportunities for everyone to engage in the conversation and feel included. We were taken out on two evenings to enjoy Florence – to a scenic rooftop restaurant and the beautiful banks of the Arno River.

I would like to extend my sincere appreciation to the OHASA executive and the IFDH for this opportunity. Maggie and I will also share our views on social responsibility in the South African context.

Natalie Gordon ●

UNITING TOWARDS BETTER ORAL HEALTHCARE

Natalie Gordon and I proudly represented South Africa at The Social Responsibility Conference that was held in Florence, Italy on 7-8 July 2017. It was indeed a proud and amazing opportunity to represent my country, but also to see Natalie showcase Cape Town’s innovative social responsibility programme. Natalie’s presentation was very well received and praised at the conference. This was indeed a proud moment for the oral hygiene profession in South Africa and the profession’s commitment to social responsibilities.

The conference was opened by Robyn Watson, the outgoing president of the IFDH, followed by different speakers from various countries focusing on different aspects of prevention, the hygienist as a change agent, driving new initiatives, the reliability of data, and the steps and challenges of starting a programme. This was followed by presentations from different hygienists from different parts of the world on the social programmes they are currently involved in.

The conference also included mini workshops based on delegates’ areas of interest, with topics including children, adolescents, pregnant women and the elderly. During these workshops delegates in each group discussed their intended social programmes and were advised on challenging issues and implementation and evaluation strategies.

This conference allowed oral hygienists from different countries, experience backgrounds who share a common goal towards better oral care and prevention, to unite. The amazing work being done by oral hygienists all over the world towards improving oral care, especially to those in need, makes me very proud of my fellow colleagues and my profession. We are also grateful for the knowledge and experience the conference equipped us with to encourage and motivate social programmes within South Africa.

Maggie Naidoo ●
OHASA NEWS

WESTERN CAPE

OHASA Western Cape was privileged to host the parallel Oral Hygiene programme at the International SADA congress in Cape Town on 5 August 2017. Expert local and international speakers presented a variety of interesting topics, with speakers including Desi Moodley, Zaki Kanaan, Alasdair McKelvie, Mark Bowes, Anushka Sing and Mark Weirtheimer.

The OHASA Western Cape Branch Exco and CPD committee would like to thank all the speakers and traders for always contributing to the Oral Hygiene profession, as well as a special thank you to the SADA committee for your support. It is your input and collaboration that makes it possible for our branch to be involved in this very successful event.

OHASA Western Cape’s last full day seminar for 2017 will be held at Durbanville Conference Centre on 14 October 2017.

Thank you to all our members for supporting and representing OHASA on all platforms!

Cape Town Greetings

Gail Smith (WC Chair), the Executive and CPD committee
OHASA GAUTENG BRANCH
Cordially invites you to the 2017 AGM

Date: Saturday 28 October 2017
Time: 8h00 – 12h30
Venue: Pretoria Country club –
241 Sidney Street, Waterkloof, Pretoria, 0145
Cost: Free

RSVP: Before 23 October 2017 to ohasagauteng@gmail.com (Please indicate special dietary requirements)

Accommodation: For arrangements please contact Angelique Kearney on ohasagauteng@gmail.com, or call her on 082 454 9987
Entertainment: Pretoria Boys High Gumboot dancers and International motivational speaker, Nikki Bush: “Get Outta your head”.
Leave having laughed yourself silly and with your emotional cup running over!

PROGRAMME
7h15 – 8h00
Coffee, Snacks & Registration
8h00 – 8h30
Opening & Gumboot Dancers
8h30 – 9h30
Branch reports & motions
9h30 – 10h30
Stella: President’s report
10h30 – 11h00
Brunch & Cash bar available
11h00 – 12h00
Speaker
12h00 – 12h30
Thank you & sign out

Gauteng Branch:
St Alban’s College invited OHASA, along with Colgate Palmolive, to take part in their special Mandela Day celebration in the form of the Moshate Rugby Festival, which took place on 15 July. Colgate’s friendly Dr Rabbit was there, along with Colgate staff and a few OHASA members to educate and distribute tooth brushes and tooth paste to 300 orphans and 200 underprivileged rugby players. The event was a great success and we are extremely joyful that 500 more children are aware of their oral health. Well done and thank you to all that were present on the day.
YOUR BEST DISINFECTING ALLIES

Elugel

0.2% Chlorhexidine
Alcohol FREE

Indications:
- Complement to periodontal and implant treatments
- Abutment screws
- Sensitive gums
- Individuals who are unable to brush effectively

Eludril CLASSIC

0.1% Chlorhexidine
0.5% Chlorobutanol

Indications:
- Reduce plaque formation
- Prevent the onset and aggravation of gum problems
- Infection control

Available from Dental Warehouse. To be put in touch with your nearest sales rep, please contact us on 011 803 5140 or infosa@pierre-fabre.com.

Pierre Fabre ORAL CARE

www.pierre-fabre.co.za
OHASA CODE OF ETHICS

1. The essential elements of the oral hygiene code of ethics are mutually exclusive. True or False.
   A. True
   B. False

2. An ethical standard is scrutinised by the degree to which it is beneficent and nonmaleficent. True or False.
   A. True
   B. False

Select one incorrect answer

3. Which of the following beliefs guide our practice?
   A. Individuals have the right to self-determination, especially when it comes to taking decisions regarding his/her health.
   B. The quality of care that we provide to our patients is dependent on external factors out of our control.
   C. People have a right to healthcare, including oral healthcare.
   D. Oral hygienists service the public through prevention and treatment of oral disease.

Select one correct answer

4. An oral hygienist has developed a treatment plan to assist patient Y who presents with refractory periodontitis and multiple underlying chronic, systemic health problems. In structuring the plan she was empathetic towards the needs, values and perspectives of patient Y and was confident that other clinicians would provide the same therapeutic services in the same context. Which fundamental services are being referred to?
   A. Responsibility and Community
   B. Universality and Responsibility
   C. Complementarity and Community
   D. Universality and Complementarity

Select one correct answer

5. Equity in oral health requires an equal distribution of oral healthcare resources to all sectors of society and equal access to affordable, quality care. Which core value is being referred to?
   A. Societal Trust
   B. Nonmaleficence
   C. Justice and Fairness
   D. Veracity

LOCAL ANAESTHESIA: PART 1

Select one correct answer

6. Failure in local anaesthesia is most commonly experienced with...
   A. Infraorbital Block
   B. Mental Block
   C. Inferior Alveolar Block
   D. Greater Palatine Block

Select one incorrect answer

7. Patient related factors that influence success in achieving anaesthesia include...
   A. Type of anaesthetic agent selected
   B. Anatomical anomalies
   C. Psychological Problems
   D. Infection and Inflammation

Select one correct answer

8. Patient X required a class V filling on tooth 44. The lesion was hypersensitive with the patient reacting to air blast and tactile stimulation. In order to provide a high quality, durable restoration you gave an inferior alveolar nerve block. Unfortunately even though the right lower lip achieved complete anaesthesia, the patient complained of discomfort. The most likely accessory nerve supply originates from a branch of the:
   A. Lingual Nerve
   B. Mylohyoid Nerve
   C. Auriculotemporal Nerve
   D. Cervical Nerve

Select one correct answer

9. In order to treat patient X (referred to in Q.8) effectively you...
   A. Repeat the Inferior alveolar Nerve Block injection
   B. Provide supplemental infiltration on the buccal aspect of 44
   C. Provide supplemental infiltration on the lingual aspect of 44
   D. Give a mental nerve block injection

Select one correct answer

10. It is most important to consider the volume (ml or number of cartridges) of anaesthetic administered and not the dosage (mg). True or False?
   A. True
   B. False

Select one correct answer

11. The maximum dosage recommendation (MDR) for 3% mepivicaine, without adrenaline, for a 25kg child is...
   A. 120mg
   B. 130mg
   C. 140mg
   D. 150mg

Select one correct answer

12. Use the “rule of 10” to calculate the maximum number of cartridges that may be used for the child referred to in Q11.
   A. 2
   B. 2.5
   C. 3
   D. 3.5

Select one correct answer

13. The commercial name for the local anaesthetic agent that does not contain a vasoconstrictor is...
   A. Ubistesin
   B. Xylocain
   C. Carbocaine
   D. Xylesthesin
Select one correct answer

14. Duration of anaesthesia is determined by the ____________ of the anaesthetic agent.
   A. Protein binding characteristics
   B. Lipophilic aromatic ring
   C. Intermediate ester or amide chain
   D. Terminal amine

15. In general, use of a 4% local anaesthetic agent should be reserved for...
   A. Infiltration
   B. Nerve block
   C. Nerve block following failed attempts with other agents
   D. All of the above

ORAL PIERCINGS

Select one incorrect answer

16. The postoperative complications of oral piercings include...
   A. Optimal masticatory efficiency
   B. Speech difficulties
   C. Difficulty in swallowing
   D. Galvanic currents

Select one correct answer

17. Oral piercings increase the risk of...
   A. Abrasion
   B. Caries
   C. Tooth malalignment
   D. All of the above

18. Narrow, cleft-like gingival recessions are typically seen in conjunction with oral piercings and most frequently affect which intra-oral site...
   A. Buccal and lingual aspects of the mandibular incisors
   B. Buccal and lingual aspects of the maxillary incisors
   C. Lingual surface of the mandibular posterior teeth
   D. Lingual surface of the maxillary posterior teeth

Select one incorrect answer

19. Strategies that may palliate the sequelae of oral piercings include...
   A. Frequent self-examination of the piercing site to prevent infection or treat as early as possible
   B. Use of a chlorhexidine containing mouthwash for several days following piercing
   C. Increased caffeine consumption to increase healing rate
   D. Meticulous oral hygiene

21. A direct link between intra-oral piercings and periodontitis has been established due to the potential for the piercing site to harbour periopathogens.
   True or False?
   A. True
   B. False

TOOTH BLEACHING

Select one correct answer

22. State the amount of hydrogen peroxide (H₂O₂) that a 20% carbamide peroxide home bleaching gel contains...
   A. 3.5%
   B. 9%
   C. 7.5%
   D. 7%

Select one incorrect answer

23. Side Effects on the dental hard tissues of chlorine dioxide use include...
   A. Enamel loss
   B. Lustrous enamel
   C. Hypersensitivity
   D. Increased susceptibility to staining

Select one correct answer

24. The most likely explanation/s for the colour rebound observed shortly after an “in-house” bleaching procedure is/are...
   A. Reformation of double bonds within the pigment molecule
   B. Presence of free radicals within the enamel and dentine
   C. Enamel rehydration
   D. Both A and C

Select one correct answer

25. The most important factor determining bleaching efficiency is...
   A. Contact time between the bleaching material and enamel surface
   B. Initial tooth colour
   C. Type of peroxide compound used
   D. Enamel prophylaxis prior to bleaching

Select one incorrect answer

26. During an “in-house” bleaching procedure, patient X started complaining of severe pain. On close inspection the clinician notes bubbling of the light cure dental dam and suspects leakage thereof with underlying gingival irritation/burning. On removal of the dam the gingiva appears blanched. The clinician should respond by...
   A. Extensively rinsing with water until gingival blanching regresses
   B. Apply a topical anaesthetic
   C. Advise the patient to avoid a meticulous oral hygiene regimen for the next few days to allow for healing
   D. Apply vitamin E

Select one correct answer

27. For aesthetic reasons patient X has elected to have all amalgam restorations replaced with composite. The dentist has referred the patient to you, the oral hygienist, to start the treatment plan with a bleaching procedure, as this will allow the dentist to match the composite restorations to the bleached shade achieved. How long after bleaching is complete will you schedule patient X’s restorative appointments with the dentist?
   A. 3 days
   B. 7 days
   C. 10 days
   D. 14 days
EXTRA CAVITY PROTECTION

A new, alcohol-free mouthwash containing green tea extract, which improves the strength & health of your teeth.

Oral Hygienists’ Association of South Africa
PO Box 830
Newlands
0049
Fax: 086 696 7313
E-mail: admin@ohasa.co.za
www.ohasa.co.za