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**Ahangari Z, Nasser M, Mahdian M, Fedorowicz Z, Marchesan MA. Interventions for the management of external root resorption.** Cochrane Database Syst Rev. 2010 Jun 16;(6):CD008003.

**BACKGROUND:** External root resorption is a pathological process which tends to occur following a wide range of mechanical or chemical stimuli such as infection, pressure, trauma or orthodontic tooth movement. Although it is predominantly detected by radiography, in some cases, root resorption may be identified by clinical symptoms i.e. pain, swelling and mobility of the tooth. Treatment alternatives are case-dependant and aim at the removal of the cause and the regeneration of the resorptive lesion.

**OBJECTIVES:** To evaluate the effectiveness of any interventions that can be used in the management of external root resorption in permanent teeth.

**SEARCH STRATEGY:** We searched the following databases in April 2010: The Cochrane Oral Health Group's Trials Register; the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2010, Issue 3); MEDLINE (via OVID) (1950 to April 2010); and EMBASE (via OVID) (1980 to April 2010). We also searched two regional bibliographic databases (IndMED and Iranmedex) and handsearched five Iranian dental journals using free text terms appropriate for this review.

**SELECTION CRITERIA:** Randomised controlled trials comparing any type of intervention including root canal medications and canal filling, splinting or extraction of teeth or the surgical removal of any relevant pathology with each other, or placebo or no treatment applied to permanent teeth with any type of external root resorption which had been confirmed by clinical and radiological examination.

**DATA COLLECTION AND ANALYSIS:** Two review authors conducted screening of studies in duplicate and independently. The Cochrane Collaboration statistical guidelines were to be followed.

**MAIN RESULTS:** 66 trials were identified in our searches none of which matched our inclusion criteria. However, we identified one ongoing study which is potentially relevant to this review and will be assessed when it is published.

**AUTHORS' CONCLUSIONS:** We were unable to identify any reports of randomised controlled trials regarding the efficacy of different interventions for the management of external root resorption. In view of the lack of any high level evidence on this topic, it is suggested that clinicians decide on the most appropriate means of managing this condition according to their clinical experience with regard to patient related factors. Future research should consist of robust clinical trials which conform to the CONSORT statement ([www.consort-statement.org/](http://www.consort-statement.org/)).

**Asgary S, Eghbal MJ, Ehsani S. Periradicular regeneration after endodontic surgery with calcium-enriched mixture cement in dogs.** J Endod. 2010 May;36(5):837-41.

**INTRODUCTION:** The aim of this in vivo study was to compare the response of periradicular tissues to mineral trioxide aggregate (MTA) and calcium-enriched mixture (CEM) cement as root-end fillings and to analyze hard tissue healing after periradicular surgery.

**METHODS:** Intentional periradicular lesions were induced in 32 premolar teeth in 4 beagle dogs. The root canals were prepared, dried, and obturated with laterally condensed gutta-percha with sealer, and the coronal access cavities were filled with amalgam. After surgical exposure of the apices, 2-3 mm of the apical root was resected, and root-end cavities were ultrasonically prepared. The root-end cavities were randomly filled with MTA or CEM cement. After 2 months, the animals were killed; tissue blocks were removed and prepared for histologic examination. Hard tissue healing including cementum and new bone formation in addition to concentration and extent of inflammation were evaluated.

**RESULTS:** Eight samples were excluded. The major finding was the cementum deposition adjacent to MTA in 11 of 12 samples and CEM cement in 10 of 12 samples. With one-way analysis of variance, no significant difference was observed between the periradicular tissue response to tested materials.

**CONCLUSIONS:** CEM cement and MTA were associated with regenerative periapical tissue response when used as root-end filling biomaterials.

**Asgary S. Furcal perforation repair using calcium enriched mixture cement.** J Conserve Dent. 2010 Jul;13(3):156-8.

This case describes a furcal perforation in a mandibular first molar accompanied by furcal lesion which has been managed after one month. Root canal treatment was performed; subsequently, the defect was repaired with calcium enriched mixture (CEM) cement. The endodontically treated tooth was restored with amalgam. A 24-month recall showed no evidence of periodontal breakdown, no symptoms, in addition to completes healing of furcal lesion. According to physical and biological properties of the newly introduced CEM cement, this novel material may be suitable for sealing and repairing the perforations. The present case report supports this hypothesis.

**Asgary S, Eghbal MJ. The effect of pulpotomy using calcium-enriched mixture cement versus one-visit root canal therapy on postoperative pain relief in irreversible pulpitis: a randomized clinical trial.** Odontology. 2010 Jul;98(2):126-33. Epub 2010 Jul 23.

The purpose of this noninferiority trial was to compare postoperative pain relief after one-visit root canal therapy (ORCT) with a pulpotomy performed with a new endodontic calcium-enriched mixture cement (PCEM) in human permanent molars with irreversible pulpitis. A total of 407 selected patients were randomly allocated into the ORCT group (n = 202) or the PCEM group (n = 205). Numerical Rating Scale questionnaires were used to record pain intensity (PI) by the patients during the first 7 days after treatment. While there was no statistically significant difference in the mean PI at baseline between the two study groups (P = 0.45), changes in mean PI were significantly different between them (P < 0.001). In the ORCT group, pain relief was achieved after 36 h [95% confidence interval (CI), 27.00-45.00], compared to 18 h in the PCEM group (95% CI, 15.00-21.00), a significant difference (P < 0.01). Comparison of the mean PI sum recorded over 7 days showed that patients in the ORCT group experienced significantly more pain than those in the PCEM group (P < 0.001); a similar difference was observed for pain in response to percussion tests (P < 0.001). Treatment with PCEM thus had the better pain-reducing effects than ORCT in irreversible pulpitis cases.

**Asgary S, Eghbal MJ. A clinical trial of pulpotomy vs. root canal therapy of mature molars.** J Dent Res. 2010 Oct;89(10):1080-5. Epub 2010 Jun 18.

Root canal therapy (RCT) and tooth extraction are the main treatment options for irreversible pulpitis or its sequelae. Pulpotomy is an alternative treatment; however, more evidence is required. If outcomes of pulpotomy with a calcium-enriched mixture (PCEM) are non-inferior for mature molars with irreversible pulpitis compared with those from one-visit RCT (ORCT), this may be a beneficial treatment option. Four hundred seven individuals met the inclusion criteria and were randomly allocated [PCEM (n = 205), ORCT (n = 202)]. We used NRS questionnaires to record pain intensity. Six-month clinical and radiographic successes were assessed. Individuals in the ORCT arm reported significantly more post-operative pain than those in the PCEM arm (P < 0.001). Clinical success rates in the two arms showed no statistically significant difference; however, the radiographic success rates were significantly greater in the PCEM arm (P < 0.001). This trial suggests PCEM as an alternative for treatment of irreversible pulpitis. If long-term results confirm initial ones, PCEM may revolutionize oral health worldwide.

**Ashraf H, Taherian A, Kerdar AN. Evaluation of cytotoxicity of two root canal filling materials by MTT assay.** Aust Endod J. 2010 Apr;36(1):24-8.

The aim of this study was to assess the cytotoxicity of two root filling materials GuttaFlow (GF) and gutta-percha (GP) on mouse fibroblasts cell line L-929. In this study there were four groups: GP and GF were considered as study groups and the other two were negative control groups. GP and GF were prepared according to manufacturer's instruction. L-929 fibroblast cells of mouse were passaged with trypsin (Merck, Germany) after elimination of freeze phase. Adequate trypsin was added to cells and they were prepared with 95% of cell vitality. After 24 h, 150,000 cells were put in each well. The cell and dimethyl methacrylate were used as negative and

positive controls. Ten specimens from each group were brought into contact with the culture medium and were incubated under sterilised conditions 24 h later. The cytotoxicity of all samples was assessed by dimethylthiazol diphenyltetrazolium bromide test after 1 h, 24 h and 72 h. The results showed that cytotoxicity of GF was less than GP when assessed at 24 h and 72 h, but there was no significant difference at 1 h. In GF, the most and least cytotoxicity were observed at 24 h and 72 h while cytotoxicity of GP increased with time.

**Bidar M, Disfani R, Gharagozloo S, Khoynezhad S, Rouhani A. Medication with calcium hydroxide improved marginal adaptation of mineral trioxide aggregate apical barrier.** J Endod. 2010 Oct;36(10):1679-82.

**INTRODUCTION:** The purpose of this study was to evaluate the effect of calcium hydroxide premedication on the marginal adaptation of the mineral trioxide aggregate (MTA) apical barrier.

**METHODS:** Forty single-rooted teeth were prepared and apically resorbed using sulfuric acid for 4 days. Teeth were allocated into two groups according to whether calcium hydroxide was placed in the canals for 1 week (medicated group) or not (nonmedicated group) before placing a 4-mm MTA apical plug in the canals. The roots were mounted on aluminum stubs, the root apex was viewed from the top under scanning electron microscopy, and the maximum distance between MTA and the surrounding dentin was measured.

**RESULTS:** The mean gap widths in the medicated and nonmedicated groups were 70.2 µm and 130.0 µm, respectively (p < 0.05).

**CONCLUSIONS:** Calcium hydroxide treatment improves marginal adaptation of the MTA apical plug.

**Dadresanfar B, Khalilak Z, Shiekholeslami M, Afshar S. Comparative study of the sealing ability of the lateral condensation technique and the BeeFill system after canal preparation by the Mtwo NiTi rotary system.** J Oral Sci. 2010;52(2):281-5.

The purpose of this in vitro study was to compare the sealing ability of the lateral condensation technique and the BeeFill system after canal preparation by the Mtwo rotary system. Forty extracted single-rooted teeth were prepared by using the Mtwo rotary system. The teeth were then divided into 2 experimental groups (n=15 each) and 2 control groups (n=5 each). The specimens in groups 1 and 2 were obturated using the lateral condensation technique and the BeeFill system, respectively. The teeth in the negative control group were also obturated with the lateral condensation technique, and the specimens in the positive control group were not root-filled. The specimens were then immersed in an aqueous solution of 2% China ink for 1 week, after which the roots were cleared and the linear extent of dye penetration was measured with a stereomicroscope by 2 endodontists. The data collected were then analyzed by using the 1-sample Kolmogorov-Smirnov test and independent t test, with a significance level of P < or = 0.05. Although the mean (+/-standard deviation) dye leakage in the BeeFill thermoplasticized injection group was less than that in the lateral condensation group (1.497 +/- 0.7 vs. 2.521 +/- 1.733), there was no significant difference between the experimental

groups on the parametric independent t-test ( $P=0.209$ ).

**Danesh F, Tootian Z, Jahanbani J, Rabiee M, Fazelpour S, Taghva O, Shabaninia S. Biocompatibility and mineralization activity of fresh or set white mineral trioxide aggregate, biomimetic carbonated apatite, and synthetic hydroxyapatite.** J Endod. 2010 Jun;36(6):1036-41. Epub 2010 Mar 15.

**INTRODUCTION:** The purpose of this study was to evaluate the effect of apatite formation on tissue contact with white mineral trioxide aggregate (WMTA) and compare this apatite with a synthetic hydroxyapatite (SHAp) in subcutaneous connective tissue of rats.

**METHODS:** Thirty-three Wistar rats were used in this study. Polyethylene tubes filled with WMTA, apatite formed by WMTA (BCAp), and an SHAp along with empty tubes were implanted into dorsal connective tissue of rats for 15, 30, and 60 days. Set MTA covered with BCAP (set MTA/BCAp) was implanted as well. The specimens were stained with hematoxylin and eosin and von Kossa and evaluated for inflammatory reactions and mineralization through a light microscope.

**RESULTS:** All groups evoked a moderate chronic inflammatory reaction at 15 days, which subsided with time. No statistically significant difference was found among the groups ( $p > .05$ ). BCAP did not stimulate mineralization. WMTA, SHAp, and set MTA/BCAp induced significantly more dystrophic calcification than BCAP ( $p < .05$ ). WMTA and set MTA/BCAp stimulated the same amount of calcification ( $p > .05$ ).

**CONCLUSIONS:** Our results suggested a possible role of apatite formation on the mineralization induction characteristics of WMTA, which indicated a definite effect on biocompatibility. BCAP produced by WMTA differed from SHAp in mineralization activity.

Zeylabi A, Shirani F, Heidari F, **Farhad AR. Endodontic management of a fused mandibular third molar and distomolar: a case report.** Aust Endod J. 2010 Apr;36(1):29-31.

Careful management of fused teeth is essential as abnormal morphology can predispose a tooth to caries and periodontal disease. In this paper, a rare case of successful endodontic management of unilateral mandibular third molar fused to a distomolar is reported. Caries was removed from the tooth complex under local anaesthesia. The pulp chambers of the third molar and supernumerary tooth were accessed and the root canals were prepared using rotary instrumentation and copious irrigation with 2.5% sodium hypochlorite. Obturation using the lateral condensation technique with gutta-percha and AH26 sealer was subsequently performed. A 1-year recall showed a good treatment result.

Khoroushi M, **Feiz A**, Khodamoradi R. **Fracture resistance of endodontically-treated teeth: effect of combination bleaching and an antioxidant.** Oper Dent. 2010 Sep-Oct;35(5):530-7.

This in vitro study assessed the fracture resistance of endodontically-treated teeth undergoing combination bleaching with 38% and 9.5% hydrogen peroxide gels as in-office and at-home bleaching techniques, respectively. In addition, the effect of an antioxidantizing agent, sodium ascorbate, was investigated.

**METHODS AND MATERIALS:** Sixty maxillary premolars were endodontically-treated, received a glass ionomer barrier as a mechanical seal and were embedded in acrylic resin up to the cemento-enamel junction. The specimens were divided into four groups ( $n = 15$ ) as follows: G I: no bleaching, access cavity restored with resin composite (negative control); G II: bleached for three weeks daily using 9.5% hydrogen peroxide for two hours and three sessions of in-office bleaching using 38% hydrogen peroxide every seven days, then restored (positive control); G III: bleached similar to G II and restored after one week; G IV: bleached similar to G II, along with the use of an antioxidantizing agent for 24 hours, then restored. In each in-office and at-home bleaching session, the whitening gels were applied to the buccal surface of the tooth and placed inside the pulp chamber (inside/outside bleaching technique). Finally, the specimens underwent fracture resistance testing; the data were analyzed using ANOVA and Scheffé's test ( $\alpha = 0.05$ ).

**RESULTS:** Significant differences were observed among the study groups ( $p < 0.05$ ). Groups I and II demonstrated the highest and lowest fracture resistance, respectively. The samples that were not bleached (Group I) and the 10% sodium ascorbate gel group (Group IV) demonstrated significantly higher fracture resistance than the positive control group ( $p < 0.05$ ). No significant differences were found between Groups III and II ( $p > 0.05$ ).

**CONCLUSION:** Within the limitations of the current study, it can be concluded that the fracture resistance of endodontically-treated teeth decreases after combination bleaching. The use of sodium ascorbate can reverse decreased fracture resistance.

**Ghoddusi J, Javidi M, Vatanpour M. Treatment of a two-canal maxillary lateral incisor.** N Y State Dent J. 2010 Apr;76(3):40-1.

Recognition of the complexity of root canals and multiple root canals that may vary for any type of tooth is necessary for long-term successful endodontic therapy. This article describes a maxillary lateral incisor with two canals. This case is unusual because considerable research has reported that these teeth can only have a single canal.

**Ghoddusi J, Dibaji F, Marandi S. Correlation between sealer penetration and microleakage following the use of MTAD as a final irrigant.** Aust Endod J. 2010 Dec;36(3):109-13. Epub 2010 Sep 1.

The relationship between sealer penetration and apical microleakage following the use of MTAD as an irrigant in root canal procedures was evaluated. A collection of 120 human teeth was divided into three groups of 40 in each group. The final rinse was varied as follows: group 1 - the final rinse was saline solution, group 2 - ethylene diamine tetraacetic acid and for group 3 - MTAD. Each group was then divided into two subgroups (20 teeth) and filled with gutta percha and either AH Plus or Dorifill sealer. Half of the teeth were selected for dye penetration testing and the sealer penetration in the remaining teeth was evaluated using scanning electron microscope. There were no significant differences between the three irrigants, but there was less dye penetration in teeth sealed with AH Plus than Dorifill. Penetration of the sealer was better in the MTAD and

ethylene diamine tetraacetic acid groups than in the saline group. Statistically, there was no significant difference between the sealer penetration into the dentinal tubules and the dye penetration.

**Hasheminia SM, Feizi G, Razavi SM, Feizianfard M, Gutknecht N, Mir M. A comparative study of three treatment methods of direct pulp capping in canine teeth of cats: a histologic evaluation.** Lasers Med Sci. 2010 Jan;25(1):9-15. Epub 2008 Jul 26.

Direct pulp capping (DPC) is coverage of exposed pulp by a biocompatible material after traumatic or carious exposure. The purpose of this procedure is to seal this spot against bacterial leakage, stimulate dentinal barrier formation, and maintain the vitality of the pulp. Several factors contribute to the consequence of this treatment, such as the kind of material used and the procedural technique. The aim of this study was to evaluate histologically the outcome of DPC using three methods. Thirty-six canine teeth of nine cats were selected for this experiment. After the cats had been anesthetized, the teeth were exposed under sterile condition. The teeth were randomly divided into three groups. In group I, the exposed pulp was covered with mineral trioxide aggregate (MTA) alone. In group II, the pulp, after being treated with erbium:yttrium-aluminum-garnet (Er:YAG) laser (energy = 200 mJ, pulse duration = 700 micros, repetition rate = 3 Hz, exposure time = 15 s, no air, no water, beam diameter = 0.6 mm), was covered with MTA. In group III, the pulp was treated with laser and covered with calcium hydroxide [Ca(OH)(2)]. All cavities were filled with amalgam after DPC. After 4 months, the animals were sacrificed and block sections were prepared. The specimens were histologically evaluated. The data were analyzed by Mann-Whitney and chi-square tests. Dentinal barrier had formed in all groups. The laser + MTA group showed little superiority to the other groups in dentinal barrier formation, type and intensity of inflammatory responses, and soft tissue changes, especially necrosis, but these differences were not statistically significant ( $P > 0.05$ ). We concluded that laser + MTA produced better healing. According to the conditions in this study, Er:YAG laser could be used in direct pulp capping treatment in combination with both common materials.

Udoe CI, **Jafarzadeh H. Xeroradiography: stagnated after a promising beginning? A historical review.** Eur J Dent. 2010 Jan;4(1):95-9.

Various methods have been introduced for obtaining radiographs. Xeroradiography which is a method of imaging uses the xeroradiographic copying process to record images produced by diagnostic x-rays. It differs from halide film technique in that it involves neither wet chemical processing nor the use of dark room. Literature on this subject is scarce. After an initial promising beginning, this imaging method, once thought to hold the key to endodontic imaging, got stagnated. A revisit of this promising endodontic imaging system would therefore be appropriate. The purpose of this study was to review xeroradiographic technique as a roentgenographic imaging system.

Habibi A, **Jafarzadeh H. Nevoid basal cell carcinoma syndrome: a 17-year study of 19 cases in Iranian**

**population (1991-2008).** J Oral Pathol Med. 2010 Oct;39(9):677-80. doi: 10.1111/j.1600-0714.2010.00896.x. Epub 2010 Apr 29.

**BACKGROUND:** Nevoid basal cell carcinoma syndrome (NBCCS) is a hereditary autosomal dominant disorder with a wide range of clinical signs and symptoms. The major criteria are more than two basal cell carcinoma, keratocystic odontogenic tumor, three or more palmar pits, and calcification of the falx cerebri, spine and rib anomalies, and a family history of the syndrome.

**METHODS:** This study reports 19 cases in an Iranian population and presents this rare syndrome as a differential diagnosis of skeletal anomalies. Between 1991 and 2008, the demographic, clinical, radiologic and histologic data of 19 patients with NBCCS were analyzed.

**RESULTS:** The average age at the time of diagnosis of NBCCS was 35.12 years. All patients had a minimum of two major criteria. The major criteria with the most frequency were the keratocysts odontogenic tumor (19 patients), and the average number was 6.2. Basal cell carcinoma (8 patients), and the average number was 14.7 calcification of the falx cerebri (17 patients), palmo-plantar pits (14 patients), mild hypertelorism (10 patients), and bilateral cleft lip and palate (1 patient). Only one patient was affected with an unusual case of NBCCS in a 30-year-old man with an associated squamous cell carcinoma of the maxillary sinus. Only two cases of this unusual association have been reported. This case is one of a large family including 14 NBCCS-affected patients.

Rai B, Kaur J, **Jafarzadeh H. Dental age estimation from the developmental stage of the third molars in Iranian population.** J Forensic Leg Med. 2010 Aug;17(6):309-11. Epub 2010 May 15.

A sharp increase in forensic age estimation of living persons has been observed in recent years. However, ethnic populations residing in different countries have been insufficiently analyzed. The aim of this study was to achieve a referral database and regression equations for dental age estimation of unaccompanied minors of Iran nationality. A total of 1200 orthopantomograms were collected from original Iran and equally divided in age categories between 10 and 27 years. On the radiographs, the developmental stage of the third molars was scored applying a Demirjian et al. scoring technique. Inter- and intra-observer reliabilities were tested using kappa statistics. Correlation between the scores of all four wisdom maxillary and mandibular third molars teeth and left/right symmetry were evaluated with spearman correlation coefficient. Student's t-test on asymmetry was performed and regression formulas were calculated. The present database was the first to assemble third molar developmental scores on radiographs of Iran individuals and provided more appropriate dental age estimation of unaccompanied Iran minors. To enhance the accuracy of forensic age estimates based on third molars mineralization, the use of population-specific standards is recommended.

Habibi A, **Jafarzadeh H. Squamous cell carcinoma of the maxillary sinus associated with nevoid basal cell carcinoma syndrome: report of a case with 21-year evaluation.** J Oral Maxillofac Surg. 2010 Aug;68(8):1982-6. Epub 2010 May 10.

**Jafarzadeh H, Abbott PV. Review of pulp sensibility tests. Part I: general information and thermal tests.** *Int Endod J.* 2010 Sep;43(9):738-62. Epub 2010 Jul 1.

A major, and essential, part of the diagnostic process for pulp disease is the use of pulp sensibility tests. When diagnosing pulp pain, these tests can be used to reproduce the symptoms reported by the patient to diagnose the diseased tooth as well as the disease state. However, a major shortcoming with these tests is that they only indirectly provide an indication of the state of the pulp by measuring a neural response rather than the vascular supply, so both false positive and false negative results can occur. The relevant literature on pulp sensibility tests in the context of endodontics up to January 2009 was reviewed using PubMed and MEDLINE database searches. This search identified papers published between November 1964 and January 2009 in all languages. Thermal tests have been used as an integral part of dental examinations. Two types of thermal tests are available, one uses a cold stimulus and the other uses a hot stimulus, and each has various methods of delivery. If these tests are used properly, injury to the pulp is highly unlikely. A review of the literature regarding the rationale, indications, limitations, and interpretation of thermal tests, the value of these diagnostic tests, as well as a discussion of the important points about each of these tests is presented.

**Jafarzadeh H, Abbott PV. Review of pulp sensibility tests. Part II: electric pulp tests and test cavities.** *Int Endod J.* 2010 Nov;43(11):945-58. doi:10.1111/j.1365-2591.2010.01760.x. Epub 2010 Aug 18.

The electric pulp test (EPT) is one type of pulp sensibility test that can be used as an aid in the diagnosis of the status of the dental pulp. However, like thermal pulp sensibility tests, it does not provide any direct information about the vitality (blood supply) of the pulp or whether the pulp is necrotic. The relevant literature on pulp sensibility tests in the context of endodontics up to January 2009 was reviewed using PubMed and MEDLINE database searches. This search identified articles published between November 1964 and January 2009 in all languages. The EPT is technique sensitive, and false responses may occur. Various factors can affect the test results, and therefore it is important that dental practitioners understand the nature of these tests and how to interpret them. Test cavities have been suggested as another method for assessing the pulp status; however, the use of this technique needs careful consideration because of its invasive and irreversible nature. In addition, it is unlikely to be useful in apprehensive patients and should not be required because it provides no further information beyond what thermal and electric pulp sensibility tests provide - that is, whether the pulp is able to respond to a stimulus. A review of the literature and a discussion of the important points regarding these two tests are presented.

Udoe CI, **Jafarzadeh H**, Okechi UC, Aguwa EN. **Appropriate electrode placement site for electric pulp testing of anterior teeth in Nigerian adults: a clinical study.** *J Oral Sci.* 2010;52(2):287-92.

Electric pulp testing is one of the pulp vitality tests which aid dentists in diagnosis of the pulp status. This test is technique sensitive and hence may elicit false responses. There are some concerns regarding the optimal placement

of the probe tip. The threshold value (the lowest electric current at which sensation is perceived) is reached when an adequate number of nerve fibers are stimulated, so the sensation would be greatest where the density of neural distribution is the highest. The purpose of this study was to identify the optimum site for electrode placement in anterior teeth of adults, the threshold values of these teeth using an electric pulp test, and to determine the influence of sex, age, and arch on the outcome. The optimum electrode placement sites and threshold values varied with type of tooth and arch. The maxillary teeth, canines, male gender and increasing age required higher electric current to evoke a sensation, while incisal edges required lower current to evoke a sensation.

Udoe CI, **Jafarzadeh H**. **Rubber dam use among a subpopulation of Nigerian dentists.** *J Oral Sci.* 2010;52(2):245-9.

In this cross-sectional questionnaire-based study, we surveyed the attitudes toward, knowledge of, and use of rubber dams (RDs) among dentists in southern Nigeria. The questionnaire, which was distributed and collected by one of the authors, requested information on the dentists' background characteristics, attitudes, and knowledge. Data were analyzed with SPSS, and the chi-square was used to assess differences in categorical variables. A total of 100 out of 108 dentists responded (92.6% response rate). The prevalence of RD use was 18%. Dentists in the government sector used RDs more often than did dentists in the private sector. About 77% of dentists had not used RDs or were unaware of how to use them. All specialists had seen RDs, but only 56% had used one in their practice. All dentists believed in the effectiveness of RDs. We conclude that rubber dams are underutilized in this population, and that dentists need to be made aware of the possibility of rubber dam use through an awareness campaign.

Saghravani N, **Jafarzadeh H**, Bashardoost N, Pahlavan N, Shirinbak I. **Odontogenic tumors in an Iranian population: a 30-year evaluation.** *J Oral Sci.* 2010;52(3):391-6.

Oral and maxillofacial pathology has paramount importance in connecting basic science and clinical features; progress in this field will improve diagnosis and treatment. Although the prevalence of odontogenic tumors varies in different geographic sites, there are no reports in English on the relative frequency of odontogenic tumors in Iran. In the present 30-year retrospective study, the case records of all patients referred to the Mashhad Faculty of Dentistry during the period 1978-2008 were evaluated. Subsequently, all lesions diagnosed as odontogenic tumors were subjected to microscopic reevaluation. Data regarding sex, gender, location, and histopathology were gathered. Among 8,766 patients, only 165 odontogenic tumors (1.9%) were found, with a mean age of 26.3 years (range 6-81 years). One hundred and fifty-eight tumors were central with high frequency in the posterior region of both jaws especially in the mandible and seven were peripheral tumors, including five in the posterior mandible and two in anterior maxilla. Malignant transformation was seen in three cases as malignant ameloblastoma (1.8%). The most common tumor was ameloblastoma, followed by odontoma, odontogenic myxoma, and adenomatoid

odontogenic tumor. Nevertheless, odontogenic tumors occurred more in females in the third decade with affinity for the posterior mandible in this study.

**Jalalzadeh SM**, Mamavi A, Abedi H, Mashouf RY, Modaresi A, Karapanou V. **Bacterial microleakage and post space timing for two endodontic sealers: an in vitro study.** J Mass Dent Soc. 2010 Summer;59(2):34-7.

AIM: The effects of immediate versus delayed post space preparation on the apical seal using resin and zinc oxide eugenol (ZOE) sealers were compared by a bacterial leakage model.

METHODOLOGY: Eighty-six premolars were randomly assigned to four experimental groups of 20 teeth. Three teeth were assigned to each control group, either positive (filled only with guttapercha) or negative (not obturated but root surfaces completely covered). Obturation was achieved by gutta-percha with resin or gutta-percha with a ZOE sealer and lateral condensation technique. Post space was prepared either immediately or a week later, while the obturated teeth had been stored in 100 percent relative humidity at 37 degrees C. The teeth were inserted into plastic vials and suspended in glass bottles. All teeth were covered with cyanoacrylate and layers of nail varnish but the apical 3 mm and were sterilized using gamma rays. Phenol red lactose broth was inoculated into the vials. Staphylococcus epidermidis was introduced into the root canal access of the teeth. Turbidity of the broth in the vials (discoloration) was evaluated daily for a period of 70 days. The data was analyzed statistically with Pearson Chi Square and two ways with ANOVA at 45 days and 70 days.

RESULTS: When the depth of time was considered, the mean time of leakage showed no differences between immediate and delayed preparation for resin AH26 versus ZOE Dorifil at 45 and 70 days ( $p = 0.37$  and  $p=0.217$ , respectively). In 45 days, considering the number of teeth with leakage, there was a significant difference between immediate preparation and delayed preparation in AH26 sealer groups ( $p=0.028$ ). No difference was present between immediate and delayed preparation groups for the ZOE sealer groups ( $p=0.14$ ).

CONCLUSION: According to the results of this study and despite type of sealer, immediate post space preparation did not achieve better sealing than delayed post space preparation. Resin AH26 showed the least leaking teeth in 45 days, but it made no difference in 70 days.

**Jalalzadeh SM**, Mamavi A, **Shahriari S**, Santos FA, Pochapski MT. **Effect of pretreatment prednisolone on postendodontic pain: a double-blind parallel-randomized clinical trial.** J Endod. 2010 Jun;36(6):978-81. Epub 2010 Apr 24.

INTRODUCTION: Effective management of endodontic pain represents a continuing challenge. This study evaluates the use of a preoperative, single oral dose of prednisolone for the prevention and control of postendodontic pain.

METHODS: Forty patients were randomly assigned to 2 groups, placebo and prednisolone (30 mg). The medications were administered 30 minutes before the start of standard endodontic treatment. Postoperative pain was assessed after 6, 12, and 24 hours by using a visual analogue scale.

RESULTS: The outcome showed that prednisolone resulted in a statistically significant reduction in postendodontic pain at 6, 12, and 24 hours ( $P < .0001$ ). No side effects were reported for any of the medications used.

CONCLUSIONS: This study suggests that a preoperative, single oral dose of prednisolone substantially reduced postendodontic pain. Further studies are needed to evaluate the applicability of these findings to other clinical conditions, single- versus multiple-visit endodontic treatment, and drug regimens.

Faramarzi F, Fakhri H, **Javaheri HH**. **Endodontic treatment of a mandibular first molar with three mesial canals and broken instrument removal.** Aust Endod J. 2010 Apr;36(1):39-41.

To succeed in any dental procedure, the clinician's awareness of the patient's dental anatomy and its variations is crucial. In endodontic therapy, obtaining full information about the root canals' variations can affect the outcome substantially. This case report presents the endodontic treatment of a mandibular first molar exhibiting three mesial root canals with 4 mm of a separated K-file in the coronal third of the mesiolingual canal on an 18-year-old female patient. This case demonstrates the importance of locating additional canals in any roots undergoing endodontic treatment and how the clinician's awareness of aberrant internal anatomy may change the treatment results.

**Khedmat S**, Assadian H, **Saravani AA**. **Root canal morphology of the mandibular first premolars in an Iranian population using cross-sections and radiography.** J Endod. 2010 Feb;36(2):214-7.

INTRODUCTION: Successful endodontic treatment is dependent on a perfect knowledge of normal root canal anatomy and variations from the norm. This study was aimed to investigate the root canal anatomy of mandibular first premolars by both radiography and cross-sectional methods in an Iranian population.

METHODS: Two hundred seventeen extracted human mandibular first premolars were used. Radiographs were taken in both mesiodistal and buccolingual directions for each premolar. Then, all the teeth were decoronated at the cemento-enamel junction and resected perpendicular to their long axes into three equal sections and stained with fuscine. Digital photographs of the cross-sectional root surfaces were taken and surveyed at 40x magnification. The root canal configuration types were determined separately by radiographs and cross-sectional images for each premolar.

RESULTS: Out of 217 teeth examined, 192 (88.47%) had a single root canal. The remaining 25 teeth (11.53%) showed two canals in at least one cross-section of their roots with five root canal configurations. In the mesiodistal (MD) radiographs, only 5.99% of premolars showed two canals with three root canal configurations.

CONCLUSIONS: One-hundred ninety two out of 217 premolars showed one canal in both cross-section and MD radiography. Only 7 premolars were diagnosed as having more than one canal with the same canal configuration in both cross-sections and MD radiography methods.

**Khedmat S**, Hadjati J, Iravani A, Nourizadeh M. **Effects of enamel matrix derivative on the viability, cytokine**

**secretion, and phagocytic activity of human monocytes.** J Endod. 2010 Jun;36(6):1000-3. Epub 2010 Apr 10.

**INTRODUCTION:** There is some controversy about the effect of enamel matrix derivative (EMD) on inflammation and resorption. The aim of this study was to investigate the effect of EMD on the inflammatory response of monocytes and their phagocytic activity in vitro.

**METHODS:** Human monocytes were incubated in complete medium (CM) and exposed to 50, 100, and 200 microg/mL EMD for different time points (12, 24, 48, and 72 hours). Untreated monocytes were considered as controls. Cellular viability was evaluated through a 3-(4, 5 dimethylthiazol-2-yl) 2, 5-diphenyl-2 tetrazolium bromide assay. For cytokine measurements, the cells were treated simultaneously with 50, 100, or 200 microg/mL EMD and 10 microg/mL Escherichia coli lipopolysaccharide. Cell-free supernatants were collected after 12, 24, 48, and 72 hours of incubation. Tumor necrosis factor-alpha (TNF-alpha) and interleukin-1beta (IL-1beta) concentrations were measured by an enzyme-linked immunosorbent assay kit. Phagocytic activity of the cells was assayed using the PHAGOTEST kit (GlycoTope Biotechnology, Heidelberg, Germany) according to the manufacturer's instructions.

**RESULTS:** The viability of cells exposed to 50, 100, and 200 microg/mL EMD for 12, 24, 48, and 72 hours were similar to the controls. There was no significant differences in the production of TNF-alpha and IL-1beta among samples with various concentrations (50, 100, and 200 microg/mL) of EMD and control (EMD = 0) at 12, 24, 48, and 72 hours. Phagocytic activity of monocytic cells increased significantly after 72 hours compared with 12 hours.

**CONCLUSIONS:** Based on the results of this study, EMD does not promote releasing of the two studied proinflammatory and resorbing cytokines, TNF-alpha and IL-1beta. By increasing the phagocytic activity of monocytic cells, EMD might accelerate wound healing.

**Khedmat S, Seyedabadi M, Ghahremani MH, Ostad SN. Cyclooxygenase 2 plays a role in Emdogain-induced proliferation.** J Periodontal Res. 2010 Sep 22. doi: 10.1111/j.1600-0765.2010.01313.x. [Epub ahead of print] Enamel matrix proteins are involved in the development and regeneration of root cementum and in its attachment to dentin; however, the mechanisms through which this occurs have yet to be elucidated. The present study was therefore carried out to evaluate the mitogenic and proliferative responses of human periodontal fibroblast (HPLF) cells to Emdogain (EMD), and the potential role of cyclooxygenase 2 (COX-2) in this process. **Material and Methods:** We investigated the effects of EMD on 5-bromo-2'-deoxyuridine (BrdU) incorporation, colchicine freezing of mitosis, XTT [2,3-bis(2-methoxy-4-nitro-5-sulphophenyl)-2H-tetrazolium-5-carboxanilide] reduction and Trypan Blue dye exclusion, with or without celecoxibe, a selective cyclooxygenase-2 (COX-2) inhibitor; we also evaluated the expression of COX-2 mRNA and COX-2 protein in response to EMD. **Results:** EMD significantly enhanced mitosis in, and proliferation of, human periodontal ligament fibroblasts in a dose-dependent manner; however, there was a small increase of DNA synthesis only in response to a high dose of EMD (200 µg/mL). EMD (100 and 200 µg/mL) elicited an increase in COX-2 expression ( $p \leq 0.05$ ). Celecoxibe

(20 µm) diminished the EMD-induced mitosis and proliferation of HPLF cells ( $p \leq 0.05$ ). **Conclusion:** Celecoxibe hampered EMD-induced mitosis and proliferation, which, in association with EMD-increased COX-2 expression, indicates that COX-2 may be involved in the proliferative response of HPLF cells to EMD.

Sahebi S, **Moazami E**, Abbott P. **The effects of short-term calcium hydroxide application on the strength of dentine.** Dent Traumatol. 2010 Feb;26(1):43-6. Epub 2009 Nov 17.

**BACKGROUND:** Studies have suggested that the long-term exposure of dentin from immature teeth to calcium hydroxide may weaken the dentin but the effects of short-term exposure of dentin from mature teeth have not been reported. The aim of this study was to evaluate the effects of a short term application of calcium hydroxide on the strength of dentine from mature human permanent teeth.

**MATERIALS AND METHODS:** 50 human extracted single rooted disease-free permanent mandibular premolars were chosen. The root canals were prepared with rotary instruments and randomly assigned to two groups. In one group, the root canals were filled with a calcium hydroxide paste. Canals of teeth in the control group were left empty. All teeth were stored in normal saline for 30 days and then coronal third root dentin cylinders were created by removing the crown and apical portions of the teeth. An Instron machine was used to measure the compressive forces needed to break the dentin cylinders and data were analysed using the Student's t-test.

**RESULTS:** The mean compressive force in the calcium hydroxide-filled teeth was significantly lower than that in the control teeth (210.6 +/- 32.3 kg cm<sup>-1</sup>) vs 246.2 +/- 29.0 kg cm<sup>-1</sup>) respectively,  $P < 0.001$ .

**CONCLUSION:** Teeth subjected to 30 days application of calcium hydroxide required less compressive force to break root dentin cylinders. Further studies are necessary to determine whether similar effects would result if impact tests were performed.

**Mohammadi Z. Chemomechanical strategies to manage endodontic infections.** Dent Today. 2010 Feb;29(2):91-2, 94, 96 passim; quiz 99.

**Mohammadi Z. Dmd Msd. Endodontics-Related Paresthesia of the Mental and Inferior Alveolar Nerves: An Updated Review.** J Can Dent Assoc. 2010 Nov;76:a117.

Paresthesia is a burning or prickling sensation or partial numbness resulting from neural injury. Paresthesia resulting from periapical pathosis or various stages of root canal treatment is of great importance in the field of endodontics. The purpose of this paper is to review paresthesia caused by periapical lesions, local anesthesia, cleaning, shaping and obturation.

**Moradi S, Poursadegh M, Bakhshae M, Bonyadimanesh R, Poursadegh V. Pulp necrosis during septorhinoplasty.** Laryngoscope. 2010 Apr;120(4):673-5. **OBJECTIVES/HYPOTHESIS:** Bony manipulation near the nasal spine or maxillary crest trimming can predispose teeth to injury during septorhinoplasty, especially when there is an aberrant vascular supply or a highly situated root apex in the premaxilla.

**STUDY DESIGN:** Prospective cross-sectional study.  
**METHODS:** A prospective cross-sectional study was carried out on 438 teeth (maxillary incisors and canines) that were supposedly affected and 73 control teeth (mandibular lateral incisors) in 73 candidates of septorhinoplasty before and after surgery to determine the frequency of pulp necrosis using electrical, heat, and cold pulpal tests. Those with difficult intubation, history of root canals or orthodontic procedures, history of dental trauma, or a positive preoperative test were excluded from the study. Patients were followed up 2 weeks, 3 months, and 6 months postoperatively, and test results were compared before and at three intervals after the surgery.  
**RESULTS:** Seventy-three consecutive patients, including 11 males and 62 females, met the study criteria. Septoplasty with anterior maxillary crest trimming and anterior nasal spine manipulation was performed in 63 and 52 cases, respectively. Only 10 cases underwent septoplasty without manipulation of the maxillary crest or the anterior nasal spine. Based on pulp testing, no case of pulp necrosis was seen during the 6-month follow-up.  
**CONCLUSIONS:** Considering there are very few reports of dental problems during septorhinoplasty, it is an unlikely cause of serious dental complications such as pulp necrosis. An abnormal anatomy might be a good explanation for rare cases.

**Nekoofar MH, Aseeley Z, Dummer PM. The effect of various mixing techniques on the surface microhardness of mineral trioxide aggregate.** *Int Endod J.* 2010 Apr;43(4):312-20.

**AIM:** To evaluate the influence of various mixing procedures including ultrasonic vibration, trituration of customized encapsulated mineral trioxide aggregate (MTA) and condensation on the Vickers surface microhardness of MTA.

**METHODOLOGY:** ProRoot MTA Original, ProRoot MTA (white), MTA-Angelus (grey) and MTA White Angelus (white) were prepared using several mixing techniques including ultrasonic vibration, trituration of customized encapsulated MTA and conventional condensation. Twelve experimental groups (four materials: three techniques) were evaluated, each with 35 samples. All samples were incubated after preparation and subjected to Vickers surface microhardness testing after 4 and 28 days. Data was subjected to a two-way anova.

**RESULT:** At 28 days, the surface microhardness value was significantly greater for all experimental groups compared to 4 days after mixing ( $P < 0.00001$ ). The application of ultrasonic energy to MTA produced significantly higher surface microhardness values compared to the other mixing techniques at both 4 and 28 days ( $P < 0.0001$ ). However, no significant difference existed between condensation and trituration techniques at both time intervals. Regardless of the mixing technique employed, a significant difference ( $P < 0.0001$ ) was observed in surface microhardness value between all types of MTA apart from between Angelus grey and ProRoot white at both 4 and 28 days, both of which produced the highest values.

**CONCLUSION:** Compared to trituration and condensation techniques, the application of ultrasonic energy to MTA produced a significantly higher surface microhardness value at both 4 and 28 days. Irrespective of

mixing technique, ProRoot white and Angelus grey had the highest surface microhardness values. Trituration of encapsulated, premeasured MTA and water provides a standardized method of mixing that produces MTA slurries with more controllable handling characteristics.

**Nekoofar MH, Stone DF, Dummer PM. The effect of blood contamination on the compressive strength and surface microstructure of mineral trioxide aggregate.** *Int Endod J.* 2010 Sep;43(9):782-91. Epub 2010 Jul 1.

**AIM:** To investigate the effects of whole, fresh human blood contamination on compressive strength and surface microstructure of grey and tooth-coloured mineral trioxide aggregate (MTA).

**METHODOLOGY:** The materials investigated were grey ProRoot MTA Original (Dentsply Tulsa Dental, Johnson City, TN, USA) and tooth-coloured ProRoot MTA (Dentsply Tulsa Dental). Three groups of 10 custom-made cylindrical moulds (internal dimensions 6 +/- 0.1 mm length and 4 +/- 0.1 mm diameter) were filled with tooth-coloured MTA. In the control group, MTA was mixed with water and exposed to water. In the second group, MTA was mixed with water and exposed to whole, fresh human blood. In the third group, MTA was mixed with and exposed to whole, fresh human blood. These three groups were then duplicated using grey MTA, creating a total of 60 samples. A predetermined amount of MTA and appropriate liquid were triturated in a plastic mixing capsule then subjected to ultrasonic energy after placement in the moulds. After 4 days of incubation, specimens were subjected to compressive strength testing. The surface microstructure of one extra specimen in each group was examined using scanning electron microscopy. Data were subjected to a two-way anova.

**RESULTS:** Regardless of MTA type, the mean compressive strength values of both experimental groups, which were in contact with blood, were significantly less than that of the control groups ( $P < 0.0001$ ). In experimental groups in which MTA was mixed with water and exposed to blood, there was a significant difference ( $P < 0.0001$ ) in compressive strength between tooth-coloured MTA (30.37 +/- 10.16 MPa) and grey MTA (13.92 +/- 3.80 MPa).

**CONCLUSION:** When blood becomes incorporated into MTA, its compressive strength is reduced. In clinical situations in which blood becomes mixed with MTA, its physical properties are likely to be compromised.

**Nekoofar MH, Oloomi K, Sheykhrezae MS, Tabor R, Stone DF, Dummer PM. An evaluation of the effect of blood and human serum on the surface microhardness and surface microstructure of mineral trioxide aggregate.** *Int Endod J.* 2010 Oct;43(10):849-58. doi: 10.1111/j.1365-2591.2010.01750.x. Epub 2010 Jul 15.

**AIM:** Short-term and long-term evaluation of the effect of whole human blood or serum contamination on the surface microhardness value and microstructure of white and grey mineral trioxide aggregate (MTA).

**METHODOLOGY:** Three groups of 10 samples for each type of MTA were prepared. The first group was mixed with and exposed to fresh whole human blood. The second and third groups were mixed with distilled water and exposed to fresh whole human blood or human serum, respectively. The control group samples were mixed with



and exposed to distilled water. During preparation, 1 g of MTA was triturated with 0.33 g of the selected liquid using an amalgamator and placed inside borosilicate cylindrical moulds. The samples were treated with ultrasonic energy. Vickers surface microhardness values were compared after 4 and 180 days. Scanning electron microscopy (SEM) analysis was performed after 4 days.

**RESULTS:** White MTA had a greater microhardness value than grey MTA in all groups. There was a significant difference between the control and the experimental groups ( $P < 0.00001$ ). There was no significant difference between the microhardness values obtained after 4 and 180 days, apart from grey MTA mixed with blood or exposed to serum ( $P < 0.00001$ ). SEM analysis showed the contaminated samples were devoid of acicular crystals that were prominent in the control groups.

**CONCLUSION:** Blood contamination had a detrimental effect on the surface microhardness of MTA in the short and long term. If blood or serum contamination is unavoidable under clinical conditions, it might be preferable to use white MTA.

**Nosrat A, Asgary S. Apexogenesis treatment with a new endodontic cement: a case report.** J Endod. 2010 May;36(5):912-4. Epub 2010 Feb 6.

**INTRODUCTION:** This article describes an apexogenesis report of an 8-year old boy referred to our clinic 4 weeks after an impact trauma to the maxillary left central incisor that caused a complicated crown fracture and pulpal exposure.

**METHODS:** In the radiographic examination, the tooth was observed to be immature. After access cavity preparation, cervical pulpotomy was performed, and the remaining pulp was capped with calcium enriched mixture (CEM) cement. The crown was restored by using the fractured incisal segment on the next day.

**RESULTS:** The radiographic and clinical examinations on the 6-month and 12-month follow-ups showed that the tooth remained functional, root development was completed, and the apex was formed. A calcified bridge was produced underneath the capping material. No further endodontic intervention was necessary.

**CONCLUSIONS:** Considering the healing potential of traumatized immature vital pulp, the use of CEM cement for apexogenesis might be an applicable choice; however, further clinical studies with longer follow-up periods are recommended.

**Nosrat A, Asgary S. Apexogenesis of a symptomatic molar with calcium enriched mixture.** Int Endod J. 2010 Oct;43(10):940-4. doi: 10.1111/j.1365-2591.2010.01777.x. Epub 2010 Jul 14.

**AIM:** This article describes the apexogenesis of a mandibular right second molar in a 12-year-old girl who was referred with a history of lingering pain and pain on chewing. **SUMMARY:** Clinical and radiographic examinations revealed extensive coronal caries and immature roots. Treatment was performed under rubber dam isolation and included caries removal followed by pulp exposure and access cavity preparation. Pulpotomy was completed, and the remaining radicular pulp was capped with calcium enriched mixture (CEM) cement (BioniqueDent, Tehran, Iran). Clinical and radiographic examinations at 3, 6, and 12 months revealed the tooth was

functional with no clinical signs or symptoms of pulpal disease. The final examination confirmed complete root development as well as formation of a calcified bridge beneath the CEM cement.

**Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review--Part I: chemical, physical, and antibacterial properties.** J Endod. 2010 Jan;36(1):16-27.

**INTRODUCTION:** An ideal orthograde or retrograde filling material should seal the pathways of communication between the root canal system and its surrounding tissues. It should also be nontoxic, noncarcinogenic, nongenotoxic, biocompatible, insoluble in tissue fluids, and dimensionally stable. Mineral trioxide aggregate (MTA) was developed and recommended initially because existing root-end filling materials did not have these "ideal" characteristics. MTA has also been recommended for pulp capping, pulpotomy, apical barrier formation in teeth with open apices, repair of root perforations, and root canal filling. Since MTA's introduction in 1993, numerous studies have been published regarding various aspects of this material. The aim of Part I of this literature review is to present investigations regarding the chemical, physical, and antibacterial properties of MTA.

**METHODS:** A review of the literature was performed by using electronic and hand-searching methods for the chemical and physical properties and antibacterial activity of MTA from November 1993-September 2009.

**RESULTS:** There are many published reports regarding the chemical, physical, and antibacterial properties of MTA. Our search showed that MTA is composed of calcium, silica, and bismuth. It has a long setting time, high pH, and low compressive strength. It possesses some antibacterial and antifungal properties, depending on its powder-to-liquid ratio.

**CONCLUSIONS:** MTA is a bioactive material that influences its surrounding environment.

Torabinejad M, **Parirokh M. Mineral trioxide aggregate: a comprehensive literature review--part II: leakage and biocompatibility investigations.** J Endod. 2010 Feb;36(2):190-202.

**INTRODUCTION:** Mineral trioxide aggregate (MTA) was developed because existing materials did not have the ideal characteristics for orthograde or retrograde root-end fillings. MTA has been recommended primarily as a root-end filling material, but it has also been used in pulp capping, pulpotomy, apical barrier formation in teeth with open apices, repair of root perforations, and root canal filling. Part I of this literature review presented a comprehensive list of articles regarding the chemical and physical properties as well as the antibacterial activity of MTA. The purpose of part II of this review is to present a comprehensive list of articles regarding the sealing ability and biocompatibility of this material.

**METHODS:** A review of the literature was performed by using electronic and hand-searching methods for the sealing ability and biocompatibility of MTA from November 1993-September 2009.

**RESULTS:** Numerous studies have investigated the sealing ability and biocompatibility of MTA.

**CONCLUSIONS:** On the basis of available evidence it

appears that MTA seals well and is a biocompatible material.

**Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review—Part III: Clinical applications, drawbacks, and mechanism of action.** J Endod. 2010 Mar;36(3):400-13.

**INTRODUCTION:** Mineral trioxide aggregate (MTA) has been recommended for various uses in endodontics. Two previous publications provided a comprehensive list of articles from November 1993-September 2009 regarding the chemical and physical properties, sealing ability, antibacterial activity, leakage, and biocompatibility of MTA. The purpose of Part III of this literature review is to present a comprehensive list of articles regarding animal studies, clinical applications, drawbacks, and mechanism of action of MTA.

**METHODS:** A review of the literature was performed by using electronic and hand-searching methods for the clinical applications of MTA in experimental animals and humans as well as its drawbacks and mechanism of action from November 1993-September 2009.

**RESULTS:** MTA is a promising material for root-end filling, perforation repair, vital pulp therapy, and apical barrier formation for teeth with necrotic pulps and open apices. Despite the presence of numerous case reports and case series regarding these applications, there are few designed research studies regarding clinical applications of this material. MTA has some known drawbacks such as a long setting time, high cost, and potential of discoloration. Hydroxyapatite crystals form over MTA when it comes in contact with tissue synthetic fluid. This can act as a nidus for the formation of calcified structures after the use of this material in endodontic treatments.

**CONCLUSIONS:** On the basis of available information, it appears that MTA is the material of choice for some clinical applications. More clinical studies are needed to confirm its efficacy compared with other materials.

**Parirokh M, Satvati SA, Sharifi R, Rekabi AR, Goriestani H, Nakhaee N, Abbott PV. Efficacy of combining a buccal infiltration with an inferior alveolar nerve block for mandibular molars with irreversible pulpitis.** Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010 Mar;109(3):468-73.

**OBJECTIVE:** The aim of this study was to assess the efficacy of inferior alveolar nerve (IAN) block combined with buccal infiltration for mandibular molars with irreversible pulpitis.

**METHODOLOGY:** Eighty-four patients were randomly assigned to 3 groups of 28 patients each. Lidocaine 2% with 1:80,000 epinephrine was used for all injections. Group I patients received an IAN block with 1.8 mL of anesthetic. Group II patients received an IAN block using 3.6 mL. Group III patients received 1.8 mL as an IAN block and 1.8 mL as a buccal infiltration. A visual analogue scale was used to rate pain before anesthesia and discomfort experienced before and during access cavity preparation. Data were analyzed by chi-square, ANOVA, Kruskal-Wallis, and Mann-Whitney tests.

**RESULTS:** The success rates for groups I to III were 14.8%, 39.3%, and 65.4%, respectively. Group III had significantly better anesthesia compared with group I ( $P < .05$ ).

**CONCLUSION:** Combining an IAN block and a buccal infiltration injection provided more effective anesthesia in mandibular molars with irreversible pulpitis. However, some cases may still require further anesthesia to prevent pain during endodontic treatment.

**Parirokh M, Ashouri R, Rekabi AR, Nakhaee N, Pardakhti A, Askarifard S, Abbott PV. The effect of premedication with ibuprofen and indomethacin on the success of inferior alveolar nerve block for teeth with irreversible pulpitis.** J Endod. 2010 Sep;36(9):1450-4. Epub 2010 Jul 3.

**INTRODUCTION:** Achieving pulp anesthesia with irreversible pulpitis is difficult. This study evaluated whether nonsteroidal anti-inflammatory drugs assist local anesthesia.

**METHODS:** In a randomized double-blinded clinical trial, 150 patients (50 per group) with irreversible pulpitis were given placebo, 600 mg ibuprofen, or 75 mg indomethacin 1 hour before local anesthesia. Each patient recorded their pain score on a visual analog scale before taking the medication, 15 minutes after anesthesia in response to a cold test, during access cavity preparation and during root canal instrumentation. No or mild pain at any stage was considered a success. Data were analyzed by the chi-square and analysis of variance tests.

**RESULTS:** Overall success rates for placebo, ibuprofen, and indomethacin were 32%, 78%, and 62%, respectively ( $p < 0.001$ ). Ibuprofen and indomethacin were significantly better than placebo ( $p < 0.01$ ). There was no difference between ibuprofen and indomethacin ( $p = 0.24$ ).

**CONCLUSIONS:** Premedication with ibuprofen and indomethacin significantly increased the success rates of inferior alveolar nerve block anesthesia for teeth with irreversible pulpitis.

**Akhlaghi NM, Kahali R, Abtahi A, Tabatabaee S, Mehrvarzfar P, Parirokh M. Comparison of dentine removal using V-taper and K-Flexofile instruments.** Int Endod J. 2010 Nov;43(11):1029-36. doi: 10.1111/j.1365-2591.2010.01769.x.

**AIM:** To compare the dentine removal ability of V-Taper and K-Flexofile instruments in mesiobuccal canals of extracted mandibular first molar teeth.

**METHODOLOGY:** Preoperative images of 40 mesiobuccal canals of mandibular first molars (with a curvature between 20° and 35°) were obtained at 2, 4.5, and 7 mm from the root apices by CT-scan and divided into two groups. Group F was prepared with K-Flexofiles and Gates Glidden drills and Group V with V-Taper Ni-Ti rotary and stainless steel hand instruments. Post-instrumentation images were then obtained and compared with the preoperative images. The ratio of dentine removal based on pre- and postoperative images was calculated, and data was analysed by anova and Tukey post hoc test.

**RESULTS:** In group F in the coronal sections, the least ratio of the dentine removal to the initial root thickness was on the buccal aspect ( $15.14\% \pm 6.72$ ), and the greatest ratio was found on the distolingual ( $29.38\% \pm 8.19$ ). In group V in the coronal, the least ratio of the dentine removal to the initial root thickness was on the buccal aspect ( $9.81\% \pm 3.26$ ); the greatest ratio was found on the distolingual surface in the coronal sections ( $34.38\% \pm 10.51$ ). In the middle sections, the least ratio was on the

buccal ( $10.51\% \pm 3.39$ ) and the greatest on the distolingual aspects ( $27.46\% \pm 12.34$ ) of the roots. In the apical sections, the amount of the dentine removed from the mesial and distal surfaces in group V was significantly more than group F ( $P < 0.01$ ).

**Parirokh M**, Mirsoltani B, **Raouf M**, Tabrizchi H, Haghdoost AA. **Comparative study of subcutaneous tissue responses to a novel root-end filling material and white and grey mineral trioxide aggregate.** *Int Endod J*. 2010 Nov 22. doi: 10.1111/j.1365-2591.2010.01808.x. [Epub ahead of print]

Parirokh M, Mirsoltani B, Raouf M, Tabrizchi H, Haghdoost A-A. Comparative study of subcutaneous tissue responses to a novel root-end filling material and white and grey mineral trioxide aggregate. *International Endodontic Journal*. **ABSTRACT:** Aim To compare the subcutaneous tissue response to grey mineral trioxide aggregate (GMTA), white mineral trioxide aggregate (WMTA) and a new experimental cement (calcium enriched cement, CEM). **Methodology** Thirty-six Wistar male albino rats each received three implants, containing one of the tested materials, and an empty tube as a control. Seven, 30 and 60 days after implantation, the animals were sacrificed. After histological preparation and H&E staining, the specimens were evaluated for capsule thickness, necrosis, and for the type, the severity, and the extent of inflammation. Kruskal Wallis and Chi-square tests were used for data analysis. **Results** After 1 week, CEM produced no necrosis compared to both types of WMTA and GMTA ( $P = 0.007$ ). After 30 days, GMTA specimens had significantly less inflammation compared with WMTA and CEM ( $P = 0.011$ ). After 60 days, less inflammation was associated with CEM specimens ( $P=0.0001$ ) compared to the other materials. Dystrophic calcifications in the connective tissue adjacent to all experimental material were detected. **Conclusion** Histological observation illustrated that all materials were well tolerated by the subcutaneous tissues.

**Rahimi S, Yavari HR, Shahi S, Zand V, Shakoui S**, Reyhani MF, Pirzadeh A. Comparison of the effect of Er, Cr-YSGG laser and ultrasonic retrograde root-end cavity preparation on the integrity of root apices. *J Oral Sci*. 2010;52(1):77-81.

The aim of this study was to compare the effect of Waterlase laser and ultrasonic root end cavity preparation on the integrity of root end in extracted human teeth. The canals of 60 extracted maxillary central incisors were cleaned, shaped, obturated and 3 mm of the root end was resected and examined for the presence of any cracks. Class I root-end cavities were then prepared using an ultrasonic unit or Waterlase laser. In the ultrasonic group, KIS 2D tip and medium intensity and in the laser group, 600  $\mu$ m laser tips and an output power setting of 4 W with 55% water and 65% air were used to prepare the cavity which was studied for the presence of any cracks or chippings. One crack was found in the ultrasonic group, while no cracks were observed in the laser group. There was no significant difference between the two groups ( $P > 0.05$ ). As for the chipping effect, seven cases (23%) had chipping after cavity preparation in the ultrasonic group but no chipping was found in the specimens of the laser group and the difference was statistically significant

( $P < 0.05$ ). According to the results of this in vitro study, laser preserves the integrity of root-end cavities better than ultrasonic devices from the standpoint of producing chipping.

**Ravanshad S**, Adl A, Anvar J. **Effect of working length measurement by electronic apex locator or radiography on the adequacy of final working length: a randomized clinical trial.** *J Endod*. 2010 Nov;36(11):1753-6. Epub 2010 Sep 19.

**INTRODUCTION:** Obtaining a correct working length is critical to the success of endodontic therapy. The aim of this clinical study was to compare the effect of working length determination using electronic apex locator or working length radiograph on the length adequacy of final working length as well as the final obturation.

**METHODS:** A total of 84 patients with 188 canals were randomized into two groups; in group 1, the working length was determined by working length radiograph, whereas in group 2, it was determined by the Raypex5 electronic apex locator (VDW, Munich, Germany). Length adequacy was assessed in each group for master cone and final obturation radiography and categorized into short, acceptable, and over cases.

**RESULTS:** There was no statistically significant difference between the rates of acceptable (master cone radiography: group 1 = 82.1% and group 2 = 90.4%; final radiography: group 1 = 85.7% and group 2 = 90.4%) and short cases (master cone radiography: group 1 = 7.1% and group 2 = 8.7%; final radiography: group 1 = 1.2% and group 2 = 1%) between the two groups. Over cases in master cone radiography were significantly more in group 1 (10.7%) than group 2 (1%) ( $\chi^2$ ,  $p = 0.00$ ). However, this category did not show a significant difference for final obturation between group 1 (13.1%) and group 2 (8.7%).

**CONCLUSION:** The results of endodontic treatment using the Raypex5 electronic apex locator are quite comparable, if not superior, to radiographic length measurement regarding the rates of acceptable and short cases. Furthermore, in addition to reducing the radiographic exposure, electronic apex locators are superior in reducing overestimation of the root canal length.

**Sadeghi S**, Dibaei M. **Prevalence of odontogenic sinus tracts in 728 endodontically treated teeth.** *Med Oral Patol Oral Cir Bucal*. 2010 Aug 15. [Epub ahead of print]

**Objectives:** The primary aim of this study was to assess the prevalence of sinus tracts in endodontically treated teeth in an Iranian population. The second aim was to seek and analyze the relationship between the clinically detected sinus tracts and factors such as sex, age, tooth type and location. **Study design:** A total of 728 patients' records and radiographs were reviewed of 427 females and 301 males for demographic data, preoperative pulpoperiapical status of treated teeth and the presence of sinus tract. Data were analyzed using chi-square test. **Results:** No significant differences were found for the prevalence of sinus tracts between two genders. Data showed that the highest prevalence of sinus tracts was in 10-19 year age group. Of 725 treated teeth, 107 teeth had sinus tracts (14.7%). Most odontogenic sinus tracts were

associated with mandibular anterior teeth. Of 348 teeth with preoperative status of periapical inflammation and radiolucency, 107 teeth (30.75%) had an odontogenic sinus tract. Conclusion: Data showed that almost one in seven teeth referred for root canal treatment had a sinus tract.

**Samice M, Eghbal MJ, Parirokh M, Abbas FM, Asgary S. Repair of furcal perforation using a new endodontic cement.** Clin Oral Investig. 2010 Dec;14(6):653-8. Epub 2009 Nov 4.

The aim of this study was to compare the histologic response elicited by repairing furcal perforations with mineral trioxide aggregate (MTA) and a new endodontic material in the name of "calcium enriched mixture (CEM) cement" in dogs' teeth. Thirty-four premolars were randomly divided into four groups: MTA (n = 15), CEM (n = 15), positive, and negative controls (n = 4). Root canal therapy were carried out; perforations were made, and the furcation areas were then repaired with MTA or CEM cement. The animals were sacrificed after 3 months. The teeth and their adjacent structures were processed and stained with hematoxylin and eosin stain for histological evaluation. Chi-square test was used to evaluate hard tissue formation, and Mann-Whitney U test was used for the histological evaluation of inflammation. Specimens in positive controls showed severe inflammatory infiltration, prominent granulation tissue, and epithelial proliferation; negative controls demonstrated normal periodontal ligament without inflammatory reactions. Hard tissue formation was observed in all the specimens of the two experimental groups. In inflammatory evaluation, mild inflammation was detected in the experimental groups, and no statistically significant differences were observed between them. MTA and CEM cement showed similar favorable biological response in furcation perforation repair, especially in inducing the formation of cementum-like hard tissue.

**Saghiri MA, Shokouhinejad N, Lotfi M, Aminsobhani M, Saghiri AM. Push-out bond strength of mineral trioxide aggregate in the presence of alkaline pH.** J Endod. 2010 Nov;36(11):1856-9. Epub 2010 Sep 16.

**INTRODUCTION:** The aim of this study was to evaluate the effect of a range of alkaline pH values on the push-out strength of white mineral trioxide aggregate (WMTA).

**METHODS:** The standardized lumens of root slices prepared from extracted single-rooted human teeth were filled with white ProRoot MTA. The specimens were then randomly divided into 4 groups (n = 20) and wrapped in pieces of gauze soaked in synthetic tissue fluid (STF) (pH, 7.4) and STF buffered in potassium hydroxide at pH values of 8.4, 9.4, or 10.4. The samples were incubated for 3 days at 37 °C. The push-out bond strengths were then measured by using a universal testing machine. Failure modes after the push-out test were examined under a light microscope at ×40 magnification. The data were analyzed by using one-way analysis of variance and Tukey post hoc tests.

**RESULTS:** The greatest ( $9.46 \pm 0.63$  MPa) and lowest ( $5.68 \pm 0.83$  MPa) mean push-out bond strengths were observed after exposure to pH values of 8.4 and 10.4, respectively. There were significant differences between

the groups ( $P = .001$ ). The bond failure was adhesive for all experimental groups.

**CONCLUSIONS:** Push-out bond strength of WMTA could be influenced by different alkaline pH values.

**Saghiri MA, Asgar K, Daliri M, Lotfi M, Delvarani A, Mehrvarzfar P, Karamifar K. Morphological behavior and attachment of p19 neural cells to root-end filling materials.** Scanning. 2010 Nov 9. [Epub ahead of print] Some techniques and instruments like stereomicroscopy and confocal microscopy used for observing neural cells are too complicated and dependent on preparation and cell fixation methods. This may question the results of these methods. Though, we have used scanning electron microscopy on replicated specimens to observe p19 neural cells and their cellular extensions. This manuscript has shown the feasibility of using replica (indirect) method instead of direct methods for observing morphological characteristics of this high sensitive cell line. As neural cells are very sensitive to fixation solutions and processes, we have used replica mode and observed neural cells with a novel indirect method. We have used replica mode in this study to indirectly and noninvasively evaluate the state of p19 neural cells and their cellular extensions.

**Saghiri MA, Lotfi M, Joupari MD, Aeinehchi M, Saghiri AM. Effects of storage temperature on surface hardness, microstructure, and phase formation of white mineral trioxide aggregate.** J Endod. 2010 Aug;36(8):1414-8. Epub 2010 Jun 25.

**INTRODUCTION:** Storage temperature influences the properties of Portland cement during mixing. Because of similarities between Portland cement and mineral trioxide aggregate, the aim of the present study was to evaluate surface microhardness, topography, and phase structure of white mineral trioxide aggregate (WMTA) after storage in a range of temperatures.

**METHODS:** Thirty WMTA sachets were divided into 3 groups of 10. The 3 groups were stored at 4 degrees C, 25 degrees C, and 40 degrees C for 48 hours with accompanying ampules. Sachets were immediately mixed after removal from storage according to manufacturer's instructions and mixed and packed into cylindrical glass tubes at room temperature. Surface microhardness of each specimen was measured after 3 days. Four specimens from each group were prepared and observed under scanning electron microscope and x-ray diffraction. Data were subjected to one-way analysis of variance and a post hoc Tukey test at  $P < .05$ .

**RESULTS:** Mean surface hardness +/- standard deviation after storage at 4 degrees C, 25 degrees C, and 40 degrees C were  $25.23 \pm 5.99$ ,  $53.56 \pm 3.28$ , and  $62.89 \pm 1.76$ , respectively. Statistically significant differences were observed among the groups ( $P < .001$ ). More voids and a disorganized, flake-like topography were observed in specimens stored at 4 degrees C in comparison with those stored at 25 degrees C and 40 degrees C. X-ray diffraction meter generated similar peaks at 40 degrees C and 25 degrees C, but slight differences were observed at 4 degrees C.

**CONCLUSIONS:** This study indicated that storage temperature might influence surface hardness and microstructure of WMTA.

**Sadeghi S, Abolghasemi M. The accuracy of the Raypex5 electronic apex locator using stainless-steel hand K-file versus nickel-titanium rotary Mtwo file.** Med Oral Patol Oral Cir Bucal. 2010 Sep 1;15(5):e788-90. OBJECTIVES: Today many clinicians use both stainless-steel hand K-files and nickel- titanium rotary files during endodontic treatment. It is of great importance for the clinician to have confidence in the accuracy of an apex locator even if these files were used interchangeably. The purpose of this in vitro study was to evaluate the accuracy of the Raypex5 electronic apex locator using stainless-steel hand K-file versus nickel-titanium rotary Mtwo file. STUDY DESIGN: Twenty straight and single canals of maxillary central teeth were used. Access cavities were prepared; actual working length were determined and compared with electronic working length obtained by means of apex locator Raypex5 using stainless-steel hand K-file and nickel-titanium rotary Mtwo file. Data was analyzed by paired T-test. RESULTS: There was no significant difference between 15/0.02 stainless-steel hand K- file and 10/0.04 NiTi rotary Mtwo file for the mean differences between actual and electronic working length ( $p=0.126$ ).

**Seifi M, Maghzi A, Gutknecht N, Mir M, Asna-Ashari M. The effect of 904 nm low level laser on condylar growth in rats.** Lasers Med Sci. 2010 Jan;25(1):61-5. Epub 2009 Feb 24.

A growth center of the mandible that contributes to its length and height is the mandibular condyle. Proliferation of prechondroblasts, followed by synthesis of the extracellular matrix and hypertrophy of the cartilage cells, governs the major part of condylar growth. The sample consisted of 54 male rats, weighing between 60 g and 80 g, divided randomly into three groups. Group I was the control group, group II was irradiated bilaterally, and group III was irradiated on the right side. Laser irradiation ( $\lambda = 904$  nm, 2000 Hz, pulse length 200 ns and output power 4 mW) was performed, and the procedure was repeated after a 50-day interval. Two months later, the rats were killed. In a single blind manner the lengths of denuded mandibles and the lengths of mandibles on soft tissue were measured. The growth of the mandibles in the unilaterally irradiated group ( $P < 0.001$ ) and the bilaterally irradiated group ( $P < 0.05$ ) was significantly more than that in the control group. There was no significant difference between right and left condylar growth in the bilaterally irradiated group ( $P = 0.3$ ). Soft tissue analysis also verified these results ( $P < 0.001$ ). Histomorphometric results also revealed a significant difference between laser-irradiated groups and the control group ( $P < 0.01$ ). We concluded that particular laser irradiation with the chosen parameters can stimulate condylar growth and subsequently cause mandibular advancement. These findings might be clinically relevant, indicating that low level laser irradiation can be used for further improvement of mandibular retrognathism.

**Sharifian MR, Shokouhinejad N, Aligholi M, Jafari Z. Effect of chlorhexidine on coronal microleakage from root canals obturated with Resilon/Epiphany Self-Etch.** J Oral Sci. 2010;52(1):83-7. This ex vivo study compared saliva coronal microleakage

in root canals filled with Resilon/Epiphany Self-Etch (SE) system after final irrigation with different solutions. A total of 60 extracted single-rooted human teeth were instrumented using Mtwo Ni-Ti rotary instruments and divided into two experimental groups ( $n = 20$  each) and positive and negative control groups ( $n = 10$  each). The canals were irrigated with 1.3% NaOCl during instrumentation. After removing the smear layer with 17% EDTA, the root canals in groups A and B were flushed with distilled water and 2% chlorhexidine (CHX), respectively, after which they were obturated with Resilon/Epiphany SE using lateral compaction technique. After sterilizing the whole system with gamma-rays, saliva leakage was tested using a split-chamber model. Specimens were monitored every 24 h for 60 days. The data collected were then analyzed using the chi-square test and Kaplan-Meier survival analysis. As compared with group A, the specimens in group B tended to be more resistant to saliva leakage; however, the difference was not significant ( $P > 0.05$ ). In conclusion, our findings suggest that 2% CHX is a good conditioner for root canal dentin before use of Resilon/Epiphany SE.

**Shokouhinejad N, Sabeti MA, Hasheminasab M, Shafiei F, Shamshiri AR. Push-out bond strength of Resilon/Epiphany self-etch to intraradicular dentin after retreatment: a preliminary study.** J Endod. 2010 Mar;36(3):493-6. Epub 2010 Jan 25.

INTRODUCTION: Retreatment procedures might affect the adhesion capability of refilling materials to dentinal walls. The purpose of this study was to compare the effect of different retreatment techniques on bond strength of Resilon (Resilon Research LLC, Madison, CT)/Epiphany (Pentron Clinical Technologies, LLC, Wallingford, CT) self-etch (SE) with radicular dentin after canal reobturation.

METHODS: Sixty extracted single-rooted human teeth were prepared using Mtwo rotary files (VDW, Munich, Germany) and obturated with Resilon/Epiphany SE. The roots were randomly divided into four groups; in group 1, no retreatment procedure was done; group 2 was retreated using Mtwo R/Mtwo files; group 3 was retreated using Mtwo R/Mtwo combined with chloroform; and group 4 was retreated using Mtwo R/Mtwo combined with Endosolv R (Septodont, Paris, France). The root canals were then reobturated with Resilon/Epiphany SE. One-millimeter slices of midroot dentin were prepared for the push-out test ( $n=30$  slices per group). Failure modes after the push-out test were examined under microscopy. The data were analyzed by using a one-way analysis of variance and the Dunnett post hoc test.

RESULTS: Group 3 showed significantly the lowest mean bond strength ( $p<0.02$ ). No significant difference was found between the values of groups 1, 2, and 4 ( $p>0.26$ ). The mode of bond failure was predominantly adhesive for all groups.

CONCLUSIONS: This study showed that the bond strength of Resilon/Epiphany SE after root canal retreatment using Mtwo files, either alone or combined with Endosolv R, was not significantly different from that of nonretreated specimens. Chloroform used for retreatment had an adverse effect on the bond strength of Resilon/Epiphany SE after root canal reobturation.

**Shokouhinejad N**, Emaneini M, Aligholi M, Jabalameli F. **Antimicrobial effect of Rosa damascena extract on selected endodontic pathogens.** J Calif Dent Assoc. 2010 Feb;38(2):123-6.

The purpose of this study was to compare the antimicrobial activity of a plant-derived extract (2 percent Rosa damascena extract) with 5.25 percent sodium hypochlorite (NaOCl) and 2 percent chlorhexidine (CHX) on selected endodontic pathogens. The minimum inhibitory concentrations (MICs) of 2 percent rose extract and 2 percent CHX for test microorganisms, except *F. nucleatum*, were lower than that of 5.25 percent NaOCl. All solutions were able to kill all test microorganisms after one minute.

**Shokouhinejad N**, **Nekoofar MH**, Iravani A, Kharrazifard MJ, Dummer PM. **Effect of acidic environment on the push-out bond strength of mineral trioxide aggregate.** J Endod. 2010 May;36(5):871-4. Epub 2010 Feb 21.

**INTRODUCTION:** Reduced surface microhardness and decreased sealing ability have been shown after the placement of mineral trioxide aggregate (MTA) in an acidic environment. In this study, the effect of an acidic environment on the push-out strength of MTA was evaluated.

**METHODS:** Eighty root dentin slices from freshly extracted single-rooted human teeth were sectioned and their lumen instrumented to achieve a diameter of 1.3 mm. One gram of tooth-colored ProRoot MTA (Dentsply Tulsa Dental, Johnson City, TN) was mixed with 0.33 g of distilled water and introduced into the canals of the root-dentin slices and treated with ultrasonic energy. The specimens were then randomly divided into four groups (n = 20) and wrapped in pieces of gauze soaked in phosphate buffer saline solution (pH = 7.4) and butyric acid buffered at pH values of 4.4, 5.4, or 6.4, respectively. They were then incubated for 4 days at 37 degrees C. The push-out bond strengths were then measured using a universal testing machine. The slices were examined under a light microscope at x40 magnification to determine the nature of the bond failure. The data were analyzed using one-way analysis of variance and the Tamhane post hoc test.

**RESULTS:** The greatest mean push-out bond strength (7.28 +/- 2.28 MPa) was observed after exposure to a pH value of 7.4. The values decreased to 2.47 +/- 0.61 MPa after exposure to a pH value of 4.4. There were significant differences between the groups (p < 0.001). Inspection of the samples revealed the bond failure to be predominantly adhesive.

**CONCLUSION:** The force needed for displacement of MTA was significantly lower in samples stored at lower pH values.

**Shokouhinejad N**, **Sharifian MR**, Aligholi M, Assadian H, Tabor RK, **Nekoofar MH**. **The sealing ability of resilon and gutta-percha following different smear layer removal methods: an ex vivo study.** Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010 Jul;110(1):e45-9. Epub 2010 May 10.

**OBJECTIVE:** The objective of this study was to compare the ex-vivo sealing ability of Resilon/new Epiphany (SE) sealer to that of gutta-percha/AH-Plus following smear layer removal with EDTA or MTAD.

**STUDY DESIGN:** One hundred extracted single-rooted human teeth were divided into 4 experimental groups and 2 positive and negative control groups. EDTA was used in groups 1 and 2. In groups 3 and 4 MTAD was used. The root canals were then obturated with gutta-percha/AH-Plus in groups 1 and 3 and Resilon/Epiphany (SE) in groups 2 and 4. After sterilization, the samples were coronally exposed to human saliva and monitored every 24 hours for 60 days.

**RESULTS:** In groups 1, 2, 3, and 4, 45%, 65%, 90%, and 65% of specimens leaked within 60 days, respectively. There were statistically significant differences between group 1 and 3 (P < .05).

**CONCLUSIONS:** Resilon/Epiphany (SE) system is as effective as gutta-percha/AH-Plus in preventing saliva leakage. MTAD did not adversely affect the sealing ability of Resilon/Epiphany (SE).

**Shokouhinejad N**, **Sharifian MR**, Jafari M, Sabeti MA. **Push-out bond strength of Resilon/Epiphany self-etch and gutta-percha/AH26 after different irrigation protocols.** Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010 Nov;110(5):e88-92. Epub 2010 Sep 27.

**OBJECTIVE:** The purpose of this study was to compare the bond strength of Resilon/Epiphany self-etch (SE) and gutta-percha/AH26 after different irrigation protocols.

**STUDY DESIGN:** Extracted single-rooted human teeth were divided into 4 groups and prepared. According to irrigation protocols, groups were: 5.25% NaOCl followed by 17% ethylenediaminetetraacetic acid (EDTA) (groups 1 and 2); and 1.3% NaOCl followed by MTAD (a mixture of tetracycline isomer, an acid, and a detergent) (groups 3 and 4). The root canals were obturated with either gutta-percha/AH26 (groups 1 and 3) or Resilon/Epiphany SE (groups 2 and 4). Push-out bond strength and failure modes were determined.

**RESULTS:** Gutta-percha/AH26 showed significantly higher bond strength than Resilon/Epiphany SE. The group with 5.25% NaOCl + EDTA and gutta-percha had a significantly higher bond strength than all of the other groups (P < .05); 1.3% NaOCl + MTAD with gutta-percha showed significantly higher bond strength than 5.25% NaOCl + EDTA with Resilon and 1.3% NaOCl + MTAD with Resilon. There was no significant difference between the bond strengths of the Resilon groups (P > .05). The failure mode for all of the experimental groups was mainly adhesive.

**CONCLUSIONS:** Irrigation with 5.25% NaOCl + EDTA can be a better conditioner before using gutta-percha/AH26. The bond strength of Resilon/Epiphany SE was not different after irrigation with 5.25% NaOCl + EDTA or 1.3% NaOCl + MTAD.

**Shahi S**, **Rahimi S**, **Yavari HR**, Mokhtari H, Roshangar L, Abasi MM, Sattari S, Abdolrahimi M. **Effect of mineral trioxide aggregates and Portland cements on inflammatory cells.** J Endod. 2010 May;36(5):899-903. Epub 2010 Mar 6.

**INTRODUCTION:** Recently, some studies have compared mineral trioxide aggregate (MTA) with Portland cements, concluding that the principal ingredients of Portland cements are similar to those of MTA. The purpose of the present study was to evaluate the effect of gray MTA, white MTA, and gray and white Portland cements on

inflammatory cells in rats.

**METHODS:** Fresh mixtures mixed with distilled water were placed in polyethylene tubes, which were implanted in the dorsal subcutaneous connective tissue of 60 Sprague-Dawley rats along with empty tubes as controls. Tissue specimens were collected after the rats were sacrificed after 7, 15, 30, 60, and 90 days. The specimens were fixed, stained, processed, and histologically evaluated under a light microscope. Inflammatory reactions were classified as grade 0: without inflammatory cells, grade I: sporadic infiltration of inflammatory cells, grade II: moderate infiltration (<25 cells), grade III: dense and severe infiltration (25-125 cells), and grade IV: very dense and severe infiltration (>125 cells). Data were analyzed with the nonparametric (two factor) analysis of variance and Kruskal-Wallis H-test.

**RESULTS:** All the groups showed grade III inflammation after 7 and 15 days; there was a decrease in the inflammatory process after 30, 60, and 90 days. After 90 days, gray MTA, white MTA, and control groups had grade 0 inflammatory process, but gray Portland cement and white Portland cement groups showed grade 0 to grade I inflammatory processes.

**CONCLUSION:** MTAs were more biocompatible; however, more studies are required.

**CONCLUSIONS:** Under the conditions of this in-vitro study, Raypex5 registered more measurements in acceptable range using 15/0.02 stainless-steel hand K- file and 10/0.04 NiTi rotary Mtwo file. It is possible to use them interchangeably without compromising the working length.

**Shahravan A, Ghoddsi J, Eslami B, Rategar AF. A histopathological study of the pulp of dogs' teeth after induction of experimental pulp inflammation for different periods of time. J Microsc. 2010 Feb;237(2):119-21.**

The purpose of this study was to investigate the reaction of the pulp of dogs' teeth after insertion of soft carious dentin from freshly extracted human teeth into the buccal cavities for short and longer periods of time. Forty-seven mature lower and upper teeth were used in this study. On the middle of the buccal side of the teeth, 3 x 5 mm class nu cavities were prepared, soft carious dentin from freshly extracted human teeth was inserted into the floor of the cavity, and those were filled with glass ionomer. The dogs were killed after 7, 14, 28 and 47 days using vital perfusion techniques. Six-micrometre sections were prepared and blindly evaluated by pathologist. An inflammatory reaction occurred in all of the samples. Moderate to severe inflammation were shown in all periods except in one in the 7-day period. Insertion of soft carious dentin gathered from freshly extracted human teeth into class nu cavities produced in dogs' teeth for 7 days is a reproducible process and could be used in study of pulp pathology.

**Tabarsi B, Parirokh M, Eghbal MJ, Haghdoost AA, Torabzadeh H, Asgarv S. A comparative study of dental pulp response to several pulpotomy agents. Int Endod J. 2010 Jul;43(7):565-71. Epub 2010 Apr 23.**

**AIM:** To examine the in vivo response of dental pulps in dogs to three pulp-capping agents: calcium hydroxide (CH), mineral trioxide aggregate (MTA) and a new

endodontic calcium enriched mixture (CEM) cement.

**METHODOLOGY:** Thirty-six second and third premolar teeth in six beagle dogs were randomly assigned to three experimental groups; CH, MTA or CEM cement. Following isolation and exposure, pulp tissues were removed with a fissure bur and haemostasis achieved. The pulps were dressed with appropriate materials, and the access cavity restored with amalgam. Histological analysis was performed 8 weeks after treatment; the samples were assessed by an independent observer for calcified bridge formation, pulp vitality and pulp inflammation. The data were analysed by Kruskal-Wallis, Mann-Whitney and one-way anova tests.

**RESULTS:** The number of root canals that showed calcified bridge formation, pulp vitality and lack of inflammation was significantly higher for teeth capped with either MTA or CEM cement in comparison with CH (P<0.05). No significant difference was found between the CEM cement and MTA in terms of calcified bridge formation, pulp vitality and lack of inflammation (P>0.05).

**CONCLUSIONS:** Mineral trioxide aggregate and CEM cement were associated with a similar favourable biological response to pulpotomy treatment and demonstrated a more effective induction of dentinal bridge formation compared to CH.

**Yavari HR, Rahimi S, Shahi S, Lotfi M, Barhaghi MH, Fatemi A, Abdolrahimi M. Effect of Er, Cr: YSGG laser irradiation on Enterococcus faecalis in infected root canals. Photomed Laser Surg. 2010 Aug;28 Suppl 1:S91-6.**

**OBJECTIVE:** The purpose of this study was to investigate the eradication of Enterococcus faecalis by high-power settings of Er, Cr:YSGG laser irradiation in root canals of extracted teeth.

**BACKGROUND DATA:** The bacteria entering the root canal system invade dentinal tubules, resulting in persistent infections in root canals due to limited penetration of irrigation solutions into the dentinal tubules. The antibacterial effects of different lasers have been investigated in previous studies.

**MATERIALS AND METHODS:** Sixty newly extracted maxillary central incisors were enlarged chemomechanically and sterilized after removal of the smear layer. Root canals were inoculated with E. faecalis, and bacteria were incubated in root canals for 48 h. Samples were randomly divided into four groups, each containing 15 teeth. One group was considered as control with no intervention. Two groups were irradiated with 2- and 3-W output powers of Er, Cr:YSGG laser for 16 s. In the last group, the canals were irrigated with 1% sodium hypochlorite for 20 min.

**RESULTS:** In the laser groups at 2- and 3-W powers, the number of bacteria was reduced 2.4% and 1.53%, respectively, compared with the controls. No significant differences were found between the two laser groups (p > 0.05). The canals irrigated with 1% NaOCl solution demonstrated no bacterial growth.

**CONCLUSIONS:** According to the results of the present study, 2- and 3-W powers of Er, Cr:YSGG laser have antibacterial effects on E. faecalis in root canals of infected teeth; however, the effect is less remarkable than that of NaOCl solution.

**Zand V, Lotfi M, Rahimi S, Mokhtari H, Kazemi A, Sakhamanesh V. A comparative scanning electron microscopic investigation of the smear layer after the use of sodium hypochlorite gel and solution forms as root canal irrigants.** J Endod. 2010 Jul;36(7):1234-7. Epub 2010 Apr 10.

**INTRODUCTION:** The effect of sodium hypochlorite (NaOCl) gel along with EDTA on the removal of the smear layer has not been studied; therefore, the aim of the present study was to compare the efficacy of gel and solution forms of NaOCl in removal of the smear layer from root canal walls.

**METHODS:** A total of 40 single-rooted teeth with minimum curvature (<5 degrees) were selected and divided into two experimental groups, each containing 15 teeth and one positive control group containing 10 teeth. The canals of all the teeth were prepared with rotary RaCe instruments up to #35. In the NaOCl solution group, the root canals were flushed with 2.5% NaOCl solution during instrumentation and in NaOCl gel group, the instruments were coated with gel form of NaOCl and used inside the root canals; then saline was used for root canal irrigation. Finally, 1 mL of 17% EDTA was used to rinse inside the root canals and remained in the root canals for 2 minutes in the both experimental groups; in the saline group, only saline was used for irrigation. The amount of the smear layer was quantified according to the Torabinejad method using a scanning electron microscope. Data were analyzed by the Kruskal-Wallis and Mann-Whitney tests. All the statistical analyses were set with a significance level of  $\alpha = 0.05$ .

**RESULTS:** There were no significant differences between NaOCl gel and solution forms in the coronal, middle, and apical thirds of root canals. There were significant differences between NaOCl solution and saline groups in the three parts of root canal walls and between NaOCl gel and saline in the coronal, middle, and apical thirds.

**CONCLUSION:** The use of NaOCl gel can be as effective as NaOCl solution along with EDTA in smear layer removal in the three parts of root canal walls.

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**CONCLUSION:** The distolingual aspect of the root canal is a danger zone for the mesiobuccal canal of the mesial root in mandibular molar teeth, and preparation of that area should be performed with caution. Except the apical part of the canal, no significant difference was found between the two preparation files or techniques used. Apart from the apical part of the canal, neither instrument maintained the original shape of the coronal and middle parts of the canal.

**Zarrabi MH, Javidi M, Jafarian AH, Joushan B. Histologic assessment of human pulp response to capping with mineral trioxide aggregate and a novel endodontic cement.** J Endod. 2010 Nov;36(11):1778-81. Epub 2010 Sep 16.

**INTRODUCTION:** This study was conducted to compare human pulp response to mineral trioxide aggregate (MTA) and a novel endodontic cement (NEC) when used as pulp capping materials after a time period of 2 and 8 weeks.

**METHODS:** Thirty-two premolar teeth that were scheduled for extraction for orthodontic reasons were exposed and capped with either MTA or NEC. Half of the specimens underwent extraction and histologic analysis after 2 weeks, and the remaining half were assessed after 8 weeks. Each slide was graded histologically according to the morphology of the dentinal bridge, thickness of the dentinal bridge, presence of odontoblast cells, and inflammation of the pulp.

**RESULTS:** Both MTA and NEC showed significantly better pulp response after 8 weeks compared with 2 weeks, with a thicker and more tubular pattern of the dentinal bridge, less pulp inflammation, and a palisade pattern of odontoblast cells. Although MTA and NEC groups had no significant difference in each measure in both time intervals, NEC induced a thicker dentinal bridge with less pulp inflammation at both 2 weeks and 8 weeks, compared with MTA.

**Zarrabi MH, Javidi M, Vatanpour M, Esmacili H. The influence of torque and manual glide path on the defect or separation rate of NiTi rotary instruments in root canal therapy.** Indian J Dent Res. 2010 Jan-Mar;21(1):107-11.

**INTRODUCTION:** One of the effecting factors in prognosis of root canal therapy is accidental procedure as broken files that may be unpreventable. Many manufacturers have designed and marketed various electromotors that can control rotational speed and torque. On the other hand, some studies have recommended applying a manual glide path to diminish contact area between the file and canal walls. The purpose of this study was evaluation of the effect of torque and a manual glide path on defects as separation of Nickel-titanium (NiTi) rotary files.

**MATERIALS AND METHODS:** This ex vivo randomized controlled trial study was carried out on 160 canals of human's matured molars with mild curvature (15-338). After initial preparation of samples and checking for inclusion criteria, in first group, preparation was carried out with air-driven handpiece, and in group two, Endo IT was used as electromotor. In both groups, Mtwo files with simultaneous technique were used for preparation. Then all data were collected and analyzed with Mann Whitney, Mantel Cox, and t-test.

**RESULTS:** No significant differences between two groups ( $P < 0.05$ ) were observed. Based on survival analysis, safety probability of files after preparation of nine canals is 64% in group one and 69.9% in group two. There was no significant differences between this safety probability in two groups ( $P = 0.272$ ).

**CONCLUSION:** Usage of torque control handpiece is not an important factor, comparing instrumentation technique.