



**Steven Singh DDS**

## Greetings!

Pulp Fiction...our new quarterly publication! I hope you find the contents useful, providing current topics in Endodontics as we take a team approach with you in providing the best endodontic treatment for your patient. We are hoping to familiarize ourselves with the ever changing numbers of new dentists so we can better serve the community's need for excellent endodontic treatment. We are also hoping to reach out to keep you up-

dated on our practice, our Endo/Implant study club as well as our involvement with the European Society of Endodontology. We have enjoyed taking several of our referring doctors to the biennial meetings and keeping up to date on Endodontic research and development. The next one is Portugal, 2013! We thank our referring doctors for your continued support since our establishment in 2001! Enjoy the contents!!!

Finally! The long wait for summer is over. It is hard to believe that we are already in the third quarter of the calendar year! Summer for me means offshore fishing in Canada and this year maybe Alaska too. For those of you who know what it is like fishing the Oregon coast, you can call me a Tuna Wrangler as well! I hope you enjoyed the articles in the last publication of Pulp Fiction. Please feel free to shoot me an email if you have any questions or comments about the articles. Being from British Columbia, I like to take advantage of getting continued education credits from The University of Victoria's Fall Symposium. The venue is over Veteran's Day weekend, with world class speakers and offers up to 28 hours of credits, all in picturesque Victoria, B.C. I will be there this year (not as a speaker unfortunately), let me know if any of you might be interested in going! Let's fire up the grills and have a fun safe summer! Enjoy the summer edition of Pulp Fiction!!!

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## Is MTA a Precursor of Calcification?

The purpose of endodontic filling material is to hermetically seal all root canal exits. A review of the literature finds a myriad of materials advocated for this purpose. Although gutta-percha (GP) is not perfect and depends on a sealer coating to fill the open dentinal tubules while filing, it does meet most of the criteria for a quality obturation material (i.e., it is malleable and stable, flows well when heated and is soluble only to liquid solvents). However, unless the initial master cone is properly fitted to working length (WL) and firmly condensed, it may fail to seal off the prepared apical segment, pull away from the canal walls and/or create voids within the body of the GP mass itself. Any one of these inadequacies could invite leakage and become a contributing factor in recontamination of the periradicular tissues.

While editing Practical Lessons in Endodontic Surgery (1st Edition), authors Drs. Arens, Torabinejad, Chivian and Rubinstein hesitated to endorse any of the currently recommended apical surgery filling materials and felt a need to find a universally acceptable filling material that could be used in the presence of water and/or blood. Loma Linda University, California, was asked to find an appropriate material to use during surgery to permanently seal a prepared cavity at the root end and, where necessary, seal off any perforations that exist apical to the crest of bone. The biochemists recommended a material composed primarily of Portland cement; they called it mineral trioxide aggregate (MTA).

The material is currently sold as white MTA (ProRoot MTA; Dentsply, Johnson City, Tenn., and MTA Branco; Angelus Soluções Odontológicas, Londrina, Brazil). Several published MTA studies have shown MTA to be hydrophilic (requiring moisture to set) and to precipitate crystals in the presence of phosphate-buffered saline, a biomineralization process that leads to the formation of an interfacial layer. Dreger et al from Federal University of Santa Catarina, Brazil, implanted dentin tubes in subcutaneous rat tissue to analyze the interaction of MTA and white Portland cement with dentin and evaluated the occurrence of mineral deposition in the dentin-cement interface and in the interior of dentinal tubules.

After removing the crown and apex of 72 single-rooted extracted human teeth, a 5-mm-thick layer of dentin tubes were exposed and enlarged with Gates-Glidden burs (SybronEndo, Orange, Calif.) to create 1.1-mm-diameter cavities. Before implantation in the backs of 18 Wistar rats, the tubes were irrigated with 17% ethylenediaminetetraacetic acid (ETDA), flushed with a 1% sodium hypochlorite solution, dried and randomly divided into 4 groups (n equals 6). The cavities of each tube were then filled with various cements: MTA Branco; MTA BIO (an experimental version of MTA; Angelus); white Portland cement (Mar Paulista, São Paulo, Brazil) combined with 20% bismuth oxide (Seelze, Hannover, Germany; PC1); and PC1 combined with 10% calcium chloride (Labsynth, Diadema, Brazil). The animals were sacrificed in equal groups at 30, 60 and 90 days, and the dentin tubes were retrieved for scanning electron microscope analysis.

The overall analysis of the MTA-dentin interface showed intratubular mineralization that became larger and more compact over time. The mineral interfacial layer between the cement and the dentinal wall and the presence of intratubular mineralization were detected at 30 and 60 days; the mineral deposition led the researchers to conclude that all the tested cements were bioactive. MTA BIO and MTA Branco promoted the biomineralization process, which increased dramatically after 30 and 60 days, more effectively than did the Portland cements. According to the authors, the bioactivity of MTA and Portland cement can be attributed to their capacity to form carbonated apatite, which is important to the formation and maintenance of the bone-biomaterial interface.

*Dreger LAS, Felipe WT, Reyes-Carmona JF, et al. Mineral trioxide aggregate and Portland cement promote biomineralization in vivo. J Endod 2012;38:324-329.*

## Accuracy of an Electric Measuring Device: The Root ZX

The object of filing a canal is to create a coronal-to-apical cone of descending diameter that terminates at the cementodentinal junction (CDJ). To meet the accuracy criteria for both filing and obturating, the dentist must be able to negotiate the entire path of a canal with a #15 test file to a point 1 mm to 2 mm beyond the radiographic length (RL). Commonly referred to as patency length (PL), this point can be estimated with some degree of accuracy by measuring RL from an x-ray (using a ruler or calculator); knowing and using the average root lengths of teeth as published in Pathways of the Pulp; or by evaluating an x-ray with the test file in place and visually adjusting its apical tip to the desired 1 mm to 2 mm PL.

Setting the #15 file at a point 1.5 mm to 2 mm shy of PL should leave the file tip 0.5 mm to 1 mm short of RL. This length would be used as the working length (WL). It is important that the WL be kept accurate and the PL kept open to avoid the danger of underestimating WL, which would leave the canal insufficiently debrided, or overestimating WL and stimulating an inflammatory response in the periapical tissues that lends itself to postoperative pain and swelling. The purpose of this study by Duran-Sindreu et al from the Universitat Internacional de Catalunya, Spain, was to compare the accuracy of the Root ZX electronic apex locator (J. Morita Corp., Tokyo, Japan) when the in vivo and in vitro protocols are identical.

Selected for the in vivo group were 21 teeth (premolars, canines and incisors scheduled for extraction from adult patients for orthodontic or periodontal reasons) that had a total of 23 root canals and completely formed apices. All the teeth responded positive to cold, and vitality (pain) was clinically confirmed upon entering the pulp chamber. After the patient was anesthetized, WL was determined with the Root ZX and confirmed after extraction.

The in vitro group (22 teeth; premolars, canines and incisors), which had a total of 23 root canals and completely formed apices without root resorption or fractures, were selected. Protocol settings were easier to determine and maintain with the tooth in hand. The apical 4 mm of each canal was trimmed to expose the file tip. The samples were observed under a scanning electron microscope, and the distance from the file tip to the point 0.5 mm coronal to the major foramen (the final WL) was measured. The data were analyzed using the Student-t test; significance was set at p less than .05.

The analysis revealed no significant difference between the in vivo group and the in vitro group with respect to the accuracy of the final WL (p equals .53). The mean distance from the final WL to the file tip was 0.23 plus or minus 0.39 mm for the in vivo group and 0.29 plus or minus 0.32 mm for the in vitro group. The final WL, which was set at 0.5 mm short of the major foramen, was accurate 78.3% of the time to plus or minus 0.5 mm and 100% of the time to plus or minus 1 mm in the in vivo group and 74% of the time to plus or minus 0.5 mm and 100% of the time to plus or minus 1 mm in the in vitro group.

Though there are other electronic apex locators on the market, the Root ZX is the only one that measures impedance and, as such, can be used in the presence of fluids. It is apparent from this study an endodontist can use the Root ZX with confidence to locate WL.

*Duran-Sindreu F, Stöber E, Mercadé M, et al. Comparison of in vivo and in vitro readings when testing the accuracy of the Root ZX apex locator. J Endod 2012;38:236-239.*

## Irrigation Trends Among Endodontists: A Web Survey

Dutner et al from the U.S. Army Fort Bragg DENTAC, North Carolina, studied the current trends in irrigation among practicing endodontists. A Web-based survey e-mailed to 3844 members of the American Association of Endodontists (AAE) asked participants to describe their usual daily irrigation protocol, irrigant selection, irrigant concentration and smear layer removal, and whether or not they use adjuncts to improve irrigation.

Of the 1102 endodontists who responded, 1054 completed the survey. Data indicated that more than 91% of respondents used sodium hypochlorite (NaOCl) as their primary irrigant. The majority (57%) of these used the irrigant at full strength (NaOCl concentration greater than 5.0%) and either ethylenediaminetetraacetic acid (EDTA; 80%) or chlorhexidine (CHX; 56%) as a final flush to remove the smear layer. Most endodontists (66%) said they would not alter their irrigant protocol on the basis of pulpal or periapical diagnosis. However, 48% said they use ultrasonic file activation, 34% use sonic or subsonic file activation, and 10% use a negative pressure irrigation system such as the EndoVac (Discus Dental, Culver City, Calif.) to treat difficult-to-manage infected teeth.

Both sonic and ultrasonic agitation of the irrigant have been studied for their ability to improve canal cleanliness. However, this technique was not absolute with regard to debris.

\* The EndoVac: Irrigant is forced against all surfaces of the root canal via negative pressure. The irrigant flows through one thin apically directed tube (canula), while a second and larger tube simultaneously evacuates the loosened debris from the canal.

\* NaOCl: NaOCl is the most popular irrigating solution. Although its antimicrobial effect is quite limited, it can dissolve vital and necrotic pulp tissue, inactivate endotoxins, and either prevent the formation of a smear layer or dissolve it once it has formed. Though these facts have been well documented, there is no acknowledgment in the literature that NaOCl is capable of cleaning the depths of the dentinal tubules. In addition, NaOCl's irrigating properties may raise the potential for severe posttreatment inflammatory reactions. If the solution inadvertently flows into the periradicular tissue, the patient may experience severe swelling and pain.

Although various irrigants and delivery protocols have been studied, little research has been conducted to determine the widespread practice or acceptance of such methods and materials by endodontists. The researchers found that the literature did not repudiate the contention that endodontists are unable to totally remove all the debris and bacteria from the fins and crevices that exist in the walls of a root canal.

*Dutner J, Mines P, Anderson A. Irrigation trends among American Association of Endodontists members: a web-based survey. J Endod 2012;38:37-0.*

## Come Visit Us At:

[www.westsideendo.com](http://www.westsideendo.com)

## Featured Case

40 y/o patient presents with discomfort with endodontic treatment done several years ago by a general dentist.

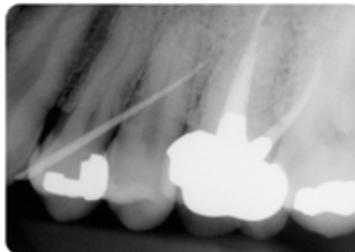
## Diagnosis

Failing previous endodontic treatment with chronic apical abscess associated with the mesialbuccal root.

We initially performed endodontic retreatment using Calcuim Hydroxide as an interm dressing then obturated the canals 4 weeks later. Pt was referred to her GP for final restorations.

Our follow ups showed that the lesion had not fully healed and actually manifested a draining fistula after 4 years. We intervened surgically, removed the cyst and retrofilled the mesial root. After only three months, we have complete healing.

Occasionally endodontic retreatments might require surgical follow-ups. In this case, even after locating the MBII, it may not always be possible to seal the apical anatomical abnormalities via conventional endodontic means. Fins and isthmuses must be cleaned with ultrasonic tips and properly sealed, in this case, with Super EBA.



## Mon, Tues, Wed, Thurs, 7:30am-5pm

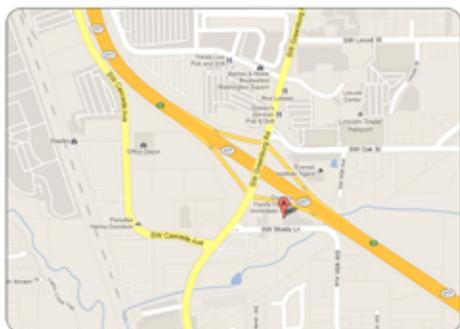
Selected Friday appointment reserved for same day emergencies only.  
Emergencies welcome at all times of business hours!



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## WASHINGTON SQUARE

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I always love the freshness of a caprese salad! My neighbor brought over a great rendition of this classic combination as an appetizer to a barbeque. Here it is to share with you!!!

## Ingredients

- 16 (1 ounce each) Boccaccini, fresh
- 16 fresh basil leaves
- 16 Cherry tomatoes
- 1/4 cup Balsamic vinaigrette
- Fresh ground pepper (to taste)

## Preparation

- 1) Insert a large toothpick or small skewer through a bite-size ball of fresh Mozzarella cheese. Then fold a fresh basil leaf and add it to the small skewer, and finally a cherry or grape tomato.
- 2) Place the cheese/basil/tomato skewers on a platter and drizzle with olive oil, balsamic vinegar or other salad dressing of your choice and some fresh ground pepper to taste.

