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OP 001. Effects of curing tip distance on Vickers hardness value of different composite resins
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Introduction and objectives: The purpose of this study was to evaluate the Vickers hardness value (VHV) of different composite restorative materials upon exposure to different distance between the light source and resin surface. **Material and methods:** Twenty samples (thickness was 2mm and diameter was 5mm.) were prepared from each types of composite resin (Filtek Silorane , Filtek Supreme, Premise, Grandio, Inten-S) and divided into 5 groups for curing with different light source distances [0 mm (surface contact), 3mm, 6mm and 9mm]. Surface hardness was evaluated by Vickers Microhardness Test. Data were analyzed with 2-way-ANOVA and Paired t test. **Results and discussion:** According to the 2-way-ANOVA, the restorative materials and distance between the light source and resin surface were statistically significant ($P=.0001$) for the bottom and the top surface of the specimens. Their interaction was statistically significant ($P=.0001$) for the bottom surface. All composite resin material groups, the lowest hardness was observed in 9mm. The highest VHV was observed in Grandio group. When comparing the top and bottom surfaces, there were statistically significant differences in all study groups ($p<.05$). VHV of the resin composite materials is related to distance between the light source and resin composite for the top and bottom surfaces. **Conclusions:** An increase in distance of the light source from resin composite surface promoted a decreased in the microhardness values. Bottom side hardness is substantially lower than top surface hardness at any distance of the light tip.

OP 002. Evaluation of color stabilities of a silorane based resin composite and a methacrylate-based resin composite

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Introduction and objectives: Aim of this study is to assess the stainability of a silorane based (SBC) and a nanohybrid methacrylate-based resin composite (MBC) against two different staining agents. **Materials and methods:** 24 disc-shaped specimens (10×2mm) were prepared for each of SBC (Filtek Silorane, 3M/ESPE) and MBC (Grandio, VOCO) groups using teflon moulds. Specimens were polished using polishing discs and they were stored in distilled water at 37°C for 24h. Both restorative materials were divided into 3 groups ($n=8$) and stored for 24h at 37°C in three different solutions: coffee with artificial creamer and sugar, black tea and distilled water (control group). Color measurements were performed before and after storage with a colorimeter and color changes of each group were calculated. Results were analyzed statistically. **Results and discussion:** In all of the solutions color stability of SBC was better than the tested MBC with statistically significant difference ($p<0.05$). In both of the composite groups lowest ΔE measurements were observed in coffee with artificial creamer and sugar solution and highest ΔE results were observed in distilled water. **Conclusions:** Although SBC was marketed as a posterior composite for its low polymerization shrinkage and stress, in our study SBC was found significantly more color stable than the tested MBC

END 003. A human in vitro investigation of a new system of intraosseous anaesthesia

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Introduction and objectives: To evaluate the temperature changes with a newly developed drilling system to penetrate the cortical substance of human bone and apply anaesthetics into the cancellous bone. **Materials and methods:** A humane male preparation was used to measure the increase of temperature during penetrating the bone (n=11) and the deformation of the rotating needle (n=24). Measurements were taken with a temperature probe close to the penetration spot. The needle tips were morphologically analysed by a light microscope (60-fold magnification) and graded (0=no deformation, 1=0° Results and discussion: During drilling (time =5s) the temperature increased on average by $3.18 \pm 4.05K$ ($p < 0.001$). This related to a temperature increase of $0.62K/s$ (curve fit: linear, $p < 0.001$). Needle deformations appeared in 83% (degree of deformation: 1.9 ± 1.5 , maximum torsion =450°). In 14% the application of the anaesthetics was not possible. Drilling into the roots of teeth resulted in needle deformation in 100%. Histological examinations showed metal filings from the needle tips and injuries of the roots. **Conclusions:** The results proved the IOA to be safe if used in the bone. However the contact to the root surface should be avoided. **Acknowledgements:** This study was supported by a grant from W&H.

OP 004. In vitro comparison of different prophylaxis pastes on laser fluorescence measurements for caries detection

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Introduction and objectives: DIAGNOdent has been tested by several researchers on occlusal and smooth surfaces and compared with visual inspection, histology, radiography and quantitative light-induced fluorescence. The aim of this study was to test the effects of prophylaxis pastes on DIAGNOdent readings. **Materials and methods:** A total of 42 extracted molar teeth were used in this study. Before DIAGNOdent (KaVo) values (DV) measurements, saliva was spread on the tooth surface and dried for 3s. After that 500 mg prophylaxis pastes (*Nupro-Dentsply*, *Prophy Pearls-KaVo*, *Topex-Sultan*, *Enamel Pro-Premier*, *Alpha Pro-Dental Technologies*, *Total 12 toothpaste-Colgate*) was taken and the occlusal surface cleaned for 10s with a slow rotating contra-angle handpiece. The paste was then rinsed off with the 3-in-1 syringe for 3s using water with air. The DV measurements were taken again and the rinsing for 3s and fluorescence measurements were repeated. **Results and discussion:** The Duncan test showed that the lowest DV was observed in Nupro and Prophy Pearl group, which were not significantly different from each other in all time intervals. When comparing of rinsing time, there was statistically significantly difference in 3s groups. There was no statistically differences between first DV and 3s + 3s groups. Industry is formulating prophylaxis pastes with fluorescence and as a possible consequence with a high inherent DV. **Conclusions:** With modern methods supporting the dentist in the detection, monitoring and diagnosis of carious lesions the possible influences of prophylactic products used in practice and in home care must be known to dentists and auxiliary personnel.

OP 005. Effects of different drinks on color stability of resin composite restorative materials
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Introduction & objectives: Discoloration of restorative materials may lead to patient dissatisfaction and additional expense for replacement. The purpose of this study was to evaluate the color stability of different composite resins upon exposure to different drinks. **Materials & methods:** Twenty-five cylindrical specimens (15×2 mm) were prepared for each of composite restorative materials (Filtek Silorane, Aelite, Quixfill, Ceram X Mono, Grandio, IntenS). The specimens were wet ground with 1000 grit silicon carbide abrasive paper for 10 seconds. The 6 restorative material specimens were divided into 5 groups ($n = 5$) for storage for 48 hours at 37°C in different types of solutions: water, coffee, tea, cola, and red wine. Color of all specimen groups were measured before and after exposure with a colorimeter (Minolta CR-300) using CIE $L^*a^*b^*$ relative then color changes (ΔE^*) were calculated. The statistical analysis of the color variation data included a 2-way analysis of variance (ANOVA). Then the means were compared by Tukey HSD test ($\alpha=.05$). **Results & discussion:** Composite resins, staining agents, and their interaction were statistically significant ($P=.0001$). For the 6 restorative materials tested, the lowest ΔE^* values were observed in the water group. The highest color difference for all restorative materials was observed in the red wine and coffee. When comparing the 6 different restorative materials, Aelite and Silorane demonstrated significantly less color change than the other materials tested. The highest color difference was observed in Ceram X Mono, IntenS, and Quixfill groups. **Conclusions:** Aelite and Silorane were found more color stable than Ceram X Mono, IntenS, and Quixfill. However, when one of these materials is used, the patient should be informed about the color change that is caused by red wine, and coffee.

OP 006. Fracture rate of IPS Empress all ceramic crowns - A systematic review
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R&D, Ivoclar Vivadent

Introduction and objectives: to evaluate the clinical fracture rate of crowns made with the pressable leucite-reinforced ceramic material IPS Empress and relate the results to the restored tooth type. **Materials and methods:** The database Medline has been searched for clinical studies with crowns made of IPS Empress. Additionally, raw data of two studies could be used for the analysis. Only crowns with an observation period of at least 2 years were included in the analysis. **Results and discussion:** Seven clinical studies were identified with 1361 crowns being adhesively luted (mean observation time 4.8 ± 1.4 years) and 30 crowns being luted with zinc phosphate (mean observation time 2.5 ± 0.5 years). Fifty-seven of the adhesively luted crowns fractured ($=4.2\%$) with the majority of fractures (62%) having occurred within the 3rd and 6th year. Molar crowns showed a statistically significantly higher fracture rate than premolar and incisor crowns (Kaplan Meier cumulative survival: molars 90%, incisors/premolars 96%; Log-rank test, $p < 0.05$). One molar crown fractured in the zinc phosphate group after 1.2 years. **Conclusions:** Adhesively luted Empress crowns showed a low fracture rate on incisors and premolars and a somewhat higher rate on molars and canines. The sample size of the conventionally luted crowns was too small and the observation too short to draw meaningful conclusions.

OP 007. Re-intervention in conservative dentistry
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Introduction and objectives: The aim of this study was to examine the characteristics of re-interventions (RI) related to defective restorations on vital teeth in everyday practice in Auvergne (France). **Materials and methods:** A random sample of private practitioners (n=100) was asked to record characteristics of 35 consecutive preventive or restorative treatments on vital permanent teeth, including patient characteristics, dental history, detection method, tooth treated, treatment (new placement, replacement, repair, prevention) or material used. **Results and discussion:** 26 dentists returned 921 forms. Of all therapies, 34% were RI, of which 95.2% were re-restorations, 2.9% polishing/refurbishing and 333 1.9% other options (2 partial replacements, 2 restoration extensions, 1 sealant and 1 other). The ratio “RI/all therapies performed” varied from 4.8% to 62.9% among the 26 participants. The primary reason for RI was the presence of secondary caries whatever the initial material considered (amalgams: 35.6%; tooth-colored restorations: 24.7%). Visual inspection was used for 47.6% of the RI and was associated with the use of an explorer for 35.8%. Radiographs were taken for 16.8% of the RI (14 panoramics, 33 periapicals, 6 bitewings). **Conclusions:** Non-invasive therapies and appropriate detection tools were rarely used. This shows the need for development and large diffusion of validated guidelines about the assessment and the management of defective restorations.

END 008. Calcium method of osteo – endo – cystic therapy
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Introduction and objectives: The “diastema” is no longer a dilemma. The Calcium Method of Osteo-Endo-Cystic Therapy now resolves this discrepancy at the midline. Spacing of the maxillary central incisors is commonly viewed as a cosmetic deviation treated with jaw surgery, orthodontics, restoration, and endodontia. Convention ascribes no infectious or odontogenic connection to the diastema and there seems to be no cyst. Yet, evidence confirms that it is a complex pathological condition. A nasopalatine cyst and a necrotic central become a major cause of periodontal disease, calculus, decay, and extensive dental breakdown. **Materials and methods:** Studies show that the cyst evolves from maxillary epithelial cells that proliferate into a nasopalatine duct at the midline and spill into the oral cavity. Often the duct is invaded by oral bacteria and cystic formation begins. The cyst expands, destroys bone, displaces teeth while its toxins drain into the mouth, and a low-grade, long-term dental breakdown ensues in adulthood. This entire process is reversed with site - specific, non-surgical osteopathic - endodontic - cystic therapy with calcium materials. **Results and discussion:** Over years of bacterial invasion, toxic drainage of the nasopalatine cyst between the centrals causes midline deviations, a diastema, and necrosis of an incisor. An innocent diastema becomes an oral disaster which is inadvertently overlooked, and then, is hidden with surgeries, restorations, orthodontic closure, and endodontia. The infectious dilemma is not resolved. Even surgical removal of the cyst or the tooth, or endodontic therapy on the tooth alone does not prevent cystic regeneration. **Conclusions:** The direct relation of bone, tooth and cyst does allow for rapid healing when both the cyst and the tooth are treated non-surgically with calcium materials. The treatment is based on long-standing calcium therapies.

MAT 009. Influence of experimental temporary cements on bond strength of composite to dentin.

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Table 1- Information regarding dental filling materials		
Material	Manufacturer	Main Components
Clearfil tri-S Bond	Kuraray, Germany	MDP, bis-GMA, HEMA, initiator, ethanol, stabilizer, filler, water
Clearfil Majesty Posterior	Kuraray, Germany	A light-cured nano-superfilled radioopaque restorative composite resin with a filler loading of 92wt% (82vol%).
Zeolite containing temporary cement	Experimental	50% ZnO, 30% Ca(OH) ₂ , 10% TiO ₂ , 10% zeolite (clinoptilolite), 0.33 ml. linoleic acid.
BHA containing temporary cement	Experimental	60% ZnO, 25% Ca (OH) ₂ , 7.5% TiO ₂ , 7.5% BHA, 0.33ml. linoleic acid

Introduction and objectives: The lack of sufficient biocompatibility to dentin of current temporary cements appeared to be the major driving force for the development of experimental materials. Zeolite, linoleic acid, hydroxyapatite derived from bovine bone (BHA) demonstrated improved biocompatibility. The aim of this study was to prepare temporary cements containing zeolite, BHA by the saponification of linoleic acid, to evaluate these cements' effects on the bond strengths to dentin of a composite material. **Materials and methods:** The mid-coronal dentin of the occlusal surfaces of 40 permanent third molars was exposed. Experimental cements were placed on dentin surfaces. Control samples received no treatment. After teeth were stored in distilled water for 7 days cements were mechanically removed. A composite material was applied on to the dentin surfaces. Shear bond strengths were recorded. Data (MPa) were subjected to a one-way analysis of variance (ANOVA), Tukey's test at a significance level of 0.05. B: Control; 17.30±1.37 MPa, BHA; 15.03 ± 3.44 MPa, Zeolite; 11.29±2.71 MPa. **Conclusions:** BHA cement did not reduce the bond strength of composite to dentin at least for short-term applications. Chemical properties of experimental temporary cements affect the shear bond test results. Prior application of zeolite containing cement in this formulation may cause a decrease in shear bond strength of composite to dentin.

PREV 010. Modeling fluoride recharge profiles of restorative materials.

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Introduction and objectives: The aim of this study was to compare various fluoride containing restorative materials' recharging capacities following topical fluoride applications by using linear regression analysis. **Materials and methods:** Specimens' intrinsic fluoride amounts into artificial saliva for six weeks were determined. Then the same specimens were divided into six subgroups and various topical fluoride treatments were applied. Re-released fluoride amounts were determined using an ion selective electrode and the data were statistically analyzed by using linear modeling technique. **Results and discussion:** Materials were found to be recharged with the applied topical fluoride treatments at different rates. The highest amount of fluoride was re-released by the material which had got the highest intrinsic fluoride release. Although the released fluoride amounts of the materials after recharge were different, their re-release profiles were found to be similar in which the release was initially fast and became slower in time. **Conclusions:** It was concluded that more than the applied topical applications' types, the frequency of the applications was a more important factor for obtaining optimum recharging ability of a material. Single linear modeling approach produces exact results and precise inference as well as it provides simplicity in calculations.

END 011. Failure and defects in MTwo rotary nickel-titanium instruments after clinical use.

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Introduction and objectives: In recent years, a number of rotary nickel titanium (NiTi) systems have been developed to provide better, faster and easier cleaning and shaping of the root canal system. Although the NiTi instruments are more flexible than the stainless steel files, the main problem with the rotary NiTi instruments is the failure of the instruments. The purpose of this study was to investigate the defects observed on NiTi rotary instruments discarded after clinical use. **Materials and methods:** Three hundred and seventy-four Mtwo (VDW, Munich Germany) rotary NiTi instruments were collected which were discarded after normal clinical usage in 9 months time in the clinic of restorative dentistry and endodontics. The instruments were discarded because of fracture, defects such as unwinding, curving or bending observed with naked eye. Moreover, the clinicians strictly told not to use files more than 4 times or discard them after 2 times use in curved canals. The length of discarded files was measured using a caliper to determine any fracture. Then each file was inspected under a stereomicroscope. **Results and discussion:** The most frequently discarded files were # 10.04 (74) and # 15.05 (75) files followed by # 20.06 (63) and # 25.06 (68) files. Defects were observed in 30.21 % of the files collected and major defect was fracture (20.86 %). The highest percentage of defects was found in #10.04 and # 15.05 files. The highest percentage of fracture was also seen in #10.04 files (35.13 %). **Conclusions:** In conclusion, relatively high incidence of deformations was observed in # 10.04 and # 15.05 files. Therefore, instruments should be checked before each use and it is important not to exceed the maximum number of usage recommended by the manufacturer.

OP 012. Randomized clinical trial of in-office dental bleaching with or without light activation

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Introduction and objectives: To evaluate the effect of four in-office dental bleaching methods on color change, color stability, patient satisfaction and postoperative sensitivity. **Materials and methods:** Forty patients selected according to pre-established criteria, were randomly divided into four groups (n=10): Group A- 35% Hydrogen Peroxide (HP); Group B- 35% HP Plus Brite smile® blue Curing Light; Group C- 35% HP plus Quick smile® LED Curing light; Group D- 35% HP plus Zoom 2® metal halide curing light. For all groups, there was only one session of bleaching with 3 applications of bleaching gel for 20 minutes each. Shade was evaluated before bleaching, immediately after, and one month after treatment using VIT Classical Shade Guide®. **Results and discussion:** Immediately after bleaching there was statistically significant difference in color change between the four bleaching methods ($p=0.012$), where Group B showed the best results. At 1 month there was no statistically significant difference between the four groups. Immediately after bleaching there was a statistical difference in dental sensitivity between the four bleaching methods ($p=0.004$), with Group A showed the least sensitivity and Group B was the highest. There was also a statistical significant difference between the four groups in patient satisfaction ($p=0.015$) with Group B was the most satisfactory to the patients. **Conclusions:** Using light activation with In-office bleaching seems to increase the efficacy of the treatment only for short period.

OP 013. Survival rate of maxillary and mandibular anterior veneer restorations made of the pressable ceramics Cergo® after 36 months in situ

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Introduction and objectives: This study evaluated retrospectively the survival rate of anterior veneer restorations made of a pressable ceramics (Cergo, DeguDent) in a private practice. **Materials and methods:** 37 patients (21 female, 16 male, age 20 – 70) were restored with Cergo veneers in the upper and lower jaw (13-23, 33-43). The teeth to be veneered were unfilled or only had minor composite restorations (maximum 2 surfaces). One dentist restored a total of 130 teeth. Distribution of the veneers in the maxilla (n=76): 13: n=10, 12: n=13, 11: n=16, 21: n=17, 22: n=14, 23: n=6; in the mandible (n=54): 33: n=8, 32: n=9, 31: n=9, 41: n=9, 42: n= 10, 43: n=9. Adhesive cementation was performed with an etch & rinse adhesive (Optibond FL, Kerr Hawe), and a dual cement (Variolink Ivoclar VivaDent / Calibra, Dentsply DeTrey). **Results and discussion:** After 36 months, the survival rate according to Kaplan-Meier was 96.4 %. Reasons for failure were 3 fractures of the veneering ceramics and 1 biological failure. 94.6% of the restorations were in service without any clinical intervention, interventions were necessary in 3 cases (2 re-cementations, 1 endodontic treatment). **Conclusions:** Anterior veneer restorations made of the pressable ceramics Cergo showed a high survival rate and a low technical and biological complication rate after this time. **Acknowledgements:** Supported by DeguDent, Hanau, Germany.

OP 014. The effect of peroxides on dentine: atomic force microscope observation.

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University of Valencia

Introduction and objectives: Different tooth whitening agents work by different mechanisms, the most commonly used agents work by oxidation. Both hydrogen peroxide and carbamide peroxide can alter the tooth surface. Atomic force microscope was used to assess the effect of peroxides on intertubular and peritubular dentine. **Materials and methods:** 30% carbamide peroxide and 35% hydrogen peroxide were applied to tooth surfaces in crown sectioned molars. Nanoindentation tests were done at 800 points in the intertubular and peritubular dentine before and after application of the whitening agents. An atomic force microscope was used and the rigidity and strength of adhesion was measured. **Results and discussion:** 35% hydrogen peroxide produces more nanostructural changes in dentine. A decrease in both rigidity and adhesion strength was observed with both peroxides, in both the intertubular and the peritubular dentine. **Conclusions:** Both whitening agents produce nanostructural effects in dentine.

CLIN 015. In-office tooth whitening: chemical activated “versus” light activated

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Introduction and objectives: In-office tooth whitening procedures can be useful to treat severe tooth discolorations with considerable success in most cases. **Materials and methods:** 120 patients' teeth with moderate or severe discolorations were whitened in-office. Chemical activated and light activated techniques were used with a specific whitener for each technique, Bright White -Kalma- and Quick White -Quick White- respectively, both consisting of 35% hydrogen peroxide. The average percentage of whitening achieved was calculated at the end of the treatment and after a week for each technique, using the Vita Lumin Vacuum Classical® (Vita) organized according to luminosity. **Results and discussion:** Average percentage of whitening at the end of the treatment for the light activated technique was 39.49 and 33.63 for the chemical activated technique and after a week it was 17.80 for the light activated technique and 25.25 for the chemical activated technique. **Conclusions:** Both products were found to be efficient, although a higher degree of whitening was achieved with the light activated product and there was less recidivism after one week with the light activated technique.

PREV 016. μ -CT detection of non-cavitated caries lesions.

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University of Valencia

Introduction and objectives: The detection of non-cavitated caries lesions is very important for highly conservative treatment. This study aims to evaluate the capacity of CT for early detection of caries lesions. **Materials and methods:** μ -CT (Skyscan 1172) was used to scan three teeth with carious lesions (white spot). In each affected area tomographic sections with 7.9 μ m separation between them were made. Image density was calculated and mineral density was measured using hydroxyapatite calibration on caries and healthy areas. **Results and discussion:** The mean density images and the hydroxyapatite equivalents in the specimens are (in the caries areas): 1) 231.3 and 1.3; 2) 229.7 and 1.4; 3) 248.4 and 1.5 respectively. Average image density loss in the caries areas was 5.4% in relation to the healthy areas. Mineral loss (hydroxyapatite equivalents) in the lesions was 3.1% in comparison to the healthy areas. **Conclusions:** μ -CT can be used to establish the densitometric characteristics of a non cavitated caries lesion, differentiating between caries and healthy area.

OP 017. Comparative study of two electronic devices for assessing tooth colour.

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Introduction and objectives: There is a need for the objective, reproducible measurement of colour in clinical dentistry. The various electronic devices currently available for measuring colour may provide a suitable solution. We evaluate the reproducibility of in vivo tooth colour measurements obtained using two electronic devices (Easyshade© -Vita- and Spectro Shade Micro -MHT-). **Materials and methods:** Colour was measured three successive times in six anterior maxillary teeth in ten patients with each instrument. Reproducibility was calculated in at least two of the three shade measurements. Concordance was calculated using Cohen's Kappa test. **Results and discussion:** The reproducibility was 96.1% for Easyshade and 95% for Spectro Shade Micro. Concordance was 81.7% for Easy Shade and 63.5% for Spectro Shade Micro. **Conclusions:** Both colorimeters showed 90% reproducibility for "in vivo" tooth colour assessment. Easyshade showed higher concordance.

END 018. Alterations in Protaper instruments after continuous use

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University of Valencia

Introduction and objectives: NiTi instruments can also be separated. Fractures and wear of ProTaper instruments are evaluated by MEB. **Materials and methods:** 30 curved canals were selected. After permeabilising them, the ProTaper sequence recommended by the manufacturer was used, with OCINa as irrigant. The instruments were sterilised after every three canals were shaped. Each instrument was observed with MEB before and after preparation of each canal up to a total of 30, recording: separation of the instrument, visible and microscopic defects, nicks in the cutting edges, breaks in the cutting edges, microfractures, fatigue cracks, metal remains, manufacturing defects and dentine remains. **Results and discussion:** Only microscopic defects were found such as: cutting edge breaks (up to 70%), fatigue cracks between 33 and 100%. No microfractures were found. Metal remains were found on all instruments. An S1 and an SX file were fractured. Dentine remains were found on all the instruments after use and some sunken edges were observed. **Conclusions:** Under the study conditions it has been found that ProTaper instruments can be used more than once.

OP 019. Confocal microscopy study of marginal adaptation of different bonding systems in bleached teeth

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University of Valencia

Introduction and objectives: The aim of this study is to analyze marginal adaptation, using confocal microscopy (CM), of two self-etching and two one-step adhesives in human teeth bleached with 22 % carbamide peroxide (CP) and 37% hydrogen peroxide (HP), connected to a permanent intrapulpal pressure device. **Materials and methods:** 40 human teeth were chosen, one half were treated with CP 22%, and the other half with HP 37%. Each half was divided in 4 groups, 5 teeth each, with two cavities in each one, and were restored with Xeno V/TPH Spectrum, AdheSE One/Tetric EvoCeram, Excite/ Tetric EvoCeram and XP Bond/TPH Spectrum. During the restoration procedure all specimens were connected to a permanent intrapulpal pressure device. All specimens were sectioned in 1 mm slices and observed with the CM. We measured the perimeter of the cavity without adhesive for each group and compared them with a one-way ANOVA test. **Results and discussion:** The adhesive systems evaluated were not significantly different. Bleached teeth with HP showed significant better marginal adaptation than those bleached with CP ($p < 0.05$). **Conclusions:** All the studied adhesive systems exhibited a similar behavior. The previous bleaching treatment was determinant for the work of the marginal adaptation.

PREV 020. Cariogenic dietary habits of a school population in Valencia (Spain)

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University of Valencia

Introduction and objectives: The study analyses the consumption of cariogenic foods in a population of children between 6 and 10 year olds. **Materials and methods:** Transversal descriptive study on a sample of 369 children who first attended to the Department 9 Dentistry dental office of the Valencia Region Health Agency (Spain). A self-administered food consumption frequency questionnaire was used to evaluate how often the foods on the list were consumed by the children. **Results and discussion:** Sticky sugar-rich foods, sugared milk and dairy products, foods containing starch and sugar, sugary liquids and foods with semi-hydrolysed starch were consumed by over 50% of the sample at main meals and between meals. The mean intake of all these food groups, was over five times a week. The older children ate more fruit and foods rich in semi-hydrolysed starch at main meals. Sweetened medication significantly reduced with age. Sugar-free sweets were consumed by almost 60% of the sample. The study shows a high intake of foods with cariogenic potential, in particular processed foods with added sugars and foods with semi-hydrolysed starch consumed between meals. **Conclusions:** These results suggest there is a need to provide health education programmes directed at improving the diet of the region's infant and juvenile population. **Acknowledgements:** The study was supported by a research grant from the Generalitat Valenciana (Valencian Government)

OP 021. Bacterial growth on four posterior restorative materials treated with different finishing techniques

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Introduction and objectives: The aim of the study was to evaluate the efficacy of finishing techniques applied to different posterior restorative materials. The assessment was based on the bacterial colony adhesion count in an “in vitro” study. **Materials and methods:** Four restorative materials were chosen: a dental porcelain (Premium Porcelain EX-3, Noritake, Aichi, Japan), a micro-hybrid resin composite (Enamel plus HFO, Micerium, Avegno-GE, Italy) a flowable resin composite (Enamel plus HFO, Micerium, Avegno-GE Italy), and a polycarbonate material (Sculpture, Generic Pentron, Wallingford-CT, USA). Finishing devices were: diamond burs (40 µm grit), diamond pastes (1-3 µm grit), liquid polish for ceramic and resin composite (Biscover LV, Bisco, Schaumburg, IL-USA). Standardized cylindrical specimens were used (7mm wide, 4mm thick). The microbial pattern was formed by periodontal and cariogenic bacteria. Specimens were inoculated in Petri dishes with agar with a calibrate suspension of 10000 C.F.U. One-way analysis of variance (ANOVA) was computed to determine significant differences with a $p < 0,05$ value. **Results and discussion:** The lowest bacteria-rate recorded was obtained in the glazed porcelain specimens. The highest value was showed by polycarbonate specimens finished with the diamond bur. Liquid polished micro-hybrid resin composite showed similar results obtained with glazed porcelain. The flowable resin composite surface cured under a Mylar matrix appeared smooth and shiny. The same restorative material finished with diamond discs showed high bacterial retention. **Conclusions:** Glazed porcelain still represents the best therapeutic choice. Applying liquid polish resins reduces statistically the number of bacteria. Delaminating of the polycarbonate material occurred often in the test, creating a rough bacterial-retentive surface. Thus, within the limits of the study, glazed dental ceramic and glazed resin composite should be preferred in caries-receptive patients

OP 022. Profilometric and SEM evaluation of restorative cavity margins finished with rotary and sonic instruments. An in vitro study.

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Introduction and objectives: The aim of the study was to evaluate the efficacy of rotary and sonic cavity walls finishing techniques of Class II indirect resin composite restoration. SEM and profilometric analysis were used in an “in vitro” study. **Materials and methods:** After Class II indirect resin composite preparation with a fissure diamond bur (107µm grit), teeth were divided into four groups, and finished with (group A) cylindrical diamond bur (46 µm grit) (group B) cylindrical diamond bur (25µm grit), (group C) cylindrical carbide bur (12 flutes), (group D) sonic diamond tip (25µm grit). A Taylor Hobson Taliscan T500 profilometer was used. 2D and 3D reconstructions were obtained and analyzed with a double-blinded test. SEM images were then obtained to evaluate the surface under different magnification: 50x, 250x, 500x. Surface Average Roughness (Ra) and Profile Length Ratio (RZ) values were statistically analyzed by two-way and one-way ANOVA tests. Additional qualitative assessment of the finished enamel/dentin surfaces was done by scanning electron microscopy (SEM). **Results and discussion:** Diamond burs (either 46µm or 25µm grit) showed grooves on the surfaces, apparently due to the diamond fine grit apposition on the bur working surface. Carbide bur showed the best result regarding smoothness and finishing precision. Sonic tip showed similar results of the 25µm diamond bur regarding cavity walls finishing precision. On the contrary, the longitudinal sonic movement could not be totally controlled by the clinician, resulting in deeper grooves on margin walls. **Conclusions:** Within the limits of the study, considering surface smoothness, finishing preparation and clinical simplicity of use, rotary carbide burs has to be considered the first choice in indirect composite restoration cavity walls finishing.

CLIN 023. Ceramic selection in Esthetic Dentistry. One mouth, different materials

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Introduction and objectives: All ceramic systems have evolved dramatically over the last 20 years. Selection of the appropriate materials requires the clinician to have a complete understanding of the biomechanical and optical properties of the ceramic material that may affect their use in different clinical situations, including preparation design, delivery, insertion procedure (cementation) and the needs of the patient. In some clinical scenarios one material will suffice, whereas in others, different types of materials may be used successfully. **Materials and methods:** Two patients were treated. Each one with different types of free-metal ceramics on the anterior teeth. Patient A: with feldspathic porcelain laminate veneers on 13-12-11 and alumina-based crowns on 21-22. Patient B with feldspathic porcelain laminate veneers on 13-12-11 and zirconium-based fixed partial denture on 21-22-23. **Results and discussion:** The functional and esthetic results were successful using different types of non-metal ceramic restorations. Porcelain laminate veneers on the teeth which required less restoration and the adhesive cementation was the best option. Alumina based crowns on those teeth without enamel, where the conventional cementation was the best option. Zirconium-based restorations to make fixed partial dentures. **Conclusions:** Different type of ceramic materials can be used on the anterior teeth successfully if the clinician chooses the most adequate on each case.

MAT 024. Relation between antagonist properties of a micro-hybrid composite after curing

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Introduction and objectives: Shrinkage stress, degree of cure and mechanical properties are antagonist properties, forcing to a compromise between an adequate curing and low stress at the interface tooth-restoration. The purpose of this study was therefore to quantify these relations in view of a micro-hybrid composite.

	Shrinkage	Gel-point	DC	HV/E
Time	.711	.898	.147	NS
Irradiation	.911	.207	.216	NS

Materials and methods: The development of degree of cure (DC) in real time at depths of 2 mm and 6 mm, the shrinkage stress and the curing time until gelation, as well as the variation of mechanical properties (HV-Vickers hardness and E= Modulus of elasticity) with depth within 6 mm were analyzed after curing a micro hybrid composite (EsthetX) with 13 curing regimes of one halogen and three LED curing units. The influence of the parameters: 'cure-time' and 'Irradiation' as well as their interaction products were analyzed in an ANOVA multivariate test. Shrinkage, gel-point, DC, HV and E were selected as dependent variables. **Results and discussion:** The partial eta squared statistic (Table) reports the practical significance of each term, based upon the ratio of the variation accounted for by the effect. Larger values of partial eta squared indicate a greater amount of variation accounted for by the model effect, to a maximum of 1. **Conclusions:** In the present study, it was shown that the soft-start polymerization concept is still valid, even with high-power LED curing units. A soft cure polymerization resulted in reduced shrinkage stress while simultaneously keeping the degree of cure and mechanical properties constant.

OP 025. Effect of different light sources on microleakage of composite resins with different monomer structures

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Introduction and objectives: The purpose of this study was to compare the microleakage of a silorane-based and two dimethacrylate-based composite resin restorative materials upon exposure to different light sources. **Materials and methods:** For the purpose of this study, standardized class V-cavities (3mmX1,5mm) were prepared both buccal and lingual surfaces of forty five human third molar teeth. The specimens were divided into 3 groups and restored with a nanofill (Aelite, Bisco), microhybrid (InTen-S, Ivoclar) and silorane (Filtek Silorane, 3M ESPE) based composites. S3 bond (Kuraray) was applied in combination with Aelite and InTen-S as well as Filtek Silorane was used with Silorane Bond (3M ESPE) according to the manufacturer instructions. Subsequently the groups were divided into three subgroups and polymerized with three different light sources(LED 550, LED1055,QTH). After finishing-polishing and thermocycling, the teeth were immersed in 0,5% basic fuchsin dye for 24 hours. Dye penetrations were evaluated at x25 magnifications with a stereomicroscope. The data were analyzed with Kruskal-Wallis and Dunn tests ($\alpha = 0.05$). **Results and discussion:** The results were statistically significant ($p=0,006$). Silorane combination with Led 1055 showed the lowest microleakage scores. **Conclusions:** The silorane showed the least microleakage among the study groups. Silorane based composite resin differs from other composite resins with its ring opening chemistry, but well designed clinical studies needed for evaluation these materials's success. **Acknowledgements:** Special thanks to Dr.Y. BEK for the statistically analysis.

OP 026. The Effects of toothpastes on surface roughness and microhardness of nanocomposites

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Introduction and objectives: Despite oral hygiene benefits, tooth brushing with toothpastes can negatively affect surface properties of composites. The aim of this study was to evaluate the effects of brushing with toothpastes (one regular, two whitening) on surface roughness and microhardness of two nanocomposites. **Materials and methods:** Eighty specimens of each composite resin (Grandio, Filtek Supreme XT) (6x2 mm) were prepared for both tests ($n=40$ each test) in plexiglass molds covered with Mylar strips. After polymerization and saliva storage (at 37°C, 24 h), ten specimens per group received no treatment for both tests (control). Remaining specimens of each composite were randomly divided into 3 groups ($n=10$) subjected to 4 sessions of 10 minute brushing with 2h intervening interval using three toothpastes: Signal White Now, Butler Gum, Crest. Pre and post-brushing surface roughness (Ra) and microhardness(VHN) of all the specimens were determined using a profilometer and a microhardness tester, respectively. Data were analyzed statistically. **Results and discussion:** All the toothpastes used increased surface roughness of the composites. Roughness differences were not significant between composites for each toothpaste ($P>.05$). Microhardness of both composites was not negatively affected from the toothpastes compared to control ($P>.05$). **Conclusions:** Surface roughness of nanocomposites was affected from toothpastes used, but the magnitude of difference appear to be small and of little clinical significance.

STUD 027. Restoration of chemically abraded teeth with resin composite veneers. A case report

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Introduction and objectives: Oral occupational hazards of chemical origin are a well-documented group of adverse reactions observed in people exposed in corrosive and irritating solutions and gases. Such cases although rare are a challenge in management. **Materials and methods:** A 57-years of age woman proceeded in the Total Patient Care Clinic, Faculty of Dentistry, University of Athens, with abraded labial surfaces in all upper and lower teeth, resulting in a serious aesthetic and functional problem. The history completion revealed a 25-years exposure to baking ammonia. Alternative restorative procedures were examined and the direct resin composite veneers were assessed as the most conservative and reliable technique. Finally, polyethylene splints were constructed, special written instructions were given to the patient for the protection of the veneers against the chemical exposure and a follow-up program has been scheduled. The first follow-up appointment has taken place after 8 months. **Results and discussion:** The clinical steps and technical details of the restorations conducted will be presented and discussed as well as the protocols recommended for the management of such clinical cases. **Conclusions:** Nowadays dentistry earns benefits from improvement in strength and aesthetic performance of contemporary resin composites. As a result, extended dental tissue loss can be restored under a conservative approach.

CLIN 028. Using of dental composite els® in aesthetic closing diastema

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Introduction and objectives: Diastema is a space or gap between two teeth, commonly between two upper incisors. The abnormal bite, uncorrected teeth and oversized labial frenum can cause diastema. Indications to closing diastema are mainly aesthetic reasons. The treatment can be provided by three methods: orthodontic, conservative – closing by used dental composites or prosthetic – by using veneers or crowns. The conservative method of closing diastema with a used of a new generation composites allows to make an aesthetic treatment during one visit and save healthy tooth's tissues according to minimally invasive dentistry rules. The aim of the study was to assess the usefulness of the extra low shrinkage microhybrid dental material – els® (Saremco, Switzerland) in aesthetic closing diastema. **Materials and methods:** The aesthetic correction was done among male and female adult patients with a diastema from 3 to 6 mm between incisors. In depending on the size of diastema the partial or total closing was done to achieve the ideal cosmetic effect. Tooth's tissues were prepared with a special diamond bur, and after etching and bonding the aesthetic restoration with a use of celluloid or silicon matrix was performed. **Results and discussion:** The material smoothly adapted to tooth's tissues and thanks to its chameleon effect polishing was great. The obtained clinical effects were highly assessed by both, dentists and patients. **Conclusions:** The application of a new technology and extra low shrinkage dental material seems to be an effective and minimally invasive method of closing diastema. The presented method seems to be an alternative treatment for the invasive prosthetic reconstruction.

OP 029. Shear bond strengths of restorations applied to enamel-dentin fractures: An in vitro study

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Introduction and objectives: Study was designed to evaluate shear bond strengths of several types of restorations applied to uncomplicated enamel-dentin fractures in permanent incisors. **Materials and methods:** Forty human mandibular incisors were divided into four groups. Incisal edges in three groups were cut off up to 2,5 mm, representing an uncomplicated enamel-dentin fracture surface. In Group 1, edge fragments were reattached by low-viscosity composite (Filtek Flowable Supreme XT). In Group 2, teeth were restored with universal resin-composite (Filtek Z 250). In Group 3, before resin-composite restorations, pre-impregnated glass-fiber sheet (everStickNet) was positioned onto fractured surface. Three-step adhesive system (Adper Scotchbond Multi Purpose) was used in all test groups. Sound teeth in Group 4 were controls. Shear bond strengths of all samples were determined in universal test machine and failure types were observed by stereomicroscope. **Results and discussion:** Shear bond strength of sound teeth was significantly higher than the restored ($p < 0.05$). Mean shear bond strengths of the reattached teeth were lower than the other two restoration types, however differences were not statistically significant ($p > 0.05$). **Conclusions:** Shear bond strengths of restoration types were not as strong as sound teeth. However, success of different types of restorations seems close to each other.

OP 030. Tooth-composite-interface on human molars with nanofiber-reinforced adhesive layer

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Introduction and objectives: Assessment of microleakage, tooth-composite interface and shear bond strength with/without nanofiber-reinforced adhesive layer (Polyethylene terephthalate, PET). **Materials and methods:** A) N=8 caries-free, extracted human molars, 2 mixed class V cavities on each of the teeth, restoration of each with Solobond M/Amaris®2 (manufacturer's instruction, G1) and Solobond M+PET/Amaris (G2, nanofibers on the cavity bottom). Microleakage test (ML, AgNO₃) and scanning electron microscopy: formation of adhesive layer and resin tags (enamel, dentin), peri-/intertubular resin penetration, cleft formations. B) Composite specimens on flat vestibular/oral surfaces of enamel/dentin (n=8 each) with/without PET, shear bond strength measurements (SBS, Zwick 1002, ISO). Statistics by U-Test ($\alpha < 0,006/0,025$, Bonferroni-Adj.). **Results and discussion:** A) ML in G1/2 on enamel (90%/68%) and dentin (71%/73%) non-significantly different; in both groups all typical interaction features on enamel/dentin, non-significantly different, marked formation of adhesive layer on enamel (G1/2: 82%/94%) and dentin (89%/92%), peritubular penetration up to 4,0/4,9µm, hybrid layers (d1,2: 3,4/4,0µm) partially incomplete (73%/78%), adhesive defects are regular. B) SBS on enamel (G1/2: 19/20 N/mm²) non-significantly different, on dentin (16/11 N/mm²) in G1 significantly increased. **Conclusions:** Nanofiber-reinforcement of the adhesive layer did not enhance the integrity of the tooth-composite-interface and the shear bond strengths. **Acknowledgements:** Voco GmbH (Cuxhaven, G), supply of materials/equipment for bond strength measurements.

MAT 031. Chemical analysis of MTA and Portland cement

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Introduction and objectives: The aim of the present study was to evaluate the heavy metal contents and chemical composition of MTA (tooth colored formula), gray Portland cement (GPC), white Portland cement (WPC) and fast setting cement (FSC). **Materials and methods:** About 0.5 g of each tested materials was digested with 10 ml of concentrated HNO₃ and filtered. Inductively coupled plasma mass spectrometry (ICP-MS) was used to analyze 10 heavy metal contents. Argon Plasma (6000K) was used with RF Power 1150W. Sample injection flow rate was 0.90 ml/min. The relative proportions of elements were identified with inductively coupled plasma atomic emission spectrometry (ICP-AES). The concentration of the samples was calculated using the line equation obtained from the evaluation of the standards. **Results and discussion:** The ICP-MS showed the chemical composition of MTA and WPC to be similar except for the presence of Bi and the absence of Pb in MTA. Both contained far less heavy metals than GPC and FSC. By ICP-AES analysis, the main element that composes all tested materials was Ca. WPC showed the highest fluoride content among all tested materials. **Conclusions:** MTA and white Portland cement contained far less heavy metals than gray Portland cement and fast setting cement. White Portland cement presented the highest fluoride content.

END 032. Fracture resistance of vertically fractured teeth which were repaired with dual cure resin and post inserted across the fragments of the fractured teeth

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Introduction and objectives: The purpose of this study was to investigate the resistance to re-fracture of vertically fractured teeth which were repaired with various methods. **Materials and methods:** 40 extracted human premolars were used in this study. After inducing complete vertical fractures, the fragments were bonded with bonding resin in control group and fixed with brasswire in the experimental groups . After endodontic treatment, the pulpal spaces of teeth in experimental group 1 were filled with core resin and para-post across the fractured fragments. Those in experimental group 2 and 3 were filled by core resin and bonded amalgam, respectively. Those in control group were filled with core resin. The ratio of re-fracture resistance to original fracture resistance was calculated and analyzed with Kruskal-Wallis test and multiple comparison test using ranks. **Results and discussion:** The results showed that teeth restored with resin and post showed significantly higher resistance to those with bonded amalgam ($p = 0.0083$). **Conclusions:** Through the present study, resin cements, rather than bonded amalgam, are suggested to be used to prevent re-fracture of vertically fractured teeth. Moreover the use of post can be considered to enhance the fracture resistance of the repaired tooth.

MAT 033. Two-year clinical prospective evaluation of zirconia-based lava Posterior 4-unit FPDs.

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Introduction and objectives: The aim of this prospective study was to evaluate the clinical performance of zirconia based (Lava) posterior 4-unit fixed partial dentures (FPDs) after 2 years of clinical observation. **Materials and methods:** Sixteen 4-unit FPDs were placed in 7 patients. Eight FPDs were placed in the maxilla and eight in the mandible. Two calibrated examiners evaluated the FPDs independently 1 week (baseline), 6 months, 1 year, and 2 years after placement using the California Dental Association quality evaluation system. Periodontal health was assessed on abutment teeth and contralateral control teeth. Periodontal indices utilized were plaque index, gingival index, probing attachment level, and margin index. **Results and discussion:** One restoration was lost due to a fracture on the distal connector after a clinical service time of 5 months. Also, one abutment tooth was extracted because of root fracture. Thus, after 2 years, the survival rate of the Lava posterior 4-units FPDs was 87.5%. Regarding the CDA ratings, the restorations were evaluated as satisfactory. Chipping of the veneering ceramic was found in 14% of cases. There were no significant differences between the periodontal parameters on the test and control teeth. **Conclusions:** The 2-year results indicate that Lava 4-unit FPDs can be a suitable alternative for use in posterior fixed prosthodontics. Proper tooth preparation and carefully performed clinical and technical procedures are of outmost importance in order to obtain satisfactory results. Further studies must be performed to establish the advisability of these restorations.

OP 034. Bond strength of composite luting cement to zirconia ceramic

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Introduction and objectives: Aim of this study was to investigate tensile bond strength (TBS) after fusing a thin layer of feldspathic ceramic to zirconia surfaces. Additionally, the influence of two luting materials on TBS was examined. **Materials and methods:** Zirconia ceramic specimens (112) were industrially fabricated (gapless, D) and divided in four groups. In Group 1 surfaces were coated with experimental feldspathic ceramic, fused with vacuum; in Group 2: with the same ceramic, fused without vacuum; in Group 3: with a commercially available liner for zirconium oxide cores; in Group 4 (control): surfaces were abraded with airborne particles (50µm Al₂O₃). Hollow screws filled with composite resin were bonded to the ceramic discs, half with conventional composite resin (Calibra) and half with phosphate-monomer-containing resin (Panavia F 2.0). Tensile bond strength was measured. For statistical analysis ANOVA and multiple comparisons of least-square-means were used. **Results and discussion:** Bond strength ranged between 18.3MPa and 49.3MPa. All kinds of ceramic layers reduced the TBS compared to airborne particle abrasion significantly ($p \leq 0.0001$). There were no differences between the experimental coatings, and between the luting materials concerning TBS. **Conclusions:** Coating of zirconia ceramic surfaces with different ceramic layers did not increase bond strength of resin cements to the ceramic surfaces compared to only air abraded surfaces.

OP 035. Microleakage of repaired class V composite restorations after Er:YAG laser and diamond bur preparation

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Introduction and objectives: The aim of this in vitro study was to compare the microleakage of repaired ClassV resin composite restorations prepared by Er:YAG laser and diamond bur. **Materials and methods:** ClassV cavities were prepared with Er-YAG laser on 64 intact human molar and were randomly divided into 8 groups. Cavities were restored with the CeramX Duo (Dentsply) or Filtek Silorane (3M/ESPE) after applying XP Bond (Dentsply) or Adhesive System Silorane (3M/ESPE). After the specimens were aged for 7 days, new cavities adjacent to the old restorations were prepared with Er:YAG laser and diamond bur (Comet). Cavities were treated with 36% ortho-phosphoric acid followed by adhesive system XP Bond or Adhesive System Silorane, and repaired with CeramX Duo or Filtek Silorane. They were immersed in silver nitrate dye and then were sectioned using low speed saw machine. Microleakage was evaluated by a stereomicroscope and scored for interface between old restoration and repair material. Data were statistically analyzed by One Way ANOVA and Bonferroni Post Hoc tests. **Results and discussion:** Even though no statistically differences were found between any groups, cavities repaired with different restoratives showed slightly microleakage especially Er:YAG Laser groups ($p>0.05$). No microleakage scores were obtained Filtek Silorane/Filtek Silorane and CeramX /CeramX repaired groups. **Conclusions:** All the materials tested can be used as a repair material after Er:YAG laser and diamond bur.

OP 036. Evaluation of diagnostic methods in detection of initial proximal caries
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Introduction and objectives: This study compares the diagnostic efficiency of clinical examination under ICDAS II criteria and of several x-ray techniques in detection of initial proximal caries. **Materials and methods:** Caries-affected proximal surfaces with no enamel breakdown in extracted premolars and molars (n=40) were subjected to clinical examination and coding according to ICDAS II criteria. Standardized radiographic images were taken by E-speed film (conventional) and by digital radiography. Furthermore, images were obtained with a micro-CT scanner. Assessment of proximal caries in all diagnostic methods was performed by two evaluators. The caries lesions were validated in tooth sections by histological examination. The sensitivity, specificity, accuracy, positive and negative predictive values were calculated for each diagnostic method. The inter-examiner agreement per method was measured using kappa-Cohen statistical test. Degree of agreement of each method with the histological results was calculated using receiver operating characteristic (ROC) statistics.

	Conventional RX		Digital RX		Micro-CT		Clinical exam. (ICDAS II criteria)	
Examiner	1	2	1	2	1	2	1	2
Sensitivity	0,46 (0,26-0,66)	0,5 (0,29-0,70)	0,45 (0,26-0,66)	0,5 (0,29-0,7)	0,83 (0,61-0,94)	0,85 (0,65-0,95)	0,96 (0,76-0,99)	0,92 (0,71-0,98)
Specificity	1 (0,75-1)	0,93 (0,67-0,99)	1 (0,75-1)	0,93 (0,67-0,99)	0,875 (0,6-0,97)	0,9 (0,65-0,98)	0,5 (0,25-0,74)	0,625 (0,35-0,83)
Accuracy	0,675	0,675	0,675	0,675	0,875	0,875	0,775	0,8
Positive predictive value	1 (0,75-1)	0,92 (0,67-0,98)	1 (0,74-1)	0,92 (0,67-0,98)	0,90 (0,72-0,97)	0,90 (0,72-0,97)	0,74 (0,56-0,86)	0,78 (0,6-0,89)
Negative predictive value	0,55 (0,37-0,71)	0,55 (0,37-0,72)	0,55 (0,37-0,71)	0,55 (0,37-0,71)	0,77 (0,54-0,90)	0,83 (0,60-0,94)	0,89 (0,56-0,98)	0,83 (0,55-0,95)

Results and discussion: The sensitivity, specificity, accuracy, positive and negative predictive values are presented in the Table (expressed as mean and CI). The kappa coefficient values (mean±SE) were 0.76±0.11, 0.77±0.12, 0.89±0.06 and 0.71±0.09 for conventional, digital radiography, micro-CT and clinical examination, respectively. The areas under the ROC curves were higher in micro-CT and clinical examination than in conventional and digital radiographs. **Conclusions:** Clinical examination and micro-CT methods showed higher diagnostic efficiency in detection of initial proximal caries than the conventional and digital radiography.

END 037. Influence of the patency file in the removal of the smear layer in the apical third

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Introduction and objectives: The use of rotary instruments increases the amount smear layer in the canals. The aim of this study is to check if the use of the patency file has any influence in the removal of the smear layer in the apical third of the canal. **Materials and methods:** Human teeth with single canal roots have been used. The working length was determined with a k-file #10, one millimeter less of the measure obtained when the file was observed through the apical foramen. The crowns were separated from the root at the cement-enamel junction with diamond disc. 30 roots were randomly distributed in two groups. In group 1 the patency was practised (with a K-file #10) during the entire instrumentation in between files, while in group 2 this technique was not used except the negotiation of the canals. All samples were prepared up to a K-flexofile #15 to obtain a correct glide path, and then they were instrumented with Protaper® system (Dentsply, Maillefer) up to a F2 file (apical size #25). Sodium hypochlorite 5,25% and EDTA 17% were used as irrigants, 1 ml of each solution between each file. Teeth were cut after the instrumentation and observed under electronic microscope in order to evaluate the amount of smear layer in the apical third. **Results and discussion:** The results showed differences between groups. In group 2 (no patency) the apical constriction was plugged with pulpar tissue and debris, and the presence of smear layer was bigger than observed in group 1 (patency). In group 1 the apical constriction was clean, although we could still find traces of pulpar tissue and smear layer in the walls of the root canal. **Conclusions:** The use of patency file decreases the amount of smear layer in the root Canals.

END 038. Validation of radiograph technique in gutta-percha obturated and diaphanised teeth

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Introduction and objectives: Compare the lengths of the gutta-percha in radiographs with the actual lengths in 56 teeth with endodontic treatment and diaphanised in order to evaluate whether the anatomical location of the apical foramen can affect precision of either methods.. **Materials and methods:** All the canals were x-rayed, instrumented with manual and rotary systems (Pro Taper) and filled with gutta-percha. The cavities were sealed and the teeth were diaphanised. After that the cases were analysed and gather data. Lastly, a statistical analysis of the results was performed. **Results and discussion:** The length in radiographs was short in 26.9%, correct in 39.3% and long in 33.9%. The actual length was short in 16.1%, correct in 37.5% and long in 46.4%. The relationship between the two shows that the actual length was greater or equal to the radiograph length but without significant differences. In the centered foramen (60.7%) the gutta-percha had an apical constriction of a 44.11% and in radiograph was long in 41.17%. In cases presenting root canals with a lateral foramen (39.3%), the gutta-percha exceeded the apical constriction in 68.18% of cases while in radiographs was correct in 54.54%. **Conclusions:** To summarize, the radiograph is a suitable system to evaluate the quality of the filling, even though in lateral apical foramens, its precision diminishes significantly.

OP 039. The influence of modulus of elasticity in base material on the marginal adaptation of direct composite restoration

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Introduction and objectives: Placing base materials, which has low modulus of elasticity, under the composite restoration has been recommended to reduce the polymerization shrinkage stress. Even though many authors has indicated that base placement with low modulus liner provide better marginal adaptation and reduce wear, we still have no information on the adequate range of modulus. The purpose of this study was to compare the marginal adaptation composites under base materials of different modulus. **Materials and methods:** MOD cavities were prepared for 60 teeth. The teeth were assigned to 6 groups according to the base materials which have different flexural modulus ; no base(C), experimental base(EXP, 2.5GP), Heliomolar flow (HF,4.4GPa), Tetric flow(TF, 5.3GPa), Heliomolar HB (HH,6.5GPa), FujiII LC (F, 8GPa) The cavities were restored with composite restoration and were under mechanical load cycle(600,000, 5kg) using custom made chewing simulator. Before and after the chewing simulation, the marginal adaptations were measured using digital stereomicroscope and were analyzed using 1-way ANOVA with Tukey at 95% confidence level. **Results and discussion:** After chewing cycling, % defect margin was; C>HH>EXP>HF, TF, F. Modulus of base material affects the marginal adaptation of composite restoration. **Conclusions:** Flowable composites of 4-6 GPa flexural strength, and LCGIC seems to be recommended as a base material. **Acknowledgements:** This work was supported by the Korea Research Foundation Grant funded by the Korean Government (MOEHRD, Basic Research Promotion Fund) (KRF-2007-313-E00506).

CLIN 040. Change of position and morphology of a mandibular canine A. LOPEZ-LAGO*1, M. CUETO1, A. FERNANDEZ1, T.P. KEOGH2. 1 Department of Operative Dentistry Oviedo University, 2 Private Practice Pamplona, Spain

Introduction and objectives: Morphology and position changes are seen every day in our clinic. We have several treatments to improve size and position of teeth: orthodontics, crowns, veneers, composites. At some moment in patient's life, direct composite restorations are better options because of age, financial limitations, certain handicaps, little time to attend the office, presence of caries. Our goal when facing this problem is to modify the morphology, varying the position of tooth 4.3 (FDI) and remove caries. **Materials and methods:** After removing caries and an old restoration, a curved bevel was made to hide the restoration's finishing line. The procedure encompassed total etch with phosphoric acid 37% and the use of PrimeBond NT (Dentsply, Germany) as bonding agent. Restoration was completed with Amaris O4, TN y TD (Voco, Cuxhaven, Germany), using layering technique. This type of restoration complies with the premises established in the introduction. Removing the caries and providing a functional tooth, along with a change of anatomy, thus the tooth is in line with the rest of neighboring teeth. **Results and discussion:** Although the facial shape of the canine may look odd at first, the restoration is functional and provides esthetics. This holds especially true in those cases involving the mandibular dentition where we can only see the incisal third of the cuspid. Patient was pleased with results. Orthodontics was not an option due to the possibilities of bone loss, recessions and financial and psychological woes. The layering or stratifying technique has advantages: pleasing and durable results in one visit, affordable, good esthetic results. Procedure did entail certain difficulties: patient limitations, difficulty in isolation, and the need for skill when utilizing the layering or stratifying technique. **Conclusions:** It's possible to change the position of a tooth by modifying its shape. The use of the layering or stratifying technique is essential to modern dentistry, not only because it restores lost tooth surface but also provides high esthetics and new challenges for managing form and position in human dentition. The success of this procedure in the antero-mandibular teeth relies on incisal third view only.

MAT 041. Comparative study of the marginal microleakage of seven cements in full-coverage restorations.

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Introduction and objectives: The purpose of this investigation was to compare the effect of adhesive resin cements and conventional cements on microleakage and marginal fit of crowns luted under two standardized seating forces. **Materials and methods:** Seventy transparent plastic crowns were luted to standardized composite (MultiCore Flow, Ivoclar) dies. The specimens were divided into seven groups for cementation with RelyX Unicem (3M Espe), Maxcem (Kerr), Multilink Sprint (Ivoclar), Panavia 21 (Kuraray), Ketac Cem Aplicap (3M Espe), Fortex (Faciden), and Fuji Plus (GC). All crowns were luted following manufacturer's instructions under similar conditions: brushing a layer of luting on axial walls and exerting a constant pressure (20 or 40 N/cm²) with a custom made holder. After storing the specimens in safranin solution, the microleakage was assessed by the extent of dye penetration within the interface. Marginal adaptation was evaluated with a scanning electronic microscope. Data were analyzed using chi-square test, analysis of variance (ANOVA) and Scheffé post-hoc test. **Results and discussion:** Conventional agents exhibited the highest percentages of extensive microleakage. The least dye penetration was recorded for adhesive resin cements. Significant differences in gap size were found between the cement type and the seating pressures ($p \leq 0.05$). **Conclusions:** Regarding microleakage, the resin cements evaluated in this study performed similarly, whereas conventional cements resulted in the highest score of microleakage. In spite of the differences among the groups, all the tested luting materials showed values within clinically acceptable limits. Marginal adaptation of these cements is improved if a high seating force is maintained throughout the initial curing period.

END 042. Evaluation of apical filtration in three endodontic obturation techniques

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Introduction and objectives: The objective of this paper was the study of three endodontic obturation techniques, lateral condensation (CL), one-piece gutta-percha ProTaper (PT) cone and EndoTwinn (ET) while evaluating the quality of radiographic condensation, gutta-percha extrusion, endodontic sealer and apical filtration. **Materials and methods:** The study included 53 root canals that underwent preoperative radiographs to determine the length of work, instrumentation and obturation with both conventional gutta-percha cones and ProTaper cones. Once endodontic treatments were completed, post-operative radiographs were taken, cavity openings were sealed, lacquer was applied to the roots and the teeth were diaphanised. Statistical analysis was done using Kruskal-Wallis and Mann-Whitney tests. **Results and discussion:** The density of the radiographic obturation was correct in 88.7%. There was no extrusion of gutta-percha but occurrence with the endodontic sealer was 22.6%, with a significant difference between CL and PT ($p < 0.05$). Apical filtration was 17% with no significant differences between the techniques. **Conclusions:** These results suggest whichever technique used for treatment is valid.

END 043. Corrosion of rotary files during endodontic instrumentation

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Introduction and objectives: Corrosion of rotary instruments affects instrumentation quality. We evaluate the electrochemical behaviour of rotary instruments inside canals irrigated with 5.25% sodium hypochlorite. **Materials and methods:** In the electrochemical tests the classic cell used was formed by three electrodes. It was used as working electrode a rotary instrument mounted in a contra-angle, located inside a training block. The electrochemical behaviour of a galvanic couple was analyzed, formed by two instruments submerged in the same solution, 5.25% sodium hypochlorite. **Results and discussion:** In a rotary instrument a galvanic couple is formed among the active part that is inside the canal and the inactive part that it remains outside of the same one. In this couple, the active part maintains an anodic behavior in front of the inactive one whose behavior is cathodic. In the tip of the instrument, the corrosion speed is bigger than in the area located outside the canal. The main responsible for the galvanic couple's formation is the concentration gradient that settles down in the electrolyte. **Conclusions:** The active part of the rotary instrument that remains inside the canal presents bigger dissolving speed regarding the inactive part that is not in contact with the canal. The rotation speed increases the galvanic couple.

STUD 044. Technical quality of root fillings performed by dental students at the Valencia University Medical and Dental School, in Spain.

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Introduction and objectives: To evaluate radiographically the quality of root canal treatment (RCT) performed on extracted teeth by undergraduate dental students. **Materials and methods:** A total of 256 extracted teeth have been prepared using nickel-titanium rotary files (Protaper Universal) or manual instrumentation (stainless steel Flexofiles) and filled using a cold lateral condensation technique by 4th grade undergraduate students. Periapical radiographs have been used to assess the technical quality of the root canal filling, evaluating three variables: length, density and taper. These criteria have been recorded and scored independently by 3 investigators. Statistical analyses have been used to determine the quality of root fillings and to investigate differences between manual and rotary preparation. **Results and discussion:** The percentage of canals with correct length is 87%, with correct density 68% and with correct taper is 63%. The first parameter has been the one best performed by the students. For the premolars the percentage of success (45%) is higher than for molars (34%). But this difference is not statistically significant ($p=0,103$). With the rotary instrumentation the treatments appear to be better carried out than with manual instrumentation (65% and 25% of success respectively). This difference is significant ($p<0,001$). **Conclusions:** It appears that inexperienced operators perform better RCT with the use of rotary instrumentation.

CLIN 045. The use of ozone therapy in an occlusal surface lesion. Clinical case

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Introduction and objectives: Ozone has been successfully used in dentistry due to its bactericidal properties. Ozone therapy also works as a virus and fungicide since it has a strong oxidizing effect and creates free radicals. This clinical case aims to describe the new application of ozone therapy based on recent investigations. **Materials and methods:** A lower molar occlusal surface carious lesion was treated using ozone therapy (2100 ppm equal to 4.2 g/m³; HealOzone, KaVo, Biberach, Germany). Caries was removed using a high speed diamond bur under constant water irrigation, with rubber dam isolation. Ozone was applied for 40 seconds. After 24 hours, the self-etching primer (3M-ESPE P90) was applied for 15 seconds, dried and light-cured for 10 seconds (Elipar™ Freeligth™2, 3M ESPE). Consequently, the bond was placed in the cavity and light-cured for 20 seconds. Restoration was placed using Filtek Silorane (3M- ESPE) with an incremental technique using no more than 2mm of material. Each increment was light-cured for 40 seconds. Treatment concluded with finishing and polishing of restoration. **Conclusions:** Based on several studies regarding the relationship between ozone and restorative procedures, it is considered a new and reliable alternative to treat caries, due to its anti-bacterial effect on microorganisms.

PREV 046. Early childhood caries in children aged 2-year-old in the city of Oporto, Portugal

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Introduction and objectives: Early Childhood Caries (ECC) is a kind of decay affecting very young children at the preschool age. Although ECC became a world-wide concern, epidemiologic studies are scarce in Portugal. The purpose of this study was to evaluate the prevalence of ECC in children aged 2-years-old, from a cohort of the XXI Generation Project. **Materials and methods:** A total of 270 children were examined at Faculty of Dentistry, University of Porto facilities. It was carried out a questionnaire on alimentary habits, breast-feeding, hygiene and fluoride contact as well as a visual examination, using the ICDAS criteria. **Results and discussion:** Of the examined children, 9 (3.35%) had at least one tooth with caries lesion. From the children with ECC, five (55.55%) presented white spot and four (44.44%) presented cavitated lesion. The dmft was 0,1, although dmft in children with ECC was higher(3). The size sample as well as the children's age, were perhaps the main cause for not found significant association between variables analyzed (fluoride, diet, hygiene, breast-feeding) and ECC. **Conclusions:** The ECC index is similar to other studies and populations. This kind of studies is essential to delineate promotion, prevention and treatment strategies for Public Oral Health. **Acknowledgements:** The participant belongs to the XXI Generation Project, which was developed by Dr. Henrique Barros from the epidemiology department, Faculty of medicine, University of Oporto.

OP 047. The influence of matrix type on the proximal contact in Class II resin composite restorations. In vitro study.

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Introduction and objectives: The aim of this in vitro study was to evaluate several types of matrices in terms of proximal contact area formation in Class II resin composite restorations. **Materials and methods:** Standardized MO cavities were prepared in artificial molars of a manikin model. Resin composite (Tetric TPH-Dentsply) restorations were placed using the matrices (n=10): (a) circumferential straight metal matrix with Tofflemire retainer-A, (b) circumferential pre-contoured metal matrix system-B (Adapt SuperCap-Kerr), (c) the same as b with transparent matrix-C, and (d) sectional pre-contoured metal matrix system-D (Palodent-Dentsply). Each restoration being completed, the manikin model was fixed on a tension-meter apparatus and an orthodontic wire (0.012 inch) was used to assess the tightness, length of contact arc (LCA) and position of contact point/LCA% (PCP). The same measurements were performed with an intact molar (control). The results were subjected statistical analysis by one-way ANOVA and unpaired t-test ($\alpha=0.05$).

Matrix system	Tightness (N)	LCA (mm)	PCP (%)
A	18.0±2.0	3,2±0,3	72.2±5.3
B	18.4±1.2	3,9±0,5	78.8±4.4
C	16.5±1.3	3,0±0,4	63.8±6.8
D	32.2±5.0	4,6±0,4	45.8±5.8
intact molar	17.1±2,1	3,4±0,4	76.1±5,9

Results and discussion: Matrix D provided the highest tightness value, with the highest length arc and with statistical differences relative to the intact molar surface. No differences were revealed among the other matrices and of each one with the control. Contact point was located more cervical and more occlusal (PCP) than the analog of the intact molar for D and C matrices, accordingly. **Conclusions:** In contrast with the sectional matrix system tested, all the circumferential pre-contoured matrices can adequately reconstruct the proximal contact area.

MAT 048. A controlled evaluation of the exothermic properties of a new silorane based composite: a preliminary study

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Introduction and objectives: A temperature rise of 5.5°C within the pulp chamber has been shown to cause irreversible pulpitis. Exothermic effects of traditional resin based composites (RBC) have been shown to be of little concern to the pulp. Newer materials have recently been released utilising Silorane chemistry. The aim of this study was to evaluate the exothermic properties of a silorane composite compared with a traditional RBC. **Materials and methods:** A standardised cavity was prepared in a dentine substitute and restored with either a conventional RBC or a silorane based composite. Thermocouples were placed above, below and within the samples. Exothermic output was measured when the samples were cured using a QTH light for a standardised time and distance. Results were compared for statistical difference. **Results and discussion:** The exotherm of a Silorane composite (150°C) is higher than that of conventional composite (7.10°C). Lower shrinkage of Silorane may tempt some practitioners to bulk fill their Silorane restorations. This is not recommended. **Conclusions:** The silorane based material has a significantly greater exotherm than the conventional RBC tested. It is recommended that low power LCUs are used to cure the material until further research is carried out. Silorane composite should be cured using incremental placement as with conventional RBCs. **Acknowledgements:** 3M ESPE

CLIN 049. Minimum Intervention Treatment Plan - Putting MI into practice. Part 1 - MI Identify: diagnose your patient's susceptibility.

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Introduction and objectives: The Minimum Intervention (MI) concept is well described in the literature and summarizes the clinical rationale for the preventive and cause related approach in cariology. Many studies showed that treatment decisions in cariology varied markedly among general practitioners (GPs) and that the GPs still wonders “how do I integrate MI in my daily practice?” The aim of the Pan-European group of academics and GPs - the GC Europe MI Advisory Board – was to present an evidence based treatment approach for the clinical practice. **Materials and methods:** Evidence based literature review. **Results and discussion:** According to the clinical steps four parts are used: identify, prevent, restore and recall. Identify encompasses more than looking for caries. The clinical signs of caries are described according to modified ICDAS criteria in addition to similar radiological criteria for bitewings. This is added by plaque and/ or gingival index, salivary factors and possibly other technical data. All this information is then evaluated to assess the patient's susceptibility and set up a preventive treatment plan. **Acknowledgements:** This work was kindly supported by GC Europe

CLIN 050. Minimum Intervention Treatment Plan - Putting MI into practice. Part 2 - MI Prevent: Stop caries and prevent it from progressing.

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Introduction and objectives: The Minimum Intervention (MI) concept is well described in the literature and summarizes the clinical rationale for the preventive and cause-related approach in cariology. The aim of the Pan-European group of academics and GPs - the GC Europe MI Advisory Board – is to present an evidence-based treatment approach for the clinical dental practice. **Materials and methods:** Evidence-based literature review. **Results and discussion:** MI Prevent deals with “preventive care” and “dental recall frequency”. Depending on the susceptibility and the risk factors of the patient, preventive treatment regimens are instituted. The standard approach for all includes oral hygiene recommendations, dietary advice, patient motivation and maintenance. This standard approach is not sufficient alone to control caries for patients with a high susceptibility. Those patients with more risk factors need active preventive care. This includes decontamination (professional mechanical tooth cleaning, antimicrobial gels and rinses, transitional restoration placement), remineralisation (fluoride, casein-phosphopeptide amorphous calcium phosphate), xylitol and salivary stimulation, dental sealants (composite or glass ionomer cement). Repeated diagnosis of the risk factors will be used to assess the need for the precise level of preventive measures and the amount of recall sessions individualised for each patient. **Acknowledgements:** This work was kindly supported by GC Europe

CLIN 051. Minimum Intervention Treatment Plan - Putting MI into practice. Part 3 - MI Restore and MI Recall: Maintain oral health and maximize tooth structure.

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Introduction and objectives: The Minimum Intervention (MI) concept is well described in the literature and summarizes the clinical rationale for the preventive and cause related approach in cariology. The aim of the Pan-European group of academics and GPs - the GC Europe MI Advisory Board – was to present an evidence based treatment approach for the clinical practice. **Materials and methods:** Evidence based literature review. **Results and discussion:** MI Restore presents techniques for conservation of tooth structure when restorations have to be placed. Distinctions are made between non-invasive and invasive techniques. Adhesive materials are nowadays available for both indications and the non-invasive or sometimes “repair approach” is shown to be successful in many indications. MI Recall: To maintain oral health the patient most often needs professional support life, to compensate his inabilities and control changes in risk factors throughout life. Despite the lack of scientific evidence regarding optimal recall intervals, there is the need for scheduling recall period according to the patient's susceptibility in order to prevent oral disease and to control the effectiveness of the preventive regimen. Information will be given to remind the audience of the relevance of customizing the recall period according to the dynamic of the carious process, the patient demand and some cultural aspects related to national health services context in the different European countries. **Acknowledgements:** This work was kindly supported by GC Europe.

OP 052. Microleakage of different bonding systems in Class V composite resin restorations prepared with Er:YAG laser and diamond bur

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Introduction and objectives: The aim of this in vitro study was to compare the microleakage of Er:YAG laser and diamond bur on different bonding systems in Class V restorations. **Materials and methods:** Class V cavities (3x3x3 mm) were prepared with Er-YAG laser (VersaWave) and diamond bur (Komet) on 80 intact human molars. Teeth were randomly distributed into 10 groups and cavities were restored with CeramX Duo (Dentsply) using 4 different bonding materials, (One Coat 7.0 Coltène; XP Bond, Dentsply; Clearfil Protect Bond, Kuraray; Adper SE Plus, 3M/ESPE) or Filtek Silorane and Silorane System Adhesive (3M/ESPE). After the specimens were aged for 7 days they were immersed in silver nitrate dye and then were sectioned using low speed saw machine. Microleakage was evaluated by a stereomicroscope and scored for interface between restoration and teeth. Data were statistically analyzed by One Way ANOVA and Tukey HSD tests. **Results and discussion:** Even though no statistically differences were found between any groups ($p>0.05$), cavities prepared with diamond bur groups showed slightly higher microleakage scores than Er:YAG laser groups. **Conclusions:** The microleakage of different bonding systems was not influenced by the choice of diamond bur or Er:YAG laser for Class V composite cavity preparation.

OP 053. Clinical evaluation of a fissure sealant and a flowable composite.

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Introduction and objectives: The aim of the study is to evaluate the clinical performance of a fluoride containing fissure sealant and a flowable composite resin placed on occlusal pits and fissures. **Materials and methods:** A fissure sealant; Heliobond F and flowable composite resin; Tetric EvoFlow were applied on 75 teeth to seal occlusal pits and fissures according to the manufacturers' instructions. The teeth were evaluated using modified USPHS criteria, at baseline, 1-, 6-, 12- month intervals by two examiners who were blinded to the materials. **Results and discussion:** At the first month, all of the treated teeth were completely intact. After 6 and 12 months the teeth were still completely sealed and showed the highest values according to the criteria evaluated. Results demonstrated that after 12 months no loss of restorations and no caries were detected for the Tetric EvoFlow as well as fluoride containing Heliobond F. **Conclusions:** After 12 months, Heliobond F and Tetric EvoFlow showed similar clinical performance in the retention rate and caries preventive effect of Heliobond F and Tetric EvoFlow fissure sealant.

END 054. Analysis of the extruded material with the continuous wave of condensation technique

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Introduction and objectives: Extrusion is the presence of obturation materials in the periapical tissues. The objectives of this study are to determine the values of extruded material according to the penetration depth of the SystemB® pluggers, to compare them and to check the adaptation to the canal walls. **Materials and methods:** 60 unirradicular teeth were instrumented with Protaper®. They were divided in two groups: only obturated with gutta-percha and obturated with gutta-percha and sealer. They were divided in three subgroups according to the plugger penetration. Then, the specimens were dyed and diafanized. Extrusion was photographed and measured with stereoscopic microscope, to calculate the volume. **Results and discussion:** No statistically significant volume differences were found neither according to the material ($p=0,205$) nor according to the plugger penetration ($p=0,941$), like in literature. Statistically significant differences exist in both groups ($p=0,007$ and $p=0,036$), regarding the frequency of extrusion appearance according to the plugger penetration depth. **Conclusions:** Pluggers should be used at 5mm of the working length, to minimize the extrusion appearance. **Acknowledgements:** Electronic microscopy unit of the USC. Department of applied physics of the USC.

MAT 055. Determination of the hardening of two types of MTA® based on the thickness. A. DIAZ-MANCHA*, B. MARTIN-BIEDMA, P. VARELA-PATIÑO, J. GONZALEZ-BAHILLO, M. RUIZ-PIÑON

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Introduction and objectives: The hardness is a physical-chemical property of the MTA® that can be influenced by other factors. However its relationship with the thickness is not known. The objectives of this study are, to know the influence the thickness in the hardening of white and gray MTA® and to identify differences between both and the zones where the measurements were made. **Materials and methods:** Twenty samples with plastic cylinders were made and divided in four groups, determined by the thickness and the colour of the material. They were included in resin and they were polished with the machine Ecomet 2. The hardness Knoop was determined in the middle (zone 2) and edges (zone 1,3) of the samples with the microhardness test MXT50. **Results and discussion:** Statistically significant differences (ANOVA) between the type of cement, the thickness or the combination of both in the zone 1 ($p=0,117/p=0,798/p=0,642$) and 3 ($p=0,798/p=0,258, p=0,825$) do not exist. However the interaction of the two factors in the zone 2 was significant ($p < 0,05$). Gary et cols. concluded that 5mm demonstrated greater microhardness than 2mm. **Conclusions:** Thickness and type of MTA® do not influence in its hardening. Acknowledgements: Institute of Ceramics of Galicia.

OP 056. The effect of different finishing and polishing systems on the surface roughness of different tooth-colored materials

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Introduction and objectives: The purpose of this study was to evaluate the effect of various finishing and polishing systems on the surface roughness of four different types of tooth-colored materials (Filtek supreme XT, Gradia Direct, Dyract Extra and Fuji IX). **Materials and methods:** 112 disk-shaped specimens (10 x 2 mm, N = 28 per material) were prepared in a metal mold covered with a Mylar strip using four different tooth-colored materials. Twenty eight specimens for each tooth-colored material were randomly divided into four subgroups ($n = 7$): unpolished (Mylar strip, control), polished with abrasive disks (Sof-Lex), polished with aluminium oxide and diamond integrated polisher (Hiluster), and Poli-Pro disk (Premier). The average surface roughness (R_a , μm) of the control and treated specimens were measured with a surface roughness tester in four different positions. Results were analyzed by two-way analysis of variance and the Bonferroni post-hoc comparisons test at a $p < 0.05$. **Results and discussion:** The order of the surface roughness ranked from the lowest to the highest according to the tooth-colored materials was: Dyract < Gradia < Filtek Supreme < Fuji IX; and the ranking for the polishing system was: Mylar strip < Hiluster < Sof-Lex < Premier. **Conclusions:** Effectiveness of the finishing and polishing systems on surface roughness seems to be material dependent.

MAT 057. Effect of thermal aging on microtensile bond strength of contemporary self-etching adhesives.

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Introduction and objectives: Self-etching adhesives are considered to be prone to hydrolytic degradation, especially one-step systems. To evaluate the effect of thermal aging on the microtensile bond strength (μ -TBS) of one-step self-etching (G-Bond, Xeno V, Bond Force), two-steps self-etching (Adper Scotchbond SE, Filtek Silorane) and one total-etch (XP Bond) adhesives on sound dentin. **Materials and methods:** A block of composite resin (Filtek Z250, except for Filtek Silorane) was bonded using the adhesives above to exposed occlusal dentin of human extracted molars. One sample per adhesive was stored in water (24h, 37 °C) and other was thermo-cycled (5000x, 5-55 °C). All teeth were sectioned in x, y axes to obtain sticks specimens with 1 mm² of bonding area. μ -TBS test was performed in a universal testing machine. Influence of adhesive system, thermal aging and their interactions on μ -TBS were analyzed by two-way ANOVA, Student-Newman-Keuls and Student's t tests ($p < 0.05$).

Table 1: Mean μ-TBS values for each adhesive system in MPa (SD).						
	G-Bond (GC)	Xeno V (Dentsply)	Bond Force (Tokuyama)	Adper Scotchbond SE (3M ESPE)	Filtek Silorane (3M ESPE)	XP Bond (Dentsply)
24 h	12,9 (4,4) a1	16,3 (3,7) a1	23,2 (6,4) b1	30,7 (6,7) c1	31,3 (8,9) c1	34,1 (8,8) c1
5000x	8,1 (0,9) A2	11,5 (2,1) A2	14,3 (1,6) B2	20,9 (2,1) C2	22,6 (5,1) C2	30,9 (7,6) D1

Same letters in the same row mean similar μ -TBS values. Same numbers in the same column mean no influence of thermal aging on μ -TBS value

Results and discussion: μ -TBS values obtained are shown in Table 1. There were statistically differences among tested adhesives: one-step self-etching adhesives showed the lowest μ -TBS values while the total-etch adhesive the highest. Thermo-cycling significantly decreased μ -TBS values except for the total-etch adhesive evaluated. **Conclusions:** Steps reduction implied a decrease in μ -TBS results. Self-etching adhesives evaluated exhibited a significantly reduction in μ -TBS values with thermal aging.

OP 058. Radicular section, friction and hybridization in fiber posts retention.

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Introduction and objectives: It has been demonstrated that post retention is largely contributed by friction along the canal walls. This study tested the null hipótesis that oval root Canals are more retentive than circular root Canals in post treatment of endodontically treated teeth. **Materials and methods:** Sixty central incisors and maxillary canines were endodontically treated, and prepared for a post with FRC Postec Plus ® system until drill nº 3. Posts were cemented with Multilink ® following two different protocols: (A) using Multilink Primer A + B in canal walls and Monobond-S ® in the posts, (B) using only the cementating agent. Specimens were then subjected to a microtraccional test using an universal testing machine. Later roots were analyzed on magnification looking for guttapercha and cement remains. **Results and discussion:** Treatment A showed more retention than treatment B. Independent of treatment Canines group have higher strength values than incisors group which were less remains found . These results contradict literature giving more significance to adhesion area and less to friction . **Conclusions:** Adhesive failure was predominately between post and cement agent interface. Using silane and adhesive agents increase retention properties. Retention in oval section canal was higher than circular group. **Acknowledgements:** Ivoclar Vivadent for supplying the posts for this study.

END 059. Microscopic analysis of the dentin surface of internal bleached teeth.

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Introduction and objectives: It is known that bleaching agents produce alterations in the dental structure. The objectives of our study are analyze this alterations and make a chromatic analysis. **Materials and methods:** 9 molars were endodontically treated and internal bleached with chemically pure sodium perborate. This procedure was repeated once per week during one month. Vita 3d Easyshade colorimeter was used to study the values of the Cie Lab. A microestructural analysis was made using electronic microscopy. **Results and discussion:** Statistically significant differences were found in the parameters L*, a* and E*. Russell et cols suggest that changes in the brightness establish a successful bleaching. Microscopically we don't find any alteration microestructural, unlike Rotstein et cols. found damages in the organic component of the matrix. **Conclusions:** It is an effective technique because we get bleached teeth without dental alterations. **Acknowledgements:** Dra. Manuela Neves Lopes. Biomateriais Dentarios, Faculdade de Medicina Dentaria, Universidade de Lisboa, Portugal.

STUD 060. Thermoplastic obturation technique: bibliographical review

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Introduction and objectives: The thermoplastic obturation technique was described by Schilder in 1967. Starting from this, multiple systems were developed that created a more homogeneous obturation and a better adaptation to the canal wall. The aim is to discover what system gathers the best conditions. **Materials and methods:** A search was done in the databases of articles among the year 2001 and 2008. We will divide the techniques in two groups: heated inside (type System B) or outside of the canal (type Thermafil). Seven parameters are compared. **Results and discussion:** Microleakage: in revised articles there is not a unanimous opinion. Sealing: type Thermafil provides better results than System B. Extrusion: System B provides better result. Curvature/section of the canal: we don't find differences. The filling of oval canals continues being committed in all the techniques. Temperature: although Thermafil reaches bigger temperature, the tissular damage it is not expected since in any technique the temperature transmitted to the tissues it is smaller than 10°C. Time: system Thermafil smaller working time. Lateral canals: the difference is not significant between the techniques. **Conclusions:** According to these data there is not a superior technique to the other ones, if not that among them they are supplemented, should be chosen according to the cases.

END 061. A microbiologic evaluation of endodontic disinfection after gaseous ozone treatment

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Introduction and objectives: The aim of this study was to evaluate the efficacy of gaseous ozone during root canal disinfection against *Enterococcus faecalis* infection. **Materials and methods:** 28 single-rooted human teeth were prepared endodontically and closed with an apical seal. After autoclaving, root canals were infected by a broth (TSB) culture of *Enterococcus faecalis* (ATCC 29212, 108UFC/ml) for three weeks. The teeth were divided in 3 groups: the first group (12 teeth) was treated applying gaseous ozone for 40 sec. inside root canal. The second group (12 teeth) was treated using sodium hypochlorite 5% for 5 min. After treatment bacterial growth was evaluated in each root canal. No treatment was performed on the third group (4 teeth) and teeth were analyzed by SEM to check *Enterococcus faecalis* growth. The results were analyzed by T-test ($p < 0,05$). **Results and discussion:** Sodium hypochlorite (complete sterilization) is demonstrated being more effective than gaseous ozone (decrease of 23% of bacterial growth) with a statistically significant difference ($p < 0,0001$). A biofilm layer was noticed in the canals of third group. **Conclusions:** Ozone has a little effect on *Enterococcus faecalis* and its antibacterial efficacy was not comparable with that of NaOCl under the test conditions used.

PREV 062. Effectiveness of Carisolv before placing fissure sealants

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Introduction and objectives: Recent study reported that Carisolv facilitated fissure sealing. The aim of this study is to confirm if pre-treatment with Carisolv improves the adaptation of fissure sealants to enamel. **Materials and methods:** Forty extracted human teeth (molars and premolars) were used and were randomly divided into four groups of 10 each. Teeth were cleaned with prophylaxis paste. Group 1: Carisolv was applied for 60" and teeth were copiously washed. Then, fissures were etched 30" with 36% orthophosphoric acid. Group 2: first, teeth were acid-etching, abundantly washing and then Carisolv was applied 60". Group 3: acid-etching 30" with 36% orthophosphoric acid. Group 4: Carisolv for 60" and next, copiously washed. Surface roughness was analyzed in five samples from each group by stereoscopic microscopy and by SEM examination. **Results and discussion:** In group 1, most of the debris in the fissures was removed by Carisolv treatment, but it do not increased surface roughness. After etching, enamel prisms microindentations do not happens. In group 2, Carisolv filled microretentions of acid-etching previously realized. Teeth of group 3 showed characteristic pattern of enamel acid-etching and Carisolv (group 4) do not produced any type of etching. **Conclusions:** Carisolv-treated surfaces block acid-etching, impeding enamel bonding to sealants

MAT 063. The effect of silane on the bond strengths of composite indirect restorations using several resin cements.

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Introduction and objectives: The aim was to determine the effect of silanization of indirect resin composite on microtensile bond strength results using several resin cements. **Materials and methods:** Flat dentin surfaces were created on extracted human third molars. Resin composite overlays (Filtek Z250) were constructed and received different surface treatment, silanization (RelyX Ceramic Primer, 3M Espe) or not. Dual cure resin cements studied were: RelyX ARC (3M Espe), and two self-adhesive cements RelyX Unicem (3M Espe), and G-Cem (GC). The bonded assemblies were stored in water (24 h, 37 °C) and subsequently prepared for microtensile bond strength testing. Beams of approximately 1 mm² were tested in tension at 1 mm/min in a universal tester. Data were analyzed by 2-way ANOVA and Student-Newman-Keuls test ($\alpha=0.05$).

Table 1- Means (standard deviations) of microtensile bond strength data in MPa.

Resin cement	Silane	n	Bond strength	Bond strength *
RelyX ARC	yes	12	21.7 (6.3)	23.4 (6.8)a
	no	14	24.8 (9.3)	
Rely X Unicem	yes	13	13.6 (8.0)	14,4 (7.1) b
	no	11	15.3 (6.2)	
G-Cem	yes	11	14.6 (6.8)	12.1 (6.7) b
	no	12	9.7 (5.9)	

* Same letters indicate no significant differences (Student-Newman Keuls, $\alpha=0.05$)

Results and discussion: Microtensile bond strength values are shown in the table. Two-way ANOVA revealed a significant influence of the resin cement used ($p<0.001$). Silanization and interactions between resin cement and silane application did not affect microtensile bond strength values ($p>0.05$). RelyX ARC exhibited the highest results followed by the two self-adhesive resin cements evaluated. **Conclusions:** Surface treatment of indirect resin composite with silane did not improve the bond strength results. **Acknowledgements:** The authors are grateful to the companies for providing the materials tested.

OP 064. The efficacy of three different bleaching systems using teeth and ivory

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Introduction and objectives: Aim of this in vitro study was to evaluate the use of ivory compared to extracted human teeth as a material to be used in bleaching studies, by testing three different products. **Materials and methods:** Three groups of human teeth and three groups of ivory (n=12), were stained and bleached with three bleaching systems, respectively: Easywhite Ready (H₂O₂ 30%) for 30min using a plasma unit, Opalescence 35% carbamide peroxide for 60min and “7 day Bleach” paint-on product (H₂O₂ 6 %) for 10 x 30min. The shade (L*a*b* values) was evaluated before, after bleaching, and one week later, using a digital camera and a spectrophotometer. **Results and discussion:** The digital evaluation showed for the ΔL values the same results for teeth and ivory. A significant difference was found between the three bleaching products (p<0.05). The spectrophotometer showed for the ΔL parameter, a similarity for teeth and ivory. Δa and Δb for teeth and ivory were not found to be similar. **Conclusions:** Ivory and teeth showed that similar results were achieved after the three bleaching procedures concerning the ΔL parameter. Although the use of ivory could be beneficial because of the ability to give a lot of similar samples, and to produce a good discoloration, further research is necessary.

OP 065. A clinical study of a new Ca₃SiO₅-based material indicated as a dentine substitute

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Introduction and objectives: A new Ca₃SiO₅-based material (Biodentine™ RD94, Septodont) has been developed as a bulk dentine substitute before direct and indirect posterior fillings. A three-year follow-up randomized multicentric clinical study was initiated to evaluate: 1) its longevity as temporary restoration vs a resin composite (Z100, 3M), and 2) its ability to be combined with an adhesive filling. **Materials and methods:** Patients, 18 to 80 years old, were included in this trial and clinical evaluation was conducted according to USPHS criteria. Observation was scheduled at D0, D15, 6 months, 1, 2 and 3 years using pulp vitality testing, radiographs and photographs.. **Results and discussion:** The clinical study is still on-going. So far, 334 patients have been included (162 female and 172 males, mean age: 47 years) with 81 Class I and 253 Class II cavities. At this stage, the temporary filling mean longevity has been established to about 12 months. Biodentine™ RD94 was preserved on all dentinal walls without any infiltration or secondary decay. **Conclusions:** This new Ca₃SiO₅-based material could be used as a dentine substitute for definitive dentinal treatment. As marginal leakage and secondary decays remain a concern in adhesive dentistry, Biodentine™ RD94 could be preserved if re-intervention is required.

END 066. Clinical outcome of root canal fillings using lateral condensation technique after 12 months.

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Introduction and objectives: The aim of this prospective clinical study was to evaluate the radiographic and clinical performance of Apexit Plus in combination with the lateral condensation technique. **Materials and methods:** 41 teeth (106 canals) with radiographically discernible signs of apical periodontitis (39.0% Non-Vital, 36.6% Revisions, 24.4% Irr. Pulpitis) were treated with a standard operative procedure. Follow-up appointments after 6 and 12 months entailed radiographic and clinical evaluation. The radiographic data was analyzed using the PAI scoring system described by Ørstavik (1986, 1998). **Results and discussion:** After 12 months 95.1% of the teeth showed an obvious tendency towards healing and in only 4.9 % no significant radiographic changes were observed. 61% of the teeth already showed radiographic healing (PAI=1-2), 37% PAI score 3 and only one case (2%) still a PAI of 4. The pre-operative PAI Score was 3.9 (± 0.9) and 3.4(± 1.0) at the immediate post-op radiographic control. After 6 months the mean PAI was 2.6(± 1.1) and 2.0 (± 0.9) after 12 months. The reduction of the PAI Scores between each of the different evaluation times was statistically significant ($p < 0.01$ Wilcoxon Test). **Conclusions:** Lateral condensation technique using Apexit Plus showed good clinical success after 12 months. An additional 3 year follow-up is ongoing to approve the long-term behaviour of this sealer.

END 067. Investigate the root canal anatomy of mandibular premolars in North-west Spanish population

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Introduction and objectives: It was observed, during the routine treatment of mandibular premolars that aberrations were becoming common. Investigators have shown that the pulp canal system is complex, and canals may branch, divide and rejoin. Although various techniques have been used in studies evaluating canal morphology, it has been reported that the most detailed information can be obtained ex vivo by demineralization and staining. **Objectives:** try to find some tooth with aberration anatomy and most common anatomy in this population. **Materials and methods:** Fifty extracted mandibular premolars were examined. Following the preparation of access cavity, pulp tissue was removed and the canal systems were stained. The teeth were then rendered clear by demineralization and immersion in methyl salicylate. Cleared teeth were examined and the following features were evaluated: type of root canals, lateral canals, and frequency of apical deltas. **Results and discussion:** The present study revealed the prevalence of multiple canals in the investigated Spanish north-west mandibular premolars. Variable root canal morphologies were found in the mandibular first premolars. **Conclusions:** The incidence of aberrations in the canal configuration of mandibular premolars is common and due considerations are to be given during endodontic intervention.

OP 068. Clinical comparison of four different whitening systems using hydrogen peroxide.
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Introduction and objectives: Many of the techniques denominated “Power Bleaching” uses hydrogen peroxide 35% without the necessity of activate it with light and obtaining good results. The objective of this study is to evaluate the efficacy of three dental whitening systems using different kinds of light activation, and to compare them to a dental whitening system using hydrogen peroxide without any kind of light activation. **Materials and methods:** 40 patients between 18 and 40 years of age were included in the study. Patients were distributed randomly in different groups. - Group 1: Dental whitening system using hydrogen peroxide 35 % with diode light activation (Luma Cool). - Group 2: Dental whitening system using hydrogen peroxide 9 % with diode light and heat activation (Metatray). - Group 3: Dental whitening system using hydrogen peroxide 25% with ultraviolet lamp activation (Zoom 2). - Group 4: Dental whitening system using hydrogen 35 % without any light activation. (Butler). **Results and discussion:** Three of the four systems has shown clinically significant results between initial and final treatment. These systems are LumaCool, Metatray, and Zoom2, whereas the control group doesn’t show significant statistically results. Zoom2 shows better results than any of the other groups. This results are statistically significant between groups 1 and 3, 2 and 3, and between groups 3 and 4. But differences between groups 1 and 4, and groups 2 and 4 are not significant. **Conclusions:** All whitening systems using light activation has demonstrated good results in our study. We can assume that Zoom2 has shown better clinical efficacy than any of the other systems.

OP 069. A clinical trial of at-home tooth bleaching using a 16% carbamide peroxide: 1 hour vs 6 hours of application. A pilot study

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Introduction and objectives: Evaluate the efficacy of a 16% carbamide peroxide at home on the six anterior maxillary teeth for different periods of application. The periods were 1 hour/day on the teeth on the right (11, 12, 13) and 6 hour/day on the teeth on the left (21, 22, 23). **Materials and methods:** Three examiners out of study evaluated the shade of the six anterior maxillary teeth of 10 patients using the Vita Shade Guide ordered by value. Patients were instructed to use dispensed gel (Zaris 3M Espe®) for a period of 1 h/day on the 3 anterior maxillary teeth on the right, and 6 h/day on the 3 anterior maxillary teeth on the left during 2 weeks. Patients were evaluated 2 weeks post-bleaching following the same protocol that was conducted at the baseline. **Results and discussion:** Application of the bleaching gel reflects a statistically significant lightening in tooth shade. There is no statistically difference ($P>0,05$) between 1 or 6 hours of application. **Conclusions:** 1 hour of 16% carbamide peroxide application shows the same results that 6 hours.

OP 070. Clinical efficacy of a dental bleaching system with a 25% hydrogen peroxide activated by u.v. light. A pilot study

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Introduction and objectives: The objective was to evaluate the clinical efficacy of a bleaching system using a 25% hydrogen peroxide activated by U.V. light. **Materials and methods:** The six anterior maxillary teeth of 11 patients were evaluated using the Vita Shade Guide ordered by value by three different operators out of the study. The investigator applied the bleaching gel to the teeth on the right for 15 minutes for a total of three times. Then, the teeth were assessed. After that, the investigator blocked and covered the teeth and the oral and adjacent tissues except the three teeth on the left, applying the bleaching gel and exposing them to the whitening lamp for 15 minutes, three times. Then the teeth were evaluated. **Results and discussion:** Application of the bleaching gel to the teeth on the right did not result in any increase of lightness in either subject. Application of the bleaching gel and exposing teeth on the left to the whitening lamp reflects a statistically significant lightening in tooth shade. **Conclusions:** Zoom 2 Whitening System is effective to increase lightness of the teeth.

OP 071. Efficacy of two customized tray-based at-home bleaching systems: a randomized controlled trial

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Introduction and objectives: Aim of this study was to assess the clinical efficacy of two different whitening products using a customized tray for at-home bleaching. **Materials and methods:** This was a two arm parallel RCT in which sixty human subjects attending a Portuguese dental school were evenly distributed to one of two groups: Ultradent Opalescence® 10%PF (OPL) or Vivadent VivaStyle® 10% (VS), both with 10% carbamide peroxide (CP). Bleaching regiment was according to manufacturer's protocols. Efficacy was assessed using the VITAPAN classical shade guide (VITA) on the facial surface of the twelve anterior teeth with A3 or darker shade at pre-treatment (PT), end-treatment (ET) and six months (6M) under standard light conditions. Shade improvement (SI) and relapse (SR) were expressed as $SI=PT-ET$ and $SR=PT-6M$ in $mean \pm S.E.M.$ Mean differences were tested with Student t-test, significance level set at $\alpha=0,05$. Efficacy was considered according to ADA criteria. This procedure was approved by the local ethical committee. **Results and discussion:** At the end of the treatment the SI was $6,280 \pm 0,177$ and $4,284 \pm 0,196$, and a mean SR of $5,598 \pm 0,265$ and $3,331 \pm 0,266$ were observed for OPL and VS respectively. **Conclusions:** The results show that both bleaching systems are effective at ET. However, only OPL can be considered efficient regarding SR at 6M.

OP 072. Efficacy of a novel in-office bleaching technique: a pilot study

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Introduction and objectives: A new in office technique using a 6% hydrogen peroxide (HP) paint on formulation has recently been developed by our group (EJED 1(1): 70-7, 2006). This pilot study aims to assess the efficacy of this technique. **Materials and methods:** 18 subjects attending a dental school clinic were selected for this study. After screening and dental prophylaxis, the clinical protocol for the in-office whitening technique using VivaStyle Paint On Plus (Vivadent) with 6% HP was performed as described previously. Efficacy was assessed using the VITAPAN classical shade guide (VITA Zahnfabrik) on the facial surface of the twelve anterior maxillary and mandibular teeth with a gradable VITA shade A3,5 or darker at pre-treatment, end-treatment and six months after the end-treatment, under corrected operatory light. Efficacy was expressed in Mean±S.E.M. of vita shade guided values. Mean differences were tested with Student t-test, significance level set at $\alpha=0,05$. This procedure was approved by the local ethical committee. **Results and discussion:** The results show a significant ($P<0.01$) 9.25 \pm 0.33 final shade improvement and a mean of 3.15 \pm 0.52 vita shade color relapse at 6 months when compared to baseline values. **Conclusions:** The results suggest that this new technique is effective, offering a viable alternative to high peroxide concentration in-office procedures.

END 073. Root fractures using fiber posts. A prospective clinical study

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Introduction and objectives: The potential of fibre posts to reduce the incidence of root fractures in comparison with traditional cast posts has been referred to in several in vitro and in vivo studies. **Materials and methods:** A prospective clinical study including 131 endodontically treated teeth have been carried out to assess their survival. One tooth each person, 53 men and 78 women. The 131 teeth were restored with a fibre post (87 with SNOWPOST®—66,4%—, and 44 with DT LIGHT POST®—33,6%—) and covered with a crown. The cement used was RelyXUnicem and dental core was built up with Dentocore Automix, a dual composite. The teeth were clinically and radiologically evaluated for a period between 1 and 7 years, every 6 months. **Results and discussion:** In disagreement with other researches, two cases of root fractures were observed. Both fractures used SNOWPOST. The first one occurred in a patient with a complete mandibular arcade and a very reduced maxillary arcade, with bruxing habits, in a maxillary lateral incisor without ferrule. The occlusal unbalance and the absence of ferrule might be the reasons for its failure. The second one occurred in a maxillary central incisor, with a previous cast post treatment, in a completely dentate patient. This tooth had a ferrule at least 2 mm. high. Its failure might be a consequence of non-detected microfractures by the retreatment. **Conclusions:** According to our research root fracture is not frequent by using fiber posts but it occurs if we don't observe certain conditions.

MAT 074. Odontointegration of a new osteoconductive implant surface. Initial results.

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Introduction and objectives: We present the initial results of the reaction of the dental calcified tissues to a new dental implant surface in an animal model. The surgical method for the implant placement was designed in order to obtain a stable contact between the implant surface and alveolar and dental tissues, both calcified and pulpar. The surface has previously showed osteoconductive properties in studies, both in vitro and in vivo. **Materials and methods:** Four implants were inserted the central incisive germs in three pigs, immediately post-extraction of the premolar teeth from maxillary bones, (3 with surface treatment and 1 without). The curved shape of the incisive permitted the implant placement through the incisive alveolar space, thus allowing the contact of the implant surface with the incisor dentin and pulp. The animals were sacrificed 90 days after. The analyses of the implant-tissue contact and interaction were performed by Backscattering-Scanning Electron Microscopy and by histology (Manzanares et al (1998)). **Results and discussion:** The surgical method proved its feasibility in allowing the contact between the alveolar bone and dental tissues, and the implant without causing bone fractures, dental lesions or the loss of the implant. Our observations showed a consistent high percentage (95 to 100%) of direct contact between the treated implant surface and the dentin tissue, the histological analysis of these samples proved that the dental pulp tissues were vital: no pulp damage was observed. **Conclusions:** The surface showed dentoconductive properties.

MAT 075. Osteointegration and dento-alveolar ankylosis: comparison of calcified tissues implicated in both process

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Introduction and objectives: The objective is the evaluation of the interaction established between the osseous tissues and the biomaterial, as compared with the ones existing between the alveolar tissues and the dental tissues, as well as the chronology of both processes. **Materials and methods:** The first study consisted in the simultaneous implantation of five types of implants coated with hydroxiapatite by pulsed laser deposition. In the tibial dyaphysis of Beagle dogs; and the second consisted in the provocation of an experimental ankylosis. The second maxillary molars ligament was removed after surgical teeth extraction, the endodontic treatment was done, and then were replaced .The animals were sacrificed respectively one, two and three months after the surgical procedure in both experiences. The samples were submitted to a scheduled procedure, in order to perform the ultrastructural observational studies: scanning microscopy with secondary and backscattered electrons. **Results and discussion:** The calcified tissues observed both in the osteointegration as in the ankylosis dento-alveolar were the same. The calcified tissues present in all these processes share the same physiological fate: osteoclasts activate the process; chondroid tissue acts as the stabilizing element in front of the mechanical forces and is substituted by woven bone and later by lamellar bone when the area reaches mechanical stability. The chronology of the described processes is essentially the same as our group described previously. **Conclusions:** No histological or chronological differences were observed between both processes.

STUD 076. Adverse effects of dental bleaching: searching for scientific evidence

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Introduction and objectives: Bleaching has become one of the most popular esthetic dental treatments but there are several controversies about its effects. Therefore, the objective is to review the literature regarding external bleaching adverse effects. **Materials and methods:** Original full articles from peer-reviewed journals included in Medline and Pubmed were selected using as search terms bleach and effects up to November 2008. **Results and discussion:** Carbamide and hydrogen peroxide may produce transitional tooth hypersensitivity. Peroxides do not have significant deleterious effects on enamel and dentin surface morphology, chemistry or microhardness. Fluoridated bleaching gels seem to reduce these effects. Peroxides do not increase the susceptibility to acid erosion, tooth paste abrasion or caries lesion formation. A period of at least 7 days should be allowed after bleaching to carry out an adhesive procedure. Bleaching does not decrease significantly microhardness of restorative materials. No systemic effect has been attributed to dental bleaching. **Conclusions:** Minimal changes in dental tissues and restorative materials are associated to dental bleaching. More research is needed simulating intraoral conditions and using comparable protocols.

END 077. Adaptation of two obturation systems to the root canal walls

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Introduction and objectives: The microorganisms are considered the principal etiological agents in the endodontic pathologies. The biomechanics preparation is very important in endodontic treatment, but it is proved that bacteria still survive in root canal tubules. Filling materials still don't prevent apical microinfiltration. Resilon is a polyester-based thermoplastic root filling material, recently introduced as an alternative to guttapercha. The purpose of this study was to compare the adaptation and penetration of guttapercha/AHPlus and Resilon System to the root canal walls. **Materials and methods:** The sample consists of 20 monoradicular teeth, cleaned and shaped by Hero Shaper and Hero 642 files. During preparation 5.25% of sodium hypochlorite was used as an irrigant, finishing with EDTA to remove smear layer. The sample was divided in Group A: guttapercha/AHPlus, and Group B: Resilon/RealSeal. In both groups, sealers were labeled with fluorescent Rhodamine B. Sections cut from the coronal, middle and apical thirds of each root were viewed using a confocal laser scanning microscopy. Depths of dentinal tubule sealer penetration were observed in statistical analysis.

		AHPlus (average)	Resilon (average)
Coronal	maximum penetration (µm)	1100	627
	penetrated perimeter (%)	91	62
Middle	maximum penetration (µm)	1000	578
	penetrated perimeter (%)	95	53
Apical	maximum penetration (µm)	61	0
	penetrated perimeter (%)	5	0

Results and discussion: AHPlus presented the best results in the coronal and middle third with statistically significant. In apical region, AHPlus also had the best results but without statistically significant.

MAT 078. Polymerization shrinkage and bonded interface: a negative relationship

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Introduction and objectives: Detrimental effects of polymerization shrinkage on μ TBS of bonded interfaces at outer extremes of longitudinal visible light cured resin composite restorations have been described. These effects would be extremely relevant in peripheral parts of extended interfaces. This study tests whether microtensile bond strength to dentin of extended light-cured resin composite restorations decreases from center to periphery. **Materials and methods:** Labial dentin of bovine incisors (n=5) was exposed (500 grit grinding) and restored (Scotch Bond1 XT, VLC Ti Core) in an only increment of at least 2mm high and 10 x 10 mm in extension. Restorations were sectioned perpendicularly to interface, producing bar-shaped samples that were submitted to tension until adhesive separation, its μ TBS calculated and the percentage of μ TBS values within each specimen transformed into PTens dependent variable. Spatial relationship of each sample with all others from same specimen was defined as its MODULE: the result of addition of all vectors with origin in the center of the sample and ending in the center of all others. MODULE was transformed to PMod: its percentage within each specimen. Relationship between PTens and PMod was tested through linear regression analysis. **Results and discussion:** Linear regression results: ANOVA's $p < 0.00001$, $r^2 = 0.42$. **Conclusions:** There is a statistically significant inverse relationship between distance to the center of a visible-light-cured mass of composite resin bonded to a flat dentin surface and μ TBS of interface.

MAT 079. Genotoxic Potential and ROS generation of Camphorquinone in Primary Human Gingival Fibroblasts

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Introduction and objectives: Objective of the present study was to evaluate whether CQ, even in the absence of visible-light (VL)-irradiation, exhibits a genotoxic potential in primary human gingival fibroblasts (HGF). **Materials and methods:** CQ-dependent cytotoxicity (0.125 to 2.5 mM) and intracellular reactive oxygen (ROS)-formation (0.25 to 2.5 mM) were assessed by means of fluorospectrophotometric analyses using propidium iodide and 2',7'-dichlorodihydrofluorescein diacetate, respectively. The alkaline comet assay \pm human 8 hydroxyguanine DNA-glycosylase 1 (hOGG1), to detect oxidative DNA-lesions, was used to determine the genotoxic potential of CQ (0.05 to 2.5 mM). The Tukey ANOVA and the Student's t-test ($p < 0.05$) were used for statistical analyses. **Results and discussion:** In concentrations > 0.25 mM, CQ resulted in rapid and significant ROS-formation in HGF. There was no significant reduction in cell viability during the 3 h incubation period. However, after 24 h of incubation CQ significantly decreased cell number and cell viability. Interestingly, CQ induced DNA-damage depend on concentration already after 3 h of incubation. In addition, experiments with the hOGG1-modified comet-assay (0.5 to 2.5 mM CQ) demonstrated a CQ-induced increase in oxidative DNA-lesions. **Conclusions:** CQ, even without VL-irradiation, exhibits a genotoxic potential in primary HGF cells in vitro. ROS-triggered oxidative DNA-lesions are at least partly involved in CQ-induced DNA-damage. Acknowledgements: Supported by DGZMK (Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde).

OP 080. Clinical comparison study of two whitening systems with different application methods.

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Introduction and objectives: Patients can choose between having their whitening done at home or in the office. Dental bleaching done “at home” has demonstrated to be an efficacy treatment and reduces the number of visits to the dental office. To compare two at-home whitening systems over patients with different application methods, one with brush one other with a traditional system using trays. **Materials and methods:** 20 patients were selected between 18 and 40 years of age. Two groups were formed, one doing the whitening using brushes and the other using thermoplastic trays. After an initial examination, patients were selected by following our criteria for inclusion. Every colour shading was carried out using the Vita Classic Guide reordered by brightness. Shading was performed by 3 different operators and the colour was selected when 2 of the 3 operators matched. The two dental bleaching systems evaluated were: Hydrogen Peroxide 6% (Vivastyle Paint on Plus, Ivoclar Vivadent) using brushes over the dental surface, and Carbamide Peroxide 16% (Buttler Whitening DAY). Night application using thermoplastic trays. **Results and discussion:** Statistically results have been found between these two groups. We have obtained better results using conventional trays than using brushes. **Conclusions:** Both systems has demonstrated their clinical efficacy, however the system using trays has shown better results, probably due to a longer contact time of the peroxide to the teeth.

MAT 081. Micromechanical properties of self-adhesive cements: an one-month evaluation.

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See table on: http://www.efcd.eu/media/pdf/Mat_081_pdf

Introduction and objectives: Limited information is available on the properties of the recently developed self-adhesive cements. The aim of this study was to assess the micromechanical properties of self-adhesive cements over one-month. **Materials and methods:** Five 4mm×4mm×2mm specimens of G-Cem, MultilinkSprint, Biscem, Maxcem, RelyXUnicem, Breeze and Sac-A (experimental) were light-cured 30s and stored in deionised water at 37°C. Elastic modulus (E), elastic work (We/Wtot), creep (Cr) and Vicker’s hardness (VH) were measured after 24h, 1-week and 1-month with a microhardness-indenter. **Results and discussion:** The Table reports means(SD) of the micromechanical properties. **Conclusions:** The micromechanical properties differ among self-adhesive cements over time. Each cement exhibited a specific variation of each property over 1-month.

OP 082. Evaluation of composite repair ability of XP Bond

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Introduction and objectives: In some clinical situation, it is needed to repair the composite restorations for preserve tooth structure and saving time. To obtain good bonding between the old and new composites, we have to make favorable surface condition. The purpose of this study was to evaluate the repair of aged composite with XP bond following various surface treatments conditions with micro-shear bond strength test. **Materials and methods:** 2 mm thick Ceram-X Mono composite was cured and aged by thermocycling (5 to 55°C, 5,000). After aging, the surface was treated by different roughening methods (sandblasting or bur grinding), and silane treatment. Then XP Bond or Adper Single Bond 2 was applied and composite was added and effect of postrepair aging was evaluated. The results were analyzed by one-way ANOVA and Tukey's test and multiple comparisons with LSD test. **Results and discussion:** Individual comparison of the 16 experimental groups showed no statistical difference. However comparing the effect of the surface roughening, silane treatment, bonding agents, and post-aging, only the bonding agent showed statistical difference – XP Bond showed higher bond strength ($p < 0.05$). **Conclusions:** Following the results of this experiment, XP bond showed superior repair bond strength than the other. **Acknowledgements:** This experiment was supported by Dentsply.

STUD 083. Analysis of an endodontic failure, in a maxillary second molar. Case report and survey.

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Introduction and objectives: There are some causes that can cause failures in endodontic treatments. We present a case of a 34-year-old male who has a water-pipe in a maxillary second molar as a cause of an endodontic failure; in this case we decided that the election treatment was extraction of the molar because the patient presented systemic problems. Objectives were: find failure's cause, to evaluate technical aspects that could be better in this case. **Materials and methods:** After the extraction the teeth were rendered clear by demineralization and immersion in methyl salicylate (USC's protocol) and study it. **Results and discussion:** The radiographic study is indispensable to value the result in a short period of time and some months after the endodontic treatment; even some times, with good radiography observations we can find the failure reason. **Conclusions:** To have success, is necessary to be in mind all components of the endodontic treatment: diagnostic, anatomy, access cavities, cleanliness, conformation, disinfection, obturation and restoration.

OP 084. The effect of preparation designs on the marginal and internal gaps in Cerec3 partial ceramic crowns

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Introduction and objectives: The purpose of this study was to evaluate the marginal and internal gaps in Cerec3 partial ceramic crowns (PCCs) of three different preparation designs in vitro using microcomputed tomography (μ CT). **Materials and methods:** Cerec3 PCCs of three different preparation designs (n=20) were fabricated according to the following: Group I-conventional functional cusp capping/shoulder preparation, Group II-horizontal reduction of cusps and Group III-complete reduction of cusps/shoulder preparation. After fixation of PCCs, μ CT scanning was performed. μ CT sections were reconstructed 3-dimensionally, then by dividing the total volume of internal gap by contact surface area, the average internal gap (AIG) was obtained. For 2-dimensional (2D) μ CT views, seven bucco-lingual sections and three mesio-distal cross sections were obtained at predetermined key points. The gaps were measured using μ CT at each reference point. Statistical analysis was performed. **Results and discussion:** For the 3D reconstruction technique, the AIGs were as followed: Group I $197.3 \pm 48.2 \mu\text{m}$, Group II $171.2 \pm 45.1 \mu\text{m}$, and Group III $152.7 \pm 27.1 \mu\text{m}$. For the 2D μ CT views, the gaps of each group were the smallest on margins, and the largest on horizontal or angle walls. Following the results, group I showed larger marginal and internal gaps compared with the other groups. **Conclusions:** The simplified designs (Group II, III) demonstrated superior results compared to the traditional cusp capping design (Group I). The marginal gaps were smaller than the internal gaps in all groups.

CLIN 085. Clinical cases of different types of provisionalization in Porcelain Laminate Veneers.

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Introduction and objectives: One of the most esthetic treatments made with ceramic systems are Porcelain Laminate Veneers (PLVs), which are usually used in anterior teeth. The choice of treatment and the sequence to follow must be thoroughly planned before the beginning of treatment, being provisionalization one of the steps that should be carefully prepared to give esthetic results and keep gingival health during the performing of the definitive PLVs. **Materials and methods:** Three patients were treated, each one with different types of provisional restorations. Patient A with provisional PLVs 1.2 to 2.2 made with a silicone impression filled with autocure resin. Patient B with provisional PLVs 1.5 to 2.5 made with a mock-up filled with flow composite. Patient C with provisional PLVs 1.3 to 2.4 made using CAD-CAM system. **Results and discussion:** Provisional made by CAD-CAM was the most esthetic option and had the best fitting with soft-tissue. Provisionals made with resin need more steps: fill the impression onto the teeth, remove excess of material and perform chemical adhesion by spot-self-etched areas. Provisional made with autocure resin can damage soft tissues and they need additional resins with different colors to make them esthetic. **Conclusions:** The functional and esthetic results were different using several types of provisional restorations. The decision of which technique to use depends on how long the restorations will be required to perform.

OP 086. Optical integration and fluorescence: a comparison between different restorative materials with spectrophotometric analysis.

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Introduction and objectives: Optical integration including fluorescence of restorative materials is important in order to obtain a better aesthetic outcome. The aim of this study was to evaluate the optical integration of 3 restorative materials (Amaris, Grandio and an experimentalOrmocere (VOCO, Cuxhaven, Germany)) including fluorescence compared to intact tooth substrate. **Materials and methods:** Ten extracted maxillary incisors with mesioincisal preparation were restored with Grandio, Amaris and Admira composites using the natural layering concept. Before and after placement of each restoration, the tooth was photographed under standardized conditions (direct, indirect and black light) with a digital camera and spectrophotometric measurements were made. Between measurements teeth were allowed to rehydrate for 2 weeks. Differences in L*a*b values (before and after) were tested with a repeated measures analysis of variance (ANOVA). Differences in ΔE values were tested with a factorial ANOVA. A subjective analysis of each photograph was made using 5 evaluators who scored each light condition (direct, indirect and black light) on a visual scale from 1 to 10. **Results and discussion:** Differences on fluorescence characteristics were found between materials and fluorescence of the restorative materials was greater than natural tooth structure ($p < 0.05$). There were no differences ($p > 0.05$) regarding optical integration between materials, although Amaris tended to have a better optical integration. Difference in L*a*b values were found between restorative materials and backgrounds. **Conclusions:** The tested restorative materials showed a good optical integration and high values of fluorescence compared to natural tooth structure.

STUD 087. Endodontic treatment: one or two sessions?

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Introduction and objectives: Usually, dentist faces the doubt of doing the endodontic treatment in one or more sessions. Nowadays, nobody has established clear rules because the decision changes according to tooth's characteristic, patient's situation, and dentist's experience. Making a classification that joins these factors and that makes this decision easier would be useful. The aim of this review is to establish a protocol that will help to distinguish between doing the treatment in one or more sessions. **Materials and methods:** To achieve these results, we have gone through several articles and statistical studies that show the successes and failures of the endodontic treatment done in different number of sessions. **Results and discussion:** Several sessions of treatment always we find necrotic pulp, vital pulp with hemorrhage when filling, acute periodontal abscess, inflammation and pre-operative pain, previous endodontic treatment and wet root canal. One session: when root canal is dry (no blood, no pus), when the tooth anatomy is not complex and whenever the professional finds himself qualified. **Conclusions:** Bearing in mind the assumptions that may come up when doing an endodontic treatment, we conclude that the general dentist will do the treatment in several sessions and, exceptionally, just in one.

MAT 088. Conversion degree, Bis-GMA release and cytotoxicity of a photopolymerizable dental composite resin

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Introduction and objectives: The dental composite resins cytotoxicity mainly depends on the presence of unpolymerized methacrylic monomers that can be released in the oral cavity. Purpose of this work was the evaluation of the conversion degree, the Bis-GMA monomer release and the in vitro cytotoxicity of Els (Saremco Dental) composite resin. **Materials and methods:** Halogen (Blue light pro, Mectron Medical Technology) or LED (Miniled Satelec, Acteon group) were utilized to polymerise circular samples; the surfaces of the latter were then analyzed by the FT-IR ATR technique. The conversion degree was determined evaluating the ratio between the intensity of two signals (C=C of methacrylic group at 1637 cm⁻¹ and Bis-GMA aromatic ring at 1609 cm⁻¹ utilized as internal standard). Similar samples were dipped in 75 % alcohol (24 h) to allow the release of Bis-GMA, then quantified by HPLC technique. Cellular toxicity was evaluated using murine fibroblasts with MTT and NRU tests. **Results and discussion:** No differences of cytotoxicity were detected in samples cured with halogen or LED source; by the way samples cured with Miniled showed a lower conversion degree and a consequent greater Bis-GMA release. **Conclusions:** It was possible to correlate the Bis-GMA release with the conversion degree of Els composite resin highlighting an invariance of cytotoxicity – resulted however moderate – in all examined conditions.

OP 089. Residual caries detection using laser fluorescence: an in vivo study

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Introduction and objectives: Currently, it is difficult to determine the endpoint of caries removal. The internationally accepted clinical criterion for healthy dentin is its hardness (Kidd, 1996). Laser-fluorescence has shown itself to be effective in detecting irreversibly denatured collagen from carious dentin, differentiating it from healthy collagen. However, it can show false positives when there are brown areas or dentin close to the pulp. The objective of this investigation is to determine the performance of DIAGNOdent® at the endpoint of caries removal. **Materials and methods:** This in vivo study was approved by the University of Seville ethics committee. We chose 71 permanent molars with dentin caries and carried out two laser-fluorescence measurements: one with infected dentin and another once clean. The “Gold Standard” was the hardness of the dentin. The color was registered, as well as the thickness of the walls and the distance to the pulp via digital radiography software (Digora®). The sensitivity and the specificity were determined.

DIAGNOdent®	n	Median (limits)	Sensitivity (cut-off >13)	Specificity (cut-off >10 / cut-off >13)
Dentin caries	71	41.96 (99-15)	1.00	--
Healthy dentin (A)	71	10.71(55-2)	--	0.76 / 0.82
Stained dentin (B)	9	38.44 (55-14)	--	0.0 / 0.0
Thickness <1mm (C)	5	14.6(18-10)	--	0.4 / 0.2
A-(B+C)	57	5.6 (13-2)	--	0.91 / 0.98

Results and discussion: The results are shown in table 1. **Conclusions:** DIAGNOdent® is a method with a high level of performance in establishing the endpoint of caries removal. However, it is not useful in stained dentin and the results can be affected when the thickness is less than 1mm.

END 090. Micromorphology of adhesively bonded root canal dentin following different irrigation protocols

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Introduction and objectives: Recently, adhesive obturation materials have been developed to provide for a more effective seal of endodontically restored teeth. In the present study, the micromorphology of the adhesive-sealer/root-canal-dentin (RCD) interface was characterized as a function of the chemo-mechanical modification of RCD through instrumentation/irrigation. **Materials and methods:** Root canals in single-rooted teeth were instrumented and subjected to irrigation with: (1) aqua demin. (control), (2) 5%NaOCl, (3) 5%NaOCl/10%citric-acid, (4) 5%NaOCl/17%EDTA, (5) 5%NaOCl/10%citric-acid/5%NaOCl. An adhesive interface was created by bonding a conventional adhesive system (Clearfil Protect Bond) and three adhesive obturation systems (Real Seal, EndoRez, Hybrid Root Seal) to RCD. Micromorphology of the resin-RCD interface was characterized in cervical, middle and apical root-canal thirds using low-vacuum-scanning-electron-microscopy (LVSEM) on polished specimens. **Results and discussion:** Criteria characteristic of the resin-dentin interdiffusion zone were identified in adhesively-bonded RCD: resin-tags, lateral-resin-tags, hybrid-layer. The micromorphology of the interaction-zone strongly depended upon the irrigation protocol and localization within the root-canal: Smear layer removal with citric-acid or EDTA exposed a collagen-rich, hybrid-layer-like zone, absent when NaOCl was used as final irrigant after smear layer removal. **Conclusions:** Micromorphology of the adhesive-sealer/RCD interface is strongly influenced by chemo-mechanical modification of the substrate. Therefore, irrigation procedures are one predominant factor if adhesive obturation of the root canal system is applied.

CLIN 091. Non surgical retreatment of a two rooted lower canine with post treatment disease subsequent to ineffective surgical and non surgical treatment

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Introduction and objectives: To report the clinical case presentation and management of a lower canine with a chronic fistula following previous non surgical and surgical endodontic treatment. **Materials and methods:** A 46 years old lady with a non-contributory medical history was referred for management of a lower canine with complex anatomy. The patient reported a history of recurrent drainage and swelling in the sulcular area associated to this tooth. Orthograde treatment was carried out twelve years prior to consultation, while surgical management was carried out five years after, following the appearance of a fistula; however treatment signs and symptoms were unchanged. **Results and discussion:** Intra-oral examination showed that the tooth was heavily restored and the previous tooth colored restoration appeared to have insufficient margins; a buccal open fistula was evident in the sulcus related to this tooth. Radiographic exam suggested the presence of two roots, periapical radiolucency and a radiolucency at the mid-root level of the tooth. Only one of the roots has been treated in orthograde manner and had apical resection, as well as an amalgam retrofil; the second root was left untouched. After removal of the previous restoration, the case was treated in an orthograde manner and, following chemo-mechanical preparation of the root canal system and calcium hydroxide dressing, the fistula disappeared; subsequently the canals were filled using gutta-percha and a final restoration using glass-ionomer cement as well as composite was carried out. The case appeared to settle after the first course of treatment; however 5 years after further symptoms appeared; this may have developed as consequence of insufficient restoration that led to marginal leakage and therefore recurrent infection. **Conclusions:** Better understanding of endodontic anatomy -as well as the importance of coronal restoration- is required to for an adequate management of root canal related infections.

MAT 092. Effect of autoclave sterilisation of addition and condensation cured silicone impression materials.

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Introduction and objectives: Current requirements only demand the disinfection of impressions. However, the sterilisation of dental impressions would appear to be a more favourable option. The aim of this study was to compare changes in dimensional stability and tear strength of impressions following sterilisation in a dental autoclave. **Materials and methods:** Twenty-four specimens were produced using a standard ruled test block for each of the silicone impression materials (Affinis, Aquasil and Speedex). Thirty tear strips, for each material, were produced and prepared for the tear test (ISO 34-1). Specimens were randomly allocated to 3 different groups (autoclaved at 134°C, disinfected in Perform-ID or untreated). A non-contact scanner and programme was used to analyse the dimensional changes and a universal testing machine (Intsrn 1193) was used to determine tear strengths. Control groups were impressions subjected to chemical disinfection as well as an untreated group. **Results and discussion:** There were no significant differences in the three test dimensions measured for any of the three impression materials following autoclaving compared to the disinfected or untreated control groups. The tear strengths were not adversely affected by autoclaving. **Conclusions:** These addition and condensation-cured silicone impression materials tested can be steam autoclaved without adverse effects on dimensional accuracy or tear strength.

MAT 093. A comparison of marginal leakage in vitro for all-ceramic crowns luted with 5 cements.

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Introduction and objectives: The aim of the study was to compare the dye leakage following cementation of all-ceramic crowns with 5 current cements. **Materials and methods:** 30 Authentic® crowns were fabricated and cemented onto extracted human teeth using 5 cements (a RMGIC: seT, SDI; a two-stage adhesive: ParaBond® + ParaCore®, ColtèneWhaledent; and three all-in-one self-adhesives: SmartCem™2, Dentsply; Maxcem Elite™, Kerr; RelyX™ Unicem, 3M ESPE). Following storage in water and thermal cycling, the teeth were exposed to dye, sectioned and examined under confocal and optical microscopy. Leakage was determined by two blinded examiners, and scoring was carried out on a scale of 0-8 per tooth (0 = no leakage) with 6 teeth per material. **Results and discussion:** The results showed a wide range of scores between the different cements. The least leakage was observed for the 2-stage adhesive ParaBond + ParaCore (mean score 0+0), followed by RelyX Unicem (0.8+0.8), SmartCem2 (1.7+2.1), Maxcem Elite, (3.2+1.7) then seT (5.2+2.5). Statistical analysis was carried out showing that ParaCore, was significantly less prone to leakage than Maxcem Elite, ($P=0.002$) and seT ($P<0.001$). **Conclusions:** In conclusion, the choice of luting cement is important in reducing dye leakage. This study favours the use of a separate adhesive system placed prior to the composite luting resin.

OPER 094. Results of preliminary questionnaires to determine the attitudes of dentists towards postgraduate distance learning courses in operative dentistry.

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Introduction and objectives: To investigate the attitude of Dental Practitioners in India towards fulfilling continuing professional development in operative dentistry via a flexible blended learning online approach. **Materials and methods:** Following a pilot study a theory of planned behavior (TpB) questionnaire was developed comprising of 25 questions and using a Likert scale interval level response format. The questionnaire was distributed in 3 different locations in India and the results statistically analysed. The respondents provided data regarding their attitudes towards flexible blended online learning. The significant data is presented. **Results and discussion:** The view of CPD via flexible learning was in general very positive, with respondents recognising its benefits for their careers, profiles among their fellow professionals and for keeping up to date. Most respondents spent more than 20 days a year on traditional methods of study. Respondents' most important considerations when choosing a CPD course were: topic; recognition by their Dental Council; worldwide status of the course provider; and inclusion of a practical component. Others aspects of importance were stated to be: cost; location; and course length. **Conclusions:** Flexible learning in dentistry was seen to be a popular method of overcoming traditional barriers. Flexible learning programmes have been launched in EU and India based on this data.

MAT 095. Flexural properties of fiber-reinforced composite posts: the effect of custom adaptation and span-diameter ratio.

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Introduction and objectives: To evaluate whether custom modification resulting in an anatomically shaped post and whether the span/diameter ratio (L/D) would affect the mechanical properties of fiber-reinforced composite posts. **Materials and methods:** Preformed glass-fiber posts (Group 1) and modified glass-fiber posts (Group 2) and glass-fiber rods (Group 3 and 4) (n = 20) were loaded to failure in a three-point bending test to determine the maximum load (N), flexural strength (MPa) and flexural modulus (GPa). The span distance tested for Group 3 was 10.0 mm, while for Group 4 was 22.0 mm. Data were subjected to different statistical analysis with significance levels of $P < 0.05$. **Results and discussion:** The maximum load, the flexural strength and the flexural modulus recorded for the different groups are reported in Table 1. **Conclusions:** The flexural properties of an anatomically custom modified fiber post were not affected by the modification procedure and the span-diameter ratio is an important parameter for the interpretation of flexural strength and flexural modulus values.

END 096. Micro-computerized tomographic analysis of root and canal morphology in maxillary and mandibular molars.

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Introduction and objectives: Objective of this study was to measure at different level the palatal root and canal of maxillary molars and the distal root and canal of mandibular molars. **Materials and methods:** 30 palatal roots of maxillary molars and 30 distal roots with one canal of mandibular molars were analyzed with micro-computerized tomography. The cross-sections corresponding to the apical ten millimeters were analyzed to measure the MesioDistal and BuccoLingual diameters of the roots and canals, the BL/MD ratios of the canal (ΔC) and the root (ΔR) diameters, the mean taper in BL and MD dimension. Multiple logistic regression analyses were performed. **Results and discussion:** In mandibular molars, BL root and canal diameter was greater than MD. ΔC and ΔR are high and increased coronally. In all root segments the BL taper was greater than the MD taper. In the maxillary molars MD root and canal diameter was greater than BL. ΔC and ΔR are small and remained constant coronally and BL and MD taper were similar. **Conclusions:** An oval anatomy is frequently present even in the most apical sections of the distal canal of mandibular molars, while the palatal canal of maxillary molars is rounder.

PREV 097. Influence of an individualised mouthrinse protocol on caries risk profile in a high-risk population for socio-economic factors.

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Introduction and objectives: This study evaluated the influence of an individualised mouthrinse protocol on the Streptococcus mutans (SM) and Lactobacillus (LB) prevalence and caries risk profile in an adult population at high-risk due to socio-economic factors. **Materials and methods:** 147 healthy adults (82 male, 65 female; mean age 42y) were enrolled in the study. Epidemiological and clinical data were collected (DMFT, DMFS, plaque index, dietary record, SM and LB count, salivary flow and buffer capacity). Patients received caries therapy, professional mechanical tooth cleaning and dietary and oral hygiene instructions. Patients with SM count high scores (2:105-106 CFU/ml; 3:>106 CFU/ml) performed a 40 days 0,12% chlorhexidine mouthrinse (2 per day). Patients with LB (2:105 CFU/ml; 3:106 CFU/ml) received a 40 days 0,05% NaF mouthrinse (2 per day). Baseline clinical and microbiological data were compared to 6 months and 1 year follow-up. Patient's caries risk profile was evaluated with Cariogram software. Paired t-test was used to analyse the differences between T0 and T6 - T12 (p<0.05).

Plaque Index	score	To (%)	T6 (%)	T12 (%)	p
Silness-Loe	0: PI < 0,4	9,85	37,00	59,60	<0,05
	1: 0,4<1	50,00	58,00	37,10	
	2: 1,1<2,0	36,30	4,80	3,23	
	3: PI>2,0	3,79	0,00	0,00	
SM	0: 0<10 ³	19,00	37,10	63,13	<0,05
	1: 10 ³ <10 ⁵	34,09	35,48	24,19	
	2: 10 ⁵ <10 ⁶	30,30	22,58	8,06	
	3: SM>10 ⁶	21,21	4,84	1,61	
LB	0: LB< 10 ³	8,33	33,87	33,33	<0,05
	1: LB< 10 ⁴	26,52	30,65	47,22	
	2: LB< 10 ⁵	33,33	27,42	16,67	
	3: LB< 10 ⁶	31,32	8,06	2,78	
Cariogram	Green area (caries-free chance)	52,00	81,00	83,00	<0,05
	Red area (bacteria)	10,00	4,00	3,00	

Results and discussion: Table 1 summarizes the variations of the observed variables at T0, T6 and T12. Microbiological scores demonstrated a significant and stable reduction at T6 and T12. **Conclusions:** The suggested mouthrinse protocol seems to be efficacious in positively influencing the patient's risk profile. **Acknowledgements:** Authors thank Dr A. Borracino for his valuable support in statistical analysis and methodology.

PREV 098. Influence of an individualized behavioral protocol on patient's compliance and caries risk profile in a high-risk population for socio-economic factors.

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Introduction and objectives: This study evaluated the influence of an individualised behavioural protocol on the compliance and caries risk profile in an adult population. **Materials and methods:** 147 healthy adults (82 male, 65 female; mean age 42y) were enrolled in the study. Epidemiological and clinical data (DMFT, DMFS, plaque index, SM and LB count, salivary flow and buffer capacity), behavioural data (manual dexterity, oral hygiene and dietary habits) were collected. Patients received caries therapy, professional mechanical tooth cleaning; dietary and oral hygiene instructions were furnished as individualised objectives. The satisfaction of the suggested objectives was statistically evaluated. Patients with high scores sugar intake (diet content and frequency) performed a 40 days 0,05% NaF mouthrinse (2 per day). Baseline clinical and behavioural data were compared to 6 months and 1 year follow-up. Patient's caries risk profile was evaluated with Cariogram software. Paired t-test was used to analyse the differences between T0 and T6 - T12 ($p < 0.05$).

Plaque Index	score	To (%)	T6 (%)	T12 (%)	p
Silness-Loe	0: PI < 0,4	9,85	37,00	59,60	<0,05
	1: 0,4	50,00	58,00	37,10	
	2: 1,1	36,30	4,80	3,23	
	3: PI > 2,0	3,79	0,00	0,00	
Diet contents	0: very low	13,64	11,29	41,67	<0,05
	1: low	33,33	58,06	36,11	
	2: moderate	39,39	30,65	19,44	
	3: high	13,64	0,00	2,78	
Diet frequency	0: 3/day	25,76	22,58	38,89	<0,05
	1: 4-5day	30,30	43,55	30,56	
	2: 6-7/day	25,00	30,65	30,56	
	3: >7/day	18,94	3,23	0,00	
CARIOGRAM	Green area (caries-free chance)	52,00	81,00	83,00	<0,05
	Blue area (diet)	16,00	5,00	3,00	

Results and discussion: Table 1 summarizes the variations of the observed variables at T0, T6 and T12. Patients received a total of 337 objectives. Dietary objectives were satisfied in 72,86%, while oral hygiene objectives were satisfied in 68,78%. **Conclusions:** The suggested behavioural protocol seems to be efficacious in positively influencing the patient's risk profile. **Acknowledgements:** Authors thank Dr A. Borracino for his valuable support in statistical analysis and methodology.

STUD 099. Undressing color

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Introduction and objectives: A usual problem to face when building up aesthetic restorations is to achieve the similar features as in natural teeth. Appropriate aesthetics must be reproduced for a successful outcome, as a proper shape, surface texture and colour. We will show how to do a thorough colour measurement for an anterior restoration aided by photography and common digital technology. It is easy to use basic software to edit digital images of our clinical cases, to obtain an accurate image that unveils the chromatic tooth features and helpful information to complete our colour chart. **Materials and methods:** From an initial picture of the clinical case, using any picture software (ex. Photoshop, Picture Project) that allows playing with contrast and brightness to modify the colour curve. With few simple steps a very accurate chromatic map could finally be achieved. **Results and discussion:** With a modified image is easy to appreciate the internal tooth features as opalescence, intensives, characterizations, crack lines, mamelons just to mention a few. **Conclusions:** If exploited properly the available digital technology, we will be able to solve many color matching issues, without needing expensive instruments or large money investments.

OP 100. Root caries treatment in elderly: ART Technique vs. ART with Carisolv®. Clinical randomized double blind essay. Preliminary results

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Introduction and objectives: Comparing the clinical efficacy in elderly root caries lesions of the conventional Atraumatic Restorative Treatment (ART) technique versus ART using a chemo-mechanical method, Carisolv ®. **Materials and methods:** Thirty-five root-surface caries lesions from elderly patients were treated. We randomized each lesion to receive one of the two study treatments: Group1, ART approach (caries removed by hand instruments) and group 2, ART approach with Carisolv® (caries removed by hand instruments helped by Carisolv®). All lesions were restored with resin modified glass-ionomer restorative material. Status of the restorations was assessed at six months intervals. The evaluation criteria used in most ART studies were adopted. **Results and discussion:** After 12 months, 38.8% of the ART restorations were assessed as being “present and sound”, 55.57% had a “slight marginal defect”, and 5.26% restorations disappeared. Among the ART approach with Carisolv® restorations, 40% were “present and sound”, 26.66% had a “slight marginal defect” and 20% restorations disappeared. The survival rates for the ART approach and ART approach with Carisolv® restorations were 94.7% and 66.6% respectively. **Conclusions:** The first results of study show that the use of Carisolv® doesn’t improve the clinical behaviour of ART restoration in root caries.

END 101. Chlorhexidine as intracanal medicament and irrigant

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Introduction and objectives: Most important irrigants of the intraradicular canal are sodium hypochlorite (NaOCl), citric acid and chelants. Calcium hydroxide -Ca(OH)₂- is mainly used as intracanal medicament. However, these products have some disadvantages like some microbial resistances. So this, other substances are being investigated to achieve better properties. The objectives are to study the effects of chlorhexidine (CHX) as irrigant and intracanal medicament. **Materials and methods:** A review of latest published literature. **Results and discussion:** There are experiments in vitro and in vivo. As irrigant, chlorhexidine has being compare with NaOCl, especially in the effect in dental tissues, antimicrobial activity and speed of action. CHX has being also associate with Ca(OH)₂ and others medicaments (camphorated p-monochlorophenol). Antibacterial effects, pain following the treatment, speed of action and their association with others substances has been investigated and reviewed. There are no differences when comparing antibacterial effects of 2,5%NaOCl and 0,12%chlorhexidine. NaOCl is more efficient in removal of debris but the substantivity is shorter than CHX. **Conclusions:** CHX 2% has more antibacterial effect and faster than Ca(OH)₂, but it don't induces apex formation. However, combination of both can be successfully for disinfection in periapical lesions and development of the antioxidant properties of CHX.

OP 102. In vitro evaluation of microleakage levels of two etch systems in class I cavities restored with resin composite

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Introduction and objectives: Polymerization shrinkage and a different thermal expansion coefficient of resin composite compared to dental tissue may cause gaps in the tooth-restoration interface. Bacteria, fluids, molecules and ions can pass through those gaps, a process which is known as microleakage. The aim of the present study was to evaluate the microleakage levels of Class I cavities restored with resin composite using two different etching techniques (total etch / self etch). **Materials and methods:** 111 extracted human molars were randomly divided into 6 groups. After a Class I preparation, the adhesive was applicated (group 1=Xeno III, 2=Excite, 3= AdperTM ScotchbondTM 1XT, 4=Adper Promp L-Pop, 5= G BondTM and 6= Prime & Bond NT) and the specimens were restored with resin composite. After thermocycling (2000 cycles), the specimens were immersed in methylene blue and sectioned. Microscopical photographs of the sectioned specimens were evaluated by different operators to score dye penetration. Data were analyzed using a two-factorial ANOVA at p<0.05. **Results and discussion:** Highest dye penetration was found in group 5, followed by groups 1, 6, 2, 3 and 4. There was no statistically significant difference between group 1 and 6, group 3 and 4, but statistically significant differences (p<0.05) were found between group 1 with groups 2, 3, 4 and 5; group 2 with groups 3, 4, 5, 6; group 3 with groups 5 and 6; group 4 with groups 5 and 6; and group 5 with group 6. **Conclusions:** The level of microleakage of Class I cavities in molars using total etch system is lower compared to the self etch system.

STUD 103. Epidemiological study of dental trauma in Valencian scholars

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Introduction and objectives: The aim of the present study was to identify some factors related to the occurrence of dental trauma in mixed and permanent dentition. **Materials and methods:** Over a period of 2 months, 1325 people, 6 to 18 years old, from three primary schools were examined in order to evaluate those factors. Data was collected through clinical examinations, photos and interviews. Dental trauma was classified according to IADT's criteria. **Results and discussion:** The prevalence of dental trauma was 6%, boys aged between 12-18 years old experienced more injuries than girls. Non complicated coronal fracture was the most frequent (91,18%). Games were the main cause of trauma (40%). Color change was observed in 20% of patients. Angle's class I was the most frequent in traumatized people. **Conclusions:** Similar prevalence of injuries and factors related to trauma that in other studies revised was observed.

OP 104. Fracture resistance of glass-ionomer liner and flowable composite used in open sandwich Class II amalgam or composite restorations: An in vitro study

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Introduction and objectives: The aim of this in vitro study was to investigate the effect of a glass-ionomer liner and a flowable composite used on the gingival floor on the fracture strength of Class II amalgam and composite restorations. **Materials and methods:** Class II slot preparations extending 1mm apical to the cemento-enamel junction were made in 42 teeth and randomly assigned to six groups. Group 1 and 4, restored entirely with nanofill composite (Filtek Supreme XT, 3M/ESPE) after applying dentin bonding agent (Adper Single Bond 2) or amalgam (World-Cap, Ivoclar). For the remaining groups, the root-dentin area was restored with light-curing glass-ionomer liner (Ionoseal, Voco) (Group 2, 5) or flowable composite (Filtek Supreme XT flowable, 3M/ESPE) (Group 3, 6) and the remainder of the cavity restored with composite (Filtek Supreme XT) (Group 2, 3), or with amalgam (World-Cap) for (Group 5, 6). The restorations were loaded in compression to failure and the data analyzed using T-test. **Results and discussion:** Group 6 (3110±220 N) showed statistically higher fracture resistance than group 1 (2690±670 N), 2 (2420±590 N), 3 (2300±700 N), 4 (2530±800N) (p< 0.05). **Conclusions:** Use of a glass-ionomer liner or a flowable composite on the gingival floor did not enhance fracture resistance of the composite restorations, however flowable composite used in open sandwich Class II amalgam restorations significantly increased fracture strength.

OP 105. Effect of polishing procedures on surface roughness and gloss of resin composites

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Introduction and objectives: Effect of one/multi-step polishing systems on roughness (Ra) and gloss (GI) of two resin composites and correlation between Ra and GI was investigated. **Materials and methods:** Specimens of microhybrid Tetric and nanofilled Filtek Supreme XT were flattened (320 grit SiC-paper) and polished for 60 s according to group (n=8): Untreated controls, Sof-Lex, Astropol, Enhance/Prisma Gloss, Kenda and PoGo. Ra and GI differences (after-before polishing, RaD and GID) were evaluated by ANOVA and Scheffé post-hoc-test ($p<0.05$). Spearman correlation was conducted between Ra and GI. Results and discussion: Ra and GI were inversely correlated irrespectively of polishing and composite ($p<0.0001$). GID ($p<0.0001$) but not RaD was significantly higher for Filtek than for Tetric. Tetric: RaD of control (mean/ μm -0.02) was significantly lower compared to Sof-Lex (-0.18) and Astropol (-0.16). RaD of Sof-Lex was significantly higher than of Enhance/Prisma Gloss (-0.03) and PoGo (-0.03). Sof-Lex (mean/GU 9.9) showed the significantly highest GID. Filtek: RaD of control (-0.02) was significantly lower compared to Astropol (-0.13) and Kenda (-0.12). RaD of Enhance/Prisma Gloss (+0.01) was significantly lower than of Sof-Lex (-0.10), Astropol and Kenda. GID of control (2.7) was significantly lower compared to Sof-Lex (15.3), Astropol (10.6) and PoGo (12.5). **Conclusions:** Both, composite and polishing system influenced GI.

OP 106. Nonvital dental bleaching - efficacy comparasion of 15% and 35% hydrogen peroxide

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Introduction and objectives: Today tooth bleaching is based upon hydrogen peroxide as the active agent. The bleaching efficacy rises with the concentration of the bleaching agent. On the other hand, higher concentrations seem to raise the risk of side effects. It has been reported in several studies high concentrations of hydrogen peroxide efficacy, above to 30%, on non-vital bleaching in office. However there are no studies comparing these concentrations efficacy with lower concentrations of the same agent. The aim of this work was verify the hydrogen peroxide concentration reduction effect on the efficacy of this agent on non-vital dental bleaching, by comparing two products with 15% and 35% hydrogen peroxide. **Materials and methods:** There were created two groups with ten teeth each and one control group with five teeth as is described in the table. Bleaching percentage per tooth was calculated after each one of the two bleaching treatment sessions for each group.

Group	Bleaching Agent
I	15% hydrogen peroxide
II	35% hydrogen peroxide
III (control)	no agent

Results and discussion: 35% hydrogen peroxide bleaching percentage was always superior with statistical significance. **Conclusions:** Reduction of hydrogen peroxide concentration decrease immediate bleaching efficacy.

END 107. The apex diameter influence in the MTA sealing ability - open apex simulation model

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Introduction and objectives: In teeth with incomplete root formation by pulp necrosis, the root development ceases and apical closure cannot be achieved. Root canal treatment at this time is a significant challenge. MTA (Mineral Trioxide Agregate) has been suggested as a potential material to form an apical barrier. Aim: The purpose of this work is to evaluate the influence of the apex diameter in the MTA sealing ability when used as an apical barrier. **Materials and methods:** Three experimental groups were created, with 10 single-root teeth each, with an open apex simulation with different diameters. All canals were instrumented with Protaper® system, followed by hand instrumentation K-flexofiles until 2mm over extrusion with 60, 80 and 100k-files in groups I, II and III respectively. All canals received a 5mm MTA apical plug. The teeth were placed in a 50% Silver Nitrate dye solution to test leakage, which was observed after 1mm sagital sections performed in the last apical 5mm. **Results and discussion:** MTA extrusion was most frequent in roots with highest apical diameter (group III), although there were no statistically significant differences ($p < 0,05$) between groups concerning its sealing ability. **Conclusions:** Increased apex diameter is linked to an increased risk of MTA extrusion but not to an increased apical leakage.

STUD 108. Methodological proposal for analyzing the international scientific production in Dentistry on the Web of Science

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Introduction and objectives: The studies in Science Citation Index (SCI) about dental scientific publications, have been based until now just on analyzing information under category “Dentistry, Oral Surgery and Medicine” (DOSM) from Journal Citation Reports (JCR). Probably the fact of excluding the rest of the JCR categories is due to difficulties on design searching techniques to retrieve this information. The objective on this project is to design retrieval strategies in order to generate data bases including all SCI dental records not only in DOSM category but in the rest of medical journals. We will analyze two periods: 1994-1996 and 2004-2006. **Materials and methods:** Creating this data base entail two tasks. One is analyzing DOSM from the JRC and as a second task a breakthrough procedure is proposed. This new technique is hybrid, thematic and author’s institutional affiliation to recover dental scientific information published on journals not included on DOSM. Data base including SCI records related to dental scientific publication between 1994-1996 and 2004-2006. **Results and discussion:** The number of records is 33.618. **Conclusions:** The innovative technique presented allows retrieve dental scientific production published on DOSM journals as well as those other papers not included in this category. This combined analysis guarantees a better scientific description of the dental research.

CLIN 109. LAVA® system. Clinical case

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Introduction and objectives: The recent progress in material technology and manufacturing procedures has extended the indications of all-ceramic systems not only for single crowns restorations but also for fixed partial dentures (FPDs) in the anterior and posterior sectors. The objective of this study is to explain the manufacturing process as well as the clinical systematic of preparation of Lava AllCeramic System posterior fixed partial denture. **Materials and methods:** We present a clinical case of a patient with decoloration by tetracycline and absences of 16 and 26. **Results and discussion:** Once clinical history and the complementary exploration were made, it was decided to rehabilitate the patient with 3-unit posterior FPD of LAVA® All Ceramic System (3M ESPE) (CAD/CAM system + zirconium oxide ceramic system). **Conclusions:** The LAVA system offers a suitable marginal sealing clinically observed, as well as excellent esthetic results, allowing in addition a conservative dental preparation. There will be necessary long-term clinical studies to evaluate the fracture resistance of this new ceramic system.

OP 110. Quantitative margin analysis and shear bond tests for selecting effective experimental adhesives

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DGZ

Introduction and objectives: The purpose of this study was to evaluate the performance of experimental adhesive systems prior to launching. **Materials and methods:** 7 groups of 8 Class-V-cavities were prepared in extracted human incisors (4 mm high, 3 mm wide, 1.5 mm deep, half of margin length located in enamel). 7 experimental adhesives (Saremco Dental) were combined with the composite ELS. Replicas were created after 21 days of water storage (TM1) and after a first thermocycling (TM2), and for 4 adhesives also after one year of water storage (TM3) and after a second thermocycling (again 2000 cycles, 5° to 55°C) (TM4). Quantitative margin analysis was performed using an SEM (200x) according to standard criteria. The results were compared with shear bond strengths (SB) performed by Saremco. **Results and discussion:** Median values (MPa for SB, % "continuous margin" for quantitative margin analysis) for the seven experimental adhesives (SB/TM1/TM2/TM3/TM4) were I:10.0/36.4/9.5, II:10.0/27.0/10.7, III:10.0/0.0/0.0, IV:16.0/100.0/100.0/100.0/100.0, V:14.0/92.0/56.9/49.7/20.7, VI: 16.0/100.0/100.0/100.0/100.0, VII:14.0/100.0/98.5/98.1/71.7. Statistical evaluation (Kruskal-Wallis-Test with Bonferroni adjustment, p<0.05) showed best results for experimental adhesives IV and VI, from which VI was launched as cmf adhesive system. **Conclusions:** Quantitative margin analysis provides detailed and precise non-destructive measures of bonding effectiveness in experimental products, supporting and strengthening shear-bond tests (especially after one year water storage). **Acknowledgements:** Supported by Saremco Dental.

OP 111. In vitro evaluation of color measuring devices.

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Introduction and objectives: The aim of this in vitro study was to evaluate the validity and repeatability of three commercially available color measuring devices. **Materials and methods:** Three devices were tested: (ES) Vita Easyshade spectrophotometer (Vita), (SS) Spectroshade spectrophotometer (MHT) and (SV) ShadeVision colorimeter (X-Rite). Each one of the 5 shade tabs [B1, A2, A3,5, D3, C4 - Vita Classical shade guide (VC)] was placed in a manikin model covered by a black box and 15 measurements in sequence were performed per device under standardized conditions. Data in L*,a*,b* values were recorded for all the devices and measurements. The repeatability was expressed as the coefficient of variance (CV) for L, a*, b* values. Color differences between every measured tab and its reference (VC) analogue were defined by calculation of $\Delta E = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]^{1/2}$. ΔE values subjected one-way Anova ($\alpha=0.05$). The validity per L*,a*,b* parameter was determined relative to the correspondence values of the reference VC by one sample t-test ($\alpha=0.05$).

Device	Repeatability			ΔE (mean \pm SD)				
	CV (L*)	CV (a*)	CV (b*)	B1	A2	A 3,5	D3	C4
ES	0–0,01 ^c	0,05–0,32 ^c	0–0,03 ^c	3,27 \pm 0,26	4,79 \pm 0,55	2,38 \pm 0,32	4,38 \pm 0,44	1,98 \pm 0,14
SS	0–0,01	0,16–1,92	0–0,04	2,06 \pm 0,19	1,86 \pm 0,80	1,09 \pm 0,16	2,44 \pm 0,12	1,02 \pm 0,02
SV	0–0,01	0,03–7,32	0–0,02	1,28 \pm 0,25	2,10 \pm 0,20	1,46 \pm 0,19	2,36 \pm 0,16	1,01 \pm 0,16

^c range of values from all shade tabs tested.

Results and discussion: Concerning repeatability, a* showed higher CV values with wider distribution than L* and b*, which presented negligible ones. ES exhibited statistically higher ΔE values for all tab shades compared to SS and SV. In regards of validity, only L* parameter of B1, D3 and C4 tabs measured by SS device proved as valid. **Conclusions:** 1) All the devices presented high repeatability in L* and b* parameters but not in a*, 2) The validity of all the devices can be characterized as poor with the exception of Spectroshade in L* parameter and, 3) Spectroshade and ShadeVision provided lower color differences (ΔE) than Easyshade relative to the reference Vita Classical shade guide tabs.

CLIN 112. Horizontal root-fractured teeth: report cases

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Introduction and objectives: Horizontal root fractures are common in dental trauma, mainly occurring on the cervical and middle third of the root of permanent upper incisors. Diagnosis of horizontal root fractures is reached by the information obtained in clinical radiographic examinations, and requires different healing patterns, according to the etiology and the location of fracture lines. The aim of this issue was to report the clinical management and their different results. **Materials and methods:** Presentation of different clinical cases, each one with a different treatment according to clinical conditions which present in the future evolution. **Results and discussion:** After the application of the pre-established, all cases had a successful evolution. **Conclusions:** We should choose a specific treatment for each case, according to clinical criteria and the post-evolution.

STUD 113. Importance of post in dental resistance to fractures

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Introduction and objectives: In endodontically treated teeth of with great loss of coronal structure, posts are used. However, many dentists don't use them for the possibility of causing dental fractures. The aim of this study is to evaluate the dental resistance to fracture according to presence/no presence of posts, kind of tooth and post types and placing techniques. **Materials and methods:** Review of the published literature. **Results and discussion:** The use of posts is necessary in the reconstruction of the dental structure to allow restoration retention . In contrast, this additional retention can cause the loss of tooth resistance. This is solved by placing posts with similar elasticity to the dentin. Posts are more resistant to fractures in this order: quartz >zirconium >glass fiber >titanium. The most fractured teeth are second premolars and mesial root of mandibular molars. A good technique for placing a post would be: post free 5mm in the apical third , 2/3 of the post into root canal, parallel walls, maximum conservation of dental tissue. **Conclusions:** Posts shouldn't be placed randomly in posterior sectors. If we use posts to increase retention, tooth will lose resistance to fracture. Posts in anterior sectors must be aesthetic.

OP 114. Influence of cusp coverage for ceramic restorations on marginal integrity

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Introduction and objectives: No information is available to date about cusp design of thin (1.0 mm) non-functional cusps and its influence upon marginal integrity of ceramic inlays (CI). The aim of the present in vitro study was to investigate the effect of cusp coverage of thin non-functional cusps on marginal integrity. **Materials and methods:** CI (n=48) preparations were performed on extracted human molars. Non-functional cusps were adjusted to: 1.0 mm wall thickness (group 1) and 1.0 mm wall thickness with horizontal reduction of about 2.0 mm (group 2). Ceramic restorations (Vita Mark II, Cerec3 System) were adhesively luted with Excite/Variolink II. Margins were evaluated before and after thermo-mechanical loading (TCML: 5000x8°C-55°C;30s/cycle; 500000 x 72.5N, 1.6Hz) by quantitative margin analysis (QMA) at the ceramic/luting agent (LA), enamel/LA and dentin/LA interface. Due to the difference of $\leq 5\%$ between the medians for all parameters a statistical evaluation was not considered meaningful.

Compromised adaptation(%); Median (25%/75%percentiles)				
	Before TCML		After TCML	
interface	Group 1	Group 2	Group1	Group 2
Ceramic/LA	0.4(0/1.0)	0.1(0/0.3)	0.3(0.1/0.6)	0(0/0.2)
Enamel/LA	0.1(0/0.7)	0(0/0.1)	0.1(0/0.7)	0(0/0.1)
Dentin/LA	4.2(1.1/6.5)	1.2(0.3/1.6)	3.6(1.4/11.8)	3.4(0.5/15.7)

Results and discussion: See table. **Conclusions:** Within the limitations of the present study, it can be concluded that coverage of thin (1.0 mm) non-functional cusp walls of adhesively bonded ceramic restorations does not influence marginal surface integrity. In similar dye penetration studies cusp coverage resulted in significantly better marginal adaptation.

END 115. The effect of two techniques of instrumentation associated to ultrasonic irrigation to remove the smear layer of root canals
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Introduction and objectives: The mechanical instrumentation of the root canal creates an irregular layer known as smear layer. The meta-analysis made, tell us that the advantages or disadvantages of the presence of smear layer are controversial. With scanning electronic microscope, it was studied the capacity to remove the smear layer from the root canals, provoked by the instrumentation with the manual step-back and rotatory technique associated or not to the passive ultrasonic irrigation (PUI). **Materials and methods:** A total of 80 palatin and distal root canals of molars had been divided randomly in four distinct groups. After each instrument, the root canals were flushed with a 3% NaOCl solution. After splitting the roots longitudinally, the specimens were examined under scanning electronic microscope.

Group	Manual step-back technique	Rotatory technique (ProTaperTM)	PUI
A	x		
B		x	
C	x		x
D		x	x

Results and discussion: The association of PUI to any one of the instrumentation techniques had the elimination of smear layer with bigger effectiveness, while that, without the aid of ultrasonic, the rotatory technique left 50% of the canals without smear layer and the manual technique left almost canals walls with debris. **Conclusions:** The statistic analysis showed that PUI increase the capacity of the cleaning of smear layer from root canals.

OP 116. Influence of composite thickness and curing light intensity on the degree of conversion of microhybrid resin composites: an in vitro study.

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Introduction and objectives: Modern curing lights are available with outputs exceeding 800 mW/cm², resulting in recommended shorter exposure times. However, this shorter irradiation may lead to an insufficient degree of conversion of the composite resin, especially at the bottom of the restorations. The aim of this in vitro study is to compare the degree of conversion obtained with high-intensity halogen and LED curing units related to different composite thickness, evaluating the efficacy of shortened irradiation time. **Materials and methods:** A micro-hybrid resin composite, shade A3, was placed in 18 aluminium rings with the same diameter (10mm) and different thickness (1mm, 2mm, 3mm). A tungsten halogen light and a LED lights were employed. The degree of conversion at the bottom surface of each sample was accomplished by ATR FT-IR analysis immediately after the high-intensity curing program. Conversion values were compared with the ANOVA for repeated measures ($p < 0.05$).

	DEGREE OF CONVERSION (mean and SD)		
LAMP	1mm	2mm	3mm
Halogen (Swiss Master Light)	0,35 (±0,02)	0,25 (±0,07)	0,19 (±0,03)
LED (Translux Power Blue)	0,38 (±0,03)	0,33 (±0,04)	0,26 (±0,05)

Results and discussion: The results are expressed in table 1. The statistical analysis showed a significant difference between the sample thicknesses but not between different curing lights. **Conclusions:** The mean degree of conversion obtained in all sample was quite low, suggesting that, despite the high intensity of the light, shortened irradiation times aren't sufficient for the composite polymerization.

STUD 117. Experimental evaluation of the adaptation of fiber post to canals shaped with ProTaper rotary instruments

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Introduction and objectives: Adaptation of the fiber post to the dowel space may be a determinant factor in the clinical performance of fiber-reinforced composite posts, especially in clinical situations with extreme loss of the root-canal dentin. The primary objective was to evaluate adaptation of fiber post to dowel space, prepared with two different techniques. The secondary objective was to examine the correlation between cement thickness and post bond strength, through the push-out test. **Materials and methods:** Thirty-two single-rooted teeth were treated endodontically, 16 root canal filled, and a dowel space was prepared with Largo vs Largo and post dedicated drills. Each specimen was sectioned into six 1 mm slices. Cement's thickness was determined using specific software. Push-out values were compared with the Mann-Whitney U test ($p < 0.05$). A linear regression model was used to correlate cement thickness with the work required to dislocate the post. **Results and discussion:** The Largo drill technique showed a greater cement thickness ($p < 0.001$), with no differences in push-out values. The linear regression model showed a positive association between cement thickness and work required ($p < 0.001$). Non-obtured specimens had higher push-out values than obtured ones ($p < 0.001$). **Conclusions:** Bond strength does not appear to be influenced by the dowel space preparation technique, although work necessary to dislocate the fiber post is proportional to the cement thickness.

STUD 118. Hydrogen peroxide penetration in pulp chamber following different teeth bleaching treatments

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Introduction and objectives: In order to minimize the irritating effects on the pulp by bleaching agents, it is mandatory to define which bleaching technique leads to the lowest penetration of free radicals in the pulp chamber. The aim of this in vitro study is to evaluate the penetration of free radicals in the pulp chamber after different bleaching techniques. **Materials and methods:** Twelve extracted teeth were treated with different bleaching protocols. Acetate buffers were placed into the pulp chamber to absorb and stabilize any peroxide that might penetrate. The penetration of H₂O₂ into the pulp chamber was determined spectrophotometrically by a UV-visible microplate reader set to 596 nm, at room temperature. The results were analyzed by a one-way analysis of variance and Tukey's test. P < 0.05 was considered significant.

Table 1. Penetration of hydrogen peroxide in pulp chamber.				
Group (n = 3)	Time of application (min)	Pulpal peroxide (% w/w)	p value	% of pulpal peroxide vs. total peroxide released
Opalescence Extra-boost 38%	10	2.512 ± 0.06	p < 0.0001	6.9
Opalescence Extra-boost 38%	20*	2.511 ± 0.04	p < 0.0001	6.9
Opalescence 15%	10	0.925 ± 0.02	p < 0.001	7.4
Opalescence 15%	240	1.674 ± 0.04	p < 0.001	16.2
* After a 10 minutes application, the bleaching gel was replaced with a new one for 10 minutes further				

Results and discussion: Results are expressed in table 1. The release of peroxide from Opalescence Extra-boost 38% was similar after 10 and 20 min. Of course, it is difficult to compare the release from Opalescence 15% after 10 and 240 min, due to the likely transformation of the relatively unstable hydrogen peroxide after the longer time. **Conclusions:** The penetration of peroxide into the pulp chamber wasn't function of application time, while it was proportional to the percentage of bleaching agent. Bleaching agents with high peroxide concentration seem to rapidly release the peroxide saturating the tooth.

MAT 119. Effect of substrate hydration on resin-dentin bonds using different adhesive systems

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Introduction and objectives: Healthy dentin is physiologically hydrated in vivo. The study evaluated the influence of simulated hydrostatic pulpal pressure (PP) on bonding efficacy of different adhesives to dentin. **Materials and methods:** Flat coronal human dentin surfaces were bonded using 1. Adper Single Bond Plus Adhesive; 2. Clearfil SE Bond; 3. Bond Force; 4. Adper Scotchbond SE; 5. Adper Prompt L-Pop; 6. G Bond with or without applying hydrostatic PP of 15cm H₂O. After completing the coronal build-up, bonded specimens were stored for 24 hours (at 37°C and 100% humidity) before performing the microtensile bond strength test. Fracture patterns were evaluated under SEM. Data were statistically analysed with Kruskal-Wallis on ranks ($p < 0.05$) and Mann-Whitney tests ($p < 0.001$) including premature failures.

Letters in each column and asterisks (*) in each row indicates significant differences ($p < 0.001$)		
Exp. groups	PP	No PP
	Mean (SD)	
Adper Single Bond Plus	31.91 (16.1) A	34.94 (13.2) a
Clearfil SE Bond	30.35 (10.1) A	33.35 (15.7) ac
Bond Force	19.05 (11.3) AC	18.30 (9.1) bc
Adper Scotchbond SE	4.27 (8.4) B	16.67 (8.3) bc*
Adper Prompt L-Pop	9.82 (12.3) BC	11.56 (13.2) b
G-Bond	No sticks	6.46 (9.3) c

Results and discussion: Mean bond strength (SD) values (MPa) recorded by the tested adhesives are listed in the Table. Single step self-etch adhesives attained lower bond strength results. PP significantly affected Adper Scotchbond SE bonding efficacy. **Conclusions:** Changes in dentin hydration may influence the bonding performance of some self-etch adhesive systems. Intra-pulpal perfusion should be applied when simulating bonding procedures in vitro.

END 120. Osteogenic differentiation of dental pulp stem cells

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Introduction and objectives: Literature states that human postnatal dental pulp stem cells (HDPSCs) have the ability to differentiate into osteoblasts. Our purpose is to differentiate HDPSCs with three different medium and compare their osteogenic ability. **Materials and methods:** Human dental pulp was extracted from teeth of healthy adult subjects aged 21 to 45 years. The pulp was gently removed and immersed in a digestive solution for 1 h at 37°C. After digestion, cells were placed in three flasks with 3 different mediums. Medium 1: Osteodiff (Miltenyi®); Medium 2: α -MEM supplemented with 15% fetal bovine serum, 100 U/ml penicillin, 0.1 mg/ml streptomycin, and 0.25 lg/ml. amphotericin B; Medium 3: α -MEM medium, supplemented with 20% fetal bovine serum, 100 mM 2P-ascorbic acid, 2 mM L-glutamine, 100 U/ml penicillin, 0.1 mg/ml streptomycin, and 0.25 lg/ml. amphotericin B. Flasks were incubated at 37°C in a 5% CO₂ and the medium changed twice week. **Results and discussion:** After 35 days, HDPSCs formed and developed mineralization nodules (clusters), as revealed by Alizarin red staining. This staining was bigger with Medium 1 than medium 2 and medium 3. **Conclusions:** This study confirms the ability of HDPSCs to differentiate into osteoblasts, and proves the superior efficacy of the Osteodiff Medium (Miltenyi®) over two locally made osteo-differentiation published formulations.

PREV 121. Effect of new protective chemical agents on microtensile bond strength of luting resins to dentine

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Introduction and objectives: To test the microtensile bond strengths (MTBS) of newly developed pretreatment methods for dentin using different chemical agents to form a resistant layer against demineralization. **Materials and methods:** Twenty-seven human molars (N=27) were embedded and flat dentine surfaces were exposed. They were divided into three luting resin groups [SuperBond C&B (S), Variolink II (V) and Multilink (M)] (n=9/group). Each group was further divided into 3 subgroups of surface treatments, namely TiF₄, CAPE and control. Flat dentine surfaces were ground with 400 grit silicon carbide papers. Conditioned ceramic specimens (5x5x5 mm) were bonded using the luting agents. After thermocycling (50-550, 20s, x1000), each tooth was sectioned into multiple beams (1x1mm). The sticks (n=108) were fixed to a universal testing machine and stressed until failure (1 mm/min). MTBS (MPa) were calculated. Failure modes were evaluated under SEM. Two-way ANOVA and Bonferroni tests were used at 95% CI. **Results and discussion:** The effect of cement type on MTBS was significant with V and S presenting higher values (15.7±3.4, 14.9±3.9, respectively) than that of M (10.5±3.2) (p<0.05). The MTBS values of the experimental chemical agent groups were significantly lower (CAPE: 12.9±2.2, TiF₄:12.9±3.8) than the control group (15.4±3.8) (p<0.05). Failure types [(adhesive (a), cohesive (c), mixed (m))] for TiF₄, CAPE and control were 20a/4c/12m, 19a/17m and 12a/5c/19m, respectively. **Conclusions:** The experimental chemical agent application on the prepared dentine decreased the microtensile bond strength values of ceramic to dentine.

OP 122. Dentinal permeability modifications produced by four dentin adhesives applied with and without positive liquid pressure in a modified Pashley system

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Introduction and objectives: Dentinal sensitivity (DS) is a frequent problem in patients. Several theories have been proposed to explain the mechanism of DS. The most widely accepted is the so-called Hydrodynamic Theory. According to this theory dentinal adhesives can be used to treat DS by creating a coat on the exposed dentine that reduces dentinal permeability. The aim of this in vitro study is to analyze the modification of dentinal permeability produced by four dentin adhesives applied with and without positive liquid pressure in a modified Pashley system, using scanning electron microscopy (SEM) to confirming our results. On the other hand, we compared the materials to find the best adhesive in reducing dentinal permeability. **Materials and methods:** Two self etch adhesives (AdheSE® y G BondTMTM) and two total etch adhesives (AdperTM ScotchbondTM 1XT y ENA BOND) were applied on dentinal discs and introduced in the modified perfusion system. In half of the discs adhesives were applied with liquid pressure and in the remaining half without liquid pressure. SEM was used to complement perfusion results. **Results and discussion:** In all cases, liquid pressure negatively affects adhesive capability to reduce dentinal permeability. Self etch adhesives showed the best capability to reduce dentinal permeability. **Conclusions:** Our results suggest that dentinal permeability should be introduced systematically in perfusion studies.

OP 123. Comparison of amalgam repair strategies in situations with and without dentin exposure

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Introduction and objectives: To test the bond strength strategies on amalgam repairs with and without surrounding dentin. **Materials and methods:** Coronal parts of sound human canines (N=50, n=10 per group) were embedded in autopolymerized PMMA. Cylindrical preparations (diameter: 2.3 mm, depth: 3 mm) were made and filled with a non-Gamma 2 amalgam (Cavex). Dentin surfaces were exposed, specimens were ground finished using 1200-grit silicone carbide papers and they were randomly assigned to one of the following conditioning methods: Group 1: Silicacoating amalgam (30 µm CoJet Sand), etching dentin, silane application on amalgam, adhesive (Clearfil SE Bond) on dentin, opaquer on amalgam, resin composite (Clearfil Photo Posterior) on both; Group 2: Etching dentin, silicacoating amalgam, silane application on amalgam, adhesive on dentin, opaquer on amalgam, resin composite on both; Group 3: Etching, adhesive on dentin, opaquer on amalgam, resin composite on both. The specimens bonded only on amalgam without involvement of dentin acted as control groups and they were further assigned to one of the following conditioning methods: Group 4: Silicacoating, opaquer, resin composite and Group 5: No conditioning, opaquer, resin composite. Specimens were kept in water at 37°C for five weeks prior to shear bond test (1mm/min). Failure types were classified by two calibrated operators. ANOVA and Tukey-Kramer adjustment tests were made at 95% CI. **Results and discussion:** Surface conditioning method had a significant effect on the results ($p < 0.05$) (ANOVA). Unconditioned control group (Gr 5) showed the least favorable results (1.4 MPa). The highest results were obtained in Group 1 (39.9 ± 4 MPa) being significantly higher ($p < 0.05$) than those of other groups. Silicacoating resulted in exclusively (100%) cohesive failures in the amalgam. **Conclusions:** For reliable repair of amalgam-dentin complex, first amalgam then dentin must be conditioned.

MAT 124. The use, application and hazardous effects of hydrofluoric acid in dentistry

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Introduction and objectives: To review the chemical properties, clinical applications of hydrofluoric acid (HF) in restorative dentistry and to highlight the possible hazardous effects of this agent as well as to recommend the treatment approach for potential risks, based on the review of the literatures existing in chemical and medical fields. **Materials and methods:** All original scientific full papers listed in PubMed and Medline about HF were included in this review using the search terms: Hydrofluoric acid, Acid etching, Surface conditioning, Ceramics, Fracture, Repair, Hydrofluoric acid burns, Hydrofluoric acid treatment, hydrofluoric acid etching, workplace poisoning, poisoning, fatalities, ceramics intra-oral repair, Fluorohydric acid, Fluoric acid, and Hydrogen fluoride solution between 1970-2007. Scientific reports, medical and chemical textbooks and handbooks were also used. Product information was referred with instruction articles, and the internet pages of the manufacturers. **Results and discussion:** 133 relevant articles were reviewed by two operators. HF is particularly aggressive for soft tissues. This is not based on the pH value, but on its toxicity. Although HF is considered to be a dangerous, harmful, irritating compound, both laboratory evaluations and clinical procedures concerning its use for glass ceramic cementation and intraoral ceramic repair have been reported without any complications. No biological risks in vivo have been reported in dentistry but HF burns have been reported in dermatology literature in the form of case reports. **Conclusions:** HF is still the most effective medium for conditioning ceramics with glassy matrix before bonding resin composite. Exposure to HF can produce harmful health effects that may not be immediately apparent but in the dental literature no such cases were found.

MAT 125. Marginal fit of Cr- Ni- Ti restorations: influence of casting technique and finish line design

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Introduction and objectives: The study was focused on researching the influence of casting technique and finish line design in marginal fit of Cr- Ni- Ti restorations. **Materials and methods:** Sixty standardized specimens of brass were prepared to receive metal-ceramic crowns, divided into two groups according to the cervical finish line: chamfer and rounded shoulder. Every group was divided in three subgroups according to the casting process. Induction and centrifuge, burner and centrifuge and induction and vacuum/pressure. All groups were casting with a Cr- Ni-Ti alloy (Tillite®) and veneered with Vita VM® 13. The marginal fit was measured at four points using an image analysis software: buccal, lingual, mesial, and distal. **Results and discussion:** Burner and centrifuge (45,87 µm) and Induction and centrifuge (48,62 µm) showed the lowest marginal discrepancies and significant differences were detected between these groups and induction and vacuum/pressure (71,08 µm). Chamfer finish line showed the lower values of marginal discrepancy (54.12 µm), obtained the rounded shoulder similar values (56.26 µm). No significant differences were observed between the two finish lines. No significant interactions between casting technique and finish line were demonstrated. Lingual surface showed the best marginal fit. **Conclusions:** The accuracy of fit achieved for the sixth groups analyzed was within the range of clinical acceptance.

END 126. Push out-strength of fiber posts placed in pre-existing root canal fillings

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Introduction and objectives: Purpose of this study was to compare the bond strength of two fiber post systems (RelyX Unicem/RelyX Fiber Post (RLX), Variolink II/ DT Light SL (VDW)) in relation to root canal fillings. **Materials and methods:** 160 human teeth were divided into 4 groups: guttapercha/AH Plus (GAP), guttapercha/Guttaflow (GGF), old 'pre-existing' root canal fillings (ORF), canals without filling (WRF, control). After canal preparation, the posts were cemented and half the specimens were thermocycled (TC, 5000 cycles, 5- 55°C). All specimens were exposed to the 'push-out'-test (1 mm/min). **Results and discussion:** Before/after TC, type of root canal filling did not affect bond strength. VDW-WRF before TC had the highest bond strength (16.5±6.4 MPa). After TC, VDW-GGF showed a decreased bond strength (9.5±3.2 vs 5.3±2.4, p=0.005). TC did not affect the bond strength of RLX. Groups ORF and WRF revealed significant differences for VDW and RLX (ORF: 16.3±6.0 vs 7.0±2.4, p=0.001, WRF: 16.5±6.4 vs 8.0±5.0, p=0.004) before TC. After TC, no differences were assessed. Microscopic evaluation of posts showed mainly adhesive failures between post and cement for VDW or mixed fractures for RLX. **Conclusions:** Fibre post systems can be used without regard of the root canal sealer. The etch&rinse system caused higher bond strength values than the self-adhesive system.

OP 127. Gingiva-shaded compomers: clinical results after 24 months

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Introduction and objectives: Periodontal recessions with wedge-shaped defects often generate aesthetic and functional problems. The restoration of these defects with tooth-coloured materials sometimes leads to inferior aesthetic results ('long clinical crowns'). These problems may be reduced by using gingiva-shaded compomers. Purpose of this study was the evaluation of their clinical long term performance. **Materials and methods:** 18 wedge-shaped defects were restored with a gingival-shaded material and a self-etch adhesive. After 16 and 24 months, all restorations were monitored and assessed by two calibrated examiners (mod. USPHS-criteria, probing depth, Wilcoxon-test for statistics) and a questionnaire regarding the patients' satisfaction with the treatment outcome was used. **Results and discussion:** At baseline 18 (retention: 100%), after 16 months 17 (94.4%), and after 24 months 16 restorations (88.8%) were evaluated. Regarding "anatomic form", at baseline 83.3% of the restorations scored A in contrast to 41.2% at 16 months and 58.8% at 24 months (p<0.05). For "gingival reaction" A-scores were 83.3% vs. 23.5% vs. 18.8% (p=0.002). No significant differences were detected regarding probing depths. The patients' satisfaction with the treatment outcome was high. **Conclusions:** Retention rate using a self-etch adhesive dropped by more than 11% within 24 months. Regarding anatomic form, a recall should be performed at regular intervals for re-finishing the cervical restoration margins.

OP 128. Shear bond strength of self adhesive resin cements in vitro

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Introduction and objectives: Self-adhesive luting resins facilitate the placement of indirect restorations. The purpose of this study was to evaluate their shear bond strength to enamel and dentin. **Materials and methods:** 60 molars were randomly assigned to 12 test-groups (each n=10) and proximal surfaces were ground flat to get an enamel and dentin surface with a diameter of at least 4 mm. Lithiumdisilicate-ceramic specimens were bonded to the surfaces either with Variolink / Syntac (VSC), Panavia F2.0 (PAF), RelyX unicem (RLX), Maxcem Elite (MCE), iCem (IC) or an experimental self-adhesive resin cement (EXP). The shear bond strength (crosshead speed 1 mm/min) was measured after 24h-storage in NaCl (37°C). The fracture modes were determined with a stereomicroscope (magnification 8 to 50 fold). For statistics, t-test was used. **Results and discussion:** VSC revealed the highest shear bond strength within the enamel groups (42.9 ± 9 MPa), IC the lowest (10.5 ± 4.2 MPa, $p < 0.001$). The highest dentin shear bond strength was determined for VSC (39.2 ± 8.9 MPa, $p < 0.001$), the lowest for EXP (7.8 ± 3.9 MPa, $p < 0.001$). Self-adhesive resin cements fractured mainly between resin and enamel/dentin. **Conclusions:** The shear bond strength of self-adhesive resin cements was partially inferior compared to etch&rinse composite resin cements.

OP 129. Clinical spectrophotometric comparison of the efficacy of an in-office and at-home dental bleaching technique.

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Introduction and objectives: Objective: To evaluate and compare the efficacy of an in-office and at-home bleaching procedure and to assess the tooth shade stability. Materials and methods: **Method and Materials:** in the present study forty patients were randomly divided in two groups, group A (n=20) using an in-office bleaching technique with hydrogen peroxide at 25% activated by a lamp (ZOOM Advanced Power, Discus Dental, USA.), and group B (n=20) using an at-home bleaching system with carbamide peroxide at 10% (Nite White, Discus Dental, USA). Digital images and spectrophotometric measurements (L^* , a^* and b^*) were taken at baseline, after the bleaching treatment, at 15 days, 1 months and 3 months after bleaching. Differences in L^* , a^* , b^* values were tested with a repeated measures analysis of variance (ANOVA). Differences in ΔE values were tested with an ANOVA statistical analysis. **Results and discussion:** Results: In group A and B, significant differences ($p < 0.05$) were detected in L^* , as well as in a^* and b^* values, between initial and post bleaching and between initial and 1 months post-op and between initial and 3 months. In contrast, there was no significant difference between post bleaching and 3 months in group B. While in group A the L^* value decreased from post bleaching to 3 months post-op. **Conclusions:** The at-home bleaching technique proved to be more efficient over a period of three months compared to the in-office technique.

MAT 130. Influence of surface treatment on adherence energy of Nickel-Chromium alloy used in bonded prosthetics

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Introduction and objectives: Literature mainly addressed that tribochemical treatment followed by application of silane increase the adherence and the water resistance of resin-bonded joints. The aim of this study is 1) to compare 2 tribochemical systems on the adherence of nickel-chromium: Rocatec® (laboratory device) and CoJet® (chairside device) and 2) to evaluate the effect of silane condensation by heat treatment on the water resistance of resin-bonded joint. **Materials and methods:** Five different surface treatments were done on 50 nickel-chromium samples: 1) Rocatec® with silane, 2) Rocatec® with polycondensated silane, 3) Cojet® with silane, 4) CoJet® with polycondensated silane 5) sandblasting with alumina particles of 50µm. The surface energy were calculated by measuring contact angles, the adherence was evaluated by the Double Cantilever Beam test on a resin-bonded joint using SuperBond®. Surface topographies were controlled with a profilometer and the evolution of silane polycondensation by FTIR spectroscopy. **Results and discussion:** There is no significant difference between CoJet® and Rocatec® ($p < 0,05$). The heat treatment of silane increases significantly the water resistance of resin-bonded joint (reduction rate of adherence energy in water decrease from 37% to 17%). **Conclusions:** Within the limits of our study, use CoJet® and heat silane is a reliable and predictable surface treatment of base alloy to enhance the energy adherence and increase the survival rate of resin-bonded prosthetics.

MAT 131. Prediction of color change after tooth bleaching using color CIELAB parameters and linear models.

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Introduction and objectives: As yet, the color variation that can be achieved with different techniques for bleaching teeth is not predictable. The purpose of this study was to develop a new mathematical algorithm that allows objectively predicting the effectiveness of the bleaching agent. **Materials and methods:** Fifty-three volunteers (16 with tetracycline stain) were selected to participate in this clinical study. All patients were instructed to bleach their teeth for 2 hours, once daily, for 2 weeks with a 20% carbamide peroxide tooth-bleaching agent (Opalescence 20% PF®, Ultradent Products). Tooth color measurement was realized using a spectroradiometer (SpectraScan PR-704®, Photo-Research) at baseline, at 7 and 15 days following initiation of the bleaching procedure. **Results and discussion:** L^* , a^* and b^* , WIO values for pre-, during and post-bleaching were obtained. Color differences, ΔE^* between tooth and reference white (0,0,100), color coordinates, were calculated. Linear models were used to obtain the relationship between initial and final color parameters analyzed. The better predictive model was obtained for ΔE^* : $\Delta E^*f = -0.49 * \Delta E^*i + 4.20$. **Conclusions:** The analysis shows it is possible to predict the tooth color change after the bleaching procedure using the initial tooth color measurement. ΔE^* was the most direct and precise measurement to obtain the color change estimations after this bleaching process.

STUD 132. Obturation capacity of IRM, MTA and Silver Amalgam as a retrograde obturation materials.

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Introduction and objectives: To compare apical sealing capacity of three root-end filling materials: IRM, MTA and silver amalgam. Sealing effectiveness was determined by their ability to inhibit ink penetration. **Materials and methods:** The root canals of 60 extracted human maxillary lateral incisors were instrumented using Protaper system and obturated with Thermafill. Each tooth was apically resected and an apical cavity 3mm deep and 1mm wide was ultrasonically prepared. Teeth were randomly divided into 3 groups and each group was respectively retrofilled with amalgam, MTA or IRM. Afterwards all teeth were varnished except for the 3 apical millimetres to assure that any filtration would occur across the obturating material. The teeth were immersed in Indian ink for 72h and kept at 37°C. They were made transparent using methyl salicylate, observed with a microscope at x24 magnification and ink filtration was quantified. **Results and discussion:** Silver amalgam resulted to be the root-end filling material with the worst sealing ability, whilst IRM and MTA showed no statistically significant differences. **Conclusions:** Silver amalgam is the obturation material provides a worst apical seal than IRM and MTA, while these two have very similar sealing capacities. However, the extrapolation of these results into a clinical practice is questionable.

OP 133. Caries incidence of individual permanent tooth surface

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Introduction and objectives: The aim of study was to evaluate the incidence of caries at individual tooth surfaces of anterior and posterior teeth. **Materials and methods:** Caries was detected according to the WHO criteria (1987): caries is recorded as presented when a lesion in a pit or fissure, or on a smooth tooth surface, has a detectably softened floor, undermined enamel or softened wall. On approximal surface, the examiner must be certain that the explorer has entered a lesion. **Results and discussion:** 2382 tooth with caries was examined, 753 were anterior and 1629 were posterior teeth. Mesial surfaces of maxillary incisor and lateral teeth contributed most to caries (59.3% and 58.5%, respectively). Distal surfaces of maxillary canine, mandibular incisor, lateral and canine teeth showed higher caries rate (74.5%, 77.5%, 74.2% and 67.6%, respectively). Distal surfaces of maxillary and mandibular first premolars (68%, 67%) and second premolars (59.4%, 64.1%) contributed most to caries. Most caries rates was detected on occlusal fissures of maxillary first, second molars (52.7%, 60.9%) and mandibular first and second molars (55.6%, 66.3%). **Conclusions:** Approximal, especially distal surfaces of anterior and premolar teeth were more prone to caries than the other surfaces. On the other hand occlusal surfaces especially fissures of molars was more susceptible to caries.

MAT 134. Microtensile bond strength of fiber post: effect of surface roughness.

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Introduction and objectives: The breakdown of a fibre post restoration often occurs as a consequence of adhesive failure. In order to improve the bonding between fibre composite and cements, different post surface treatment have been proposed: the aim of this study was to evaluate the effect of the increased surface roughness of a new fibre post. **Materials and methods:** 50 fibre posts in 5 groups: 1) DT Illusion^{#2}(Dentsply); 2) RelyX Posts^{#2} (3M-ESPE); 3) Unicore^{#4} (Ultradent); 4) Postec Plus^{#1} (Ivoclar); 5) Prosthetic OverPost^{#3} (Overfibers), the last having a special surface texture at least 3-times rougher than the other posts. Surface roughness was determined for each post. PanaviaF and Photocore composite (Kuraray) were used to make a build-up following the manufacturer directions. The specimens were thermocycled, stored in 100% humidity, and 4 slices for microtensile test were obtained from each post. **Results and discussion:** Mean bonding values of groups 1) to 4) were not significantly different, whereas group 5) value was (15.2 MPa, $p < 0.05$, 1-way ANOVA). The results strongly suggest that surface roughness, increasing both micromechanical retention and surface area, has a great effect on the post/cement adhesive strength. **Conclusions:** A surface texture of 3.8 Ra of a new post type significantly increases the adhesive bonding without any further surface treatment.

MAT 135. Bond strengths of self-adhesive cements to fiber-reinforced posts prior and after thermocycling**C. MAZZITELLI*1, F. MONTICELLI2, A. CASUCCI1, M. TOLEDANO3, R. OSORIO3, M. FERRARI1***1University of Siena; 2University of Zaragoza, Spain; 3University of Granada, Spain*

Introduction and objectives: Self-adhesive cements represent the last adhesive approach for fiber post luting. The study aimed to assess the effect of thermocycling on the push-out bond strengths of contemporary self-adhesive resin cements used for luting translucent fiber posts. **Materials and methods:** Forty fiber posts (RelyX Fiber Post #1) were luted to endodontically treated single canal teeth using four self-adhesive resin cements (RelyX Unicem, G-Cem, Max-Cem, Breeze). Bonded specimens were submitted to thermocycling (TC: 5.000 cycles from 5°C to 55°C, dwelling time of 30s in each bath) or stored in a moist field (37°C, 100% relative humidity) for 1 month prior to push-out bond strength test. Data were statistically analyzed with Two-Way ANOVA ($p < 0.05$) and Tukey tests ($p < 0.05$).

Experimental groups	Initial	TC
Rely X Unicem	10.27(2.18) A	13.66(8.23) A
G-Cem	6.78(2.57) B	10.0(4.34) A*
Max-Cem	3.86(2.94) C	8.71(3.97) A*
Breeze	10.31(4.60) A	9.92(6.33) A

Results and discussion: Push-out bond strength values are listed in the Table. Values are means (SD) expressed in MPa. Different letters in each column and asterisks in each row indicate statistically significant differences ($p < 0.05$). **Conclusions:** Selecting the adequate luting agent for restoring endodontically treated teeth is crucial for achieving satisfactory and long-lasting clinical results. Self-adhesive resin cements were not negatively affected by thermocycling. Additional in vitro and in vivo data are required to validate the results obtained.

END 136. In vivo evaluation of the root canal length determined by an apex locator in vital and necrotic pulp

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Introduction and objectives: The ideal apical endpoint of a root canal is considered to be the apical constriction or cemento-dentinal junction of a tooth with completed root formation. Manufacturers claim that third-generation apex locators locate the apical foramen in the presence of moisture, pulp tissue, blood, exudates, or solutions such as sodium hypochlorite or EDTA. They also claim that no special instruments are necessary to operate the device; a standard endodontic file is used as the intracanal probe. For this study, a third-generation electronic apex locator, Neosono Ultima EZ (Amadent, U.S.) was chosen. **Materials and methods:** In this study 37 teeth were used, 17 out of them with vital pulp, and 20 teeth with necrotic pulp in which was apical radiolucency. Initially, a K-file was placed in the root canal, and afterwards was done the Computerized Dental Radiography. NiTi-files, were used as instruments in which a stopper made out of rubber was placed in the endometric length, which was calculated with ApexLocator, calibrated monitor from 0.0-0.1mm. The measurements were conducted in a wet ambient with NaOCl solution in a distance of 0.5mm. In this position, digital radiography was done with CDR (Schick Technology, USA). The instrument which was used (NiTi-file) was fixated with epoxy resin, while the rest of it which was left was carefully cut. The extraction of the tooth was carefully done in order to not be created any kind of movement of in the instrument. **Results and discussion:** Under the certain issues of this experiment, with the use of Ni-Ti instruments, the length of the canal measured in electronic method NT, in 66% of the canals (36 canals) was the same with the actual length of root canal. In 14.8% (8 canals), the length measured in the electronic method was 0.5% shorter than the actual root canal. In 13% (7 canals) the electronic measurement was 0.5mm longer than the actual root canal. The tip of the endodontic instrument was went beyond the foramen in 5.6% of the cases (3 canals). In cases when it was over passed, it was 1-2 mm from the actual length of the root canal. These results suggest that in 94.4% (51 canals), with Ultima EZ apex locator, and with NiTi- instruments, the measurements were +/- 0.5mm of the actual length of the root canal. **Conclusions:** Since, Ultima EZ apex locator gives accurate readings, thus the exposure of patient in rtg, waves. Apex locators have a lot of advantages compared to the radiographic method.

END 137. Variations in the number of roots and canals in the 1-st maxillar premolar

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Introduction and objectives: The success of the endodontic therapy depends from the bio-mechanical instrumentation and three dimensional root canal obturation. The failure of these treatments, are very often as the results of number of the roots and morphological variation, except the main root canal it can be present also the accessory and supplementary (lateral) canals and this is trait for every tooth. The narrowness of the maxilla first and second premolar root, the longitudinal groove along their length are responsible for the differences in the number and typography of cavum dentis. Knowledge of these variations advances the concept for the successful endodontic treatment. In this study we research the variations of the number of roots. **Materials and methods:** 342 teeth were performed and macroscopically analysed. **Results and discussion:** The results of this research show that in 57% of the cases are present two roots, in 40% of the cases are present single roots and in 3% are three roots. In the cases with single root according to Vertucci classification, in 65% is type IV (2), 30% with type II (2-1) and 5% type I (1). **Conclusions:** If the compression of roots (mesio-bucal way) it will results in change of intra-canal system.

MAT 138. Zirconia surface pre-treatments: a combined AFM and SEM analysis

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Introduction and objectives: Zirconia surface conditionings have been proposed to enhance micromechanical retentions with resin cements. Zirconia morphology after different chemo/mechanical surface pre-treatments was analyzed with AFM and SEM. **Materials and methods:** Fourteen zirconia discs (Lava: Ø10 mm x1 mm) were divided into 7 groups (n=2) according to the surface pre-treatment: 1) No surface pre-treatment; 2) Sandblasting (125 µm for 10s); 3) 9.5% Hydrofluoric acid (90 s); 4) Selective Infiltration Etching (SIE); 5) Experimental Etching Solution, EES (10 min); 6) EES (30 min); 7) EES (60 min). After ultrasonic cleaning for 30 min, each disc was evaluated with an Atomic Force Microscope (Multimode Nanoscope IIIa) in the tapping mode (tip: 1-10 Ohm-Cm phosphorous (n) dopes Si). Fields of view at 5x5 µm scan size were considered. The average surface roughness (Ra) after different surface treatments was determined with multiple measurements (Software Nanoscope V530R35R). Data were statistically analyzed with Kruskal-Wallis (p<0.05) and Mann-Whitney tests (p<0.05). Then, each disc was gold sputtered (Polaron-Range SC7620) and analyzed under SEM (JEOL) at 12.000x.

	Mean Ra (nm)
No surface pre-treatment	6,94 (1,34) [°] A
Sandblasting	7,11 (1,09)A
Hydrofluoric acid	5,23 (0,88)A
Selective Infiltration Etching	26,02 (8,83)B
Experimental etching solution for 10s	54,22 (28,97)C
Experimental etching solution for 30s	81,79 (8,03)C
Experimental etching solution for 60s	103,02 (31,19)C

Results and discussion: The experimental etching solution at 10, 30 and 60 s increased zirconia surface roughness (p<0.05) (Table 1). Mean (SD) surface roughness values (Ra) recorded with Atomic Force Microscopy after different zirconia surface conditioning approaches. Different letters indicate statistically significant differences (p<0.05). **Conclusions:** AFM and SEM have complementary capabilities that allow for a more reliable evaluation of zirconia morphology after chemo/mechanical surface treatments.

CLIN 139. Improvement of the periodontal interface in restorative treatments.

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Introduction and objectives: Gingival factors present a significant influence in the esthetic and biological success at the perio-restorative interface. The Periodontal Biotype can condition several aspects of restorative procedures: tissue handling for impressions, placement of the finishing line, emergence profile, light transmission in the cervical area and tendency to gingival retraction. The authors will present a case where the periodontal biotype and been surgically enhanced to improve long term soft tissue stability in a perio-restorative interface. **Materials and methods:** Male patient, 30 years old, with two porcelain fused to metal crowns on both upper central incisors, placed 15 years ago. Marginal discrepancies were causing unpleasant esthetics and chronic gingival inflammation. After discussing treatment options with the patient, the following treatment sequence was adopted: removal of old PFM crowns; direct custom made provisionals; lab-made indirect provisionals; connective tissue graft using the tunnel technique to augment tissue thickness; replacement of old metallic posts with direct fiber posts and abutment reconstruction; surface smoothing of the scar tissue and conditioning of the emergence profile by modification of the provisional restorations; placement o two full ceramic crowns with zirconia copings. **Conclusions:** Optimizing a Periodontal Biotype can enhance the esthetic and biological result at perio-restorative interfaces. Although these procedures can make treatment more complex and extended, the short to long-term benefits can be very significant.

OP 140. Water sorption and solubility of five contemporary resin composites

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Introduction and objectives: The aim of this in vitro investigation was to study water sorption and solubility of five contemporary resin composites. **Materials and methods:** The materials selected for study were: the nanohybrids Premise (Kerr), Clearfil Majesty Posterior (Kuraray), Tetric EvoCeram (Ivoclar); the micro-filled Heliomolar and the hybrid Quixx Posterior Restorative (Dentsply). Water sorption and solubility were studied according ISO 4049. Disk-shaped specimens (n=8) 15mmX0.5mm were fabricated using a steel mold. Water sorption was calculated from the formula $W\alpha = (d1 - f1)/V$, where d1 is the specimen weight after hydration, f1 is the final dry weight and V is the volume. Solubility was calculated from the formula $W\delta = (m2 - f1)/V$ where m2 is the dry weight before hydration. One-way ANOVA and Tukey's multiple comparison tests were used to compare the results ($\alpha=0.05$). **Results and discussion:** Water sorption ($\mu\text{g}/\text{mm}^3$) was: 18.41 \pm 0.83 (A) Heliomolar, 15.66 \pm 1.06(B) Tetric EvoCeram, 12.81 \pm 2.62 (C) Premise, 10.03 \pm 1.05 (D) Clearfil Majesty Posterior, 9.11 \pm 0.51(D) Quixx Posterior Restorative. Groups with different letters are significantly different. Solubility ($\mu\text{g}/\text{mm}^3$) was: 3.81 \pm 0.57 (A) Tetric EvoCeram, 3.25 \pm 0.44 (A) Heliomolar, 2.51 \pm 0.68 (B) Premise, 2.36 \pm 0.21 (B) Quix Posterior Restorative, 1.07 \pm 0.11 (C) Clearfil Majesty Posterior. All recorded values are below the ISO 4049 accepted values. **Conclusions:** The nanohybrids and the hybrid composite presented lower water sorption than the micro-filled composite. For water sorption, two nanohybrids and the hybrid showed lower values than the micro-filled composite. The three nanohybrids showed differences in water solubility and sorption performance.

END 141. Comparison between lateral condensation modified technique and warm gutapercha technique for fill internal resorption.

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Introduction and objectives: Dentine resorption is a condition caused by a pulp inflammation; the pulp is transformed into a highly vascularized tissue with a significant reabsorptive activity. This is manifested by an increase in the diameter of the pulp chamber and root canal. In the root form when this disease presents communication with the periodontium the clinical manifestations may appear. Due to the nature and evolution of this disease, the procedure endodontic cleaning, and sealing three-dimensional conformation may become complicated. Purpose: to compare the quality of the filled canal by the two techniques with radiographic standardized image. To compare the quality of the canal filling techniques at optical microscope. **Materials and methods:** 20 lateral incisors were selected. After the preparation, cleaning and conditioning of the root canals, were to create a longitudinal cut to divide the teeth in two halves. Once sectioned, teeth were carved with a round burn, making a circular cavity in the middle third of both halves at the same level. Then use a methacrylate adhesive replenishment. The root portion of the teeth was included in acrylic blocks. Following this, randomized selection of two groups was made: Group A. Technique with hot gutta-percha: This was applied to half of the sample (10 incisors). Group B. Lateral modified condensation technique: This was applied to the other half of the sample (10 incisors). Finally the results were confirmed by two radiographic projections (vestibular and proximal). Besides was made the optical microscope analysis, to confirm in greater detail, the padding obtained. Statistical analysis was used by non parametric tests. And Tukey's test to confirm validation. **Results and discussion:** Radiographic image show complete radio opacity in the group A. 70% more filled Group A in the microscope. **Conclusions:** The hot Gutta-percha technique is indicated to fill the internal root resorption in. Is necessary to use a larger sample. Is necessary to compare another hot gutta-percha technique to fill internal root resorption.

STUD 142. Is Resilon the definitive root canal filler?

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Introduction and objectives: Within endodontic filling materials, gutta-percha is the filling material par excellence. Recently, a new root canal filler has appeared: Resilon/Epiphany (thermoplastic synthetic polymer), that is considered an efficient alternative vs. gutta-percha. The aim of this work is to evaluate the effectiveness of Resilon/Epiphany. **Materials and methods:** Review of the published literature. **Results and discussion:** The advantages of Resilon, compared with gutta-percha, are better apical sealing, better spreading through the side and better resistance to vertical fracture. However, we couldn't say the Resilon/Epiphany has antimicrobial power (though it's effective against S. aureus during the first 24 hours), or who has better coronal seal. The main controversy, related to the possible failure in the future, is its biodegradability, as its surface is eroded in contact with bacteria and enzymes, humid environments, and sodium hypochlorite 5'25% (> 5 minutes). The main advantage of Resilon/Epiphany -monoblock form with dentin- would be altered by degradation of the material surface and create a possible failure of endodontic treatment. **Conclusions:** More investigations are necessary for concluding that Resilon is the ideal material for endodontic, because is possible that degradation of bonding to dentine happens.

MAT 143. Influence of load and indentation site on nanomechanical properties of enamel
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Introduction and objectives: The aim was to determine the influence of load and indentation site on modulus of elasticity and hardness, using CSM method. **Materials and methods:** Enamel sections of 2 mm thick from bovine incisors (n=4) were studied by nanoindentation tests using a Berkovich indenter. CSM (continuous stiffness measurement) method was used to determine the elastic modulus (E) and hardness (H). Indentations were carried out at intervals of 100 µm (n=10) from the enamel surface to the dentin-enamel junction up to a total penetration depth of 2µm. The results were analyzed with ANOVA and Student-Newman-Keuls tests (p<0.05). **Results and discussion:** E and H values significantly decreased with the load (p<0.05). E values were significantly different among the four loads selected: 1 mN 87.5 GPa (±26.1); 10 mN 80.3 GPa (±12.8); 100 mN 73.4 GPa (±6.4); 200 mN 68.7 GPa (±5.1). The same tendency was observed for H values: 1 mN 4.6 GPa (±2.8); 10 mN 3.7 GPa (±1.1); 100 mN 3.1 GPa (±0.5); 200 mN 2.7 GPa (±0.4). E and H decreased as the indentations approached the dentin-enamel junction (p<0.05). **Conclusions:** E and H values determined by nanoindentation are very sensitive to load applied and the location of the indentation.

OP 144. Effects of blood contamination on microleakage of different adhesive systems
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Introduction and objectives: The aim of this study was to evaluate the effect of blood contamination before and after adhesive application on microleakage. **Materials and methods:** Class V preparations at cement-enamel junction were made on the buccal and lingual surfaces of 45 freshly extracted human teeth. The teeth were randomly assigned into three groups for different adhesive systems; etch and rinse adhesive system (XPBond) and two different one-step self-etching adhesive systems (XenoV) and (FuturabondNR). The specimens were then further subdivided into three groups (n=10): Group A contamination before adhesive application, Group B contamination after adhesive application, Group C no contamination, which was the control. Contamination of the surfaces was performed with fresh blood and blood was removed by a gentle air blast in each group. The adhesive systems were applied according to their manufacturer's recommendations. The specimens were restored with Filtek Supreme XT nano-composite. After thermocycling (X500, 5-55C0) and immersion in 0.5% basic fuchsin, the dye penetration was evaluated under stereomicroscope. Statistical analyses were performed with the Kruskal-Wallis and Mann-Whitney and Wilcoxon tests. **Results and discussion:** No statistically significant differences were found among subgroups on the enamel or on the dentin for Xeno V and XP Bond (p > 0.05); however for Futurabond NR blood contamination before adhesive application exhibited higher microleakage than other subgroups on dentin. (p<0.05). **Conclusions:** Blood contamination may increase the microleakage depending on the adhesive system.

STUD 145. Intra-oral piercing: dental complications

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Introduction and objectives: In the last decade intra-oral piercing has gained acceptance as a sign of individuality, marginality, decoration, or group membership. It has been observed that the trend of wearing jewelry inserted into the intra-oral tissues may result in significant damage to the dental structure. The purpose of this study is to review current relative literature on intra-oral piercing regarding its dental complications in order to determine the prevalence of damage to dentition among piercers. **Materials and methods:** The current study was based on scientific literature regarding oral piercing published within the last decade. **Results and discussion:** After reviewing the scientific literature, the most common dental problem registered was teeth fractures (40%): chipping of teeth and teeth cracked or with cusp fractures. Selective dental abrasion was registered as well as galvanic currents produced by the appliance. **Conclusions:** Every day dental injury by piercings is more common. Is therefore necessary that dentists inform patients on the potential complications and the risk to oral health of intra-oral piercings.

END 146.

WITHDRAWN

MAT 147. Using restorative composite for assembling composite inlays – a study of the degree of conversion.

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Introduction and objectives: There is no consensus on the material to use to bond composite inlays. Some recommend using light curing restorative composite while other favor dual cure resin cements (DCRC) considering light absorption by the inlay. Our objective is to study the degree of conversion (DC) of light curing composite used as a bonding agent for composite inlays. **Materials and methods:** 10 indirect composite inlays were made on 10 anatomically similar, freshly extracted human third molars with a maximum depth of 2mm (Enamel HFO – Micerium). Those were bonded with 2 steps etch and rinse adhesive (One Step Plus – Bisico) and light curing restorative composite (Enamel HFO – Micerium) with a LED curing unit. The teeth were then sectioned in half and microhardness of the bonded joint was measured. In order to correlate microhardness with degree of conversion, DC was measured by FTIR-ATR on composite samples through polymerized composite discs of varying thickness, microhardness was then recorded. **Results and discussion:** There is a correlation with microhardness and DC ($R^2=0.91$). The DC was 20% to 30% lower under the bonded inlays except on the center of the tooth. Despite conducting light curing with high energies, light absorbance by the composite induces a notable loss in terms of DC of the bonded joint. **Conclusions:** These results lead us to prefer DCRCs instead of light curing restorative composite to bond composite inlays.

MAT 148. Implant surface modification to prevent dimensional bone changes after immediate implant placement in dogs.

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Introduction and objectives: To study the effect of implant surface modification in dimensional alterations of the alveolar bone ridge that occurred following tooth extraction as well as processes of bone modelling and remodelling in immediate placement. **Materials and methods:** Six Beagle dogs were included in the study. In both quadrants of the mandible and maxilla incisions were made in the crevice region of the 3rd and 4th premolars and molar 1st. Minimum buccal and lingual flaps were elevated. The third, four premolars and first molar were hemi-sected. The distal roots were removed and 72 SPI Element implants 4 mm Ø x 9.5 mm length (Thommen Medical, Waldenburg, Switzerland) were placed. Split mouth of maxilla and mandible were made, right side with conditioned surface implants and left side implants without conditioned surface. The extraction sites were covered with the mobilized gingival tissue. The extractions of the roots and the sacrifice of the dogs were staggered in such a manner that all dogs contributed with sockets representing 2, 4 and 12 weeks of healing. The animals were sacrificed and tissue blocks containing the extraction socket were dissected, decalcified in EDTA, embedded in paraffin and cut in the buccal-lingual plane. The sections were stained in haematoxyline-eosine and examined in the microscope. **Results and discussion:** The microscopic healing patterns at weeks 2, 4, and 12 for the two implant types with conditioned and non conditioned surface showed similar bone findings. The mean percentage of the new formed bone in contact with the implant (BIC) was significant greater at 1 month for conditioned SLA at buccal plate ($38.33 \pm 1.4 \%$) and lingual plate ($49 \pm 1.4\%$) than the non conditioned surface at buccal ($36.83 \pm 1.6 \%$) and lingual plate ($38 \pm 1.6 \%$). **Conclusions:** The bundle bone was resorbed and replaced with woven bone more in the lingual cortical bone. Lingual crestal bone was resorbed more than buccal plate at 12 weeks follow up period. Conditioned implant surface increase bone apposition and reduce healing osteointegration process.

MAT 149. Use of collagenized porcine bone vs. bovine bone in sinus lift procedures

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Introduction and objectives: The purpose of this study is to assess the effectiveness of collagenized porcine bone MP3 vs bovine bone acts as a bone substitute in the maxillary sinus lift after 2 years of follow-up. **Materials and methods:** Twenty-four patients with sinus lift bilateral, 12 men and 12 women with an average age of 25 to 68 years, divided into test and control group. Group 1 underwent sinus lift with bovine bone (Bio Oss) as a control group and Group 2 was placed in the contralateral sinus porcine bone + collagen MP3 as a group test. Eight months after the biopsies were taken with hole drills before placing implants. Forty-eight implants NanoTite Certain Prevail (Biomet 3i, Palm Beach Gardens, FL, USA) were placed. **Results and discussion:** The average height obtained in the test group of MP3 (Osteobiol, Tecnooss Dental, Italy) was 13 mm in the control group of bovine bone Bio Oss (Geistlich, Switzerland) was 11.5 mm. The site treated with porcine bone was found vital bone with bone neoformation and small portions of biomaterial, within the control group where the presence of biomaterial was higher and a less bone neoformation. There have been no inflammatory processes and not any implant was lost during the 2 years of study. **Conclusions:** The surgical procedure for lifting the maxillary sinus using a mixture of porcine bone + collagen compared with bovine bone alone, resulting in an increase in bone formation. The porcine bone is biocompatible and can be used as bone substitute material in these procedures without the interference of biological processes of bone formation.

MAT 150. Comparison of material effects on the clinical wear resistance, flexural Weibull statistics and fracture of posterior composites

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Introduction and objectives: Comparison of material effects on the clinical wear resistance, nanohardness(NIH), elastic modulus(E), flexural strength(FS), Weibull modulus(m), deflection at failure and fracture toughness(KIC) of nanocomposites (Filtek Supreme, Tetric EvoCeram, N'Durance) and microhybrid composites (Gradia Direct posterior, Tetric Ceram and Z100). **Materials and methods:** Flexural strength and Weibull parameters were determined in three-point bending (n=20*6). Single-edge-notched-bend specimens (n=5) were used to evaluate KIC and SEM fractography was performed subsequently. In vivo wear magnitude was quantified using a 3D-laser scanner. All results were statistically analyzed with t-test, ANOVA and post-hoc Tukey HSD.

Composites	Wear (μm)	NIH (Gpa)	FS (Mpa)	m	E (GPa)	Deflection (mm)	KIC $\text{MNm}^{-3/2}$
Z100	32 \pm 9	2,2 \pm 09	145 \pm 17	8,8 \pm 1,3	14,2 \pm 2,8	0,43 \pm 08	1,6 \pm 0,6
FS	37 \pm 10	2,0 \pm 01	140 \pm 16	9,5 \pm 1,0	11,1 \pm 2,6	0,54 \pm 01	1,7 \pm 0,7
TC	46 \pm 16	1,9 \pm 04	123 \pm 14	8,4 \pm 1,2	9,7 \pm 2,2	0,50 \pm 01	1,6 \pm 0,2
TEC	43 \pm 14	1,6 \pm 03	105 \pm 12	9,3 \pm 1,7	8,9 \pm 1,8	0,54 \pm 01	1,5 \pm 0,2
GDP	49 \pm 13	1,2 \pm 01	96 \pm 10	12,9 \pm 1,2	7,1 \pm 1,6	0,55 \pm 02	1,2 \pm 0,5
ND	54 \pm 12	1,0 \pm 02	91 \pm 7	13,5 \pm 1,7	6,7 \pm 1,0	0,61 \pm 01	1,0 \pm 0,3

Results and discussion: see table. **Conclusions:** Materials out of the same family, Z100-Filtek Supreme and Tetric Ceram-Tetric EvoCeram show similar wear resistance, flexural Weibull modulus, fracture mechanics parameters and comparable deflection, revealing their dependence on the microstructural properties. The different failure mechanisms evident in fractography supports the statistically different results observed among the nano and microhybrid composites.

MAT 151. Resin water sorption and hygroscopic expansion reduce the interfacial gap and microleakage.

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Table: see this link http://www.efcd.eu/media/pdf/Mat_151_Table.pdf

Introduction and objectives: The objective was to evaluate the effect of the water sorption and hygroscopic expansion on the interfacial gap and microleakage. **Materials and methods:** Four resins were evaluated:Ormocer (Admira [Voco]); Compomer (Dyract Extra [Dentsply]); Hybrid (Spectrum [Dentsply]); Nanohybrid (Exthet•X [Dentsply]). Water sorption and hygroscopic expansion were evaluated after water immersion for 24 h; 1 week and 4 weeks and it effect on the interfacial gap size and microleakage variations. Water sorption was evaluated by weighting resins discs after the three immersion periods. Hygroscopic expansion was measured under white light confocal microscope from the volumetric variations of resins fillings in cylindrical cavities prepared in dentin discs. Interfacial gap size was obtained from the cylindrical cavities resin filled under white light confocal microscope. The microleakage study was done in class v cavities prepared in extracted third molars. A multifactor ANOVA and Tukey tests were applied. **Results and discussion:** see table. **Conclusions:** Water immersion induces water sorption and hygroscopic expansion. Hygroscopic expansion reduces the interfacial gap and cavity microleakage. The effect of hygroscopic expansion on the gap size and microleakage is dependent on the resin material.Ormocer and Compomer suffer higher hygroscopic expansion and then higher gap and microleakage reduction over time. Hybrid and microhybrid composites suffer lower hygroscopic expansion and then lower gap and microleakage reduction over time. **Acknowledgements:** This work was supported by the “Ministerio Español de Educación y Ciencia” (project MAT2007-66117, Junta de Andalucía (project P07-FQM-02517) and the European Social Fund (ESF).

MAT 152. Mechanical characterization of several self-adhesive resin cements by nanoindentation

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Introduction and objectives: The objective of this study was to evaluate the hardness and Young's modulus of several self-adhesive resin cements using nanoindentation. **Materials and methods:** Three self-adhesive resin cements (dual-cured) were tested: RelyX Unicem (3M Espe), Maxcem Elite (KerrHawe), an experimental resin cement (Voco), and a self-etching resin cement (chemically-cured) Multilink Automix (Ivoclar Vivadent). Disc-shaped specimens were prepared for each resin cement using a teflon mold, 6 mm in diameter and 1.5 mm thick. The dual-cured resin cements were polymerized for 40s (Bluephase, Ivoclar Vivadent). Specimens were stored in dry conditions (37°C, 7 days). After that, 15 indentations were performed on each specimen with a Berkovich indenter (maximum load: 100mN). Young's modulus and hardness of the cements were determined from the load–displacement curves following the Oliver–Pharr methodology.

Mean hardness and Young's modulus (SD) of resin luting agents tested.		
Resin cement	Hardness (GPa)	Young's modulus (GPa)
RelyX Unicem	0.373 (0.042) a	10.74 (0.45) a
Maxcem Elite	0.375 (0.060)a	9.77 (1.90) a
Experimental cement Voco	0.334 (0.055)a	9.79 (1.32) a
Multilink Automix	0.091 (0.034)b	2.94 (0.82) b
For each column, means with the same letter are statistically similar after Student-Newman-Keuls multiple comparisons ($p>0.05$)		

Results and discussion: Hardness and modulus of elasticity are shown in the table. One-way ANOVA revealed a significant influence of the resin cement used ($p<0.001$). The chemically cured cement, Multilink, presented the lowest values of stiffness and hardness. Dual-cured cements tested showed similar values of hardness and modulus. **Conclusions:** All self-adhesive resin cements (dual-cured) tested showed comparable hardness and modulus values after 7 days in a dry condition. **Acknowledgements:** The authors are grateful to the companies for providing the materials tested.

PREV 153. Dental and periodontal condition in patients with systemic diseases

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Introduction and objectives: The paper aims at evaluating the frequency of occurrence and intensity of tooth periodontium pathologies in patients with thyroid hyperactivity, thyroid hypofunction and non-toxic goitres. **Materials and methods:** A total of 101 adult subjects were examined. The parameters evaluated were: the number of teeth preserved, dental caries (by DMFT and its components), oral cavity hygiene (by PI.I.) and the periodontal condition (by CPI). **Results and discussion:** Compared to the control group (71.7%) we observed significantly lower number of teeth preserved in the hyperthyroid disease group (32.1%) followed by the hypothyroid (43.9%). A markedly higher DMFT value compared to the control group (24.2%) was observed in the hyperthyroid (28.4%), whereas a significantly higher PI.I. value compared to the control group (1.2%) was recorded in hypothyroid patients (2.0) and in the hyperthyroid (1.8). Clinically healthy periodontal tissue was only observed in the non-toxic goitre group of patients. The most advanced periodontal disease was observed in patients with hyperthyroidism. **Conclusions:** The patients' involvement in their systemic disease treatment might have been the reason for neglecting oral hygiene, greater caries intensity and periodontium pathology. **Acknowledgements:** We thank Prof. D. Waszkiel for help during data analysis and Prof. I. Kinalska, Prof. M. Górska, Prof. M. Szelachowska, Dr A. Zonenberg for assistance and advice.

MAT 154. Details of the surface roughness in zirconium implants available in the market

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Introduction and objectives: In the last times have developed the implants of zirconia stabilized with Itrium to achieve an improvement in the aesthetic results in comparison with the ones of TiO₂. The superficial roughness of the material is the one who delimits the biological interaction. **Objectives:** to describe the quality characteristics of the different zirconium implants available, through SEM., and to quantify surface roughness of different zirconia available implants, through perfilometric analysis. **Materials and methods:** 6 zirconium implants with different surface changes through physical or chemical treatments. 1 titanium implant with a double acid etching and sandblasting as skipper. Comparing the surface roughness in three areas of the implant (collar, middle third and apical third) through the analysis of mechanical and optical surfaces (nm and micrometers) (Perfilometer Veeco model dektak 3). Study with electron microscopy (JEOL-6100) scanning and imaging management program (q500Mc Leica). **Results and discussion:** The surface roughness varies depending on the surface treatment, being the highest value that found the chemical and physical processing combined (70% higher). Followed by physical treatments (53%) and finally chemical treatment (32%). **Conclusions:** The physical-chemical treatment provides greater surface roughness. The chemical treatment alters very little surface zirconium.

MAT 155. Comparison of the surface micro texturing at 3 nano-particle composites after standardized polishing.

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Introduction and objectives: To study the effect of surface polishing in surface microtexturing of three nano particle composites, and to compare the surface roughness values of the nano-composite after polishing. **Materials and methods:** Was selected three nano-particle composites: A.Filtek supreme XT®, B. Esthetics®, C. Gradia®. 30 central teeth with a class V cavity preparation and random fill, in 3 samples: group 1 (10 teeth filled with composite A), group 2 (10 teeth filled with composite B), group 3 (10 teeth filled with composite C). Polishing with a standardized protocol. P value <0.05 . Statistical analysis was perform with non parametric Kruskall Wallis , and Tukey test. **Results and discussion:** The roughness values in nano particle composites are lower in C. (80%), B (60%), A (55%). **Conclusions:** The nano-composite Gradia shows a better polished flat surface compare with the other two nano-composites. . The surface roughness depends of the nano particle and also of polishing technique used. Is necessary to continue this research with a more wider sample to obtain statistical significance and power.

END 156. Histopathologic differences between periradicular lesions of endodontally treated and non treated teeth

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Introduction and objectives: The aim of this study is to determinate the histological differences between periradicular lesions of endodontically treated and non treated teeth. Apical periodontitis is produced in most cases by intraradicular infection and the chronic inflammatory periapical lesion is the most common pathology found in the alveolar bone of the jaws. **Materials and methods:** The periradicular lesions were radiographed to measure the size of the radiolucidity and those teeth that had received root canal treatment were identified. The biopsies were obtained during periapical surgery or by tooth extraction. Removed samples were fixed in 10% neutral formalin, embedded in paraffin, cutted and stained with hematoxylin and eosin for radiographic examination. **Results and discussion:** The histologically studied samples had a simple stratified squamous epithelium with a lymphoplasmocitary content and inflammatory infiltrate. In some samples it can also be seen Russel's bodies. **Conclusions:** There are not histological significant differences between periradicular lesions of endodontically treated and non treated teeth.

OP 157. Effect of ozone treatment on enamel and dentin bond strength

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Introduction and objectives: Ozone has been recognized as a powerful sterilizing agent in dentistry. There have been concerns regarding potential adverse effects of application of ozone prior to bonding procedures. The aim of this study was to evaluate the effect of ozone application on dentin and enamel shear bond strength of two different adhesive systems. **Materials and methods:** Forty human enamel and 40 human dentin samples were used. Ten samples per group were prepared as follows: (I) Ozone application (Ozonytron X) with subsequent application of an etch & rinse adhesive (Excite), (II) Ozone application with a two step self-etch adhesive (AdheSe), (III) etch & rinse adhesive application, (IV) self-etch adhesive application. Specimens were restored with a nanohybrid composite resin (Tetric Evo Ceram) according to the Ultradent method. After storage in water for 24h, shear bond strength was measured with a universal testing machine. Data were analyzed using Mann Whitney U test. **Results and discussion:** No decrease in shear bond strength was detected for ozone –pretreated enamel specimens compared to untreated controls. However Ozone treatment resulted in significantly decreased bond strength ($p < 0.05$) on dentin specimens for both adhesive systems. **Conclusions:** Ozone pre-treatment may provide comparable bond strengths depending on the tooth substrates applied.

STUD 158. Discrepancies in the visual determination of dental color

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Introduction and objectives: The visual determination of dental colour is a routine task in the dental clinic. This study aims to assess the discrepancy concerning the selection of the tooth color. **Materials and methods:** Descriptive observational double-blind study. Dental students ($n=96$) took the colour of four teeth (21, 22, 23 and 33) of the same patient under controlled conditions (illumination, time, place). There were 2 groups: a) with the light of the equipment (LE), b) with daylight (D). The colour was taken according to the shade guide Vitapan ® Classical and compared with the results obtained according to the spectrophotometric system Vita Easyshade ®. **Results and discussion:** There was a great variability in the selection of color (% of agreement with spectrophotometer): Tooth 21 (LE): 8.9%, Tooth 21 (D): 14.9% , Tooth 22 (LE): 12.9% , Tooth 22 (D): 15.8% , Tooth 23 (LE): 24.0% , Tooth 23 (D): 19.8%, Tooth 33 (LE): 29.7% , Tooth 33 (D): 31.7% . **Conclusions:** Obtaining the dental colour is a fairly difficult and complex task. Although it would be desirable to enhance learning it in dentistry schools, clinical experience does not seem to influence the choice of colour. Besides, it would be desirable to make use of spectrophotometer systems.

END 159. Comparative study of collagen exposure in root dentine treated with two irrigation protocols.

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Introduction and objectives: We studied the percentage of collagen exposed in dentine of each root third after applying irrigation protocol 1: 5% NaOCL + 17% EDTA as final irrigant; or protocol 2: 20% Citric acid + 2% CHX. **Materials and methods:** We used 48 single-root human teeth divided into 2 groups (n=24). Group A underwent manual biochemical preparation and Group B was prepared using the ProFile® system. Irrigation protocols 1 and 2 were applied in each group and RealSeal™ or EndoREZ® were used as filling materials. Roots were cut into 1-mm slices, which were abraded and stained with Masson's trichrome method. Light microscopic study was used to calculate the percentage of collagen exposed.

Table: Percentages of exposed collagen								
Third	5% NaOCL + 17% EDTA				20% Citric acid + 2% CHX			
	Material		Instrumentation		Material		Instrumentation	
	RealSeal	EndoREZ	Manual	Rotary	RealSeal	EndoREZ	Manual	Rotary
Cervical	59.0(29.5)	9.3(12.9)	38.0(33.2)	30.3(35.4)	79.4(17.4)	80.0(14.6)	77.7(16.6)	81.6(15.3)
Middle	50.0(26.5)	12.0(14.4)	29.1(26.6)	32.9(31.3)	64.3(22.5)	77.7(27.9)	58.8(27.2)	83.2(17.9)
Apical	56.2(35.0)	4.3(12.1)	31.2(38.0)	29.4(37.3)	93.9(9.0)	86.0(27.5)	83.2(27.5)	96.6(4.3)
Total	55.0(29.9)	8.5(13.2)	32.7(32.2)	30.8(33.8)	79.2(20.7)	81.2(23.7)	73.2(25.9)	87.1(15.0)

Results and discussion: The highest percentage of collagen was exposed with 20% Citric Acid + 2% CHX as irrigant and rotary instrumentation.

MAT 160. Demineralization effects of phosphoric acid on surface and subsurface enamel bovine bleached with in-office hydrogen peroxide

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Introduction and objectives: To measure the demineralization capacity of 37% phosphoric acid on superficial and subsuperficial bovine enamel after short office bleaching with 30% and 38% hydrogen peroxide and abrasion of 0, 25, 50 and 100 μ m. **Materials and methods:** Three equal-sized 4 x 4 mm sections were obtained from the coronal enamel of ten bovine incisors embedded in resin. One sample specimen from each crown was assigned to one of three groups (n=10): Group I, no bleaching agent (control group); Group II bleached with 38% hydrogen peroxide for 20 min (Opalescence Boost Ultradent) and Group III with 30% hydrogen peroxide (Office Illuminé Dentsplay) for 60 min. At 24 h, each specimen was measured with a micrometer (Mitutoyo 350-MHN1-25-DM) and immersed in 37% phosphoric acid solution, then aliquots were collected at 30 s and 60 s, 5-ml. Specimens were abraded 25 μ m with 1200-grit silicon carbide paper discs and again immersed in 37% phosphoric acid solution. This process was repeated for 50- and 100- μ m abrasions. Ca^{2+} concentrations were measured by atomic absorption spectrophotometry. **Results and discussion:** The amount of Ca^{2+} removed was similar at all depth levels between specimens bleached and not bleached with 30% hydrogen peroxide (Illuminé Office®). More Ca^{2+} was removed at 25 μ m depth in specimens bleached with 38% hydrogen peroxide (Opalescence Boost. Ultradent®) than in unbleached specimens. **Conclusions:** 38% hydrogen peroxide bleaching increases the decalcifying effect of phosphoric acid on subsurface enamel. 30% PH did not modify the decalcifying capacity of phosphoric acid at surface and subsurface levels.

END 161. Effect of different irrigation protocols on the adhesive interface in endodontics
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Introduction and objectives: To compare the bond strength of RealSeal™ and EndoREZ® to dentine of each root third treated with 5% NaOCL + 17% EDTA [Protocol 1] or 20% Citric Acid + 2% CHX [Protocol 2] using the push-out test. **Materials and methods:** Forty human single-root teeth were divided into two groups (n=20), applying irrigation Protocol I in one group and Protocol II in the other and filling with RealSeal™ or EndoREZ®. Roots were transversally cut to obtain 1-mm sections. Regional bond strength was measured with the push-out test using an Instron 3345 system.

Table: Bond strength in Mpa				
Third	5% NaOCL + 17% EDTA		20% Citric acid + 2% CHX	
	RealSeal	EndoREZ	RealSeal	EndoREZ
Cervical	2.9(5.8)	8.0(10.5)	1.4(4.6)	8.7(11.3)
Middle	4.5(7.5)	9.2(14.1)	1.6(4.2)	5.9(10.1)
Apical	5.9(8.9)	17.3(20.7)	1.1(4.0)	5.8(10.8)
Total	4.2(7.4) a	11.2(15.7) b	1.4(4.3) a	6.9(10.7) b

Results and discussion: The best results were obtained with 5% NaOCL + 17% EDTA (p=0.001) using EndoREZ filling material. No significant differences were found among the root thirds

MAT 162. Biomaterials of bone graft. Prospective study to 2 years.

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Introduction and objectives: The need for new horizons in dealing with dental implants makes the preoperative preparation of the field work (bone, soft tissue). Based on the gold-standard (graft autology) materials xenografts trying to level the playing field achieved by it. To evaluate the success of xenografts compared with graft autology. **Materials and methods:** Graft autology obtained the calotte, menton, iliac crest and mandibular branch. Xenografts materials: bio-oss and osteobiol. Patients in private practice to which they are performed bone graft surgery after recessive. The waiting time for placement of implants is 6 months. Implants placed: BIOMET 3i, and Zimmer. Charging time of the implant in the upper jaw at 5 to 6 months; in the jaw to 3 months. **Results and discussion:** GRAFT AUTOLOGOUS CASES: Follow-up to two years. Survival of the implants 100%. Average loss of bone: <1.6 mm. XENOGRAFTS CASES: Follow-up to two years. Survival of the implants 100%. Average loss of bone: <1.4 mm. **Conclusions:** Gold Standard: autology. Ideal for long-term recovery of large volumes. Improvements of the short-term particulate xenografts. Recovery of smaller volumes without compromise of the soft tissues. **Acknowledgements:** Dra. M. Maté: Statistical analysis.

MAT 163. Cut enamel shear bond strength of silorane

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Introduction and objectives: Recently, a dental composite of low-shrink (Filtek Silorane) has been introduced in the dental market. The purpose of this study is to evaluate the in vitro cut enamel shear bond strength (SBS) and to determine the type of bonding fracture. **Materials and methods:** Forty-five bovine incisors were used in three groups: group A (n=15): Filtek Z250 + Scotchbond 1XT etch-and-rinse adhesive, group B (n=15): Filtek Z250 + Scotchbond SE self-etching adhesive, and group C (n=15): Filtek Silorane + Silorane self-etch adhesive. Enamel was slightly drilled (ground). Resin cylinders (stubs) were bonded to enamel surface using the bonding agent according to manufacturer's instructions. The SBS were registered with an Instron testing machine, operating at a crosshead speed of 1 mm/min. The bonding fracture was observed with scanning electron microscope (SEM). The data was statistically analysed using ANOVA ($p \leq 0.05$). **Results and discussion:** The mean SBS (MPa) were: A = 14.48 ± 4.11 ; B = 5.50 ± 2.59 ; C = 8.21 ± 2.91 . SBS of both B and C were significantly lower than A ($p < 0.01$). No significant differences between B and C. **Conclusions:** Filtek Silorane adhesive presented similar shear bond strength that self-etching adhesive, but lower than etch-and-prime adhesive.

MAT 164. Evaluation of the effect of different polishing systems on restorative materials.

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Introduction and objectives: The systems used for finishing and polishing composite resins and compomers are numerous and affect the success of filling from a mechanical, biological and aesthetic point of view. Objective: to evaluate “in vitro” the effect of different polishing systems on some restorative materials. **Materials and methods:** The surface of some aesthetic restorative materials finished and polished with different methods or systems (n: 2520): Sof – Lex Pop On®, Brushes Sof Lex®, Enhance®, Super Snap®, One Gloss®, Pogo®, Filtek Supreme®, Quixfil®, Ceram X Duo®, Tetric Ceram®, Gradia Direct®, Spectrum TPH®, Inten S®, Renamel®, Esthet X®, Dyract Extra®, Premise® and Compoglass F®. In each specimen was measured the surface roughness and was related with scanning electron microscopy (SEM) images. **Results and discussion:** The best combinations were: Filtek Supreme® Sof Lex®, Ceram X Duo® - Super Snap®, Ceram X Duo® - Sof Lex Pop On® and Renamel® - Pogo®. a highly polished restoration is necessary to help promote a plaque – free environment. Mann Whitney – Kruskal Wallis (α : 0,05). **Conclusions:** The surface roughness and SEM revealed that the effect of all systems studied (compomers, composite resins and polishing systems) were clinically acceptable.

MAT 165. Intact enamel shear bond strength of silorane and its changes on enamel surface

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Introduction and objectives: Recently, new restorative systems have been introduced in the dental operative field. One of them is Filtek Silorane, which is supposed to offer low shrink rates. Till now there are few studies about the shear bond strength (SBS) of this product. The aim of this study was to compare the SBS of Filtek Silorane with traditional acid-etching technique and with a self-etching adhesive system in intact enamel and evaluate changes in enamel surface. **Materials and methods:** 45 bovine upper incisors with intact vestibular enamel surface were used for the SBS test divided in three groups (n=15). I: (37%-phosphoric acid, Adper Scotchbond 1XT and Filtek Z250), II (Adper Scotchbond SE and Filtek Z250) and III (Filtek Silorane adhesive system and Filtek Silorane paste). Scanning Electron Microscope (SEM) observations were also carried out to observe the enamel surface changes. The data were statistically analysed using ANOVA ($p \leq 0.05$). **Results and discussion:** The mean SBS (MPa) were: A=13,55 \pm 2,98; B=11,98 \pm 3,77; C=7,92 \pm 2,91. SBS of C was significantly lower than A ($p = 0.007$). No statistical differences were found between other groups. **Conclusions:** Filtek Silorane adhesive presented similar SBS that self-etching adhesive, but lower than etch-and-prime adhesive.

STUD 166. Protaper instruments' fracture with and without previous manual debridement

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Introduction and objectives: Several studies have evaluated rotary instrument's fractures, because the clinical practice showed more fracture incidence in rotary techniques than manual techniques. The aim of this study is to quantify the number of fractured ProTaper rotary files in extracted teeth working with and without previous manual instrumentation. **Materials and methods:** Two homogeneous groups were used of extracted teeth regarding the quantity, types of tooth and angle curvature of their roots. Both groups were instrumented with permeability K-files (0.8, 10, 15) and with ProTaper files (S1, S2). First group was instrumented only with K-file to determine work endodontic length and then we used S1, S2-files. However, at second group we used K-files to determine work endodontic length and to clean the canals and then S1,S2-files too. Irrigation between different files was always used. Finally, we quantified the number of fractured ProTaper files (S1, S2) in each group. **Results and discussion:** ANOVA statistical analysis didn't show significant differences between both groups in our preliminary results (with or without manual instrumentation). **Conclusions:** Even when we permeabilize or we instrument we have the same results. This situation may be because the sample is still insufficient.

STUD 167. Ozone and teeth bleaching. The reality

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Introduction and objectives: The ozone in dentistry has received various applications such as a disinfectant for surfaces, arrest of bleeding, to provide oxygen in the surgical wound to improve wound healing, antiseptic to treat stomatitis, endodontic canal disinfection, alveolitis, remineralizing to affect the arrest of caries and desensitizing. Objectives: to evaluate the effectiveness of ozone as a bleaching agent. **Materials and methods:** In vitro study of 30 upper anterior teeth extracted, check and register of the start colour with Vita Easyshade® will use to evaluate and quantify the colour change. The sample was divided into three groups of 10 teeth each, a) teeth that are applied carbamide peroxide at 16% , b) Ozone (Healozone™ Kavo) c) carbamide peroxide at 16% + Ozone (Healozone™ Kavo). After two sessions of bleaching. Quantify the obtained changes by Vita Easyshade®. **Results and discussion:** The teeth treated with carbamide peroxide clarified his tone in 1 degree, and teeth treated with carbamide peroxide and ozone clarified its colour 2 or 3 degrees, the ozone alone don't produce any value change. **Conclusions:** The combination of carbamide peroxide at 37% used with ozone appears to be more effective than the carbamide peroxide only. The ozone don't affect in two apply the final colour of this sample teeth.

STUD 168. Diaphanization: usefulness and advantages

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Introduction and objectives: The diaphanization allows to view the internal anatomy of the tooth by demineralization, turning a natural tooth in a transparent totally tooth. The aim of study is to check its effectiveness against others techniques and its usefulness. **Materials and methods:** Published literature review. **Results and discussion:** Besides from viewing the internal anatomy of teeth, the benefits of diaphanization (in vitro technique) are: to preserve the original shape of the roots, to enable the observation of morphological changes, to reduce the possibility of failures of endodontic treatments, to allow the three-dimensional visualization of the tooth and to preserve the teeth over a period extended period of time, if only takes place in vitro, introducing a high cost and investment of time. The radiographic technique (in vivo and in vitro technique) is a quick and easy method, but does not allow three-dimensional vision. Recently, diaphanization is used like a training tool in dentistry schools. **Conclusions:** Diaphanization is an in vitro efficient technology, but it can't be used in clinic. At present, diaphanization is an excellent method for training endodontics.

OP 169. Comparative study of different diagnostic methods of fissure caries currently used

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Introduction and objectives: The objective is to compare sensibility and specificity of different diagnosis systems of fissure caries. **Materials and methods:** For this "in vitro" study we used 36 recently extracted molars without apparent cavitation but with pigmented fissures. Samples were examined by the following methods: visual and tactil with exploratory probe, radiography (Digora), KaVo Diagnodent and Vistaproof (Dürr Dental). Then we made 1'5 mm. mesiodistal cuts with Struers machine. Finally the results were analyzed.

	PROBE	Rx	DIAGNODENT	VISTAPROOF
TP	19	8	33	26
TN	3	3	3	1
FP	0	0	0	2
FN	14	25	0	7
Sensibility	57%	24%	100%	78%
Specificity	100%	100%	100%	33%

Results and discussion: Results match with previous studies about diagnosis of incipient caries that compare traditional methods and KaVo Diagnodent. Vistaproof recently appeared and nowadays there are not published studies to compare results. **Conclusions:** Traditional methods do not match sensibility and specificity for incipient caries lesions. They can not be used as unique diagnosis method. KaVo Diagnodent shows the best result comparing fluorescence systems.

END 170. Effects of chlorhexidine on the dentin of ferric sulphate pulpotomized primary teeth. E. RODRÍGUEZ-PRIEGO*, M. BOLAÑOS-CARMONA, S. GONZÁLEZ-LÓPEZ, M. BRIONES-LUJÁN

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Introduction and objectives: Ferric sulphate (FS) is used in primary teeth pulpotomy. FS can jeopardize the bond strength of some adhesives. Viscostat®'s (V) manufacturer (Ultradent Products, UT, USA) recommends cleaning the V treated dentin with Chlorhexidine (CHX). This study tests the null hypothesis that 2% CHX (Hibimax®, AstraZeneca S.A., Spain) does not modify the μ TBS, micromorphology or molecular structure of primary dentin prior treated with V. **Materials and methods:** Study groups: 1.: VTE: Viscostat + Total etching (37% PA + Excite (Ivoclar Vivadent, Schaan, Liechtenstein). 2.: VCTE: V + CHX + Total etching. 3.: VSE: V + self-etching (Adper™ Scotchbond™ SE, 3M ESPE, UK). 4.: VCSE: V + CHX + self-etching. μ TBS test (n= 16). 1 mm² dentin/adhesive bars were tested in tension in an INSTRON® 3345. Microscopy: two teeth per group were visualized by OM and VP-SEM. FTIR. Thin dentin slices (125-130 μ m) were soaked with FS and CHX. Two mg per group of dentin dust were analysed. **Results and discussion:** μ TBS-test results (MPa): VCTE (11.68 \pm 6.17)* < VTE(13.23 \pm 7.07) < VSE (13.88 \pm 6.79) < VCSE(16.70 \pm 8.03)*. * P <0.05(ANOVA, Tukey's HSD test). Ferric ions remained on the FS treated dentin surface even after cleaning with CHX. **Conclusions:** CHX improved the adhesion of a self-etching primer to V prior treated primary dentin.

END 171. New system of sponge contained drug delayed antibiotic release in endodontics M. RUIZ PIÑÓN*1, P. VARELA PATIÑO2, B. MARTÍN BIEDMA, J. BLANCO MÉNDEZ3, A.J. PÉREZ ESTEVEZ3.

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Introduction and objectives: The aim of this study was to develop a state-of-the-art in sponge contained drug for its delayed release within the root canal. **Materials and methods:** At a first stage different concentrations of antibiotics (Amoxicillin) in sponge polymer were tested on Mueller-Hinton culture media to assess their effectiveness, release and manipulation features. Enterococcus faecalis was used. In subsequent studies a formulation containing 0.44 mg of amoxicillin per mg of sponge which released antibiotics for antibiotics for 3 to 4 days was used. The second part of the study was carried out in Vitro on using 14 extracted uniradicular teeth. Before inserting the sponges with amoxicillin in the teeth. **Results and discussion:** As for the samples obtained after scraping the root canal walls, bacterial growth was only observed after 24 hours in one of the two teeth studied while both samples came out positive after 48 hours. **Conclusions:** Further analysis of different concentrations and antibiotics are necessary to reinforce the preliminary goods results of this new means of antibiotic transport.

MAT 172. Management of pretest failures in microtensile bond strength tests.

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Introduction and objectives: Number of pre-test failures (PTF) in tensile bond strength tests is difficult to interpret. Objective is to compare PTF of various adhesives when tensile bond strength (TBS) of interface and tensile cohesive strength (TCS) of dentin adjacent to interfaces were tested. **Materials and methods:** 40 third molars were randomly assigned to a group (Adper Prompt L-Pop (APLP), Xeno V (XV), Adhese One (A1), Adper ScotchBond SE (SBSE), Clearfil SE Bond (CSE), Optibond All in One (OPT), Clearfil DC Bond (DCB), Clearfil S3 Bond (CS3)). Oclusal enamel and roots were removed and teeth perfused (20 cm distilled H2O). Two horizontal parallel grooves (2 mm wide, 2 mm deep, 2mm separation) were drilled in oclusal dentin, and were restored (Filtek Z250), before crown was rebuilt (2 mm height). Compound bars (resin-dentin) were obtained from grooves (to assess TBS at interface) and from between grooves (to assess TCS at the same horizontal plane than TBS). Bars were rounded before testing and PTF annotated. Only specimens that failed before mechanical test were included in analysis. To test if number of valid/PTF specimens was independent of test (TBS/TCS), Goodman's Tau for independence coefficient was calculated.

Materials / test		number of valid and PTF specimens		Independence test results (Tau, significance)	
(TBS or TCS)		PTF	valid	Tau	p
APLP	TBS	24	4	0.52	0.00001
	TCS	1	10		
XV	TBS	6	19	0.1	0.63
	TCS	3	14		
A1	TBS	23	1	0.63	0.000001
	TCS	3	13		
SBSE	TBS	13	12	0.22	0.003
	TCS	1	15		
CSE	TBS	0	15	N/A	N/A
	TCS	0	18	"	"
OPT	TBS	0	23	"	"
	TCS	0	16	"	"
DCB	TBS	0	18	"	"
	TCS	0	14	"	"
CS3	TBS	2	14	0.06	0.18
	TCS	0	14		

Results and discussion: see table. **Conclusions:** When APLP, A1 and SBSE were tested, specimens prepared to measure TBS failed prematurely significantly more times than the ones prepared to measure TCS of adjacent dentin. This didn't happen with the rest of materials.

END 173. Comparison of behavior of pain after mechanical or manual endodontic instrumentation

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Introduction and objectives: Shaping of root canals has changed in recent years due to the increased use of rotary nickel-titanium files. These new shaping techniques have many advantages when compared with the traditional manual method using stainless steel files, but it is not known if postoperative pain behaviour differs according to the shaping technique we use. Aim of study is to establish the influence of the shaping technique in the incidence, degree, length and type of postendodontic pain. **Materials and methods:** Endodontic treatments were carried with mechanical instrumentation (n = 44) or manual shaping techniques (n=44) in a single visit and data about pre-treatment patient's conditions and tooth diagnostic factors were collected. Patients were given a questionnaire to be filled and returned, where they should record the presence or absence of postendodontic pain, its duration, need of previous stimulus (none, chewing) and level of discomfort. **Results and discussion:** We observed significantly more postoperative pain (X2 test, p = 0.05) in the group treated with manual shaping techniques. However, in this group in duration of pain was shorter (Mann-W test, p = 0.008). Differences in level of discomfort were not statistically significant (X2 test, p = 0.8) between groups. **Conclusions:** Incidence of postoperative pain is significantly lower in teeth shaped with rotary instrumentation, but length of pain, if present, is significantly prolonged in these cases.

STUD 174. Microperforated needle for root canal disinfection with ozone

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Introduction and objectives: In general medicine, the ozone-oxygen gases medley is proving itself as a highly efficient treatment. Ozone is a broad-spectrum germicide effective against all types of bacteria, fungi, viruses and even spores. Dentistry is not foreign to this capacity. The objective is to investigate new systems of root canal disinfection during endodontic treatments. **Materials and methods:** We patented a silicon needle (ES: 200701651 U), straight, flexible and microperforated in all his length. This patent is based on a bibliographic review about root canal disinfection with ozone-oxygen gasses. The new needle has a minor caliber in comparison with present ones. Allows us to come closer to the apex. Treats the root canal in all his length and three-dimensionally. Allows the use of high ozone concentrations. It can be used, moreover, with irrigation solutions, in which case the risk of creating periapical damage is much lower. **Results and discussion:** Other needles or cannulae used by other equipments have only one ozone exit located apically. If we rely on the physical-chemical properties of ozone, it is inactivated at the first point of contact. Moreover the other techniques use oxygen from the patients breathe and in low concentrations. **Conclusions:** These needles show better clinical results than other designs.

STUD 175. Microperforated trays for oral treatments with ozone

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Introduction and objectives: International scientific community recognized ozone as one of the most powerful oxidants in nature and its antiviral, antifungal and antibacterial capacity have been widely proved. The principal aim is to prove the major efficiency of these patent in comparison with present devices. **Materials and methods:** Based on researches on present equipments, a microperforated tray was patented (ES: 200701858U) for ozone applications in oral treatments such as incipient caries, teeth withening and periodontal disease. The silicon tray is microperforated along its entire surface. It has a double layer with inner cabin and a connection to the ozone entrance (luer or luer lock). The tray contacts with the whole surface to treat. Ozone will be obtained from medical oxygen at high concentrations. **Results and discussion:** The advantage of this equipment is that higher ozone concentrations that can be achieved. Due to physical-chemical characteristics of this gas, aspiration is not required. A wider surface will be treated more equally. Present devices are more complex and its aspiration systems aspire more than they eject. Usually they obtain oxygen from the patient his breathe and at low concentrations. **Conclusions:** The microperforated tray its design is simpler. There is no risk of injury in the respiratory epithelium.

END 176. Glucose and dye penetration of intraorifice sealing materials in root canal treatment

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Introduction and objectives: Prevention of coronal leakage in root canal therapy has been accomplished by temporary restorative materials. The use of a material to seal the orifice, in addition to the temporary restoration after root canal filling mitigates bacterial leakage. The purpose of this study was to evaluate the sealing capacity of three different intraorifice barriers with two different models of leakage. **Materials and methods:** The coronal portions of 60 single-rooted teeth extracted were removed to obtain roots with 15mm in length. The canals were prepared with hand instrumentation technique and were filled using the cold lateral condensed technique of the gutta-percha and AH Plus. The four coronal milimetres of the filling material were removed with System B. ProRoot MTA, Cavit G and Tetric EvoFlow were placed into the orifice. The roots were mounted on a glucose penetration and dye leakage models. The penetration was measured at 45 days in mmol L-1 (glucose) and millimetres (dye). **Results and discussion:** The results obtained with three sealing materials were similar with the glucose penetration models; however ProRoot MTA showed significantly lower dye leakage scores (0.95 ± 0.93) that the other materials ($p < 0.05$). **Conclusions:** Cavit G and Tetric EvoFlow, in both models, exhibited a similar performance at 45 days. **Acknowledgements:** Thanks to Dr. Rafael Poyatos for help in measurement to the samples.

END 177. Evaluation of dentine adhesive systems to seal the pulp chamber using two leakage models

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Introduction and objectives: An adequate coronal seal is critical for the success of root canal therapy. A variety of temporary materials have been tested in an attempt to provide a coronal barrier to prevent microleakage in endodontic, but none of the materials were able to reduce leakage completely. The purpose of this study was to compare the sealing properties of two different dentine adhesive placed in the pulp chamber with a glucose penetration model and a dye penetration test. **Introduction and objectives:** Sixty extracted human premolars were instrumented to a size 40 K-file and obturated with gutta-percha and AH Plus, using the lateral condensed technique. The access cavities were filled with Clearfil SE Bond+Cavit G, Primer & Bond NT+Cavit G, or Cavit G alone. Microleakage was assessed by methylene blue dye penetration (millimetres) and glucose penetration model (in mmol L⁻¹). **Results and discussion:** The results obtained with the glucose penetration model, at 45 days, were similar for the three and there were no significant differences ($p>0.05$) between them. With the dye penetration test, Cavit G alone showed the lower leakage scores (2,16mm). **Conclusions:** Under conditions of this study, the use of the dentin adhesive systems did not enhance the temporary seal of the pulp chamber access. **Acknowledgements:** Thanks to Dr.Rafael Poyatos for help in measurement to the samples.

END 178. Eradication of Enterococcus faecalis biofilms by chlorhexidine and cetrimide

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Introduction and objectives: Enterococcus faecalis is often isolated in root canals with persistent periapical disease. Its ability to grow as biofilms might allow E. faecalis to survive in these hard conditions. The exo-polysaccharide matrix of biofilms prevents the diffusion of the irrigants; cationic surfactants would be able to disrupt this matrix. The aim of our study was to evaluate the minimal biofilm eradication concentration of chlorhexidine (CHX), cetrimide (CTR) and several combinations of both against E. faecalis biofilms. Biofilms of E. faecalis grew aerobically in polystyrene surfaces for 24h at 37°C and were exposed 1 minute to ten serial twofold dilutions of 4% CHX, 0.1% CTR and 4% CHX combined with constant concentrations of CTR (0.01, 0.02 and 0.05%). The antibacterial activity of solutions was evaluated by determining the viable cell counts and logarithmic killing of cultures. **Results and discussion:** 4% CHX and 0.05% CTR did not eradicate E. faecalis biofilms. In contrast, the combinations of: 0.125% CHX + 0.01% CTR, 0.0625% CHX + 0.02 % CTR and all CHX dilutions + 0.05% CTR were able to eradicate them after 1 minute. **Conclusions:** The combination of CHX with CTR showed synergistic activity in eradicating E. faecalis biofilms. **Acknowledgements:** To Francisca Castillo for her technical assistance.

STUD 179. Relationship between smoking and pulpar pathology

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Introduction and objectives: Smoking has local and systemic effects on the microcirculation and immune system. Therefore, smoking impairs the body's response to infection including pulp response. **Objective:** to discuss the possible relationship between cigarette smoking and endodontic treatment. **Materials and methods:** Literature review. **Results and discussion:** There are evidences linking smoking with periapical pathology. It seems probably that nicotine causes release of neuropeptide CGRP in pulp tissue, which is associated to significant changes in blood flow, inflammation and pulpal pain. However, other studies show no statistically association between smoking and endodontic disease as apical periodontitis is likely to be multifactorial. Current cigarette smokers have the highest percentages of teeth with calculus, more decayed or filled coronal and root surfaces and have lost more teeth than never smokers but it was suggested that this factors are more likely to be due to other oral factors associated with smoking such as reduced flow of saliva and gingival exudate than a direct effect of smoking. **Conclusions:** It is not possible to state that smoking increases the prevalence of apical periodontitis.

END 180. An audit of intra-oral digital radiographs.

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Introduction and objectives: The objective of this study was to improve the quality of digital radiographs taken during endodontic treatment at King's College Hospital Dental Institute in three phases. The first phase compared the Schick CDR system with Digora Optime. The second and third phases involved ways of improving the quality of the digital radiographs produced by the Schick CDR system. **Materials and methods:** The FGDP Guidelines on Selection Criteria for Dental Radiography and Guidance Notes for Dental Practitioners on the Safe Use of X-Ray Equipment-National Radiological Protection Board enabled the use of a 3 point quality scale (1 excellent, 2, diagnostically acceptable, 3 unacceptable), which took into consideration sensor angulation, positioning, contrast and focusing. The recommended FGDP guidelines are not less than 70% images scoring excellent. For the first phase 50 exposures recorded with the Schick CDR system were compared with 50 recorded using Digora Optime. For the second and third phases 50 radiographs for each phase were evaluated with images generated by the Schick system with training provided between the phases. **Results and discussion:** Images produced by the Schick system showed an inferior quality compared with the images generated by the Digora method. Both systems failed to reach the desired quality FGDP standard of 70% excellent (Schick 55% Digora 69%). Comparison of the results in the second and third phases showed that training the operator improved the quality but recommended the purchase of a size 1 or 0 Schick sensors to improve positioning errors. **Conclusions:** This study was carried out in order to minimise the ionising radiation dose to patients and to maximise the clinical and administrative benefits of using a digital system. It demonstrated an improvement in the quality of radiographs across all criteria measured up to and beyond the desired standard, from 55% of radiographs scoring excellent in the first phase to 80% in the third phase. As a result of the study it was decided to install the Schick CDR system because of the speed it produced images even though the first phase of this study demonstrated inferior image quality.

OP 181. Influence of patient's age and initial color in dental bleaching effectiveness

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Introduction and objectives: Dental bleaching is a very common treatment in Aesthetics dentistry. Dental color changes with age because of enamel and dentin amended. Young patients have thick, opaque enamel while in old patients enamel becomes thin and translucent. Dentin with age becomes yellowish, with thin and translucent enamel. All these changes in enamel and dentin makes tooth become darker. These changes in enamel and dentin are irreversible with bleaching. The aim of the study was to determine the influence of patient's age and dental initial color in the bleaching result. **Materials and methods:** We used Vivastyle paint on plus® (Ivoclar Vivadent), a 6% Hydrogen Peroxide. Twenty-eight patients were classified in three groups of age: group I (25-34 years), group II (35-44 years) and group III (45-55 years). They used dental bleaching twice a day for a week. Dental color was measured with Vitapan Classical Guide and black and white digital Photographs. We measured dental color after treatment, a month and three month after treatment. Successful bleaching table was used to obtain a percentage of bleaching. **Results and discussion:** Group I patients obtained a higher percentage of bleaching than group II and III patients. Bleaching results were better for dark initial colors. **Conclusions:** Young patients obtained better results in dental bleaching than old patients. Initial color influenced the results.

MAT 182. In vitro evaluation of the antimicrobial activity of several self-etching adhesive systems against Pseudomonas Aeruginosa and Enterococcus Faecalis.

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Introduction and objectives: The purpose of this study was to determine in vitro the antimicrobial activities of several self- etching adhesive systems against two endodontic and periodontal pathogens, Pseudomonas aeruginosa and Enterococcus faecalis. **Materials and methods:** The diffusion method on Brain Heart Infusion (BHI) agar was employed, previously inoculated with both microorganisms. Susceptibility paper discs (SensiDisc®) were placed in the agar plates filled with four adhesives: Futurabond DC® (Voco), Adhe SE® (Ivoclar Vivadent), Xeno III® (Dentsply Maillefer) and GC G- Bond® (GC). After 48 hours of incubation at 37° the zones of growth inhibition were observed and measured with Image Tool 3.0. **Results and discussion:** For the group Pseudomonas aeruginosa, Adhe SE® showed the widest diameter (2,003 mm; SD +/- 0,655), followed by Futurabond DC® (1,808 mm; SD +/- 0,476), GC® (1,00 mm; SD +/- 0,322) and Xeno III® (0'857 mm; SD +/- 0,388). For the group Enterococcus faecalis, Futurabond DC® showed the widest diameter (4,799 mm; SD +/- 0,830), followed by Xeno III® (1,143 mm; SD +/- 0,345), GC® (0,761 mm; SD +/- 0,358) and Adhe SE® (0,487 mm; SD +/- 0'198). **Conclusions:** Futurabond DC® is an inhibition agent for both bacteria with wide haloes. Adhe SE® inhibits both bacteria with narrow haloes. Xeno III® and GC® show very narrow haloes.

MAT 183. Energy densities and microhardness ratio of nanohybrid composites

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Introduction and objectives: The aim of this study was to control the hardness ratio (bottom surface microhardness/top surface microhardness) of samples of nanohybrid composites cured by LEDs. **Materials and methods:** Two LEDs, Bluephase (Ivoclar Vivadent) and Elipar Freelight 2 (3M ESPE), were used to polymerize 3mm-thick samples of two nanohybrid resins, Ceram X (Dentsply Caulk) and Tetric EvoCeram (Ivoclar Vivadent). Hardness ratio was measured at various combinations of power and energy densities. The power density was obtained by modulating the distance and controlled by a digital radiometer (Cure Rite/Dentsply Caulk). The energy densities were obtained by varying the exposure duration. The microhardness (Vickers Hardness) of both top and bottom surfaces was measured with a microdurometer (Model 5014/Buehler), and the ratio calculated. **Results and discussion:** CeramX always reached the greatest values of microhardness (good spectral concordance between the absorption spectrum of the photoinitiator included and the emission spectrum of the LEDs). All combinations of resin/LED presented a ratio greater or equal to 80% at energy densities greater or equal to 20J/cm². **Conclusions:** An energy density of 20J/cm² need to be reached to insure a hardness ratio of 80%. **Acknowledgements:** The authors wish to thank Ivoclar Vivadent, 3M ESPE and Dentsply Caulk for the supply of materials.

MAT 184. Elaboration of growth factors-loaded microspheres as colloidal carriers for dentin-pulp complex regeneration

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Introduction and objectives: The application of growth factors such as FGF (Fibroblast Growth Factor) and TGFβ (transforming growth factor) in dental tissue engineering necessitates the use of a delivery system. A wide range of drug delivery carriers have been applied to accommodate different molecules to regenerate dental tissues. **Materials and methods:** In this work FGF, TGFβ was encapsulated in PLGA microspheres by a w/o/w double emulsion solvent extraction technique. Microspheres size, colloidal stability, surface properties and morphology were studied. Release kinetics and Encapsulation efficiency were determined in vitro. Biological activity was studied by MTT test. **Results and discussion:** It was found that FGF was encapsulated into these microspheres with good encapsulation efficiency and that there biological activity was kept after encapsulation process. Smooth and spherical microspheres were obtained after the drying process. FGF was released in a multiphasic fashion including an initial burst effect. **Conclusions:** These findings provide baseline data for potential uses of microencapsulated FGF and TGFβ in dental pulp healing and dental tissue-engineering applications. Subsequently FGF-microspheres will be implicated as direct pulp capping materials into in vitro entire tooth culture model of human immature third molars, pulp lesion will be done. Pulp responses after applying these FGF and microspheres will be evaluated. In vitro results of this application will be obtained soon.

OP 185. Influence of saliva contamination on microleakage of three adhesive systems

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Introduction and objectives: Moisture control of the operating field is a critical factor that enhances restoration's quality and clinical success. The purpose of this study was to evaluate the influence of saliva contamination on microleakage of three adhesive systems. **Materials and methods:** Class V cavity preparations were made at the CEJ, on buccal and lingual surfaces, in 60 molars. Teeth were randomly divided for 3 adhesive systems: Prime&Bond®NT, FuturabondNR and FujiBOND LC. Fresh saliva contamination was done before adhesive polymerization. Three decontamination protocols were tested: (1) cotton-pellet drying; (2) rinsing, air drying and adhesive reapplication; (3) air-stream drying. Specimens were restored with Grandio®. After thermocycling 1500 cycles, dye penetration (blue-of-methylene 2%) was evaluated in an optical microscope (16X). Qui-Square Independence Test for statistical analysis was used at $p < 0.05$. **Results and discussion:** No statistically significant differences were found for Prime&Bond®NT. There were statistical significant differences for FuturabondNR, showing less leakage in decontamination protocol 1 ($p < 0.001$) and protocol 3 ($p = 0.002$) at enamel, and for protocol 2 ($p = 0.002$) at dentin, and for FujiBOND LC at dentin margins ($p < 0.001$) for decontamination protocol 2. **Conclusions:** Saliva contamination had no influence in microleakage of any adhesive systems studied, except when the cotton-pellet drying decontamination is applied in dentine margins of FuturabondNR and in enamel margins of FujiBOND LC.

CLIN 186. Management of postoperative hypersensitivity following composite restorations

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Introduction and objectives: The use of resin composite restorative materials has increased due to the high aesthetic demands of our patients and the environmental issues raised with the use of silver amalgam. There has been an increase in their use for the restoration of posterior teeth. Many have reported an increase in postoperative sensitivity resulting in which may last for a few days but can in some cases last many weeks. **Materials and methods:** Using clinical cases, the possible causes of tooth hypersensitivity are reviewed, and the management and options of treatment are outlined showing a well defined clinical protocol. **Results and discussion:** Fluid flow within dentine is the main physiological factor held responsible of this sensitivity. Another explanation could be the inflammatory reaction of the pulp due to bacterial contamination. Several factors are responsible for postoperative hypersensitivity when composite materials are used, including polymerization shrinkage, poor light-curing outcome and inadequate bonding procedure as well as other factors which may cause such a fluid movement. **Conclusions:** Achieving a composite restoration needs 2.5 times more than an amalgam restoration. The use of adequate materials, following a well defined protocol, will reduce considerably postoperative sensitivity.

END 187. Fracture protection of endodontic treated teeth.

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Introduction and objectives: The destabilizing effect of endodontic treatment upon teeth is still controversial. The stability of the crown-root-complex is mainly determined by the remaining substance. The aim of this study was to find an easy way to stabilize and to protect endodontically treated teeth. **Materials and methods:** In the present study 33 human, freshly extracted molars were assigned to 3 different groups: A: Control group (untreated teeth), B: Endodontic treatment, m-o-d preparation and composite resin restoration, C: Endodontic treatment, m-o-d preparation flattening and partial crown. Group C was built up with composite resin. Afterwards crowns were flattened and restored using a partial ceramic coverage ("occlusal shield"). All teeth were subjected to a linear loading until fracture by using a universal testing machine. After the tests every tooth was valued: easy to repair, difficult to repair, unable to repair. **Results and discussion:** The statistical evaluation showed a significant difference between groups A and B ($p < 0.05$) but no difference between groups A and C ($p > 0.05$). Results in group C were superior to group B but the difference was not statistically significant ($p = 0.054$). **Conclusions:** The results of our study show that stabilization of endodontically treated teeth can be achieved by a simple replacement of the most upper part of the crown.