The Boomslang, *Dispholidus Typus*, does it in style, the snake has three very large grooved fangs situated at the back of the mouth, which can open to 170 degrees, enabling a bite to the arm or leg of a victim. A highly toxic haemolytic venom is delivered. The maxillary teeth are small, seven or eight in number, whilst the mandibular dentition is described as “sub-equal” (nearly but not quite equal!). Recognise this usually green snake by the round pupils in large eyes.

Source: SA Wildlife.blogspot.
Cost calculations:

1. Machine costs recovery: 60 months - lease
2. Materials:
   2.1 Chair side materials: Eg composite resin, glass ceramic, 20 min labour, post-processing.
   2.2 Lab materials: Eg Zirconia 2 hours labour, post-processing, 16 hours sintering.

Average production cost R350 per crown.

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My wife comes through whimpering with a cut finger, she has been cutting glass for a stained glass window. I bind it and comfort her.

In fact she does not whimper, not at all, a certain amount of fortitude is required when preparing a stained glass window. The cuts in the glass are curvaceous, the pieces often small, the need for accuracy intense. Directing the glass-cutting diamond or steel wheel requires a strength of character as well as a marked physical commitment. As for effecting the break... well, deliberately breaking glass is in many ways just contrary to our instincts!! In fact, I admire her intrepid tenacity!!

It is intriguing that the art of stained glass windows has never attracted a name, one who dresses stone is a mason, the art of trimming hedges is topiary, a seamstress sews, a carpenter works wonders with wood. Stained glass has been known to man since around 2700BC when it is thought that the Egyptians, who had discovered the substance whilst firing their vessels, produced coloured glass beads. The Romans used stained glass in their windows, and it was certainly used in religious buildings, pieces of stained glass estimated to date from 686 AD having been found in an English monastery. The earliest record of stained glass being used as an art form is a 10th century window depicting the head of Christ, found at Lorsch Abbey, Germany. The art form has been with us for a long time and is enjoying a revival of popularity after a loss of prestige after the Renaissance. During the Medieval period a popular topic for stained glass windows in churches was St Apollonia, the Patron Saint of Dentistry. Examples are to be found in numerous churches and abbeys. Almost always she is depicted as a young and attractive woman, holding a fearsome pair of tongs. The truth is that at the time of her martyrdom she must have been well advanced in age.

She refused an order by the Roman Emperor (perhaps Decius, perhaps Philip, no one is sure) to publicly worship the Roman gods. She was a staunch Christian and declined, was dragged off by a mob who threatened to burn her alive. She was steadfast in her principles and the mob then either removed her teeth one by one, or smashed all her teeth with a club (again no one is sure except for the fact that she did lose all her teeth). In extreme courage she acted as though she was repenting, the vigilance of her attackers was relaxed for a moment, and St Apollonia dived herself into the flames, there to perish, gaining the reluctant admiration of the mob for her dedication. The beatification into Sainthood was enacted in 300AD. The Catholic Church celebrates St Apollonia on 9th February each year.

And it is true that the Church and Dentistry have had close ties. Before the profession came into being, people had two resources to call upon in their time of need to relieve dental pain, firstly an appeal to St Apollonia, and then a visit to someone willing to pull the tooth, the barber, the surgeon, the blacksmith, OR the monks at a monastery would oblige! Indeed the church of Santa Marie in Aracelli was wellknown; the Franciscan Monks had their forceps ready for the poor unfortunate suffering the pangs of toothache. St Apollonia must have received so many appeals in those days:
Illustrious virgin martyr, Apollonia,  
Pray to the Lord for us  
Lest for our offenses and sins we be punished  
By diseases of the teeth.¹

No wonder then at the number of images of St Apollonia in Stained Glass. The pieces of glass are held in place by an ingenious system requiring each item to be carefully edged with a ribbon of lead, called a came, which is formed as an H in cross section, enabling the edges of adjacent pieces of the glass to be inserted and held. The lead was soldered at the joints and the window assumed a reasonably solid structure.²

Another system was developed in response to a need generated by Louis Comfort Tiffany, who designed the most intricate of panels with pieces of glass so small that the lead came was far too wide and heavy. Tiffany lamps exemplify the new technique which involved the use of a narrow copper strip to envelope the edges of each individual piece before the strips on adjacent components are soldered together.

It is time to invoke one of my favourite words, concinnity; defined by the Oxford English Dictionary as: “the skilful and harmonious adaption or fitting together of parts.” How very apt a description of stained glass work, as a glance at the illustration of a Tiffany lamp will prove. Of course, Dentists practice concinnity every day, the exacting tolerances demanded of oral restorations, of periodontal surgery, of orthodontic tooth positioning, all require just that skilful and harmonious fitting together.

Failure to satisfy concinnity leads inexorably to collapse of our endeavours. That Dentistry can record high rates of success is a remarkable achievement and bears testament to both the enhancement of clinical skills but also, and possibly more relevantly, to the advances in the technology of Dentistry. The availability of precision optics, accurate apex locators, new medications, new materials, computerised radiographic methods and more have all been effective in raising success rates. A recent paper shows how the introduction of these techniques into an endodontic practice brought the success rate up from 90% to 94.1%.³ In general, clinical success rates do reach at least the mid 90% range, bridges may last 10 years, removable dentures 3 to 5 years, metal format ceramic restorations some 97% over seven years, implants have a 95% to 98% success record over 40 to 50 years! Achievable only with concinnity!

Of course there are failures, as Nora Roberts, bestselling American author, observed: “Nothing worthwhile is ever without complications.”⁴ The entire Dental Community, whether clinical, organised, research, manufacturing, selling, consuming, are intimately involved in the quest to reduce further the spectre of failures. The Communique from Head Office in this issue emphasises the need for concinnity, the greater the number of our members who participate in close agreement with the need to provide data for the determination of relevant RVU’s, the more significant will be our success. It is the acting in harmonious accord that will produce the format that will provide the basis for advancement of the practice of our profession. Concinnity is the word!

By the way, how about Concinnitous Chromatic Glaziers for those who produce Stained Glass Windows?

References
I am excited about the progress that SADA is making in getting many of our projects underway. During the time of turmoil of a cabinet reshuffle and subsequent downgrading of SA by rating agencies, SADA has continued working hard behind the scenes: we have kicked off on our long awaited Relative Value Unit (RVU) Study!

RVU’s are a means of measuring the complexity of dental procedures in comparison with a pre-determined baseline procedure in terms of the experience, judgement and skill required to perform that procedure, the risk involved in performing the procedure and the time taken to complete the procedure. RVU’s are crucial variables in the equation used to calculate tariffs for procedures. For several years now we have been at the mercy of the tariffs enforced by the Medical Schemes, restricted as we have been by a lack of scientific evidence to warrant our motivating for better benefits….. the equivalent of turning up at a gun fight with plastic knives! The conclusion of this study will no doubt equip us with ammunition to effectively fight this battle with Medical Schemes.

Our partner in conducting this RVU study, Deloitte, will be calling upon practitioners to complete surveys soon. We urge all members to take the time to complete these surveys honestly and as completely as possible. We realize it is a time-consuming process and we sincerely appreciate the effort you will be taking to cooperate. The more responses we receive, the more credible will be the results of the study and the more ammunition we shall gather to support a demand better rates for our services. We would also like to assure members that all information provided in these surveys will remain completely confidential and will be routed directly to Deloitte; SADA Management and Office Bearers will have no sight of any of this information. We cannot stress strongly enough the value of contributing to this study!

In other equally important news, the Minister of Health has finally published amendments to the Regulations regarding Registration of Dental Assistants. Unqualified Dental Assistants will have until the 7th of October to apply to the HPCSA for registration. They will then have two years from the point of registration within which to pass the Board Exams, failing which they will not be able to work as Dental Assistants. Members are advised to encourage all unqualified assistants to register as soon as possible.

Have you seen our activity on social media platforms? We have started disseminating information and engaging with members of the public as well as the dental professional! We have used these platforms to promote the undisputed premier Dental Congress in Africa, SADA’s Congress 2017 taking place in Cape Town on the 4-6 August, which has received a lot of interest from local and international professionals. It is bigger and better:

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Use of antibacterial nanoparticles in Endodontics

SUMMARY
Several root canal irrigants and medicaments are available to combat endodontic pathogens. However, evidence of complete elimination of these pathogens by the use of these solutions is not recorded in the literature. The possible development of resistant bacterial species is one of the problems related to the efficacy of the currently available irrigants and medicaments. In addition, the complex anatomy of the root canal system allows endodontic pathogens to be hidden in areas inaccessible to the action of the irrigating preparations. This is further enhanced by the protective layer that is formed by the remnants of pulp tissue, dentin powder and dead cells which inhibit the antibacterial activity of the root canal irrigants and medicaments. Antimicrobial nanoparticles show promising effect against resistant pathogens in pharmaceutical science as a result of their unique physio-chemical properties. Unlike traditionally used antimicrobial agents, these nanoparticles destroy bacterial cells through multiple mechanisms. The concept of using nanoparticles in endodontics as a new treatment modality was developed recently and their antibacterial efficacy against endodontic pathogens was evaluated by several researchers in many in vitro studies. This article reviews some of the currently available literature on laboratory studies that evaluated the efficacy of nanoparticles against endodontic pathogens.

Keywords: Endodontics, Antibacterial; chitosan; functionalized; nanoparticles; silver, magnesium, zinc.

ACRONYMS
ROS: reactive-oxygen species

INTRODUCTION
The world “nano” originated from a Greek word which means “dwarf”. The philosophy of nanotechnology was first illustrated in 1960 by Richard P. Feynman, a Nobel Prize winner, in his lecture “There’s Plenty of Room at the Bottom”. Since then, the concept of nanotechnology has been applied in numerous scientific fields such as physics, engineering as well as in the medical field. Nanotechnology is defined as a science that deals with the development of new materials with new properties and functions through controlling and restructuring of the materials on a nanometer scale of “less than 100 nm” and hence the name nanomaterials. The term is applied, according to the European commission, to “any natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50% or more of the particles in the number size distribution, one or more external dimension is in the size range 1 nm – 100nm”.

Nanomaterials exist in different forms and shapes. They are categorized according to their dimensions into: zero dimension such as nanoparticles, one dimension such as nanorods, two dimensions such as thin films and three dimensions such as nanocones. They show increased chemical reactivity compared with their bulk form.

The term nanodentistry is defined as “the science and technology of diagnosis, treating and preventing oral diseases, relieving pain, preserving and improving dental health using nanostructured material”. Nanodentistry is applied in different areas, for example: manufacturing of dental materials; prevention of oral diseases such as dental caries and periodontal disease; as therapeutic agents for the treatment of dentine hypersensitivity, oral cancer and endodontic diseases; in the technology of tissue engineering;
and as a diagnostic aid to identify certain diseases such as oral cancer.\textsuperscript{7} Currently the application of nanomaterial in endodontics is limited to a few studies that evaluated the antimicrobial properties of some nanomaterials in different forms against endodontic pathogens.

**Endodontic diseases as a microbial infection**

Microbial elements are the most common cause of pulpal and periapical pathosis.\textsuperscript{8,9} All endodontic infections are polymicrobial in nature with differences between the types of micro-organisms isolated from primary and secondary root canal infections.\textsuperscript{10,11} Microbiological studies have revealed more than 400 microbial species from endodontic samples.\textsuperscript{12}

Endodontic infection is eventually established as a biofilm.\textsuperscript{13} This form of microbial colonization inside the root canal system was initially discovered by Ramachandran Nair.\textsuperscript{14} Microbial biofilm is a surface-attached microbial community defined by Mohammadi et al as “a sessile multicellular microbial community characterized by cells firmly attached to a surface and enmeshed in a self-produced matrix of extracellular polymeric substance”.\textsuperscript{15} Endodontic biofilm is composed of 10-15% bacterial cells embedded in 85-90% of that extracellular substance.\textsuperscript{16}

**Virulence of endodontic pathogens**

The virulence and pathogenicity of endodontic microorganisms in a biofilm state are enhanced by several factors.\textsuperscript{16-19} In 2010, Kishen listed basic mechanisms which allow endodontic pathogens to resist the commonly used root canal irrigants and medicaments.\textsuperscript{20} These mechanisms are usually associated with the extracellular polymeric matrix, rate of bacterial growth, availability of nutrients and ability to adopt a resistant phenotype.\textsuperscript{20}

The extracellular polymeric matrix can play a major role in increasing the resistance of endodontic biofilm against root canal irrigants and medicaments.\textsuperscript{16} Amongst the factors contributing to this resistance are: the ability of the extracellular polymeric matrix to facilitate the adhesion of the biofilm structure to the tooth surface and provide mechanical stability to the biofilm. The matrix is a source of nutrition during starvation conditions.\textsuperscript{16} Moreover, the close proximity of the bacterial cells within the biofilm structure facilitates microbial communications such as exchange of genetic information and communication between cells (quorum sensing) in the regulation of gene expression and microbial synergy.\textsuperscript{16} Additionally, the extracellular polymeric matrix was shown to decrease the penetration rate of antimicrobial agents.\textsuperscript{21}

Another factor associated with the high virulence of endodontic pathogens in a biofilm state is their ability to demonstrate dissimilar gene expression patterns compared with those microorganisms found in a planktonic state. As a result, microbial biofilm is found to be more resistant to antimicrobial agents.\textsuperscript{22,23}

**Antibacterial mechanisms of nanoparticles**

The use of nanoparticles as antimicrobial agents has recently attracted considerable attention in the medical field as a result of their superior antibacterial properties compared with those of other antimicrobial agents together with a low potential to produce microbial resistance.\textsuperscript{24} The antimicrobial activity of nanoparticles against different microorganisms differs from that of its original bulk state\textsuperscript{24} and may vary according to the different types of nanoparticles.\textsuperscript{25}

The efficacy of the nanoparticles to eliminate bacterial cells is attributed to the concurrent effect of two different mechanisms (Figure 1). One involves the binding of nanoparticles to the targeted bacterial cell membrane through electrostatic forces, causing an alteration in the membrane potential, depolarization and eventually loss of membrane integrity.\textsuperscript{26} This results in disturbance of major bacterial cell functions such as respiration, transportation of nutrients and disturbance of energy transduction, leading subsequently to bacterial cell death.\textsuperscript{27} The second mechanism includes the production of oxygen free-radicals such as reactive-oxygen species (ROS) that can influence survival of the bacterial cell by blocking the protein function, destroying DNA and resulting in excess radical production.\textsuperscript{27}

**Antimicrobial efficacy of nanoparticles in endodontics**

Different types of nanoparticles have been investigated recently in different forms in \textit{in vitro} studies to evaluate their efficacy against endodontic pathogens.\textsuperscript{1,28,29} The nanoparticles used in these studies broadly can be classified into three categories according to their nature: metallic or inorganic, polymeric and bioactive non-organic nanoparticles.

**Antibacterial efficacy of metallic or inorganic nanoparticles**

The antibacterial effect of metallic or inorganic nanoparticles such as silver, magnesium and zinc oxide against endodontic pathogens have been evaluated in many \textit{in vitro} studies.\textsuperscript{30-32} Among these, the antibacterial effect of silver nanoparticles was the most commonly considered in the literature.

![Diagrammatic representation of the antibacterial mechanisms of nanoparticles](image-url)

Figure 1: Diagrammatic representation of the antibacterial mechanisms of nanoparticles

(A) Toxicity through production of reactive oxygen species (ROS),
(B) Nanoparticles attach to bacterial cell membrane causing toxicity through cell membrane damage.
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Silver nanoparticles (Ag-NPs)
The antimicrobial properties of silver nanoparticles were first demonstrated by Jose Ruben et al. Silver nanoparticles have the ability to bind to the negatively charged part of the bacterial cell membrane, disturbing its functions such as permeability and respiration, causing leaking of the cytoplasmic content and eventually rupture of the bacterial cell. As a result, the nanoparticles will infiltrate inside the cytoplasmic content and interact with sulphur- and phosphorus-containing proteins such as DNA and RNA, causing further damage to the bacterial cell. Additionally, the silver nanoparticles release silver ions when in contact with an aqueous media, further disturbing the bacterial functions.

Wu et al. evaluated the effect of silver nanoparticles in a concentration of 0.1% as an endodontic irrigant solution and as a gel in two different concentrations (0.02% and 0.1%) against Enterococcus faecalis biofilm. The solution did not cause any major change to the structure of E. faecalis biofilm. However, the use of silver nanoparticles in a gel form with a concentration of 0.02% had the ability to disrupt the structural integrity of the E. faecalis biofilm more than a 0.01% silver nanoparticle gel and thus decreased the number of viable bacteria.

The antibacterial effect of silver nanoparticles as an intra-canal medicament in a paste form was evaluated by Buruniera et al. Three different carriers for silver nanoparticles were used in their study, namely: hydroxyethylcellulose polymer, carbomer polymer gel and polyethylene glycol. The antibacterial efficacy of these new materials was evaluated against different bacterial species such as E. faecalis, Pseudomonas aruginosa, Streptococcus mutans, E. coli and Staphylococcus aureus. This study showed that the use of silver nanoparticles when loaded into different types of carriers had an antibacterial effect against the tested bacterial species. Additionally, the use of hydroxyethylcellulose polymer gel as a vehicle for silver nanoparticles provided the maximum homogeneity and fluidity as a carrier compared with the other materials and thus resulted in improved antibacterial properties.

Silver nanoparticles may hold different surface charges and the effect of these variations on their antibacterial efficacy was evaluated by Abbaszadegan et al. The efficacy of three preparations having surface charges of neutral, negatively-charged or positively-charged against planktonic cells of E. faecalis was compared with that of

<table>
<thead>
<tr>
<th>Nanoparticles used</th>
<th>Microorganism tested</th>
<th>Test mechanism</th>
<th>Findings</th>
<th>Authors/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag-NPs</td>
<td>E. faecalis biofilm</td>
<td>As an irrigant and as a gel</td>
<td>Use of Ag-NPs as irrigant does not change biofilm structure. 0.02% Ag-NPs in a gel form can disrupt the structural integrity of the biofilm.</td>
<td>Wu et al (2014)</td>
</tr>
<tr>
<td>Ag-NPs</td>
<td>E. faecalis</td>
<td>Added to calcium hydroxide</td>
<td>Ag-NPs enhance the antibacterial properties of calcium hydroxide</td>
<td>Abdhami et al (2015)</td>
</tr>
<tr>
<td>Ag-NPs</td>
<td>E. coli, P. aruginosa, S. mutans, S. aureus</td>
<td>As intra-canal medicament using different carriers</td>
<td>Ag-NPs have antibacterial properties against the tested microorganisms in the three carriers</td>
<td>Buruniera et al (2014)</td>
</tr>
<tr>
<td>Ag-NPs</td>
<td>Planktonic E. faecalis</td>
<td>With different surface charges (neutral, positive and negative)</td>
<td>Positively charged Ag-NPs have low antibacterial properties, although more effective in lower concentrations than neutral and negative surface charges in diluted concentrations. Antibacterial properties were not affected by the inhibitory effect of dentine powder.</td>
<td>Abbaszadegan et al (2015)</td>
</tr>
<tr>
<td>Mg-NPs</td>
<td>E. faecalis, S. aureus, C. albicans</td>
<td>As an irrigant solution</td>
<td>Mg-NPs showed extended antibacterial action over time</td>
<td>Monzavi et al (2015)</td>
</tr>
<tr>
<td>ZnO-NPs</td>
<td>E. faecalis biofilm</td>
<td>As an irrigant solution and when added to zinc oxide based sealer</td>
<td>ZnO-NPs decreased the number of colony forming units of the tested bacteria. ZnO-NPs enhanced the antibacterial property of zinc oxide based sealer. Dentine treated with zinc oxide nanoparticles reduced bacterial adhesion to dentine wall by 95%.</td>
<td>Kishan et al (2008)</td>
</tr>
<tr>
<td>ZnO-NPs</td>
<td>E. faecalis in planktonic and biofilm state</td>
<td>As an irrigant solution</td>
<td>ZnO-NPs completely eliminated planktonic bacteria while those in biofilm could survive up to 72 hours. The biofilm thickness was reduced.</td>
<td>Shertha et al (2010)</td>
</tr>
<tr>
<td>ZnO-NPs</td>
<td>P. aruginosa, C. albicans, S. aureus, K. rhizophila, E. faecalis</td>
<td>As intra-canal medicament when incorporated with polyethylene glycol with and without calcium hydroxide</td>
<td>ZnO-NPs with calcium hydroxide had higher inhibitory effect against P. aruginosa, and lower effect against E. faecalis and varying degrees of effectiveness against the other tested microorganisms.</td>
<td>Guerreiro-Tanomaru et al (2013)</td>
</tr>
</tbody>
</table>
sodium hypochlorite and chlorhexidine. Positively-charged silver nanoparticles showed a minimal effect against the tested bacterial species. However, unlike with neutral and negatively-charged silver nanoparticles, sodium hypochlorite and chlorhexidine, the minimal antibacterial effect was still shown with the positively charged silver nanoparticles at lower concentrations. Additionally, some tissue inhibitors, such as dentine powder or the remnants of pulp tissue, that have the ability to inhibit the antibacterial effect of root canal medicaments,46 were shown to have no such effect on the antibacterial properties of the positively-charged silver nanoparticles even after 24 hours contact time. The study concluded that the antibacterial effects of different surface-charged silver nanoparticles, sodium hypochlorite, and chlorhexidine depended on their concentrations and the contact time.39

Furthermore, silver nanoparticles were shown to enhance the antibacterial properties of some intra-canal medicaments such as calcium hydroxide, as has been demonstrated by Afkhami et al. in their study which tested the effect of the combination on E. faecalis.41

The use of silver nanoparticles as an antimicrobial agent against endodontic pathogens shows promise. However, further investigation is required to evaluate any effect on the colour stability of the tooth structure, the dentine surface and possible cytotoxic actions on human cells.

Magnesium-containing nanoparticles (Mg-NPs)
Magnesium-containing nanoparticles were suggested for use as antimicrobial agents against endodontic pathogens due to their known antibacterial properties against gram-positive and gram-negative bacteria, spores and viruses.25 Magnesium-containing nanoparticles are either magnesium-oxide nanoparticles or magnesium-halogen-containing nanoparticles such as chlorine, bromine and fluorine.26,42 The antimicrobial properties of magnesium-containing-nanoparticles were thought to be due to multiple mechanisms. Similar to the common antimicrobial mechanisms of nanoparticles, magnesium-halogen-containing nanoparticles infiltrate inside the bacterial cell, resulting in a disturbance in the membrane potential. The penetration facilitated the DNA binding and lipid peroxidation effects of the nanoparticles, causing more destruction of the bacterial cell.44 Magnesium-oxide nanoparticles were found to be bactericidal when present in an aqueous form as a result of the action of superoxide anions that formed on the bacterial cell surface.44

The antibacterial efficacy of different concentrations of magnesium oxide nanoparticles (5 mg/L and 10 mg/L) and 5.25% sodium hypochlorite and 2% chlorhexidine against endodontic pathogens such as E. faecalis, S. aureus and Candida albicans was studied by Monzavi et al.30 The results showed no significant differences in the antimicrobial efficacies of the irrigant solutions used against the tested endodontic pathogens. However, the inclusion of magnesium oxide nanoparticles in an irrigant solution produced extended antibacterial activity when compared with sodium hypochlorite.30

Zinc oxide nanoparticles (ZnO-NPs)
Zinc oxide nanoparticles showed high antibacterial effectiveness,45,46 destroying microbial cells in a higher pH environment.47 The antibacterial mechanism of zinc oxide nanoparticles is similar to that of other types of nanoparticles, causing increased permeability of the cell wall membrane, a release of cytoplasmic content and cell death.48 The bactericidal effect of zinc oxide nanoparticles was shown to be related to size, the smaller the size the higher the antibacterial effect and the production of reactive oxygen species such as hydrogen peroxide when in contact with an aqueous medium.42,47,49-51 Additionally, zinc oxide nanoparticles can produce zinc ions inside the bacterial cell causing disturbances in its enzymatic system and the mechanism of amino acid metabolism, resulting in further damage.52 The antibacterial effect of zinc oxide nanoparticles has been shown to depend on concentration, higher levels resulting in the maximum antibacterial effect.43

The antibacterial and antibiofilm efficacy of zinc oxide nanoparticles against some endodontic pathogens such as E. faecalis were assessed by Kishan et al.32 It was shown that zinc oxide nanoparticles can reduce the colony forming units of E. faecalis in a biofilm system. The same antibacterial effect was evident when zinc oxide nanoparticles were incorporated into a resin based root canal sealer. Also shown was a 95% reduction in the ability of E. faecalis to adhere and form biofilm in a dentinal wall.32 Another study found that the thickness and structure of the E. faecalis biofilm was reduced and disrupted after 72 hours contact time with zinc oxide nanoparticles but concluded that zinc oxide nanoparticles have the ability to eliminate E. faecalis in a planktonic state but not in a biofilm state.53 Varying degrees of antibacterial effects against P. aeruginosa, E. faecalis, C. albicans, S. aureus and Kocuria rhizophila were shown when zinc oxide nanoparticles were incorporated into polyethylene glycol to form a creamy mix and used as an intra-canal medicament.49

Several studies also shown the antibacterial effect of using metallic nanoparticles against endodontic pathogens (Table 1). However, further developments in understanding their chemical structure are required if their antimicrobial properties are to be enhanced and further clinical testing of the antibacterial effects should be undertaken.

Application of polymeric nanoparticles in endodontics
Chitosan nanoparticles
Polymeric nanoparticles gained significant interest amongst researchers as a result of their biocompatible and antimicrobial properties.50 Chitosan nanoparticles (Cs-NPs) are one of the commonly investigated polymeric nanoparticles in endodontics. Chitosan is a natural polysaccharide46 that is obtained by deacetylation of chitin,51 one of the most abundant polysaccharides in nature that forms most of the external skeleton of arthropods such as crabs and shrimps.56 Chemically, chitin is composed of (1-4)-linked 2-acetamido-2-deoxy-β-D-glucan.57 A modification in the structure of chitin in which the acetyl group is reduced by 40% to 35% by chemical hydrolysis in alkaline solution and high temperature produces a new chemical formula that consists of a copolymer of (1-4)-2-amino-2-deoxy-β-D-glucan and (1-4)-2-acetamide-2-deoxy-β-D-glucan which is known as chitosan.58
Table 2: Summary of studies that evaluated the antimicrobial effect of chitosan nanoparticles against some endodontic pathogens

<table>
<thead>
<tr>
<th>Authors/year</th>
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<tr>
<td>Kishan et al (2008)</td>
<td>E. faecalis in a biofilm and a planktonic state</td>
<td>As an irrigant solution and when added to a zinc oxide based sealer</td>
<td>Complete elimination in planktonic state and significant reduction against E. faecalis in a biofilm state</td>
</tr>
<tr>
<td>Shertha et al (2010)</td>
<td>E. faecalis in planktonic and biofilm state</td>
<td>Using photodynamic therapy by incorporating rose bengal in chitosan nanoparticles in the presence of tissue inhibitors</td>
<td>Complete elimination of E. faecalis with chitosan nanoparticle rose bengal mixture in the absence of tissue inhibitors</td>
</tr>
<tr>
<td>Shertha and Kishen (2014a)</td>
<td>E. faecalis in planktonic and biofilm state</td>
<td>Photodynamic therapy using rose bengal chitosan nanoparticle</td>
<td>Presence of tissue inhibitors delayed the antibacterial action up to 24 hours</td>
</tr>
<tr>
<td>Shertha and Kishen (2014b)</td>
<td>S. Oralis, P. intermedia, A. naeslundi biofilms</td>
<td>Photodynamic therapy using rose bengal chitosan nanoparticle</td>
<td>Pulp tissue remnant and bovine serum albumin had the highest inhibitory effect</td>
</tr>
<tr>
<td>DaSilva (2013)</td>
<td>E. faecalis biofilm</td>
<td>Chitosan nanoparticles incorporated with zinc oxide eugenol sealer</td>
<td>The mixture inhibits E. faecalis biofilm formation</td>
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Although the antimicrobial efficacy of chitosan was assessed by several investigators, the antibacterial mechanism of chitosan has not yet been fully clarified. Several hypotheses have been postulated, based on its cationic nature. Chitosan with low molecular weight was considered to have the ability to penetrate the bacterial cell membrane and then to bind to the DNA, inhibiting its transcription and mRNA synthesis, while chitosan with high molecular weight was surmised to bind to the negatively charged components of the bacterial cell wall, forming an impermeable layer and blocking transportation into the cell. Another alternative hypothesis for the antibacterial mechanism of chitosan is thought to be as a result of its ability to bind to the negatively charged bacterial cell membrane, increasing its permeability and ultimately resulting in leaking of the cytoplasmic contents and bacterial cell death. Others postulated that as chitosan has the ability to chelate metals, microbial growth was inhibited by reducing enzyme activity through metal chelation.

In endodontics, the use of chitosan nanoparticles as an antimicrobial agent was investigated against some endodontic pathogens (Table 2). Kishan et al. and Shertha et al. showed that chitosan nanoparticles can completely eliminate E. faecalis pathogens present in a planktonic state, and can cause a significant reduction of bacteria in the biofilm state.

Chitosan nanoparticles can be used as a drug carrier. This property was utilized by Shertha and Kishan by conjugating a photosensitizer material (rose bengal) to the chitosan structure and then evaluating its antimicrobial property against biofilms of E. faecalis, Streptococcus oralis, Prevotella intermedia, and Actinomyces naeslundi. They showed that such a conjugation can destroy the bacterial cell membrane of the tested bacterial species and then can penetrate deep into the biofilm structure of the tested species reducing the biofilm thickness and the number of microbial cells.

The presence of some tissue factors such as dentine powder, dentine matrix and remnants of pulp tissue within the root canal system was shown to inhibit the antimicrobial properties of some endodontic disinfectants. The effect of these tissue factors was evaluated by Shertha and Kishan against the antimicrobial properties of synthesized chitosan nanoparticles conjugated with rose bengal as photosensitizer. Remnants of bacterial tissue and dentine powder reduced the antibacterial efficacy of the conjugated solution in the first few hours. However, complete elimination of the tested bacteria before and after application of low energy photodynamic light was shown after 24 hours.

Chitosan nanoparticles were incorporated into a zinc oxide eugenol based sealer and were assessed for their antibacterial effect against E. faecalis biofilm on bovine root dentine treated by phosphorylated chitosan, chitosan conjugated with rose bengal and a combination of phosphorylated chitosan and chitosan conjugated with rose bengal, respectively. There was an inhibition of E. faecalis biofilm formation, the degree of inhibitory effects varying with the different treatment solutions.

**Bioactive glass nanoparticles**

In 1971 a new material with antibacterial properties and that can bond to the bone structure was developed. The developed material consisted of 45% SiO₂, 24% Na₂O, 24.5% CaO and 6% P₂O₅ and was named Bioglass. The antimicrobial property of bioactive glass material was shown to be through its ability to: 1) release its ions when it came into contact with an aqueous medium, 2) increase the surrounding pH, 3) increase the osmotic pressure around the bacterial cell causing inhibition of bacterial growth and 4) to precipitate calcium and phosphate ions in the bacterial cell membrane, disturbing its functions.

The use of 4SSS bioactive glass nanoparticles was found to produce better antibacterial effects against E. faecalis than micro-sized bioactive glass particles. However,
Zehnder et al showed that calcium hydroxide is more effective than 20 – 60 nm sized bioactive glass nanoparticles against E. faecalis.11

The use of bioactive glass nanoparticles as an antimicrobial agent as a replacement for the commonly used endodontic disinfectants is still an area of controversy as a result of the variation in results obtained by different studies regarding their efficacy against endodontic pathogens. More studies after further improvement in the synthesis of bioactive glass nanoparticles are needed.

DISCUSSION

The large number of nanoparticle materials available today provide multiple choices for their use in the medical field. Current endodontic research is focused on evaluating the antimicrobial properties of some nanoparticles as new agents against endodontic pathogens. Available studies show that there is promise in the use of different types of nanoparticles as antimicrobial agents especially against persistent endodontic pathogens such as E. faecalis. Whilst it appears that some of the shortcomings, of traditional root canal irrigants and medicaments can be overcome, more in-vitro and in-vivo studies are needed to evaluate which nanoparticles are more appropriate for use as a root canal irrigant solution, intra-canal medicament, or even bioactive root canal filling material, which is still an area of further investigation. Also, the antimicrobial effects of the nanoparticles need to be tested against a large variety of persistent endodontic pathogens. Indeed, more studies are needed to evaluate the biocompatibility, safety, cost and ease of use of these innovative materials.

References

Radix Entomolaris: Literature review and case report

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INTRODUCTION

According to Swartz, Skidmore and Griffen, mandibular first molars have a significantly lower success rate compared with other teeth.¹ Missed canals and the failure to remove all the microorganisms and pulp remnants from the root canal system are probably the main reasons for persistent infection around endodontically treated molars.² It is therefore important that clinicians have an awareness and good understanding of the variations in root canal morphology of the mandibular first molar.

Permanent mandibular first molars in Caucasian populations are generally two rooted teeth (one mesial and one distal root) with two mesial and one distal root canals.³,⁴ The two mesial root canals can end up in two distinct apical foramina (Figure 1) or they can merge together at the root tip end into one apical oramen (Figure 2).⁵

Vertucci and William (1974)⁶ as well as Barker et al., (1974)³ reported the presence of independent middle mesial canals in the mesial root of lower first molars (Figure 3). According to a literature review by Baugh and Wallace (2004), the prevalence of a third mid-mesial root canal in mandibular first molars is between 1-15%. They also reported that the mid-mesial canal can be independent with a separate foramen (Figure 4), or this additional canal may have a separate canal orifice and then join apically with either the mesio-buccal or mesio-lingual canal.⁷

In 1971, Skidmore and Bjornldal reported that 71.1% of distal roots of mandibular first molar teeth have only one canal, 28.9% can have two canals and in rare cases it can have three root canals.⁸ A review article (2010) revealed that the distal root of first mandibular molars had a Vertucci Type I configuration (single pulp canal is present from the crown to the apex) in 62.7% of cases (Figure 5) followed by a Type II configuration (pulp canal separates in two near

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the crown and joins at the apex to form one root canal) in 14.5% of cases (Figure 6) and a Type IV configuration (pulp canal separates into two distinct canals and extends till the root apex separately) in 12.4% of cases (Figure 7). Another variation can also be to find three root canals in the distal roots of mandibular first molars. The incidence of three root canals in the distal root of the mandibular first molar is between 0.2% and 3% (Figure 8). In addition to these case reports, there have been numerous studies that clearly indicated that the mandibular first molar could present with more than four root canals.11,13

The number of roots for the mandibular first molar teeth may also vary. Carabelli (1844) was the first to report on mandibular first molars with supernumerary roots. The third root was located on the disto-lingual side and was called radix entomolaris (RE) (Figure 10). In very rare cases, the mandibular first molar can also present with an additional root at the mesio-buccal side and is called radix paramolaris.5,15

PREVALENCE OF RE

The presence of RE in the mandibular first molar is associated with certain ethnic groups. In populations with Mongoloid traits (for example Chinese, Eskimo and American Indians) the frequency can range from 5-30%.16–21 However, in Eurasian and Indian populations it is less than 5% and in African populations less than 3%.22

Radix entomolaris can be found on first, second and third mandibular molar teeth, occurring least frequently on second molars.23 Studies have also reported a bilateral occurrence with as frequency of 50-67%.24

ETIOLOGY OF RE

According to Calberson et al. (2007) the etiology behind the formation is still unclear but it could be related to external factors during odontogenesis.25 Racial genetic factors can also influence profound expression of a particular gene that can result in the more pronounced phenotypic manifestation.26

MORPHOLOGY OF RE

The coronal third of the disto-lingual root of RE can be fixed partially or completely to the distal root. Based on the curvature in a buccal-lingual orientation, the separate RE variants can be classified into three types according to De Moor et al. (2004).26 Type I refers to a straight root/root canal.

Type II refers to an initially curved entrance, which continues as a straight root/root canal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third.

RADIOGRAPHIC DIAGNOSIS OF RE

Walker and Quackenbush reported a 90% precision in the diagnosis of 3-rooted molars using only panoramic radiographs.20 However, due to the fact that the RE is found mainly in the same bucco-lingual plane of the disto-buccal root, it may cause superimposition on the preoperative periapical or panoramic image.27 This often results in inaccuracy to reveal this anatomic variation.

A major limitation of conventional radiographic images is to compress 3D anatomy into a 2D image or shadow-graph.28,29 In an attempt to overcome this drawback of conventional radiography in order to detect the presence of RE, it is helpful to take additional exposures changing the horizontal angulation of the main x-ray beam. Wang et al., demonstrated that 25-degree mesial radiographs were significantly better than 25-degree distal radiographs for RE visibility and determination of optimum diagnosis.31 According to Clark’s rule (Also known as SLOB rule or Waltons projection), an object that moves in the same direction as the cone is located toward the lingual. Conversely, an object that moves in the opposite direction from the cone is located towards the buccal. Therefore, the RE image that moves distally is superimposed on the distobuccal root image that moves towards the mesial, when taking radiographs with small distal angulations.

According to Wang et al. (2011), radiographic images taken with eccentric beam angulations have the potential to improve diagnosis. However, they are inherently less distinct and they lose normal sharpness that is expected because anatomical structures could overlay roots and affect visibility and identification of roots and canals.32

Cone-Beam Computed Tomography (CBCT) provides dentistry with a practical tool for non-invasive and 3-dimensional (3D) reconstruction imaging for the use in endodontic applications and morphologic analyses.34 CBCT imaging allows for visualizing a new dimension, eliminate superimpositions, provide additional information for diagnosis and therefore enables a more predictable management of complex endodontic conditions compared with intraoral radiographs along.27,35,36

CBCT imaging allows ascertaining the identification, exact location, curvature and angulation of the RE in order to prevent iatrogenic events that might occur in relation to canal curvature like instrument separation, perforation and ledge formation.37
CLINICAL DIAGNOSIS OF RE

Clinical inspection of the tooth crown and analysis of the cervical morphology of the roots by means of periodontal probing can facilitate identification of an additional root. An extra cusp (tuberculum paramolare) or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity, can indicate the presence of an additional root.2

After access cavity preparation, the location of the canal orifice of the RE can also be problematic. The orifice is generally located disto- to mesio-lingually from the main canal or canals in the distal root. The orifice is often covered with overlying dentine or pulp roof remnants and must be removed before it is possible to locate the entrance of the canal. Extension of the access cavity to the disto-lingual side also ensures easy location.

A recent study by Souza-Flamini et al., (2014) used high resolution Micro-computed tomography (uCT) to examine the internal and external morphology of RE in mandibular third molars. The spatial configuration of the canal orifices on the pulp chamber floor was mostly in a trapezoidal shape and the radix canal orifice was usually covered by a dentinal projection.27

CASE REPORT

The patient, a 45 year old female presented with pain and discomfort on her mandibular left first molar, previously restored with a ceramo-metal crown. A pre-operative radiograph revealed evidence of extensive decay on the mesial margin as well as unusual root morphology (Figure 10a). The ceramo-metal crown was removed, caries excavated and a temporary crown placed. A CBCT, axial coronal slice confirmed the presence of two roots (mesial and distal)(Figure 10b). There was no clear evidence of canal orifices in the mesial root. Two canal orifices were visible in the distal root. Another axial slice in the midroot area, revealed the presence of distal root bifurcating into two separate roots. The additional root, branching off on the lingual aspect, confirmed the presence of radix entomolaris (RE)(Figure 10c).

The canals were negotiated with size 08 C+ and K-Files to patency and a length determination was done with an electronic apex locator (Pixie, Dentsply/ Maillefer) and confirmed radiographically. Reproducible glide paths were prepared with hand files and the ProGlider instrument (Dentsply/ Maillefer) and the root canals prepared with ProTaper Next X1 and X2.

Figure 10: (a) Pre-operative radiograph of mandibular left first permanent molar that was restored with a ceramo-metal crown, showing evidence of decay on the mesial gingival margin (b) CBCT - coronal axial view showing a mesial and distal root (arrows); (c) CBCT- midroot axial view revealed the presence of a mesial root (M), distal (D) and radix entomolaris on the lingual aspect (RE).

GuttaCore X2 verifiers (Dentsply/ Maillefer) were fitted into the prepared root canals and a periapical radiograph revealed that the verifier in the distal root canal travelled past working length (Figure 11a). A ProTaper Next X3 gutta-percha point was then fitted in the distal canal and a periapical radiograph confirmed a snug fit up to working length (Figure 11b). The mesio-buccal, mesio-lingual and radix entomolaris was obturated with size X2 GuttaCore obturators (Dentsply/Maillefer). The distal root canal was obturated with the ProTaper Next X3 gutta-percha point using the continuous wave of condensation technique with the Calamus Dual Obturation Unit (Dentsply/Maillefer).

Figure 11: (a) Radiographic confirmation of the fit of the GuttaCore verifiers. Note that the verifier in the distal root canal travelled past working length (white arrow), and that the sharp apical curve in the radix entomolaris was maintained after root canal preparation with the ProTaper Next instruments; (b) ProTaper Next X3 gutta-percha point was then fitted in the distal canal and a periapical radiograph confirmed a snug fit up to working length.

Figure 12: (a) Parallel, radiographic view of the post-operative result after obturation; (b) A 30 degrees, mesial angulated view of the four obturated root canal systems.

DISCUSSION

Radix entomolaris, first described by Carabelli, is an anatomical variant in the first permanent mandibular molar typically characterized by an additional third root located disto-lingually.14 RE occurs in first, second and third molars with the lowest prevalence in second mandibular molars.23,25,28 Although the presence of RE differs within associated ethnical groups, it should be regarded...
as a normal anatomical variation within the Mongoloid population. Studies show no significant predilection for gender or side distribution with bilateral occurrence ranging between 50-67%. Understanding the complexity of the anatomical variants seen in the first permanent mandibular molar proves to be invaluable in the clinical approach when treating these cases endodontically.

The authors used a Global G6 (Global, USA) six-step microscope fitted with LED illumination during the clinical procedures depicted in this article. The LED light source on this microscope delivers brighter and whiter illumination compared to traditional metal halide and halogen light systems. This type of illumination makes the careful inspection of the pulp chamber floor to locate accessory canal orifices more predictable. Magnification and illumination can substantially improve the visualisation of root canal orifices. De Carvalho and Zuolo (2000) demonstrated in a study that the use of the DOM could increase the number of root canal orifices located in mandibular molars. In their study 111,24 first and second molars were examined with the naked eye followed by examination with the DOM (8-13x magnification). With the naked eye, a total of 641 canals were located. After examination with the DOM, an additional 50 canals (7.8%) were located.42

Limited field Cone Beam Computed Tomography (CBCT) with the Kodak 9000 3D (Carestream, Paris) was used as a diagnostic imaging modality for effective evaluation of the root canal morphology. Matherne et al (2008) showed that CBCT images result in the identification of a greater amount of root canal systems in teeth compared to conventional radiography.41 The study also concluded that the combination of CBCT scanning with the dental operating microscope were important diagnostic tools for locating and identifying root canals.41 In general, limited field of view (FOV) machines are preferred over larger field of view machines in Endodontics as very small structures (calcified, accessory and missed root canals) that require a high resolution for adequate interpretation are being visualized. Other advantages of the limited FOV machines include decreased radiation exposure (for the patient and less responsibility for the clinician because a smaller volume needs to be interpreted.42

The Kodak 9000 3D system (Carestream) generates 3D images that provide clinicians with anatomical detail and diagnostic possibilities in the field of endodontics, implantology and oral maxillofacial surgery, periodontics, general dentistry, forensic dentistry and orthodontics. The application of CBCT technology in endodontics is not just limited to determine root canal morphology, number of roots, canals and accessory canals. It can also be used to establish the correct working length, assess existing root canal fillings, and determine the exact position and angulation of fractured instruments and to detect the presence and extent of inflammatory root resorption, just to mention a few.43

Protaper Next (Dentsply/Maillefer) was used for root canal preparation for most of the cases depicted in this article. The key benefits of Protaper Next include simplicity, excellent cutting efficiency and predictable final canal shape to allow for cone fit with tug-back. The system also ensures a 6% taper in the apical third of a canal after preparation with only two instruments, the X1 and X2.44

The Protaper Next instruments make use of the progressively tapered design. Each file presents with an increasing and decreasing percentage tapered design on a single file concept. The design ensures that there is reduced contact between the cutting flutes of the instrument and dentine wall, and reduced chance for taper lock (screw effect). At the same time, it also increases flexibility and cutting efficiency.45

Another benefit of the system is the fact that the instrument is manufactured from M-wire and not traditional nickel titanium alloy. Research by Johnson et al (2008) demonstrated that the M-wire alloy could reduce cyclic fatigue by 400% compared with similar instruments manufactured from conventional nickel titanium alloys.46 The added metallurgical benefit contributes towards more flexible instruments, increased safety and protection against instrument fracture.47

The last major advantage of root canal preparation with the Protaper Next system is the fact that the instruments present with a bilateral symmetrical, rectangular cross section (except in the last 3mm of the instrument, D0-D3). Rotation of the instrument produces a snake-like (swaggering) wave of movement. The benefits of this design characteristic include:

- It further reduces (in addition to the progressive tapered design) the engagement between the instrument and the dentine walls. This will contribute to a reduction in taper lock, screw-in effect and stress on the file.48
- Removal of debris in a coronal direction because the off-centre cross-section that allows for more space around the flutes of the instrument. This will lead to improved cutting efficiency, as the blades will stay in contact with the surrounding dentine walls. Root canal preparation is done in a very fast and effortless manner;48
- Reduces the risk of instrument fracture because there is less stress on the file and more efficient debris removal.49
- The swaggering motion of the instrument initiates activation of the irrigation solution during canal preparation improving debris removal.49

In most of the cases depicted in this article, carrier based obturation was utilized for root canal obturation. Buchanan (2009) advocates the use of carrier-based obturators in long, narrow and severely curved canals.49 The flexibility of the carrier allows for obturation of these canals, however, the stripping of the gutta-percha may cause direct contact between the plastic carrier and the dentine wall in curved canals.50 This problem has been attributed to procedural errors such as improperly shaped canals.49

GuttaCore crosslinked gutta-percha core obturators (Dentsply/Maillefer) was recently introduced to overcome these clinical challenges. GuttaCore consists of a carrier/core manufactured from a cross-linked, thermoset elastomer of gutta-percha coated in regular gutta-percha. The core is a polysoprene polymer cross-linked with peroxide for strength, designed to facilitate removal during retreatment and/or post space preparation by simply trephining through the core.51

CONCLUSION

The successful outcome of root canal treatment depends to a large extend on access, cleaning and shaping and three dimensional obturation of the entire root canal system. CBCT technology as well as proper angulation when acquiring radiographic images proves helpful in locating canals in especially first mandibular molars with a high incidence of anatomical variations. A thorough understanding of the prevalence of RE, its anatomical variations as well as radiographic and clinical diagnosis will provide the clinician with a better understanding of its complexity in order to ensure successful treatment outcomes.
Lodox® digital imaging – A tool for dental identification in single and mass fatality situations

ABSTRACT

Lodox®Statscan™ is a relatively recent addition to the field of post-mortem radiology and imaging in forensic dentistry and forensic medicine. A number of cases were encountered where victims who could not undergo visual identification were positively identified by comparing their post mortem Lodox® images with their ante-mortem dental records. A brief description is provided of how Lodox®Statscan™ images can be of benefit in cases where visual identification is not feasible or must be validated by another method of post-mortem identification. The digital images also provide a permanent record of the dentition of the deceased, for future reference. The emphasis of this article is on the Lodox®Statscan™ as a screening tool for cases which are suitable for dental identification, especially in mini-mass fatality and mass fatality situations, which is a poten new possibility in the field of dental identification. The use of these full body low dosage digital radiographic images for the purposes of dental identification has not been reported in the literature previously.

Keywords: Forensic Dentistry; Lodox®Statscan™; full body scan; low dosage radiation; dental identification.

INTRODUCTION

Lodox®Statscan™ (LS) was developed by the South African mining industry in order to perform low dosage regular screening of employees to detect illegal diamond smuggling. During 1999 it was realized that this low dose digital scanner is an effective triage tool in emergency medicine departments in hospitals, as full body images could be obtained in a matter of seconds, with minimal manipulation of the trauma victim. The LS is an equally valuable application in forensic medicine, and amongst the advantages discussed in the literature are the detection of peripheral skeletal injuries and foreign objects, such as projectiles, especially in multiple gunshot injury cases. Lodox has been applied as a screening device for maxillofacial injuries, but exploring the application of Lodox digital radiographs in forensic odontology, especially for the purpose of dental identification, has to date been neglected in the dental literature.

Many forensic investigative facilities do not have continuous access to a forensic odontologist for expert consultation nor do they have advanced dental imaging modalities available. LS could provide a fast primary radiographic survey of bodies admitted for medico-legal investigation, especially in cases where the identification of the deceased is unknown. Cases with recognisable dental restorations can be selectively separated for dental identification. In South Africa, a country with financial constraints, limited staff and restricted availability of post mortem radiographic imaging modalities, LS provides an alternative to obtaining full body digital recordings of each deceased individual admitted to our medico-legal laboratories. The system also enables radiographic screening for unique dental features. Any aspect of the digital image, including the dentition of the deceased, can be enlarged and digitally enhanced to render a more detailed picture.

LS is a useful imaging tool in medico-legal laboratories with high case loads, as it can obtain a full body lateral and anterior-posterior scan in an average of only 5-6.5 minutes. It has the ability to scan bodies in quick succession, emits low radiation, has minimal scatter of radiation and thus can be placed directly in the autopsy room/operational area, without putting staff at additional risk. Although it is difficult to compare the effective dose of radiation of a full body anteroposterior (AP) scan with the effective dose of conventional radiographs, it has been shown that the effective dose emitted by a Lodox® full body AP scan performed on a medium sized adult is approximately 14% of the effective dose of an abdominal AP image taken by a conventional X-ray machine. Similar findings were apparent in a paediatric study, where it was found that effective dose of LS AP abdomen and AP pelvis scans comprised only 10% of the effective dose of similar images taken by conventional radiography. In fact, ten Lodox® full body scans per year would still expose the individual receiving those scans to
less radiation than the prescribed maximum accidental dose to the general public of 1 millisievert (mSv) per year, as per the 1990 recommendations of the International Commission on Radiological Protection.8,11 Another major advantage is that images can be viewed almost immediately after the scan is completed.6

It has been suggested that the LS could enable health care workers in the clinical setting to utilise radiographs in the mass disaster, “mini-mass disaster”, or high volume trauma scenarios, as previously this would have been a time consuming and labour intensive exercise, with numerous logistical constraints.2 The use of LS for identification purposes in mass fatalities and specifically for dental identification has previously not been reported in the literature.

Two cases are used to illustrate the identification process using LS.

**CASE 1**

The presence of multiple concordant dental features with no inexplicable discrepancies when comparing the maxillary and mandibular dental arches on the LS with the ante-mortem dental records serves to confirm the identity.

The points of dental concordance included:

- 11. Porcelain veneer crown (position of the crown was checked in the anterior-posterior angulated image)
- 48 F am O
- 47 F am MO
- 46 F am O
- 45 F am DO
- All lower anterior teeth sound
- 18 F am O
- 28 F am O

(F = filling, am= amalgam, O = occlusal, M = mesial, D = distal)
CASE 2
Comparison of the maxillary and mandibular dental arches of this case on the LS and the ante-mortem dental records also resulted in a positive dental identification.

The points of dental concordance included:
• Edentulous maxilla
• Root anatomy of the 47 similar
• Root position and anatomy of 46 similar
• 46 F am MOD similar
• 48 missing
• 37 F am MO (characteristic shape of amalgam similar)
• 36 F am MOD

(F = filling, am= amalgam, O = occlusal, M = mesial, D = distal)

In each case the forensic dentist was satisfied with the concordant features present for examination. Additional images may be taken if required, and can include skull rotations if necessary. In Case 1, it was deemed necessary to check that the crown present on the lateral radiograph was indeed the 21 and not any other anterior crown.

DISCUSSION
Lodox® scanners have successfully been used in our forensic mortuary to identify single victims and victims of multiple fatalities where decomposition, mutilation and/or carbonization have been present. Bodies are put through the LS to determine if any dental restorations or recognisable dental features are present. In each case where ante-mortem dental records were available, the LS images were compared with the ante-mortem records received from the dental surgeons and comparisons made. The quality of the images observed in the LS is sufficient to ensure a positive correlation, and thus an identification of the victim. As illustrated in the LS images, dental restorations, implants, composite restorations and tooth relationships are clearly visible. As a standard protocol all teeth and dental restorations are charted on Interpol F2 forms and odontograms constructed for the identification process. From our experience, the complete identification process should not take longer than 10 minutes per body. The two cases are included to illustrate the clarity of the LS and comparison of ante-mortem and post mortem records. It must be emphasised that when the head is being scanned laterally it must be tilted to avoid superimposition of the left and right sides (oblique lateral).

The use of the LS in mass disaster situations offers the following advantages.
1. The LS can facilitate the quick and effective identification of burned, decomposed and mutilated bodies in mass disasters. Dental identification that is quick, cheap and accurate is the method of choice when fingerprints and DNA are not available and visual identification is unreliable due to decomposition, mutilation or burning.
2. Dental identification can be carried out without any form of facial tissue damage. In cases of carbonisation or rigor mortis the dentition must be mechanically exposed to visualise the teeth. Conventional radiography requires the digital sensor to be placed in the palate or lingual to the mandibular teeth, necessitating access to an open oral cavity.

3. Obtaining radiographic images of the victim’s dentition without having to gain surgical access to the oral cavity has benefits for certain religious groups.
4. Ability to carry out a dental examination before the start of the formal autopsy can facilitate the identification of key individuals e.g. the pilot/co-pilot.
5. In cases of severe carbonisation the tooth structures may become extremely fragile, and are often damaged or displaced during the exposure of the dentition. By using the LS it is possible to observe the dentition without any manipulation of the dental structures.
6. The detail observed in both the maxillary and mandibular dental arches is sufficient to perform age estimation analyses on children and young adults burned in mass disaster situations. In a recent aircraft accident, for example, three children aged 14, 9 and 6 were tentatively identified by radiological evaluation of their tooth development. This contributed greatly to their final identification.
7. A full body digital radiographic survey of each case can easily be saved as a permanent imaging record of the body. This can be used for comparison should dental records or other maxillofacial or skeletal identifying features captured on ante-mortem records become available at a later stage. These might include sinus patterns and orthopaedic prostheses.
8. Permanent full body digital images can be easily manipulated and enlarged and transferred to other institutions for consultation, especially in areas where no forensic odontologist is available.

The fact that the Lodox® scanner is not portable restricts the examinations of bodies to the main centres where the services are available. In practise it is often difficult to position bodies in rigor mortis, and more than one scan is required to ensure that the head is well aligned and that the extremities do not obscure either the facial features or the abdominal and pelvic cavities. Such procedures can
prolong the time required to obtain the desired images. Although the Lodox provides diagnostic information similar to that of conventional X-rays, it cannot replace high resolution modalities like CT scanners and MRI-scanners. Lodox images cannot be used to compile 3D reconstructed images.

CONCLUSION

The routine use of LS at a medico-legal laboratory in Pretoria, South Africa, has proven that this imaging modality can be successfully utilized for the purposes of dental identification of severely mutilated victims, including charred and decomposed bodies.

All cases admitted to the medico-legal laboratory undergo a full body LS screening and the images are thus readily available for dental identification by the forensic odontologist where applicable.

Not only could LS digital radiographs be an effective method of conducting forensic dental identification, but serve also as a useful screening tool to detect the presence of dental work in victims of mass disasters.

References

Management of necrotic pulp of immature permanent incisor tooth: A regenerative endodontic treatment protocol: case report

ABSTRACT
It is possible that a paradigm shift may be in the offing in the approach to treatment of immature teeth with necrotic pulp, away from traditional apexification procedures and to a biologically-based endodontic protocol intended to produce regeneration, based on the deliberate introduction of bleeding into the canal space to provide a scaffold and allow the ingress of stem cells.

Methods: A patient presented with a maxillary right central incisor tooth with an open apex and periapical radiolucency. The tooth was irrigated with sodium hypochlorite and then dressed with tri-antibiotic paste consisting of ciprofloxacin, metronidazole and amoxicillin. At a subsequent visit a blood clot was produced in the canal by irritating periapical tissues and the canal then sealed with mineral trioxide aggregate and glass ionomer cement.

Results: The patient was pain free, the draining sinus was resolved in two weeks, root maturation continued and apical closure occurred after two months. The tooth became responsive to cold pulp vitality testing.

Conclusions: Continued root growth invoked by regenerative endodontics may reduce the risks of fracture and premature tooth loss otherwise associated with traditional Ca(OH)_2 apexification procedures. When apexification is undertaken, however, it is accepted that there will be no more development of the root in terms of apical maturation and thickening of its dentine walls. Hence these teeth have been found to be prone to cervical fracture and subsequent loss, due to their thin dentinal walls and perceived problems associated with long-term placement of calcium hydroxide. Those unfavourable outcomes have led to the development of endodontic procedures such as pulp revitalization as an alternative to the use of Ca(OH)_2 for the treatment of infected pulps in immature permanent teeth. Indeed, if evidence-based research substantiates the potential, there could be a paradigm shift in the treatment of immature teeth with necrotic pulp from traditional apexification procedures to a biologically-based regenerative endodontic protocol. Recently there has been an increased interest in the possibility of regenerating pulp tissue into a previously infected immature tooth. Regenerative endodontics is considered as one of the most exciting prospective developments in dentistry today.
biotechnology have made it possible to provide treatment modalities that protect the vital pulp, allow manipulation of reactionary and reparative dentinogenesis, and, more recently, permit revascularization of an infected root canal space. These approaches are referred to as ‘regenerative’ procedures, and in endodontics are biologically-based and designed to replace damaged tissues, including dentin and root structures, as well as cells of the pulp-dentin complex. ‘Revascularization’ was adapted as a term by Iwaya et al.2 to describe the clinical healing of periapical abscesses and the continuation of root formation in immature teeth with non-vital pulps.2 The term simply means the re-establishment of vascularity in the pulp space. With that rich blood supply comes the possibility of actual tissue regeneration, of cementum, periodontal ligament, bone, and dentin and, most relevantly, of the pulp, restoring functional properties of the tooth. Continued root development may thereby be fostered in immature teeth, and apical periodontitis resolved or prevented.1,2,3,4,5,6

Thus, the alternative term of “revitalization” has been proposed.2 Permanent teeth with immature apices have a rich cellular and vascular supply and so dental pulp stem cells (DPSC) and stem cells of apical papilla (SCAP) may survive disinfection, as has been shown when immature teeth with pulpal necrosis still undergo apexogenesis.11,12 The maintenance of pulp vitality is particularly critical in young patients with incomplete root formation13 and hence the gain in interest in this endodontic treatment protocol for the management of the immature permanent tooth with an open apex. Regenerative endodontic procedures can allow for resolution of apical periodontitis and associated draining sinus tracts and enable continued root maturation.6 The rationale of revascularization is that if a sterile tissue matrix is provided in which new cells can grow, pulp vitality can be re-established.14 A newly created blood clot formed as a result of deliberately induced bleeding into the canal space provides that matrix. Growth factors like platelet derived growth factor, vascular endothelial growth factor and tissue growth factor are present in the clot and can stimulate the differentiation of undifferentiated cell types. The scaffold provides a physico-chemical and biological three-dimensional micro environment for cell growth and differentiation, promoting cell adhesion and migration.15 Stem cells and progenitor cells from the pulp (DPSC) and/or periodontium (SCAP) contribute to continued root development.6

CASE REPORT

Patient History

A healthy 10-year-old boy was referred to the Tygerberg Oral Health Centre for evaluation and treatment of a dental abscess. On clinical examination, swelling of the upper lip was noted. Intra-oral examination revealed a fractured crown on upper right central incisor, tooth number 11.

Figure 1: Fractured central incisor and slight inflamed swelling on the gingiva.

Figure 2: Fractured tooth number 11 showing immature open apex.

(figure 1) with pulpal exposure. A gingival swelling was present in the apical region and slight mobility of the tooth was observed. Radiographically, a periapical radiolucency was associated with the 11, which was also seen to have an open apex (Figure 2).

According to the American Association of Endodontists (AAE) recommendations 16 for the endodontic management of the permanent immature tooth with an open apex, the patient should fulfil the following criteria:

- Tooth with necrotic pulp and an immature apex.
- Pulp space not needed for post/core, final restoration.
- Compliant patient/parent.
- Patients not allergic to medicaments and antibiotics necessary to complete procedure (ASA 1 or 2).

The presenting patient fulfilled the AAE requirements for the management of the traumatised 11.

Informed consent

Informed consent from the parent was obtained for the following:

- Two or more appointments may be required for this treatment.
- Use of antimicrobials.
- Possible adverse effects: staining of crown/root and lack of response to treatment, pain/infection.
- Alternatives treatment options such as apexification, no treatment or extraction were presented.

First appointment

Local anaesthesia, dental dam isolation and access into the pulp chamber were obtained. The canal space was cleaned using 20ml 1.5% NaOCl applied through a side-vented needle that minimized the possibility of extrusion of irrigants into the periapical area. The irrigating needle was positioned about 1 mm from root end, to reduce cytotoxicity to cells in the apical tissues. The canal was then irrigated with saline and dried with paper points. Triple antibiotic paste, combining ciprofloxacin, metronidazole and minocycline with saline to a final concentration of 1.0 mg/ml, as described by Sato et al.17 was placed into the canal system using a syringe. Since there is a possibility of staining with triple antibiotic, the paste was kept below the CEJ. The remaining space was restored with an initial layer of calcium hydroxide and sealed with 3-4mm of glass-ionomer temporary restoration material (Vitremer, 3M ESPE). The patient was dismissed for two weeks.

Second appointment

The patient was assessed for signs/symptoms of persistent infection. The swelling on the gingiva was...
completely resolved and patient was free of any discomfort. Anaesthesia using 3% mepivacaine without vasoconstrictor was obtained and the tooth was isolated with a dental dam. The canal space was gently irrigated with 20ml of 17% EDTA and dried with paper points. Bleeding was created into canal system by over-instrumenting and rotating a pre-curved K-file at 2mm past the apical foramen with the goal of having the entire canal filled with blood to the level of the cemento–enamel junction. Bleeding was stopped at a coronal level that allowed for about a 3-4mm space. Mineral trioxide aggregate (MTA; Dentsply Tulsa Dental, Tulsa, USA) was carefully placed over the blood clot followed by glass ionomer restorative material (Vitremer, 3M ESPE).

**Two-month follow-up appointment**

Clinical and radiographic examination: No pain, soft tissue swelling or sinus tract was present. Resolution of the apical radiolucency with slightly increased width of root walls and closure of the apex was noted radiographically (Figure 3). A positive response was observed when the tooth was subjected to pulp vitality testing.

**Five-month follow-up appointment**

Radiographically (Figure 4) tooth number 11 reveals closure of apex five months’ post treatment. Clinically the tooth was vital, responding to cold stimulus.

**DISCUSSION**

Conventionally, it has been thought that successful regeneration cannot be an expected outcome after a tooth has become infected. However, there is a growing body of evidence to suggest that regenerative endodontics may in fact be possible in teeth with pulpal necrosis, apical pathosis, and immature apices.18

The American Association of Endodontists (AAE) recognizes the potential in regenerative endodontics and hence has made the protocol a strategic priority.16 The AAE Regenerative Endodontics Committee encourages endodontists to submit their cases to: [http://www.aae.org/members/revascularizationsurvey.htm](http://www.aae.org/members/revascularizationsurvey.htm) to create a larger data base for research. The degree of success of regenerative endodontic procedures, as laid out by the AAE, is largely measured by the extent to which it is possible to attain primary, secondary, and tertiary goals.16

**Primary goal:** The elimination of symptoms and evidence of bony healing.

**Secondary goal:** Increased root wall thickness and/or increased root length (desirable, but perhaps not essential).

**Tertiary goal:** Positive response to vitality testing (which could indicate a more organized and vital pulp tissue).

Most studies on regenerative procedures have been conducted on teeth with open apices. The size of the apical foramen may not be the decisive factor for successful revascularization and ingrowth of new tissue after transplantation. The minimum width of the apical foramen has not been determined, but it has been shown that a size smaller than 1mm does not prevent revascularization and ingrowth of vital tissue.19

With regards to the type of irrigant to be used in regenerative endodontic procedures, a balance needs to be made between elimination of bacteria and at the same time maintaining the vitality of the stem cells. Because of the possibility of extruding NaOCl through the open apex, risking cytotoxicity to the apical stem cells,20 the AAE recommends the use of as low a concentration of the irrigant as possible.21 However, a subsequent rinse with 17% EDTA could minimise any toxic effects, and allow recovery of cell viability.22 EDTA has another positive effect in that it stimulates the release of growth factors on the dentine surface.23 Mechanical cleaning may further weaken the thin root canal walls24 and remove vital tissue remnants that might still be present in the apical parts of the canal, and hence should be avoided during this procedure.

Intracanal medication with the use of a combination of three antibiotics, ciprofloxacin, metronidazole and minocycline, called triple antibiotic paste (TAP), efficiently eliminates the bacteria commonly found in infected root canal dentine,25,26 and has been widely used for revitalization therapies with good success.13 However, since minocycline may cause discolorations, this antibiotic was more recently replaced by cefaclor in a modified mTAP.27 Other practitioners28 have omitted it completely and have used a double antibiotic paste, DAP, while Cachell et al. used CaOH₂ as a medicament.29 There are concerns of antibiotic resistance, risk of patient sensitization and the fact that antibiotic pastes may negatively influence growth factor release from dentine by EDTA, a process which is actually increased after the use of calcium hydroxide.28 However, regenerative endodontic treatment with triple antibiotic paste produced significantly greater increases in root length and wall thickness than either the mineral trioxide aggregate (MTA) apexification or non-surgical root canal treatment control groups.29

In a clinical study involving teeth in 14 patients, 93% of the teeth showed resolution of peri-radicular radiolucencies, and thickening of lateral dentinal walls was seen in 57%, with increased root length in 71% of the cases.30 None of the patients presented with pain, reinfection or radiographic enlargement of pre-existing periapical lesions.31

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**Figure 3:** Two-month follow-up of patient showing closing of the apex of tooth number 11.

**Figure 4:** Apex on tooth number 11 closed following regeneration procedure after five-months follow up.
In the case under report, a blood clot was created in the canal after disinfection to act as a matrix for the growth of new tissue into the pulp space. Dental pulp has a high regenerative capacity because of the presence of progenitor cells and inductive regeneration signals from different origins. Apical closure was seen after five months. The nature of the tissue formed within the canal space in this and similar cases is not clear and is currently controversial. Some histologic studies suggest that the calcified material deposited on the canal wall is bone/cementum rather than dentine, hence the absence of pulp tissue with or without an odontoblast layer. Continued root development is seen, mostly by cellular/acellular cementum and histologically, the most apical portion of the canal shows newly formed mineralized tissue. Immuno-histochemical analysis has shown that the tissue formed inside the root canal is positive to bone sialoprotein (BSP) but negative to dentine sialoprotein (DSP). Histologic evidence of hard-tissue deposition on the root canal walls (43.9%), apical closure (54.9%), and formation of vital tissue in root canal space (29.3%) was demonstrated by Thibodeau et al. in a dog model.

It is relevant to note that failures have been experienced with this treatment protocol, have been reported and are mainly associated with re-infection of the root canal system, root resorption possibly as a result of inadequate removal of biofilm, the presence of bacteria in dentinal tubules or defective restoration.

CONCLUSION
This case illustrates success in the short term, mainly in the closure of the apex and a thickening of the dentinal walls. Although promising results have been reported, it is clear that randomized clinical trials are required to assess the long-term clinical outcomes of this innovative treatment protocol.

References
Insights into a comparison of three different cements on the push-out bond strength of a glass-fibre post

ABSTRACT
One of the main causes of failure of fibre posts is debonding of the post in the prepared post space. The adhesive properties of total etch adhesive cements were assessed by comparing the performance of cements using self-etching adhesive resins, to verify which system provided the best retentive capabilities with a double tapered post system. Extracted maxillary central incisors were endodontically treated and randomly divided into three groups: the Calibra (Dentsply), RelyX Ultimate (3M ESPE) and Panavia F2.0 (Kuraray) groups. RelyX Ultimate produced significantly the highest debond stress values (p<0.05) in the overall performance, as well as in the coronal, middle and apical sections of the tooth. Thus RelyX Ultimate with self-etching adhesive reliably can be used for post cementation with a double tapered post system in endodontically treated anterior teeth.

INTRODUCTION
Endodontically treated teeth are usually more brittle and prone to fracture. In the past, the most accepted restorative option has been the cast metallic core because of its inherent ability to fit into the treated canal and its toughness. However, this restorative option creates undesirable stress concentrations generated inside the apical region of the tooth due to its rigidity.¹ These stress concentrations lead to an increased likelihood of unfavourable root fractures. To alleviate this complication, fibre posts with an elastic modulus close to dentine and a high flexural strength were developed. These characteristics ensure an even distribution of forces on the tooth and strengthen the core restoration.² Double tapered fibre posts systems were developed to prevent over preparation of the apical third of canals (cylindrical posts) and to ensure a better fit of the coronal third of the post space which was a problem with the conventional tapered posts.³ One of the main causes of failure of fibre posts is debonding of the post in the prepared post space. The conditioning of root dentine as part of the cementation methods used with modern cements can be divided into three groups; the etch and rinse adhesive method, the use of self-etching primers and the self-etching adhesive cements.⁴ Etch and rinse adhesive methods involves the use of an acid (etchant) to condition the dentinal surface prior to the application of a primer and adhesive or simultaneous application of both depending on the system used. The acid (etch) removes the debris in the root canal space that was formed during canal preparation.⁵ Self-etching primers were developed to simplify cementation procedures by eradicating etching, rinsing and drying steps.⁶ As a further refinement, self-etching adhesive cements consist of acidic and hydrophilic monomers in the cement that have unique chemical capabilities to condition, infiltrate and bond to enamel and dentine.⁷ Thus, the aim of this study was to evaluate, in three segments of the roots of the teeth (the cervical, middle, and apical thirds) the push-out bond strength of a glass fibre post that was cemented with self-etching and total etching luting cements.

MATERIALS AND METHODS
Thirty freshly extracted maxillary central incisors with fully closed apices were used (extracted for periodontal reasons, ethical clearance # 12/3/31 and stored in 0.5% chloramine-T solution at 4°C for less than 1 month). The apical portions were removed to ensure a standardized
root length of 14 mm. The roots were instrumented with Protaper hand files (Dentsply, USA) and irrigated with 2.5% sodium hypochlorite. Obturation of the canal was done using the cold lateral condensation technique. Cavit W (3M ESPE) was utilised as a temporary restoration while the teeth were stored in an aqueous solution at 37°C until use. During post preparation, sodium hypochloride was used to irrigate, followed by flushing with distilled water. The post spaces were prepared according to the manufacturer’s instructions for DT Light-Post (Bisco, USA). A double-taper D.T. Light-Post (Bisco, USA) was used for all canals. For the RelyX Ultimate group the fibre post was pre-treated with alcohol and Scotchbond Universal Adhesive (3M ESPE), the adhesive cement applied to the entire tooth structure and the post seated. For the Calibra group, the canals were etched with 34% Caulk tooth conditioner, the post pre-treated first with alcohol and then with Prime and Bond NT. The adhesive cement was applied to the post space and the post seated. For the Panavia group, the post was cleaned with alcohol, the adhesive cement ED primer II liquid A and B placed in the post space and also applied to the post and the post then seated. After post cementation, the teeth were stored in water in an incubator for seven days at 37°C. All specimens were placed in a mould and encased in resin. Two mm slices from the coronal, middle and apical areas were cut and subjected to a push out test to assess the de-bond stresses required to dislodge the post from the specimens.

RESULTS AND DISCUSSION

The median de-bonding values (MPa) are given below.

<table>
<thead>
<tr>
<th>Cement</th>
<th>Coronal</th>
<th>Middle</th>
<th>Apical</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibra</td>
<td>2.45</td>
<td>0.99</td>
<td>0.66</td>
<td>1.21</td>
</tr>
<tr>
<td>Panavia F2.0</td>
<td>2.77</td>
<td>2.35</td>
<td>2.21</td>
<td>2.57</td>
</tr>
<tr>
<td>RelyX Ultimate</td>
<td>8.18</td>
<td>9.40</td>
<td>8.52</td>
<td>8.82</td>
</tr>
</tbody>
</table>

RelyX Ultimate showed throughout higher de-bond stress values than Panavia F2.0 and Calibra. Panavia, the differences being statistically significant (Tukey Kramer, p<0.05). F2.0 also showed throughout higher de-bond stress values than Calibra but the differences were not statistically significant.

There is conflicting evidence in the literature with regard to the bond strengths between total etch adhesive systems and self-etch adhesive systems. These results have shown that one of the self-etch adhesive systems had significantly higher push out values than the total-etch system while there was no significant difference between the other self-etch adhesive system compared with the total etch system. The manufacturer of RelyX Ultimate advocates agitating the adhesive for 20 seconds into the dentine to facilitate the penetration of the cement into the surrounding dentinal tubules. This seemed to pay off because we could see dentinal chips present on all the samples, which indicate that the resin tags penetrated the dentine sufficiently. Another noteworthy observation was the absence of air voids in all samples. This can be accredited to the unique application tips (Aplicap Elongation Tip), which allows the clinician to reach the apex of the tooth and, with a backfill technique, to gradually apply the cement from apical to coronal in a slow retraction action.

The manufacturers of Calibra (Dentsply Caulk) advocate the application of the cement into the post space with a lentulo spiral – which seems not to play a main part overall.

The manufacturers of Panavia F2.0 (Kuraray) do not have any specific recommendations for the use of their cement on fibre posts and therefore the clinical application technique for metal posts were followed.

All the cements showed a decline in the push out strengths from the coronal through the middle to the apical section. This finding is in agreement to other studies. The reasons given vary from debri, curing light distance, apical sclerosis, humidity to density of dentinal tubules.

CONCLUSION

Within the limitations of the present investigation, it can be concluded from this study that the resin cement, RelyX Ultimate (3M ESPE), used with self-etching Scotchbond Universal adhesive, was significantly stronger than Panavia F2.0 with self-etching ED Primer II (Kuraray) and Calibra (Dentsply) with its total-etch adhesive. RelyX Ultimate reliably can be used for post cementation in endodontically treated teeth with a double tapered post system on anterior teeth.

References

Currently, in general dentistry the most commonly used local anaesthetic agents are 2% lignocaine (Xyloox, 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.1 The aromatic ring improves lipid solubility.1–3 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 thiophene 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.2,5

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.3 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.1,2,6 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).1–3,6 As a result, articaine has a half-life of only 20 minutes compared with 90 minutes for lignocaine that requires total hepatic clearance.3 Hence, articaine presents less risk for systemic toxicity during lengthy appointments when additional doses of anaesthetic are administered.2,3

**DOSAGE OF LOCAL ANAESTHETIC**

Dental cartridges generally contain two drugs, namely, a local anaesthetic and a vasoconstrictor, each having its own dose limitations. Serum concentrations are related to the total dosage rather than the concentration of the solution, e.g. 2% or 4% local anaesthetic. Administering 20ml of 2% or 10ml of 4% (400mg) produces the same serum concentration.2–3 Thus it is important to consider the dosage (milligrams) administered and not the volume (milliliters or cartridges) of the local anaesthetic administered. One should consider anaesthetic cartridges as containing 2ml and not 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 literature7 from 4.4mg/kg8 to 6.6mg/kg.9 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.8,10 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.7 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 ARTICAINES 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.11 However, anecdotal reports claim that articaine
1. works faster,
2. works better,
3. “don’t miss as often,” and
4. “gets patients numb when other local anaesthetics fail.”11
Patients with irreversible pulpitis. The success of articaine efficacy was compared in maxillary buccal infiltrations between the articaine and lignocaine solutions when their concentration effect or a greater diffusion of articaine. There was a high statistically significant difference in the first molar region. The drugs appear to have similar adverse effect profiles. Another meta-analysis study concluded that articaine had a probability of achieving any statistically significant differences in anaesthetic latency and duration of pulpal anaesthesia but have not demonstrated any statistically significant differences in anaesthetic efficacy. When the success of inferior alveolar nerve blocks were compared, articaine and lignocaine performed similarly. For infiltration articaine produced shorter onset and longer duration of pulpal anaesthesia than the lignocaine solution. Supplemental buccal infiltration with articaine was more effective than lignocaine in mandibular molars with irreversible pulps. This may be the result of articaine being superior to lignocaine for intra-lingual and buccal infiltrations in patients with irreversible pulps. The success of articaine after infiltration may be attributable to high lipid solubility and more molecules/ml injected when compared with lignocaine. For patients undergoing periodontal surgery, 4% articaine anaesthetic with 1:100,000 adrenaline offers better clinical performance than 2% lignocaine in terms of latency and duration of anaesthetic effect, but have not demonstrated any statistically significant differences in anaesthetic efficacy. When the success of inferior alveolar nerve blocks were compared, articaine and lignocaine performed similarly. For infiltration articaine produced shorter onset and longer duration of pulpal anaesthesia than the lignocaine solution. Supplemental buccal infiltration with articaine was more effective than lignocaine in mandibular molars with irreversible pulps. This may be the result of articaine being superior to lignocaine for intra-lingual and buccal infiltrations in patients with irreversible pulps. The success of articaine after infiltration may be attributable to high lipid solubility and more molecules/ml injected when compared with lignocaine. For patients undergoing periodontal surgery, 4% articaine anaesthetic with 1:100,000 or 1:200,000 adrenaline provides excellent surgical pain control.

In a systematic review articaine was shown to be more effective than lignocaine in providing anaesthetic success in the first molar region. The drugs appear to have similar adverse effect profiles. 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; \( P < 0.0001 \)). 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; \( P =0.009 \)).

2% lignocaine and 4% articaine with 1:100,000 adrenaline have similar properties for use in surgery and have demonstrated a good safety and tolerance profile.

On the other hand, articaine with 1:100,000 adrenaline showed a higher success rate than lignocaine with 1:100,000 adrenaline for buccal infiltration of mandibular molars, but not when administered in the attempt to anaesthetize teeth with irreversible pulps. The efficacy of 4% articaine with 1:100,000 adrenaline was similar to 2% lignocaine with 1:100,000 adrenaline for intra-lingual and buccal 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. When the success of inferior alveolar nerve blocks were compared, articaine and lignocaine performed similarly. For infiltration articaine produced shorter onset and longer duration of pulpal anaesthesia than the lignocaine solution. Supplemental buccal infiltration with articaine was more effective than lignocaine in mandibular molars with irreversible pulps. This may be the result of articaine being superior to lignocaine for intra-lingual and buccal infiltrations in patients with irreversible pulps.

The apprehension that 4% articaine is related to adverse neurological effects like paraesthesia seem to stem from a retrospective study by Haas and Lennon. 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 prilocaine 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.

Allegations that 4% local anaesthetics are associated with a greater risk of paraesthesia are based solely on anecdotal reports and have no scientific justification. 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. To date, there has been no explanation that an inferior alveolar nerve block can, on a rare occasion, cause permanent nerve injury. Articaine is a safe and effective local anaesthetic drug to use in Dentistry.

<table>
<thead>
<tr>
<th>Local anaesthetic agent</th>
<th>Concentration of local anaesthetic</th>
<th>mg/cartridge (1.8ml) local anaesthetic concentration</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>
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<tbody>
<tr>
<td>Lignocaine</td>
<td>2%</td>
<td>36mg</td>
<td>300mg</td>
<td>4.4mg/kg</td>
<td>1:80000</td>
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<td>Mepivacaine</td>
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<td>Articaine</td>
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<td>72mg</td>
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<td>72mg</td>
<td>500mg</td>
<td>7.0mg/kg</td>
<td>1:200000</td>
<td>0.009mg</td>
</tr>
</tbody>
</table>

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 Lennon. 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 prilocaine 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.

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The most obvious clinical finding is the presence of a localized swelling (Fig. 1 white arrow) and multiple radiopacities at the angle of the right side of the mandible. A diagnosis of multiple calculi (sialolithiasis) within the submandibular gland (yellow arrow) and duct (blue arrow) as well as calcifications of some cervical lymph node (green arrow) was made (Fig. 2). Fig. 3 shows the salivary gland stone which was removed during surgery. An interesting observation is the erosion (red arrow, Fig 2) of the cortex of the mandible above the gigantic sialolith, which is suggestive that this stone may have been present for a long time. Ninety two percent of calculi occur in the submandibular gland, 6% in the parotid gland, and 2% in both the sublingual and minor salivary glands. Sialoliths are calcareous deposits in the ducts of major or minor salivary glands themselves. It is believed that sialoliths form by deposition of calcium salts around a central nidus that may consist of desquamated epithelial cells, foreign bodies, bacteria, abnormal mucous material, or bacterial debris. Although the cause and pathogenesis of salivary calculi are not known, several theories have been proposed. One, proposed by Rabinov and Weber (1985), is that the pathogenesis of salivary gland calculi appears to be related to the greater alkalinity of the submandibular gland as opposed to the more acidic product of the parotid gland. This difference in pH may explain the greater incidence of stone formation in the submandibular gland. Eversole and Sabes (1971) stated that the localization of major salivary calculi primarily in the submandibular gland and the minor salivary gland calculi to the buccal mucosa suggests that local factors, such as trauma and duct morphologic characteristics, may be involved. Wharton's duct of the submandibular gland is much more irregular and longer than Stenson's duct of the parotid: Wharton's duct follows an uphill course that encourages stagnation of saliva, and stagnation leads to calculus formation. The use of an occlusal radiograph or axial CT scan is very helpful to demonstrate the very dense oval shaped mass located along the right Wharton duct. (Fig. 4 & 5 arrows). The Axial CBCT scan of the submandibular gland (Fig. 6) shows multiple strictures and dilations in Wharton's duct (string of "sausage appearance") caused by chronic infection and obstruction. After being involved by infection, the nodes become fibrous, and foci of dystrophic calcification subsequently develop.

**Reference**

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Charles Darwin said “It is not the strongest species that survive, nor the most intelligent, but the ones most responsive to change.”

INTRODUCTION
There has been a global explosion in the access to and use of social media (SM) internet sites and instant messenger services. As a result, the ways people obtain, share, publish and discuss information have changed. The medical and dental professions have not been spared from this development, with many health care providers and patients using SM for communicating with colleagues and patients; gaining access to or disseminating health-related information and for social networking. In addition, there are many professional sites aimed solely at health care professionals or specifically dentists.

The possible benefits are numerous, with many dentists already using different sites for professional networking, to enhance their expertise and reputation by sharing information on patient treatment outcomes, to seek advice for difficult clinical situations, and to discuss new products that they have used or are wanting to test. SM also have potential for professional development such as educational discussion circles where members can acquire CPD points for participation, as well as for community engagement.

Other uses include education and promotion of healthy behaviour amongst the public as it is possible to reach diverse audiences and to foster engagement with them. However, every perceived benefit is accompanied by risks of professional damage if the options are used inappropriately.

These threats broadly can be placed into three categories related to the dentist:
1. Patient relationships,
2. Interactions with colleagues and

WHAT IS “SM”?
The Oxford Dictionary defines SM as “websites and applications that enable users to create and share content or to participate in social networking”. This encompasses any form of electronic communication through which users can create online communities to share information, ideas, personal messages and other visual content. It can refer to a number of online applications that allow for the creation and exchange of user-generated information, social interaction and real-time collaboration. Different sites have varied uses, users and applications.

Some of the more popular sites include those for:
1. Collaborative projects (e.g. Wikipedia, Podcasts);
2. Short newsworthy updates (blogs), reports and opportunities (e.g. Twitter, Blogger);
3. Content communities (e.g. YouTube);
4. Social networking sites (e.g. Facebook);
5. Virtual gaming worlds (e.g. Second Life);
6. Discipline-specific discussion forums;
7. Personal professional promotion (e.g. LinkedIn).

Despite the diverse nature of each medium, all have a number of characteristics in common. These include:
1. Rapid communication with a large audience;
2. Anyone can post anything, but once posted it is almost impossible to remove;
3. All postings are open to others to view;
4. A widespread, but unknown audience;
5. All postings are open to others to view.

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5. Electronic data can be manipulated, altered and shared without the knowledge of the original author.6

These features carry many ethical, legal and professional challenges.

**BENEFITS AND USES FOR SM IN MEDICINE AND DENTISTRY**

Increased use of SM by health professionals is considered acceptable if it serves “good” rather than “evil” purposes.6 This includes adhering to the principles of beneficence, non-maleficence and confidentiality,9 and promotion of the profession in line with the rules and regulations of the HPCSA. The link between patients and practitioners can be mutually beneficial as it allows for the provision of much needed information to a wide range of patients regarding development of new technologies, medications and therapies, conveys education about patients’ rights in the health care settings, and enables the dissemination of public health care messages.6 At the same time patients can alert the profession about public health issues and concerns they may have experienced or witnessed.10

SM has changed the way knowledge is spread, allowing anyone with Internet access the opportunity to access information as well as to participate in collaborative sharing of ideas.6 Mann et al list three key features that make SM effective in knowledge translation, namely: personalization, presentation and participation.6 The personal tailoring of content allows users to share and to access information that is of value to themselves. Presentation and participation refer to the many different ways in which the material can be displayed such as written text, illustrations, real-life photographs, video inserts, or interactive platforms. The collaborative nature of the communication can stimulate meaningful discussions and debates and could potentially generate a wealth of new ideas. “Groups are remarkably intelligent, and often smarter than the smartest people in them”.11

In medicine, SM has the potential to be a valuable educational tool that will not only increase knowledge, but may also help close the gaps between theory and clinical practice.6 In addition it may prompt the development of innovative tools for teaching and learning that will be able to reach a far wider target audience than traditional lectures and clinical training. Certain virtual programmes can even provide a form of “hands-on” experience. Another way in which it can be used for educational purposes is by showing difficult cases, including those with errors and failures, and explaining the procedure and pitfalls in detail. This may prevent others from making the same mistakes and could stimulate productive debates that may lead to alternative solutions.5

It allows for free communication between colleagues, which enables the transfer of knowledge and skills and facilitates discussions, queries and debates. These platforms also have potential for professional development by building and cultivating professional networks. Indeed, the options in the South African context are immense as it can form part of professional guidance to students, clinicians or staff in remote areas.

Some sites allow practitioners to have personal communications with their own patients, or to offer general advice to an open population group. These options allow SM to be used to build up a rapport with patients before they present for their initial examination as well as between visits.5 or to disseminate public health information rapidly and widely, especially in times of crisis.6

It can also play a major role in community health where SM can provide increased social support to patients through internet-based communication networks, enabling a wider reach of communications related to health promotion topics. Specifically in dentistry, SM has been used to educate the public on oral cancer, the links between oral and systemic health, the impact of smoking on periodontal conditions, and even to the provision of specific individual advice, through user-generated applications.5,12 At the same time one must be cautious not to make ominous declarations about health concerns or treatment. This form of fear-mongering is unethical as it may prompt patients to seek new tests or procedures, or make unwarranted health related decisions purely because they feel under duress.13

SM may also provide recruitment sites for participants in health research.5 Advertisements can be drafted that describe the exact profiles and demographics of the desired candidates, and may be an efficient and cost effective recruitment method.5 There are obvious concerns about confidentiality, anonymity, full disclosure of study risks, and offers and incentives which may entice vulnerable or disadvantaged participants. Investigators will have to develop methods to address such issues.

There are also a realm of websites for personal and social interactions (Facebook, Blogs, You tube) as well as those specifically aimed at professional career development (Googl+, LinkedIn, Tumblr, Twitter, WordPress). These will not be discussed further in this paper.7

**“ON-LINE” DANGERS**

Posting on SM is free to anyone with internet access, with comments having an immediate and widespread reach.6 This open sharing, transparency and informality is in almost direct contrast to medicine which values privacy, confidentiality, one-on-one interactions and formal conduct.5 Questions may be raised of informed consent, public/private boundaries, professionalism, medical ethics and conflicts of interest.5 In addition, there is potential for dissemination of misinformation, as SM sites have no control of what is posted (as opposed to journals which undergo a strict peer-review process before anything is published).6 False information or ill-considered advice can mislead others, who may accept and apply the recommendations, possibly resulting in dire consequences. Unprofessional postings can create negative publicity, and affect the public’s trust in the entire profession;12 and introduces concerns about accountability, liability and litigation.6 Any practitioner who publicizes professional medical opinions or advice should be sufficiently confident of their own convictions that they identify themselves, as well as their status as a doctor.13 While open access may increase the efficiency of health care education by reaching large audiences, there is also the risk that this may include more or different people than intended.13 There are real risks of “self-diagnosis and treatment” by patients who substitute
online information and advice in place of personal visits to a recognized health care professional. This could have harmful and dangerous results. In addition, they may interpret information in a way other than was intended. Thus before posting on SM, the content should be scrutinized in terms of appropriateness as well as who may have access to that information. Note too that posting on some sites (e.g. Wikipedia) can be edited by others who may add disagreeable new data which becomes immediately visible to viewers. There are no clear guidelines on how this can and should be handled in order to protect the image and reputation of the original author.

A main concern in the health care sector is that of patient privacy, anonymity, confidentiality and consent. Posting inappropriate comments, identifiable patient photographs, or sensitive details about treatment can not only damage a practitioner’s reputation, but could also lead to unwanted media attention or disciplinary action. The obvious advantages are improved access to health care, speed, convenience and cost. However there are also a number of disadvantages. A full clinical assessment is not possible and certain crucial warning signs about a patient’s condition may be missed. This could leave the doctor vulnerable if it results in a mis-diagnosis or an adverse outcome. Arguments blaming equipment failure and Skype shortfalls cannot be used in defense of the errors, as practitioners remain personally responsible for their diagnoses regardless of what facilities were relied upon to aid them in the process. For this reason, the HPCSA does not advocate any initial consultation and diagnosis or the relaying of test results by any means other than a personal physical examination or consultation.

Another hazard is the possible crossing of personal and professional lines when clinicians and patients have access to each other’s personal profiles and postings. Clinicians who use SM sites should ensure they have secure privacy settings. However, even these are not foolproof or absolute. Electronic messages are not protected, and even a username does not guarantee anonymity. They all carry a “digital footprint” that can be tracked, manipulated, copied, shared or misdirected without the sender’s knowledge. Once information is digitized, the author relinquishes all control over it. It can live forever in the Internet, even if the posting is later deleted. A further risk is that of “perceived anonymity” which can lead to uninhibited content, where followers are able to follow other people’s followers. In addition, anyone can access a person’s profile and see who they themselves are following, and then draw conclusions about that persona based on this information.

PATIENT CONFIDENTIALITY

Health care practitioners should respect patient as persons, and acknowledge their intrinsic worth, dignity and sense of value. They must be cognisant that they are in a position of power over their patients due to their access to personal information and confidences revealed during communications with them. They should never abuse this privilege or erode the trust in the doctor-patient relationship by disclosing any patient information without the knowledge, understanding and consent of the patient. This respect for privacy, dignity and confidentiality also applies to all online activities.

The General Dental Council Guidelines prohibit dentists from posting any information or comments about patients on social networking sites unless it is to describe anonymized cases for the purpose of discussing best practice. SM can be useful for sharing information for the benefit of your patients, for providing educational advice, and to seek guidance in specific circumstances. In all instances, however, there must be no way the patient can be identified.

To repeat, it is not permissible to share any patient information without written consent. Patients also need to know exactly where and how the information will be used, and who will have access to it. Each clinician should adopt a specific consent and assent document for patients to sign if they wish to share information on SM.

In the case of a minor; parental or guardian consent is required. Note, that guarantees of anonymity alone may not be enough to safeguard a patient’s identity. The clinician must also be sure not to upload enough separate pieces of information that could allow someone else to piece together the data and identify the patient. This is particularly relevant in small communities, where a patient’s identity can be easily identified by a very small amount of shared information.

Practitioners may also need to draw up a policy for their employees with regards to their use of both professional and private SM sites. The guidelines should “reflect the same values that they are expected to follow offline, such as trust, honesty and respect for others”. They should also be cautioned regarding the following: to not post negative comments about the practice, the patients or other employees; not to use inflammatory or offensive speech; not to post content that may cast a negative image of the practice; to keep non-public financial and operational information confidential; never to share personal information about patients and to never discuss any of the practice’s legal issues.

LEGAL REGULATIONS PERTAINING TO SM USE BY HEALTH CARE PROFESSIONALS

There is currently no law in South Africa governing SM specifically. The Bill of Rights of the South African Constitution (1996) and the more recent Protection of Personal Information (POPI) Acts (2012) have attempted to address this in part. They have sections dedicated to equality, human dignity, freedom and personal dignity and privacy.

There are many unanswered legal questions with regards to SM usage.

There is an urgent need to develop national guidelines on professionalism in the use of SM. These structures can be used: as a guide to support practitioners when giving
personal opinions; enable them to have an individual professional online presence; to foster collegiality and camaraderie within the profession; to provide opportunities to disseminate public health messages widely; and to protect both current and future professional SM users.\textsuperscript{12}

SM should also not be used as means of spreading defamatory comments about products (or persons), nor as an avenue for advertising and promoting oneself or other medical amenities and procedures.\textsuperscript{13} This includes any form of touting which “draws attention to one’s offers, guarantees, or material benefits that do not fall into the category of professional services yet are linked to the rendering of those services and are designed to entice the public to that practice”.\textsuperscript{4} A recent example seen on Facebook was an Internet competition offering “free dental bleaching” to the winner.

It is also not permissible to state academic achievements or to insinuate superior knowledge on professional sites.\textsuperscript{14} There are no clear policies regarding advertising on the web, however it has always been the convention that those practicing “learned professions” such as medicine, dentistry and law should not advertise or market themselves and should uphold the value of their profession. Advertising has also been viewed as possibly misleading and likely to influence potential patients As such there should also be some legal channels available for alerting authorities to unprofessional postings by colleagues, especially if they have refused advice to remove these. They need to be made aware that their online content may not only negatively influence their reputation amongst patients and colleagues, but can undermine the trust of the public in the entire profession.\textsuperscript{12}

Professional websites are allowed but criteria for what may and may not appear on these needs to conform to country-specific specifications. Generally they should present the practitioner’s name and qualification, scope of practice, DP registration number, name and geographic address of the practice, contact details including telephone, email and emergency numbers, billing policies, details of the complaints procedure as well as to provide the patient with contact information for relevant authorities (e.g. the HPCSA or Dental ombudsman) should they be dissatisfied with the care provided.\textsuperscript{2}

**ETHICAL GUIDELINES / E-PROFESSIONALISM**

If medical practitioners are making use of SM for any form of professional activities they need to be aware of how to indemnify themselves and protect their patients. The following guidelines may help clinicians in SM etiquette towards patients:

- Professional standards do not change when communicating through SM rather than by traditional face to face correspondence or traditional media.\textsuperscript{1}

- Your appearance in SM communicates information about your personality, values and priorities and can impact on your reputation. Many SM users are connected to overlapping networks making it almost impossible to separate personal and professional posts. Thus the impression you create can be based on all aspects of your SM profile such as photographs, comments you post, like or share, your circle of friends, organizations you support, websites you visit and media that you follow.\textsuperscript{9}

- Any post is immediately made public and cannot be retracted.\textsuperscript{1} It can also be copied and re-distributed without your knowledge or approval. It may be viewed by anyone including patients and colleagues.

- Be professional at all times.\textsuperscript{10} Remember that your online image and personal profile may reflect on your professional life.\textsuperscript{1}

- All information posted must be credible and suitable for the target audience.\textsuperscript{4}

- In all postings, restrict yourself to your level of expertise, training or subject of interest, and ensure the facts are scientifically correct and in accordance with the same standards of a peer-reviewed publication.\textsuperscript{4}

- Take full responsibility for all information posted, and acknowledge colleagues or other cited sources.\textsuperscript{4}

- If in doubt about the answer to an online query do not respond. Rather be honest and acknowledge your uncertainty, and if possible direct the patient to a more qualified source.\textsuperscript{4}

- If you encounter inappropriate content by colleagues, approach them directly and discreetly and not in an open forum.\textsuperscript{4}

- Comply with Internet and SM policies.\textsuperscript{1}

- Don’t post anything which could damage public confidence in you as a professional, or that could bring yourself or the profession into disrepute.\textsuperscript{3,14} Remember that all postings are accessible. Dentists should not divulge personal information about themselves during consultations with patients on SM.\textsuperscript{15}

- Maintain patient confidentiality and professional courtesy.\textsuperscript{1}

- Keep appropriate boundaries and respect in all relationships with patients and other colleagues on SM.\textsuperscript{1,15}

- Ensure that all actions are in the best interest and wellbeing of the patient.\textsuperscript{10}

- Show respect for all patients at all times.\textsuperscript{10}

- Ensure that the patients have given Informed Consent before using their details (this encompasses issues such as respect for human dignity, freedom and security).\textsuperscript{10}

- Maintain patient privacy, confidentiality and anonymity. This will also foster their trust in you and the profession.\textsuperscript{10,15}

- Allow for patient participation in their own health care.\textsuperscript{10}

- Act with impartiality and justice.\textsuperscript{10}

- Endeavour to promote access to health care for as many patients as possible.\textsuperscript{10}

- Declare any potential conflicts of interest.\textsuperscript{10}

- Limit access to personal SM accounts to family and friends and keep separate professional accounts for staff, patients and colleagues.\textsuperscript{10}

- If a practice has a professional website, it should also have an SM policy covering issues such as privacy settings, patient confidentiality, establishment of boundaries, respect for colleagues and reputational behaviour guidelines.\textsuperscript{3}

- Patients should also be given a copy of the practice’s online policy so that boundaries are not crossed.\textsuperscript{8} At the same time the clinicians must endeavour to keep the doctor-patient relationship professional at all times.\textsuperscript{14}
• It is wise to politely refuse “friend requests” from patients, explaining why it should be inappropriate to accept. Text messages carry an even greater risk of leading to more informal dialogues, boundary crossing and interpersonal violations. It is the dentist’s responsibility to set the boundaries, and not leave this up to the patient to decide.15

• When patients ask specific questions about their health, provide concise factual information. For anything more complex, diagnostic or involving medication prescriptions, it is better to advise them to book a personal consultation. This also protects privacy.21

• Any advice given to a patient via SM, including discussions about finance, post-surgical follow-ups maintenance programmes must be part of the patient’s records. Accordingly, all e-mail, sms and Internet correspondence must be clearly documented and maintained in the patient’s records.15 Not only will this safeguard the clinician, but it is a legal requirement.16

• Although sms and e-mail are more private forms of communication, practitioners still need to seek permission from their patients to use these channels. Patients should also be advised to alert the practice if they get a new number, especially if they give the old phone to a third person who may then erroneously receive their personal messages. As mentioned above, these messages and mails must also form part of their records, and must be kept secure.3 Avoid engaging in personal conversations or discussions about treatment with patients via sms or e-mail. (There are exceptions such as sending quotations, invoices, or statements).

• When using sms or e-mails to relay messages there should be an automated response indicating receipt, and the site should be checked regularly.3 Keep all patients records and correspondence together so that it can be readily available to another practitioner in an emergency.3

• In the event that electronic communications are used for treatment discussions and advice, the patient needs to be made aware that they may be billed for these sessions before any consultation takes place.4

• Do not respond publically to negative comments posted by patients about you on the Internet, especially if you feel emotional about it at the time. Not only is this destructive of your reputation, but it may also result in a breach of doctor-patient confidentiality. Rather make a public statement to the effect that you value the patient’s opinions and confidentiality and invite them to discuss the issue with you personally.3 Then take the matter offline and treat the comments as a formal complaint and handle them using the appropriate formal channels.3 This will allow you time to investigate the concerns, and provide an explanation or apology if necessary. It is hoped that this approach will also diffuse the situation positively and constructively.14

• At the same time, defamation laws also apply to online posts by patients. They are answerable for any comments shared, and if these are found to be factually incorrect or untruthful, the authors should be given the opportunity to make amends. They can be asked to delete the accusation and / or post a public retraction and apology. Failure to do this is justifiable grounds for the practitioner to sue.3

• Treat colleagues fairly and with respect on SM.1

• In professional group communications it may be easier for a dentist to express opinions that he/she may not be inclined to voice in a face-to-face communication. However, group comments can spread rapidly and easily go viral, as not all members of the group will maintain privacy settings. Mistakes and ill-advised statements can be misused, tweeted and sent to a far wider audience.7,15

• It is also tantamount to plagiarism to re-post material that was presented by another person at a congress or demonstration.15

• When taking part in public forums such as radio or television in a professional capacity, one should always get an indemnity agreement from the producers beforehand.3

• NB: SM is not the avenue to follow when one wants to raise concerns about a colleague or their practice. There are correct channels for whistleblowers. On SM, colleagues should be treated fairly and with respect no matter what the situation.1

• It is also not the forum for making gratuitous, unsubstantiated or unsustainable negative comments about individuals, groups or organizations. Similarly a professional should never post offensive language, personal attacks or racial comments.15

CONCLUSIONS

For health care practitioners, SM offers many ways to facilitate communication between colleagues, participate in professional developmental activities, promote expertise, products or services, and foster social interactions. It also has the potential to stimulate research and development by advancing collaborative projects between peers, and for serving as an excellent medium for presenting virtual hands-on teaching and training courses which can augment traditional didactic teaching.

For patients, it provides an immediate, cost effective channel for consultation with their doctors, while professional web pages can also educate and empower them with respect to issues around their own health.

When used cautiously and professionally, SM can be a powerful and effective tool to improve the quality of health care provision, resulting in better patient care and outcomes. However, thoughtless, unethical or illegal postings can have widespread ramifications for the practitioner as well as the profession.

To paraphrase Prof Mazwai, the President of SAMA “In light of the blurred boundaries in Internet usage, doctors must have clear vision before making statements or posting material on any SM website”.

References
Two modalities of implant insertion are possible: Submerged implant insertion and non-submerged implant insertion. Osseointegration follows insertion of the implant. This process is characterized by the development of an intimate bone contact with the implant surface. To minimize the risk of impaired osseointegration it has historically been recommended that the implant be inserted into the bone (submerged implant) and allow for submerged healing for three months in the lower jaw. After that time, during a second surgery, the implants are uncovered.

Maintaining a high level of oral hygiene is a very important factor for the success of any dental implant insertion technique. Several topical antimicrobial substances used as an adjunct to mechanical cleaning procedures, such as essential oils, metal salts, oxygenating agents and others, have been employed generally in plaque control but the gold standard remains chlorhexidine (CHX) either at a concentration of 0.12% or 0.2%. CHX showed substantivity (i.e. its binding) in the oral cavity, to both hard and soft tissues, producing a very durable effect, including long after (7–12 h) the moment of its application. This characteristic contributes to its antiplaque effect and has been shown to be effective against peri-implantitis that may affect the soft tissues around the implant.

More recently a commercial product (Plac Away) has been introduced into the market for the treatment of gingivitis. It contains 0.12% chlorhexidine plus hyaluronic acid (CHX+HYL). The linear polymer of glucuronic acid N-acetylglucosamine disaccharide (hyaluronic acid, HYL) seems to be involved in both the reduction in inflammatory responses, due to its anti-oedematogenous and bacteriostatic effects, and in the promotion of a re-epithelization phenomenon.

Genovesi and colleagues (2017) reported on a randomized clinical trial that sought to compare, over a two-week period, the efficacy of the two types of mouthwash, both being 0.12% chlorhexidine mouthwashes, one with hyaluronic acid (CHX+HYL) and the other without hyaluronic acid (CHX). An analysis was undertaken of the assessments of the clinical outcome parameters, which included oedema, inflammation around the suture area and granulation tissue in areas where submerged dental implants were placed; patient compliance was also followed up.

The secondary aim was to assess the effectiveness on plaque, bleeding, and staining index reduction in the two mouth-rinses (CHX+HYL versus CHX); a correlation analysis was also performed between the levels of consumption of coloured beverages and the staining index.

MATERIALS AND METHODS
This double-masked parallel-arm randomized controlled clinical trial was conducted among 40 patients, all of whom had undergone a dental implant insertion for fixed prosthetic rehabilitation. The following criteria were employed:

Inclusion criteria:
- At least 18 years of age.
- Patients requiring dental implant insertion in a single-tooth edentulous area with the presence of healthy teeth adjacent to the healed extracted site (tooth without fixed prosthetic restoration, without failed dental restorative materials or restored cervical abrasion, abfraction, resorption lesion),
- A maximum of two dental implant placements per patient. If two implants were placed (with an adjunctive implant positioned in a different side or arch), just one site, following all inclusion criteria, was considered.
Exclusion criteria:
- General contraindication to dental implant treatment (uncontrolled diabetes and severe cardiovascular or infectious diseases).
- Intravenous and oral bisphosphonate therapy.
- Presence of severe, moderate or mild untreated periodontal disease.
- Unwillingness to return for the follow-up examination.
- Use of more than 10 cigarettes per day (being a risk factor for failure of dental implants).

Two types of mouthwash were labelled with an X (CHX, 0.12% chlorhexidine mouthwash plus 0.1% hyaluronic acid, 9ml Dentosan®chlorhexidine 0.2% plus 6ml Aftarmed® 25mg/100g). Patients were assigned to one of the two mouthwash groups, X and Y, using an exactly symmetric binomial random binary sequence (X or Y), which had been generated prior to patient selection; Additionally, once scaling had been completed, patients were trained in the modified Bass brushing technique, using a manual toothbrush and a toothpaste having no influence on CHX effects, as well as in the use of dental floss.

The collection of clinical data was carried out by a blinded and calibrated researcher, who was unaware of the particular mouthrinse used by the participants. Data were collected for each patient: age, gender and location of dental implant placement. Details of the daily consumption of wine, tea and coffee were recorded during the observation period.

All patients were subjected to an oral hygiene session prior to the surgery in order to provide a more favourable oral environment for wound healing: all stain, calculus and plaque were removed. All the participants in the study remained blinded until the end of the study. For the surgery (placement of implants), patients received prophylactic antibiotic therapy (2g amoxicillin or, if allergic to penicillin, 600mg clindamycin) one hour before the procedure. All patients certified in their rinsing calendars that they meticulously followed the variables related to each patient’s beverage consumption of wine, tea and coffee.

Patients were treated under local anaesthesia using lidocaine with adrenaline 1:50 000. After a mid-crestal incision, a full thickness mucoperiosteal flap was minimally elevated and osteotomy for each site was prepared according to the manufacturer's indication. A final countersink was used to prepare the 2mm coronal part of the ridge to the same diameter of the implant. Subsequently, the implants were inserted, using the prescribed unit, to a calibrated maximum torque of 40 Ncm at predetermined 30 rpm. All titanium dental implants, root form, internal hex, rough-surfaced screws were inserted with the implant platform at the bone crest level. Cover screws were placed and flaps were closed over the implant with simple interrupted sutures.

All patients were instructed to continue with prophylactic antibiotic therapy (1g amoxicillin or 300mg clindamycin) twice a day for 4 days, and naproxen sodium 550mg tablets were prescribed as an anti-inflammatory to be taken twice for the first day, but only if it was required.

Following the surgical procedure, each patient rinsed their whole oral cavity with mouthwash twice a day (in the morning and in the evening) for 1 min, using the sample solution, which was supplied for 15 days, and which was then expectorated. All participants were instructed to refrain from using water mouthrinse for one hour. Around the site of dental implant placement, toothbrushing was not allowed, and mouthwashing was the only choice. Compliance was checked by gathering a rinsing calendar which had been directly self-recorded by the patients.

Three hours after surgery, at two and at fifteen days, edema, inflammation around the suture area and granulation tissue were recorded as binary events (presence versus absence) using the following scale: 0 = absence and 1 = presence.

At baseline (before surgery), and at 2 and 15 days after surgery, a comprehensive mouth plaque, bleeding and staining index was computed by means of the data acquired for the three standard indices.

a. Plaque index (PI): plaque was revealed by plaque-disclosing tablets (two per patient). Six surfaces were examined per tooth (disto-buccal, mid-buccal, mesio-buccal, disto-lingual, mid-lingual and mesio-lingual); The absence or presence of plaque was recorded for each surface.

b. Bleeding index on marginal probing (BIMP); bleeding on marginal probing was examined for six surfaces per tooth (disto-buccal, mid-buccal, mesio-buccal, disto-lingual, mid-lingual and mesio-lingual); the presence of bleeding was tested within 1 min after the gingival margin had been probed at an angle of approximately 60° to the longitudinal axis of the tooth. The record was noted on a scale from 0 to 2 (0 = non-bleeding; 1= pinprick bleeding; 2 = excessive bleeding).

c. Staining index (SI): four areas were examined per tooth: one incisal, one gingival and two approximal. Intensity of staining was scored as 0 = no stain; 1 = light stain; 2 = moderate stain; 3 = heavy stain).

Any side effects encountered by patients during mouthwash treatment, such as a lesion in the oral mucosa or taste modification, were also documented. For the final time point (15 days), pairwise linear correlations between the variables related to each patient’s beverage consumption and the three indices were performed employing the Spearman’s rank correlation test.

The submerged implants included in this study were restored three to four months after implant placement.

RESULTS
A total of 40 patients (24 men and 16 women, aged 54.7 ± 12.1 years) completed this trial. All patients certified in their rinsing calendars that they meticulously followed indications of the present paper, giving a 100% compliance. No patient dropout occurred.

Neither allergic reactions to CHX and/or HYL or antibiotics nor major complications were recorded in the subjects. Two patients (belonging to CHX group) continued analgesic therapy till the third day. These two patients were
excluded from statistical analysis due to the prospective cumulative effects of the analgesic/anti-inflammatory drug on surgical outcomes; however, these patients had shown inflammation around sutures and oedema both at baseline and at two days after surgery. During the mouthwash treatment, no minor side effects, such as burning mouth or taste modification, were reported by any of the patients.

For between group comparisons, the incidence of oedema showed significant differences between the two groups within two days after surgery (with 9 and 15 events at the 3-h control, respectively, for the CHX+HYL and CHX groups, with a P-value of 0.0205; and with 4 and 14 events at the two-day control, respectively, for the CHX+HYL and CHX groups, with a P-value of 0.0009). Significant differences between the two groups were displayed neither for variables related to inflammation around the suture area nor for that related to the granulation tissue. Significant differences were not found for any of the indices (PI, BIMP and SI), nor for the percentages of colonized sites, between the two mouthwash groups at any of the time points of the survey, whereas a similarity between indices and percentage of colonized sites was shown when intragroup significances were investigated.

For within group comparisons, the plaque index revealed significant differences for both the CHX+HYL and CHX groups, except for the comparison between two- and 15-day time. Regarding the BIMPs, the pre-operative values (0.14 ± 0.10 and 0.13 ± 0.11 for the CHX+HYL and CHX groups, respectively) were different from those at the two-day stage (0.09 ± 0.08 and 0.09 ± 0.09 for rinses in the CHX+HYL and CHX groups, respectively) and 15-day time point (0.07 ± 0.04) for the CHX+HYL mouthwash type, all with significant P-values less than 0.008. The distribution of the staining index seemed to increase for both mouthwash types, from 0.14 ± 0.17 to 0.19 ± 0.14 in the CHX+HYL group, and from 0.12 ± 0.19 to 0.31 ± 0.34 in the CHX group, but with no significance.

No significant correlations were found between the staining index and the consumption of any of the coloured beverages for either type of rinse.

CONCLUSIONS

In the healing site of patients subjected to dental implant placements, no difference between groups was observed at 15 days post-surgery; however, an anti-oedematigenous additional effect in early healing seemed to be disclosed for 0.12% CHX+HYL mouthwash. No significant differences in antiplaque, antigingivitis and antistaining effects were revealed by the comparison between the two rinses; however, when either 0.12% CHX+HYL or 0.12% CHX mouthwash was employed, significant reductions in plaque and bleeding were observed; moreover, both the rinses seemed to exhibit a tooth-staining effect.

IMPLICATIONS FOR PRACTICE

Significant results were obtained for the chlorhexidine mouthwash plus hyaluronic acid, yielding anti-oedematigenous additional effects on surgically treated sites compared with chlorhexidine alone. Both rinses performed equally well for all the other variables investigated.

Reference

chlorhexidine versus 0.12% chlorhexidine plus hyaluronic acid
mouthwash on healing of submerged single implant insertion
areas: a short-term randomized controlled clinical trial. Int J

2. Alcohol-free 0.2% chlorhexidine oral rinse versus 0.2%
chlorhexidine rinse with alcohol for the control of dental
plaque accumulation.

Papaioannou W, Vassilopoulos S, Vrotsos I, Margaritis V,

Plaque control using mechanical means (toothbrush and
interdental cleaning aids), when practiced successfully
and on a daily basis, is usually sufficient for the preserva-
tion of healthy dental and periodontal tissues.1 The
majority of patients, however, do not succeed in effectively
removing plaque, especially in the interdental areas and
other hard-to-reach surfaces, hence, adjunctive use of
antiseptics in the form of mouthwashes has been shown
to be effective in successfully controlling plaque and gin-
gival inflammation.1

Chlorhexidine digluconate (CHX) is a powerful
antimicrobial substance that chemically belongs to the
bisguanides family. Mouthwashes that contain CHX in
different concentrations (0.1-0.2%) are considered to be
the most effective in reduction of plaque accumulation
and gingival inflammation.1 This is due to the action of CHX,
which primarily strikes the bacterial cell membrane causing
leakage of cell components of Gram-positive bacteria,
Gram-negative bacteria, fungi and viruses (HSV1, HSV2,
Influenza A).1 CHX can also penetrate into the plaque biofilm
and act against the already incorporated bacteria.1 CHX
preserves its antimicrobial action for more than 12 h due
to its supragingival substantivity. It has both a bactericidal

ACRONYMS

| CHX: chlorhexidine |
| Dl: discolouration index |
| GI: gingival index |
| PI: Silness and Löe plaque index |
and bacteriostatic effect dependent on the available concentration. Resistant microbial strains do not develop, even after prolonged use of CHX.

Papaioannou et al (2016) reported on a trial that sought to compare the clinical efficacy of two formulations, both containing the same concentration of active ingredient in the solution (CHX 0.2% w/v) but having different content of excipients, on a) the formation of plaque, b) gingival inflammation and c) the discoloration of the dental tissues.

MATERIALS AND METHODS

This was a double-blind crossover study. Ten healthy volunteers who were non-smokers, had a high level of oral health (Community Periodontal Index <2), no active dental caries, no allergies to the medication and had no removable dental prostheses or fixed or removable orthodontic appliances were included in this trial.

The clinical measurements were performed by a calibrated examiner at the beginning (baseline) and at the end of each study stage. The examiner was blinded to the solution used as well as to the previous measurements. The presence and the amount of plaque were recorded using the Silness and Løe plaque index (PI). More specifically, this index was measured on the mesial, middle and distal of both the buccal and lingual surface of all teeth except for the third molar and with a 0–3 gradation (0 = absence of plaque, 1 = no visible plaque detected by periodontal probe, 2 = moderate accumulation along the gingival margin of the tooth, 3 = abundant accumulation on the gums and on the dental surface).

On the same surfaces and with the same 0–3 grading, gum inflammation was also assessed with the help of the gingival index (GI) by Løe and Silness (0 = lack of inflammation, 1 = light discolouration and light swelling but lack of bleeding during probing, 2 = redness, swelling and bleeding during probing, 3 = intense redness, swelling and tendency to bleed automatically).

Finally, the discolouration index (DI) was recorded on the buccal and lingual surfaces, directly without the use of photographs, for the six anterior teeth of both the mandible and maxilla. This index records the discolouration both qualitatively (colour intensity: 0 = lack of stain, 1 = light stain – yellow to brown, slightly visible, 2 = medium stain – medium brown colour, 3 = dark stain – dark brown to black colour) and quantitatively (amount: 0 = lack of stain, 1 = thin stain line (<1 mm width), 2 = moderate band of stain (1–2 mm), 3 = wide band of stain (>2 mm).

These scores are combined into a single overall score according to the formula: 1.5 × stain intensity + 1 × stain amount, resulting in a final DI rate for the mouth, which was a mean for all examined surfaces. The formula was developed taking into consideration that even a small amount of black stain can be more aesthetically annoying for the patient than a wider amount of light discolouration.

The 10 volunteers followed a two-week preparation programme that included plaque removal through a professional prophylaxis – as thoroughly as possible – and repeated instructions on oral hygiene. The objective was that the subjects taking part in the study were free of microbial plaque and gingivitis at the end of this time period. This study consisted of only one group that followed two 21-day experimental gingivitis test periods. During these time periods, the study subjects abstained from every kind of oral hygiene with mechanical or other means except by the oral rinse provided. The products under investigation, CHLOREL® 0.2% w/v and CORSODYL® 0.2% w/v Mint Mouthwash were given to the study subjects at the respective time period, in identical packaging with only the following indications: Bottle A, Bottle B. The 10 volunteers rinsed every morning and evening and for a duration of 1 min with a) 10 ml solution from Bottle A for period 1 and b) 10 ml solution from Bottle B for period 2. This was a double-blind study. The contents of the bottles were revealed to the investigators after completion of the study.

After the end of the first test period, a 14-day washout period followed, during which the study subjects resumed oral hygiene with mechanical means at home, while plaque removal, tooth scaling and polishing were repeated at the clinic. Both at the beginning and at the end of each test period, the same examiner obtained and analysed the clinical measurements.

Briefly, the stages were the following:
1. Initial clinical measures (Day 0 – Baseline: PI, GI, DI, CPI)
2. Two-week preparation programme: Repeated instructions on oral hygiene, plaque removal, tooth scaling and polishing at the clinic.
3. First test period lasting three weeks: clinical examinations at the start (PI, GI, DI)
The subject abstinates from all means of oral hygiene; rinses every morning and evening with 10 ml of solution A for 1 min.
Clinical examinations repeated (PI, GI, DI) at the end of the period.
4. Washout period and 14-day preparation: The use of mouthwash is ended and daily oral hygiene using mechanical means is started. Repeated instructions on oral hygiene, plaque removal, tooth scaling and polishing.
5. Second test period lasting three weeks: clinical examinations at the start (PI, GI, DI). The subject abstinates again from all other means of oral hygiene; rinses every morning and evening with 10 ml of solution B for 1 min. Clinical examinations repeated (PI, GI, DI) at the end of the test period.
6. Completion of study: subjects have plaque removed by scaling and polishing at the clinic.

RESULTS

The group of volunteers comprised six females and four male students with a mean age of 23.4 years (SD 3.9). All had very good or excellent oral health. Mean values (standard deviations) of PI increased similarly for both solutions; however, these differences between initial and final values were statistically significant only for CHLOREL® (0.52 [0.15] to 0.75 [0.19]), respectively. Similarly, the mean values for the GI showed small increases over the course of the study periods, but these differences were not found to be statistically significant for either solution. The mean values of DI for CORSODYL® and CHLOREL®, which were at 0 at the beginning of each study period increased significantly for both solutions, with the former showing the highest mean final score, that is 0.20 (0.30). These differences were statistically significant for both solutions.
Mean values (standard deviations) of the percentage of surfaces free of plaque for the solution CORSODYL® initially and finally were 52.55 (19.50) and 36.95 (18.17), respectively, while for the solution CHLOREL® the figures were 51.28 (11.82) and 32.62 (16.80), respectively. However, these differences were statistically significant only for CHLOREL®.

Regarding the comparison of the initial and final values between the solutions, per index, no statistically significant differences was observed.

No adverse events occurred in any of the participants during the study.

CONCLUSIONS

No statistically significant difference in any tested parameter was observed between the two antiseptic solutions. The non-alcoholic chlorhexidine rinse (CHLOREL®) had levels of action comparable to the generally recognized gold standard alcoholic rinse (CORSODYL®). The two formulations are equally effective and safe to use.

IMPLICATIONS FOR PRACTICE

The present study found that an alcohol-free 0.2% CHX mouthrinse had very acceptable clinical effectiveness on de novo plaque growth and gingival inflammation, in the absence of mechanical plaque control, and suggests that clinicians can prescribe such a rinse with confidence in its efficacy in the indicated cases.

Reference
A guideline to new regulations regarding mandatory inspections for dental x-ray equipment as per code:

DIAGNOSTIC QC Dental (March 2017) Version 10

In the beginning of 2013 the Department of Health instituted mandatory acceptance tests on all new Dental X-ray equipment purchased. These inspections are conducted by a SANAS accredited inspection Body. The department of Health then approved the inspection Body to conduct the inspections.

During the course of 2014 mandatory inspections were introduced as follows.

Intra oral full image chain (x-ray unit developing procedures or digital sensor and diagnostic monitors)
3 yearly cycle.

Panoramic and Cephalometric units (x-ray unit developing procedures or digital sensor and diagnostic monitors)
3 yearly cycle.

Cone Beam CT units (x-ray unit digital sensor and diagnostic monitors) Annual cycle. (only the CT Part of the X-ray)
Annual cycle.

A guideline of what to expect during an inspection:

• During the inspection the unit being inspected will not able to be used.
• No staff may enter the x-ray room while exposures are being done.
• The inspector will need access to any computer equipment used to take x-rays during the inspection process.
• A competent staff member / dentist must be available should the inspector need to ask any questions.
• As per the Department of Health Radiation Control the licence holder must be in possession of a phantom.
• The Department of Health stipulated the following phantoms in their code.
  “Film & digital - Intra-oral - Use To UniIDENT phantom or similar
  Film - Intra-oral, Panoramic & Cephalometric radiography - Use TOR DEN conventional phantom or similar
  Digital - Intra-oral, Panoramic & Cephalometric radiography - Use TOR DEN digital phantom or similar”
• Since the above phantoms and similar imported phantoms carry a very high price tag (± R9000.00 per phantom) Gendentsa Inspection Body over the period of 2 years developed a local Intra oral Phantom and Pan Ceph phantom which was approved for use in South Africa. These phantoms are at least 70% less expensive than imported phantoms and are available from your local dental supply company. (Gendentsa inspection Body does not supply phantoms directly to practices.)
• The inspector will demonstrate to staff members how to conduct the mandatory routine quality control tests.
• In follow up inspections the inspection body will be required to check that routine quality control tests have been conducted by the licence holder and record this as a pass or fail.
• The SANAS accredited inspection Bodies do not work for the Department of Health and are private companies who are obliged to enter the data recorded on site into the department of Health’s database.
• All routine quality control tests, Mandatory and acceptance test certificates must be filed in an individual Equipment Register.
• The department of Health will conduct routine audits on practices to make sure the inspection Bodies are conducting inspections appropriately and that licence holders are conducting routine quality control tests.
• Make sure the Inspection Body you choose to conduct your inspections is familiar with dental equipment and will as part of their service train your staff on routine quality control testing.

It is important to keep your records up to date.

Please remember the inspection Body is not your enemy.
We are here to help you through this process.

Gendent SA
GendentSA Inspection Body, A SANAS accredited facility
Accredited for scopes: 1. Reporting monitors 10. Dental x-ray equipment
10.1 Dental x-ray equipment 10.2 Dental x-ray equipment 10.3 Cone beam CT
National Call Centre Number 063 476 3407
## Programme Overview

### Friday 04 August 2017

<table>
<thead>
<tr>
<th>TIME</th>
<th>Room 2: PRE-CONGRESS</th>
<th>Room 3: PRE-CONGRESS</th>
<th>Room 4: PRE-CONGRESS</th>
<th>Room 7: PRE-CONGRESS</th>
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<tr>
<td>07:30</td>
<td>REGISTRATION</td>
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<tr>
<td>08:00</td>
<td>RESTORATIVE (3M ESPE)</td>
<td>LASERS (SCIVISION)</td>
<td>SEDATION</td>
<td>IMPLANTOLOGY (WRIGHT-MILLNERS)</td>
</tr>
<tr>
<td></td>
<td>Johan Palm: Old versus New: Practical Posterior Restorations</td>
<td>Bryan Sher: Lasers in dentistry workshop</td>
<td>James Roelofse: 1) Challenges we face in sedation 2) Pre-sedation evaluation: how important is this for us</td>
<td>André van Zyl: Extraction of a root-rest using the Benex low-trauma technique and placement of an immediate implant: a hands-on skills training exercise</td>
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<td>10:00</td>
<td>TEA BREAK</td>
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<td>10:30</td>
<td>RESTORATIVE (3M ESPE)</td>
<td>LASERS (SCIVISION)</td>
<td>SEDATION</td>
<td>IMPLANTOLOGY (WRIGHT-MILLNERS)</td>
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<td>Johan Palm: Old versus New: Practical Posterior Restorations (REPEAT)</td>
<td>Bryan Sher: Lasers in dentistry workshop</td>
<td>James Roelofse: 1) Challenges we face in sedation 2) Pre-sedation evaluation: how important is this for us 3) The mobile sedationist 4) Is sedation an alternative for general anaesthesia?</td>
<td>André van Zyl: Extraction of a root-rest using the Benex low-trauma technique and placement of an immediate implant: a hands-on skills training exercise (continue)</td>
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<td>IMPLANTOLOGY (WRIGHT-MILLNERS)</td>
<td>ENDODONTICS</td>
<td>INTERACTIVE SESSION/ YOUNG DENTAL COUNCIL</td>
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<td>IMPLANTOLOGY (WRIGHT-MILLNERS)</td>
<td>ENDODONTICS</td>
<td>INTERACTIVE SESSION/ YOUNG DENTAL COUNCIL</td>
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<td>André van Zyl: Extraction of a root-rest using the Benex low-trauma technique and placement of an immediate implant: a hands-on skills training exercise (continue)</td>
<td>Peet van der Vyver: Step-by-step clinical protocol for performing direct pulp capping procedures on immature and permanent teeth (continue)</td>
<td>Hlombe Makuluma: 3) Positioning and planning your practice for the future</td>
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<td>12:30</td>
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<tr>
<td>08:00</td>
<td>KC Makhubele - SADA CEO: OPENING - Take action – Own the future</td>
<td>SASPIO Leonardo Trombelli: New perspectives in periodontal regeneration</td>
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<tr>
<td>12:30</td>
<td>REGISTRATION / LUNCH BREAK</td>
<td>SASPIO Leonardo Trombelli: Hands-on: New perspectives in periodontal regeneration</td>
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<tr>
<td>14:00</td>
<td>Grant Gavin: Lessons from a traffic light</td>
<td>SASPIO Leonardo Trombelli: Hands-on: New perspectives in periodontal regeneration</td>
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<td>15:10</td>
<td>TEA &amp; TRADESHOW</td>
<td>SASPIO Leonardo Trombelli: Hands-on: New perspectives in periodontal regeneration</td>
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<td>15:40</td>
<td>Londo Shangase: The association between periodontitis and systemic diseases</td>
<td>SASPIO Leonardo Trombelli: Hands-on: New perspectives in periodontal regeneration</td>
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<td>16:20</td>
<td>Zaki Kanaan: Immediately implant or not to immediately implant... that is the question!</td>
<td>SASPIO Leonardo Trombelli: Hands-on: New perspectives in periodontal regeneration</td>
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<tr>
<td>17:30</td>
<td>CONGRESS WELCOME FUNCTION: SHEBEEN PARTY</td>
<td>SASPIO Leonardo Trombelli: Hands-on: New perspectives in periodontal regeneration</td>
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</table>
## SATURDAY 05 AUGUST 2017

### TIME | PLENARY | ORAL HYGIENIST
--- | --- | ---
07:30 | REGISTRATION | REGISTRATION
08:00 | Minister of Health | 08:30 – 09:30 Desi Moodley: Causes of failure in local anaesthesia in dentistry
08:30 | João Borges: Minimally invasive treatment of endodontically treated teeth | 09:30 – 10:30 Zaki Kanaan: Whiter than white
09:10 | Cynthia Schoeman: Ethical Leadership for Professionals | 
09:50 | Peet van der Vyver: Root canal irrigation: When and why to use different solutions | 
10:30 | TEA BREAK | TEA BREAK
11:15 | Peet van der Vyver: Benefit of activation devices for irrigation solutions | 
13:15 | LUNCH BREAK | LUNCH BREAK
14:45 | João Borges: The 5 steps to the successful achievement of the restorations of posterior teeth | 
15:25 | TEA BREAK | TEA BREAK
15:40 | Dinos Kountouras: Aesthetic and functional rehabilitation of the smile using minimal invasive bonded ceramic restorations | 15:40 – 16:40 Mark Wertheimer: Fundamental orthodontic considerations for the hygienist
17:00 | CLOSURE | CLOSURE
19:30 | GALA DINNER / CCC | GALA DINNER / CCC

### TIME | DENTAL ASSISTANT | PRACTICE MANAGEMENT
--- | --- | ---
07:30 | REGISTRATION | REGISTRATION
08:00 | Simon Reeves: Triage of dental enquiries | Lizelle van der Walt (Loock): Effective practice management - The practice manager as a person
10:30 | TEA BREAK | TEA BREAK
11:15 | Simon Reeves: Bridging the gap | Lizelle van der Walt (Loock): The practice manager’s toolbox
13:15 | LUNCH BREAK | LUNCH BREAK
14:15 | Simon Reeves: The issue of consent | Lizelle van der Walt (Loock): Application and measurement
15:25 | TEA BREAK | TEA BREAK
15:40 | Simon Reeves: Continue | Lizelle van der Walt (Loock): Continue
17:00 | CLOSURE | CLOSURE
19:30 | GALA DINNER / CCC | GALA DINNER / CCC

## SUNDAY 06 AUGUST 2017

### TIME | APSA | SASMfos
--- | --- | ---
08:00 | 08:30 - 09:30 Dinos Kountouras: Complete Smile Design (digital and analogue methods used) from a prosthodontic perspective. | Stuart Graves: Vomer implants: “You thought you have to graft but you didn’t”
08:40 | | Stuart Graves: Zygomatic implants: “You thought you have to graft but you didn’t”
09:30 | BREAKFAST | 10:30 - 11:00 Stuart Graves: Pterygoid implants: “You thought you have to graft but you didn’t”
10:30 | 10:30 - 11:30 Dinos Kountouras: Diagnostic and minimal invasive treatment considerations in the complete design of the smile. | 11:00 - 11:30 Greg Boyes-Varley: Implantology in oncology - the surgical aspect
11:30 - 12:00 Dale Howes: Implantology in oncology- the prosthodontic aspect | 
11:50 | TEA BREAK | TEA BREAK

### TIME | PLENARY
--- | ---
08:00 | Dale Howes: Due diligence in oral rehabilitation | 
08:40 | Anushka Singh Bhima: The right to bodily integrity -The truth about Sexual Harassment in the workplace | 
09:30 | BREAKFAST | 
10:30 | Zaki Kanaan: Whiter than white | 
11:10 | Alasdair McKeilvie: Professional indemnity. “Commercial expediency or a lifetime of protection? It’s your choice” | 
11:50 | TEA BREAK | 
12:30 | Paul van Zyl: Less is more: occlusal considerations in the interception and treatment of dental attrition and erosion | 
13:10 | Stuart Graves: Implantology without Augmentation | 
13:50 | SADA CEO & President: CLOSURE OF CONGRESS |
Delegate Registration Form
SADA Congress 04 - 06 August 2017

Online registration: www.sadacongress.co.za

If not registering online please complete the entire registration form, and submit with your Credit card details for manual transactions processing.
Send to Nelisa Makubalo via fax to: 086 758 9889, or via E-mail to NMakubalo@sada.co.za.
Enquiries: Tel: 011 484 5288. Office hours, Monday to Friday, 08:00 - 16:00.
For online registration and payment go to: www.sadacongress.co.za

SECTION A
PERSONAL INFORMATION

(PLEASE PRINT IN BLOCK CAPITALS AND INDICATE THE APPROPRIATE BLOCKS WITH AN ‘X’.)

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<th>SURNAME</th>
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SECTION B
REGISTRATION FEES (VAT INCLUDED)

25% CANCELLATION FEE WILL BE LEVIED FOR ALL CANCELLATION OF REGISTRATION MADE ON OR BEFORE 31 MAY 2017. NO REFUNDS WILL BE GIVEN FOR CANCELLATIONS RECEIVED AFTER THIS DATE.

REGISTRATION SECTION (MARK WITH AN ‘X’)

<table>
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<tr>
<th>DENTAL CATEGORY</th>
<th>FULL REGISTRATION: 04 - 06 AUG 2017</th>
<th>DAY DELEGATE REGISTRATION FEES PER DAY</th>
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<td>LATE (AFTER 31 MAY) MARK X</td>
</tr>
<tr>
<td><strong>SADA IDESA member</strong></td>
<td>R 3 800</td>
<td>R 4 500</td>
</tr>
<tr>
<td><strong>SADA Core Member</strong></td>
<td>R 4 800</td>
<td>R 5 500</td>
</tr>
<tr>
<td>Non-SADA Member</td>
<td>R 5 700</td>
<td>R 6 800</td>
</tr>
<tr>
<td>Dental Technician/Therapist</td>
<td>R 2 500</td>
<td>R 3 000</td>
</tr>
<tr>
<td>Oral Hygienist</td>
<td>R 2 000</td>
<td>R 2 400</td>
</tr>
<tr>
<td>Dental Assistants / Practice Management</td>
<td>R 1 600</td>
<td>R 1 900</td>
</tr>
<tr>
<td>Registrar / Student</td>
<td>R 1 800</td>
<td>R 2 200</td>
</tr>
<tr>
<td>Exhibition ONLY Visitor</td>
<td>R 1 000</td>
<td>R 1 200</td>
</tr>
<tr>
<td>Spouse Visitor</td>
<td>R 650</td>
<td>R 800</td>
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<tr>
<td>TOTAL R</td>
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</tbody>
</table>

* SADA IDESA Member - SADA Member who has purchased the IDESA (Educational) membership package which allows the member a discount of R1000 on the Annual SADA Congress full registration fee.
** SADA Core Member - SADA Member who has purchased the CORE membership package. This does not qualify the SADA Member for a discount on the Annual SADA Congress full registration fee.
Please note this bookings work on a first come first serve basis due to limited seats in the lecture room. Please indicate your option with an ‘√’.

**FRIDAY 04 AUGUST: SESSION OPTIONS**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 - 10:00</td>
<td>RESTORATIVE (3M ESPE)</td>
</tr>
<tr>
<td>10:30 - 12:30</td>
<td>RESTORATIVE (3M ESPE)</td>
</tr>
<tr>
<td>08:00 - 12:30</td>
<td>LASERS (SCIVISION)</td>
</tr>
<tr>
<td>08:00 - 12:30</td>
<td>SEDATION</td>
</tr>
<tr>
<td>08:00 - 12:30</td>
<td>IMPLANTOLOGY (WRIGHT-MILLNERS)</td>
</tr>
<tr>
<td>08:00 - 16:40</td>
<td>SASPIO</td>
</tr>
<tr>
<td>08:00 - 12:30</td>
<td>ENDODONTICS</td>
</tr>
<tr>
<td>08:00 - 10:00</td>
<td>INTERACTIVE SESSION/ YOUNG DENTAL COUNCIL</td>
</tr>
<tr>
<td>13:30 - 17:00</td>
<td>MAIN PLENARY</td>
</tr>
</tbody>
</table>

**SATURDAY 05 AUGUST: SESSION OPTIONS**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION</th>
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</thead>
<tbody>
<tr>
<td>08:00 - 17:00</td>
<td>MAIN PLENARY</td>
</tr>
<tr>
<td>08:30 - 17:00</td>
<td>ORAL HYGENIST</td>
</tr>
<tr>
<td>08:00 - 17:00</td>
<td>DENTAL ASSISTANT</td>
</tr>
<tr>
<td>08:00 - 17:00</td>
<td>PRACTICE MANAGEMENT</td>
</tr>
</tbody>
</table>

**SUNDAY 06 AUGUST: SESSION OPTIONS**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION</th>
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</thead>
<tbody>
<tr>
<td>08:00 - 14:00</td>
<td>MAIN PLENARY</td>
</tr>
<tr>
<td>08:00 - 13:50</td>
<td>APSA</td>
</tr>
<tr>
<td>08:00 - 12:00</td>
<td>SASMFOS</td>
</tr>
</tbody>
</table>

**SECTION C: PROGRAMME SESSION BOOKINGS**

Please indicate whether you will be attending the Shebeen Party on Friday 04 August 2017 by marking the appropriate block.

<table>
<thead>
<tr>
<th>VENUE: HALL D CENTURY CITY CONFERENCE CENTRE</th>
<th>DRESS CODE: Formal</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

**SECTION F: DIETARY REQUIREMENTS**

All food served at the venue is from a HALAAL FRIENDLY kitchen. Attendees wishing to utilize food from the STRICTLY HALAAL kitchen, or have STRICTLY KOSHER REQUIREMENTS, indicate your preference below.

<table>
<thead>
<tr>
<th>DELEGATE</th>
<th>DELEGATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 570</td>
<td>R 570</td>
</tr>
</tbody>
</table>

**TOTAL SECTION E R**

A food surcharge* is applicable for Kosher requirements, but no extra charge** applicable to Halaal Friendly and Strictly Halaal.

**SECTION D: CONGRESS WELCOME FUNCTION**

Please indicate whether you will be attending the Gala dinner on Saturday 05 August 2017 by marking the appropriate block.

<table>
<thead>
<tr>
<th>VENUE: HALL D CENTURY CITY CONFERENCE CENTRE</th>
<th>DRESS CODE: Formal</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

**SECTION E: GALA & AWARDS DINNER**

Please indicate whether you will be attending the Gala dinner on Saturday 05 August 2017 by marking the appropriate block.

**SECTION G: PAYMENT DETAILS**

Please fill in details below. SADA does not store or record any card details.

- Charge my: Visa [ ] Master [ ] Annex [ ] Diners [ ]
- To the amount of R [ ]
- Expiry date [ ]
- Initials and surname of cardholder [ ] [ ]
- Surname [ ]
- ID no. [ ]
- TERM AND CONDITIONS
  - Full payment of registration fees are required to confirm registration.
  - Delegates are responsible for their own accommodation and travel arrangements.

**TERMS AND CONDITIONS**

- Full payment of registration fees are required to confirm registration.
- Delegates are responsible for their own accommodation and travel arrangements.

**CANCELLATIONS**

- 25% cancellation fee will be levied for all cancellation of registration made on or before 31 May 2017.
- No refunds will be given for cancellations received after this date.
- Cancellation should be received in writing.
- If notification is not received in writing and confirmed by this office, you will be liable for the full registration fee.

I have read and understand the terms & conditions and cancellation clause, as indicated above.

**NAME**

**SIGNATURE**
GENERAL

Use of antibacterial nanoparticles in Endodontics. (p 105)

1. Identify the INCORRECT statement: The following are characteristics of Human papillomavirus:
   a. Increased ph values causing loss of respiratory function
   b. specific antibodies reactive against the cell proteins
   c. oxygen free radicals which block the protein function.
   d. inflammatory reaction with autolysis of the bacterial cell

2. Chitosan nanoparticles are too small to be useful as drug carriers.
   a. True
   b. False

3. The efficacy of bioactive glass nanoparticles as an antimicrobial agent in endodontics has been satisfactorily proven and its use is recommended.
   a. True
   b. False

Radix Entomolaris: Literature review and case report (p 113)

4. Radix Entomolaris is an extra root on the lower first permanent molar located:
   a. On the distal aspect of the distal root.
   b. Within the structure of the distal root.
   c. On the buccal side of the distal root.
   d. On the lingual side of the distal root.

5. Cone Beam Computed Tomography imaging facilitates the identification, exact location, curvature and angulation of the Radix Entomolaris, unless there is superimpositioning.
   a. True
   b. False

Lodox® digital imaging – A tool for dental identification in single and mass fatality situations (p 118)

6. Identify the INCORRECT statement. Lodox is a useful imaging tool in medico-legal laboratories with high caseloads, as it:
   a. can obtain full body scans in an average of only 5–6.5 minutes.
   b. is readily portable
   c. can scan bodies in quick succession
   d. emits low radiation
   e. has minimal scatter of radiation

7. The detail seen on Lodox® films is sufficient to enable age estimation analyses on children and young adults burned in mass disaster situations.
   a. True
   b. False

Management of necrotic pulp of immature permanent incisor tooth: A regenerative endodontic treatment protocol: Case Report. (p 122)

8. The concept of revascularization in endodontics offers promise that continued root development may be fostered in immature teeth.
   a. True
   b. False

9. Identify the INCORRECT statement: Apexification in endodontics:
   a. Uses calcium hydroxide in sealing the root-end in non-vital infected immature teeth.
   b. Allows the successful retention of many of these teeth.
   c. Is not accompanied by further apical root development, but thickening of the dentine walls does occur.
   d. May result in loss of the tooth due to fracture of the root.

10. Stem cells and progenitor cells can be generated from the periodontium.
    a. True
    b. False

Insights into a comparison of three different cements on the push-out bond strength of a glass-fibre post. (p 126)

11. The cast metallic core has been the most accepted restorative option for endodontically treated teeth because it has an excellent fit into the canal and is strong.
    a. True
    b. False

12. The self-etch cements used with a double tapered fibre post system provide a reliable substitute for metal posts.
    a. True
    b. False

Maxillo-Facial Radiology Case 149 (p 131)

13. The most common site for development of salivary calculi is the parotid gland.
    a. True
    b. False
14. String of “sausage appearance” is indicative of chronic infection and obstruction.
   a. True
   b. False

**Local Anaesthetics in Dentistry. Choice of local anaesthetic agent (p 128)**

15. Although there are claims that 4% articaine is related to adverse neurological effects like paraesthesia, articaine has a half-life of only 20 minutes and therefore presents less risk for systemic toxicity during lengthy appointments.
   a. True
   b. False

16. Enhanced lipid solubility does not contribute to increased potency of the anaesthetic agent.
   a. True
   b. False

17. It is the dosage (milligrams) administered and not the volume (milliliters or cartridges) of the local anaesthetic which must be considered in the administration of the drug.
   a. True
   b. False

18. The Maximum Recommended Dose varies slightly according to each local anaesthetic but a safe approach is the “rule of 10” i.e. 1 cartridge per 10kg body weight (up to 70Kgs).
   a. True
   b. False

**Clinical Windows (p 90)**

19. In the Genovesi et al trial, the incidence of oedema showed significant differences between the two groups favouring the chlorhexidine group
   a. True
   b. False

20. In the Papaioannou et al trial, the comparison of the initial and final values between the solutions, per index, was not statistically significant.
   a. True
   b. False

**ETHICAL**

Social Media and Dentistry - Part 8: Ethical, legal and professional concerns with the use of Internet sites by health care professionals. (p 132)

21. Identify the CORRECT answer
   Patient information may be shared on the web:
   a. with data that renders the patient identifiable;
   b. without informing the patient how the information will be used;
   c. without the patient knowing who will have access to it;
   d. provided the patient has full knowledge and has signed a written consent.
   a. True
   b. False

22. In the interests of anonymity, practitioners who post medical advice on the Internet need not identify themselves.
   a. True
   b. False

23. Posts on large Internet sites like Wikipedia are more reliable as they cannot be altered by others.
   a. True
   b. False

24. Clinicians are entitled to have a social media policy for their practices and restrict personal posts made by those in their employment.
   a. True
   b. False

25. The practitioner may charge for copies of records which are requested by a patient.
   a. True
   b. False

Readers will note that we have reduced the number of General Questions to twenty whilst retaining five Ethics based questions. Our allocation of CPD points remains unchanged. There is optimism that this section will continue to provide members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure Continuing Education. Please note that SADA is no longer offering the ‘CPD via SMS’ service.

Contact Ann Bayman at SADA, Tel: 011 484 5288, for any enquiries and assistance.

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1. Go to the SADA website www.sada.co.za.
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Sharon Fisher
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  - the wording of the advertisement as you require it to be published;
  - the members professional number; (will not be published);
  - the members contact details (will not be published).
- Advertisement lifespan is two weeks from the date of upload.
- Advertisements to be repeated follow the same process as the original placement request.
- All advertisements which exceed a word count of 100 words will be forwarded to our publishers E-Doc for further processing as a potential advertisement to be placed in the SADJ electronically or as website advertising. E-Doc will contact you thereafter regarding your requirements.
- Advertisement must be paid in full prior to uploading on the web platform for Public Domain advertising.
- Invoice may be settled telephonically with the use of a credit card to prevent delay of placement.
- Telephonically processed payments will result in uploading of advertisement within 24 hours of settlement.
- Advertiser remains liable for placement costs should payment be dishonoured and invoice remains unpaid.

Contact details:
Ann Bayman
South African Dental Association
Tel: 011 484 5288
Fax to email: 086 683 0392
e-mail: ABayman@sada.co.za
or via fax to 086 683 0392

SADA Contact Numbers:
MEMBERSHIP
Adjustment / Application / Contact detail change / General enquiry / Renewal

All membership enquiries should be channelled through your allocated MRO (Member Relations Officer) who will direct your enquiry accordingly should they not be able to assist you.

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MRO: Nelisa Makubalo
Email: NMakubalo@sada.co.za
Fax: 066 758 9889

Branch: Border Kei
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Email: NMakubalo@sada.co.za
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Branch: Free State
MRO: Joseph Moalusi
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Fax: 086 743 1309

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Email: Sylinda@sada.co.za
Fax: 066 689 5799

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MRO: Nelisa Makubalo
Email: NMakubalo@sada.co.za
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Email: NMakubalo@sada.co.za
Fax: 086 758 9889

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MRO: Anna Tsumane
Email: ATsumane@sada.co.za
Fax: 086 644 2411

If you are not currently a member of SADA/DPL and would like to apply for SADA membership please speak to the MRO relevant to your provincial area.

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TARGET AUDIENCE All people involved in dentistry in South Africa. Our main target groups are General Dental Practitioners, Dental Specialists, Dental Assistants, Oral Hygienists, Dental Therapists, Practice Managers and other professionals with an interest in dentistry and dental Traders.

EXPECTED NUMBER OF DELEGATES 600 Delegates and 150 Trade representatives = 750

INVITED SPEAKERS The organising committee has been successful in signing up excellent local and international speakers from European countries (UK, Spain, Czech Republic, Greece, Italy) and America to present at the Congress.

INTERNATIONAL SPEAKERS João Borges • Stuart Graves • Zaki Kanaan Dinos Kontouras • Leonardo Trombelli • Alasdair McKelvie

LOCAL SPEAKERS Mark Bowes • Greg Boyes-Varley Bradley Bredekamp • Grant Gavin Dale Howes • Lizelle Loock Hlombe Makuluma • Desi Moodley Johan Palm • Simon Reeves James Roelofse • Cynthia Schoeman Londi Shangase • Bryan Sher Anushka Singh Bhima • Peet van der Vyver Mark Wertheimer

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