

## Poster abstracts of the 5th biennial meeting of the European Federation of Conservative Dentistry (EFCd) held in association with the 6th international congress of the Society of Restorative Dentistry, Turkey (RDD), 13–15 October 2011, Istanbul, Turkey

### Prologue

#### Fatma Koray

The fifth biennial meeting of the European Federation of Conservative Dentistry (EFCd) held in association with the sixth international congress of the Society of Restorative Dentistry, Turkey, with concurrent meetings of member associations of EFCd, Academy of Operative Dentistry European Section (AODES) and Sociedad Española de Odontología Conservadora (SEOC) and Annual Meeting of the Turkish Academics Teaching Conservative Dentistry, provides the opportunity to scientists and practitioners working on prevention, restoration and aesthetics in conservative dentistry to come together in Istanbul, Turkey. The joint meeting which is called “ConsEuro Istanbul, 2011” is of 3 days duration.

In the morning of the first day of ConsEuro Istanbul, 2011 there will be meetings of AODES and SEOC, member organisations of EFCd, and of Turkish academics teaching conservative dentistry. The scientific programme of ConsEuro 2011 begins in the afternoon. A symposium on “Principles of the Aesthetic Conservative Restorations of Anterior Teeth” and three lectures about the endodontics held in a parallel session are on the programme. Congress continues with the opening ceremony. At the opening ceremony, Prof. O. Fejerskov and Prof. J.B. Ten Cate are presented with the 2009 and 2010 EFCd Awards of Excellence for their outstanding contributions to conservative dentistry. The ceremony of presenting the Awards of Excellence will include Prof. O. Fejerskov's talk on “Pre- and Post-eruptive Enamel Maturation” and Prof. J.B. Ten Cate's speech on “Caries prevention beyond fluoride”. It will be followed by the welcome reception. Three symposiums, eight lectures and six poster sessions are scheduled for the second day of ConsEuro. Symposiums on the second day of ConsEuro Istanbul, 2011 are

entitled “Novel Methods For Caries Diagnosis, Risk Assessments and Prevention”, “Avoidance Of The Failures In Conservative Adhesive Dentistry”. The topics of the lectures are given in parallel sessions on the same day are “The Differential Indication of Direct Composite Restorations versus Indirect Restorations in Posterior Teeth”, “Laser in Conservative Dentistry”, “Side Effects of Dental Materials”, “Clinical Possibilities with Fibre Reinforced Polymers”, “Diagnosis and Treatment of the Gummy Smile”, “Diagnosis and Treatment of the Gummy Smile”, “Restoration Of The Non Carious And Carious Cervical Lesions” and “Inlay and onlay Restorations”. The poster presentations are organised in six sessions: four for research—prevention, operative dentistry, endodontics and biomaterials, and two for clinical case presentations and student's presentations. Posters are presented as poster display or poster discussion. Poster presenters entered into the poster prize competitions are eligible to win “The Best Poster Prize of ConsEuro Istanbul, 2011” of each poster category. Scientific programme on the third day is comprised of a symposium on the “Future in Conservative Dentistry”, lectures about the restorations of the endodontically treated teeth and post restorations and “Closing Ceremony”. At the closing ceremony, the winners of the Poster Prize competition of each category are announced and will be given their prizes. ConsEuro Istanbul, 2011 is closed by saying “See you at ConsEuro Paris, 2013.”

Fatma Koray

President of EFCd and ConsEuro 2011, Istanbul

e-mail: fatmakoray@hotmail.com

fatmakoray@istanbul.edu.tr

**PP 1**

Category: Biomaterials

EFFECT OF ZIRCONIA PRIMER ON THE SHEAR BOND STRENGTH OF DENTAL CEMENTS TO YTZP  
Kyungho ROH<sup>1</sup>, Seung-Ryong HA<sup>2</sup>, Yu-Sung CHOI<sup>3</sup>,  
Sung-Hun KIM<sup>1</sup>

<sup>1</sup>Prosthodontics, Dental School of Seoul National Unit, Seoul, Korea

<sup>2</sup>Dentistry, School of Medicine, Ajou University, Suwon, Korea

<sup>3</sup>Prosthodontics, School of Dentistry, Dankook University, Cheonan, Korea

**Objective** The objective of this study was to investigate the effect of zirconia primer on the shear bond strength of conventional resin cements to Y-TZP ceramic and comparing chemically adhesive resin cements with conventional resin cements with zirconia primer. **Materials and Methods** Sixty three Y-TZP ceramic cylinders were sandblasted with 50 µm Al<sub>2</sub>O<sub>3</sub> particles and divided into three groups. Each group was divided into three subgroups (n=7) depending on the material. In Group A (control group), conventional resin cements without zirconia primer were used (Resicem, Multilink and Superbond C&B). In Group B, conventional resin cements with zirconia primer were used (Resicem with AZ primer, Multilink with Metal/Zirconia primer, and Superbond C&B with Zirconia-Liner). In Group C, chemically adhesive resin cements without zirconia primer were used (Panavia F2.0, Clearfill SA luting, Zirconite). The mixed resin cement with cylindrical shape (ø3 mm×3 mm) was placed onto the Y-TZP ceramic cylinders. All specimens were stored in distilled water at 37°C for 100 days. Shear bond strengths were measured by a universal testing machine with a cross head speed of 0.5 mm/min. All data were analyzed by T-test and one-way ANOVA and multiple comparison Scheffé test (α=0.05). **Results** The shear bond strength of Group B was significantly higher than that of Group A except for Resicem. The bond strengths of Group B and C were varied, depending on the materials. **Clinical implications** The application of zirconia primer is recommended when conventional resin cement is used for the bonding of zirconia restorations.

**PP 2**

Category: Biomaterials

IMPACT OF 6-MONTH WATER-CONSERVATION ON THE SURFACE AND DEPTH HARDNESS OF A SILORANE BASED COMPOSITE  
Pieters PRELE<sup>1</sup>, Sophie GAUMET<sup>1</sup>, Veronique DUPUIS<sup>1</sup>,  
Dominique GILLET<sup>1</sup>

<sup>1</sup> Odontology, Bordeaux, France

**Objectives:** The aim of this study was to study the influence of 6-month water-conservation on the surface and depth microhardness of a silorane based composite (Filtek® Silorane, SIL). **Materials and Methods:** SIL was placed in a 3 mm high (H0) mould then polymerized. After 24 hours of dry-conservation in a hermetic box, the 10 samples were weighed (W0) (balance Sartorius® BP221S) and the initial surface microhardness (ISMH) was measured (microhardness tester Shimadzu, 100 g, 15 s). **Experimental group:** 5 samples, bi-distilled water-conservation, 37°C. **Control group:** 5 samples, dried-air conservation, 37°C. After 6 months, microhardness was measured on surface(S), subsurface (SS=0.05 mm±0.01), and up to the heart (H) of the samples. To measure the depth microhardness, successive layers of composite were removed by manual manufacturing, using abrasive papers of decreasing size grading. After every manufacturing, samples were weighed (w). The removed thickness (t) was calculated by the formula:  $t=wH0/W0$ . The depth (d) was deducted by:  $d=H0-t$ . Hardness Vickers Numbers results presented were the mean (±SD) of 5 measures. Data was analyzed by using Mann-Whitney-U Test. **Results:** No statistically significant difference was observed at H (p>0.05). **Conclusions:** These in vitro results showed a post-hardening phenomenon and a softening effect of water until SS of SIL. **Clinical Relevance:** Mechanical properties being a fundamental question for posterior restoration materials, the softening of SIL until sub-surface when conserved in water for 6 months, indicates a potential durability problem.

**PP 3**

Category: Biomaterials

SURFACE CHARACTERIZATION OF RESTORATIVE GLASS-IONOMER CEMENTS WITH TWO DIFFERENT POLISHING SYSTEMS

Olivier ETIENNE<sup>1</sup>, Youri ARNTZ<sup>2</sup>, Gabriel FAUXPOINT<sup>3</sup>,  
Hervé PELLETIER<sup>4</sup>

<sup>1</sup>Prosthodontics, Uds/School of Dental Medicine, Strasbourg, France

<sup>2</sup>Research, Uds/UMR CNRS 7213, Illkirch, France

<sup>3</sup>Statistics, Uds / School of Dental Medicine, Strasbourg, France

<sup>4</sup>Surface Engineering, National Institute of Applied Sciences, Strasbourg, France

**Objectives** The aim of the study was to compare the surface roughness of several glass-ionomer restorative materials, with two different polishing systems. **Materials and methods** Five glass-ionomer restorative materials were chosen as competitors, 3 Light-cured GIC and 2 Self-cured GIC: - Ionolux AC (VOCO) - Riva Light Cure (SDI) - Fuji II LC (GC) - Ionofil

Molar (VOCO) - Fuji IX GP (GC) For each material, 6 samples were built and divided in 2 groups depending on the polishing system. Two polishing systems were selected for the study: - Super-Snap Rainbow Technique Kit (Shofu) : successively : L506 (Coarse),L508(Medium),L519 (Fine), L502 (Superfine) - PoGo One Step Diamond Micro-Polisher (Dentsply) : disc polish burs The study was conducted with a multi-technique approach including Optical profilometry measures, SEM and AFM observations. Datas were analyzed with a one-way analysis of variance (ANOVA). Results 1. According to AFM Observations, Ionolux AC showed the smallest particles (less than 1  $\mu\text{m}$ ) when compared to other competitors analyzed. 2. According to Optical profilometry and AFM observations, all samples (except Fuji II LC with AFM observations) showed a smoother surface with the Pogo finishing system. The Supersnap finishing system (Shofu) seems to create rougher surfaces, probably caused by the successive grid disks (as observed with SEM). 3. Smoothest surfaces were observed with Ionolux AC and Fuji II LC after polishing. Clinical Relevance Within the limit of this study, Fuji II LC and Ionolux AC gave the smoothest surface, especially when use with a single device polishing system.

#### PP 4

Category: Biomaterials

#### APPLICATION PROTOCOLS OF SIMPLIFIED DENTAL ADHESIVES

Filipa CHASQUEIRA<sup>1</sup>, Sofia Arantes OLIVEIRA<sup>1</sup>, Jaime PORTUGAL<sup>1</sup>

<sup>1</sup>Biomaterials, School of Dentistry, University of Lisbon, Lisbon, Portugal

Objectives: The aim of this study was to evaluate the shear bond strength (SBS) between a composite and dentin, promoted by two dental adhesive systems (Easy Bond (3M ESPE), and Scotchbond 1XT (3M ESPE)) with different application protocols. Materials and Methods: Fifty-three caries-free human molars were selected. Proximal enamel was removed to obtain two dentin discs per tooth, which were randomly assigned to the experimental groups (n=15) presented in Table 1. The composite resin used was Filtek Z250 (3M ESPE). Specimens were mounted in the Watanabe device and shear bond test was conducted in an universal testing machine with a crosshead speed of 0,5 mm/min. Data were analyzed with ANOVA and Student-Newman-Keuls tests. Results: The highest SBS mean value was achieved with E3 group (41,23 $\pm$ 2.71 MPa) and the lowest with EP (25,15 $\pm$ 2,68 MPa). For both adhesive systems tested, the SBS values increased with the number of layers, till the third. E4 yielded similar results to E3, and E5 decreased SBS values. There were no

statistical differences within the S3, S4 and S5. Conclusion: Considering the SBS results, we can recommend three adhesive layers when using Easy Bond and Scotchbond 1XT adhesives. The pre-etching treatment of dentin, before Easy-Bond, is not recommended. Clinical relevance: This study may help the clinician achieving better results with simplified adhesive systems that usually perform worse than multi-step systems.

Table 1 - Experimental design

PROTOCOLS	ADHESIVE SYSTEMS	
	Easy Bond	Scotchbond 1XT
Manufacturer's instructions	E1	S1
Two adhesive layers	E2	S2
Three adhesive layers	E3	S3
Four adhesive layers	E4	S4
Five adhesive layers	E5	S5
Manufacturer's instructions + hydrophobic layer	EH	SH
Pre-etching treatment	EP	-

#### PP 5

Category: Biomaterials

#### SHEAR BOND STRENGTH OF RESIN COMPOSITE USING DIFFERENT DIMENSIONS OF RESIN MODIFIED GLASS-IONOMER LINER

Emine Suzan TOKDEMIRLI<sup>1</sup>, Saadet GÖKALP<sup>1</sup>

<sup>1</sup>Conservative, Hacettepe University, Ankara, Turkey

Objectives: To evaluate shear bond strength (SBS) of a composite resin to dentin using resin modified glass ionomer liner (RMGIL) applied with different dimensions. Materials and Methods: Forty five sound human molar teeth were sectioned mesiodistally. Each half was grounded and randomly divided into three groups (n=30). Group 1: RMGI (Vitrebond, 3M) was placed as a liner (circle diameter of 3.0 mm) and randomly divided into three groups (n=10). Xeno V (Dentsply), Clearfil SE Bond (Kuraray) and XP Bond (Dentsply) were applied according to manufacturers' directions. Group 2: RMGI was placed in an elliptical form (axes of 1.5-3. mm) using the same protocol. Group 3: Adhesive systems were used without RMGI using the same protocol. For all groups, Filtek Supreme XT cylinders were placed with two 2-mm-thick increments using 3 mm diameter, 4 mm height teflon tube, and cured for 20 s (LED, SDI). After storage in water at 37°C for 24 h. specimens were tested in SBS at a crosshead speed of 1 mm/min. and fracture mode was examined. Five teeth were prepared for SEM. One

way and two way ANOVA and t-test ( $p < 0.05$ ) were used. Results: RMGIL decreased SBS values for both applications compared to Group 3. The fracture mode was predominantly adhesive. Some spaces were observed at the interface of RMGIL-dentin, but homogenous interaction for resin-dentin interface. Conclusions: Despite the lower SBS values, the results need to be supported by the clinical studies. Clinical Relevance: SBS values have been found acceptable for dentin treatments.

#### PP 6

Category: Biomaterials

#### CYTOTOXIC EFFECT OF ACIDIC MONOMERS ON HUMAN DENTAL PULP CELLS

Sung-Geun CHO<sup>1</sup>, Jin-Woo LEE<sup>1</sup>, Kyoung-Kyu CHOI<sup>1</sup>, Sun-Young KIM<sup>1</sup>

<sup>1</sup>Dept. of Conservative Dentistry, KyungHee University, Seoul, Korea

Objectives Acidic monomers are indispensable components in self-etch adhesive systems for improving bonding effectiveness. When the self-etch adhesive systems are used for deep caries or direct pulp capping procedures, acidic monomers can diffuse into pulp chamber and affect pulpal cells. The aim of this study was to investigate the possible cytotoxic effect of acidic monomers on cultured dental pulp cells. Materials and Methods Dental pulp cells were obtained from extracted upper premolar for orthodontic reason. Pulpal cells at passage 7 were cultured with DMEM(10% FBS, 1% antibiotics-antimycotics) under 37°C incubator supplied with 5% CO<sub>2</sub>. 10-methacryloyloxydecyl dihydrogenphosphate (10-MDP; U-Chemo Holding Co., China) and 4-methacryloyloxyethyl trimellitic acid (4-META; Esstech Inc., USA) were dissolved in dimethyl sulphoxide and diluted to final concentration with culture medium prior to use. Triethylene glycol dimethacrylate (TEGDMA; Sigma-Aldrich, USA) was used as control. Cultures were exposed to various concentration of monomers and incubated in the presence or absence of ascorbic acid for 24 hrs. Cell viability was measured by MTT assay. Results All monomers caused a decrease in cell viability dose-dependently. The ranking of the cytotoxicity based on LD50 was 10-MDP (0.4 mM) > 4-META (1.8 mM) > TEGDMA (2 mM). Ascorbic acid reduced the cytotoxic effect of TEGDMA but not 10-MDP and 4-META. Conclusions Acidic monomers have a dose-dependent cytotoxic effect on dental pulp cells. Ascorbic acid does not seem to have a reducing effect in cytotoxicity of acidic monomers when compared to TEGDMA. Clinical Relevance Acidic monomers can cause pulpal damage when directly exposed to pulpal cells.

#### PP 7

Category: Biomaterials

#### SELF-ETCHING ASPECTS OF A CLASSIC ETCH&RINSE ADHESIVE

Jose BAHILLO<sup>1</sup>, Tisiana BOTOLOTTO<sup>2</sup>, Miguel ROIG<sup>1</sup>, Ivo KREJCI<sup>2</sup>

<sup>1</sup> Restorative Dentistry, International University Catalunya, Barcelona, Spain

<sup>2</sup> Division Cariology and Endodontics, University of Geneva, Geneva, Switzerland

Objectives: The purpose of the present study was to evaluate the self-etching properties of a classic 3-step etch&rinse adhesive, OptiBond FL (OFL). Materials and Methods: Class V cavities with margins located in enamel and dentin were performed on extracted molars, restored with OFL and a micro hybrid resin composite (Clearfil AP-X). The specimens were randomly assigned to three groups: 1.enamel (E) and dentin (D) etching with 37% H<sub>3</sub>PO<sub>4</sub> followed by Primer (P) and Adhesive (A) application, 2. Only E etching with H<sub>3</sub>PO<sub>4</sub> followed by P and A application and 3. P and A with no previous etching with H<sub>3</sub>PO<sub>4</sub>. Thermo-mechanical loading was performed and specimens were subjected to quantitative marginal analysis before and after loading. Data was evaluated with ANOVA and DUNCAN post hoc test. Results: At the total margin length, no significant differences in the % of continuous margins (CM) were observed before loading. Interestingly, after loading no significant differences were observed on dentin margins, evidencing a self-etching effect on dentin. However, significantly lower % CM were observed on enamel in group 3. Conclusions: A self etching behavior was observed due to the presence of the acidic monomer GPDM within the composition of OFL. Clinical Relevance: OFL, a classic 3-step etch&rinse adhesive, behaves as a self-etching adhesive.

#### PP 8

Category: Biomaterials

#### PHYSICOCHEMICAL CHARACTERIZATION OF SOME ORTHODONTIC CEMENTS.

M. Victoria BOLAÑOS-CARMONA<sup>1</sup>, M. Purificación SÁNCHEZ-SÁNCHEZ<sup>2</sup>, Bilal ZEIN<sup>1</sup>, Santiago GONZÁLEZ-LÓPEZ<sup>1</sup>, Ramón DEL CASTILLO-SALMERÓN<sup>1</sup>, Yaymarilis VERANES<sup>1</sup>

<sup>1</sup>Stomatology, University of Granada, Granada, Spain

<sup>2</sup>Inorganic Chemistry, University of Granada, Granada, Spain

**Objectives:** To analyze the micro-hardness in relation to thermal behavior and conversion degree (CD) of five orthodontic cements.

**Material and methods:** Five orthodontic cements were tested: greenglo<sup>TM</sup> (G); blüglöo<sup>TM</sup> (B) (Ormco Sybron, CA, USA); Transbond XT<sup>®</sup> (T) (3M Unitek, MN, USA); Reliance Phase II (Ra) and Reliance Phase II dual (Rd) (Reliance Orthodontic Products, Inc, IL, USA). Microhardness: Vickers Hardness Number (VHN) (Buehler 2101, Lake Bluff, Illinois, USA; 100 g load for 30s) from five indentation on brackets/cement sections, just below three polycarbonate brackets (Spirit<sup>TM</sup>, Omco, Sybron CA). One-way ANOVA and Tukey's test allowed for comparisons between groups. CD: FT-IR spectra from standard pills of 95 mg KBr powder grounded with 5 mg of unpolymerized and polymerized materials (n=3) were taken at 32 cm<sup>-1</sup> and 256 scans/sample. CD was calculated from the relation between peaks height (1638/1608 cm<sup>-1</sup>) (polymerized vs non-polymerized materials). Thermal analysis: about 20 mg of each material were submitted to thermal degradation by Thermogravimetry (TG)(900°C, 10°C/min) and Differential Scanning Calorimetry (DSC) (400°C, 10°C/min).

**Results:**

VHN: G=57.82(4.63) <Ra="76.95(3.41) FT-IR: CD(%): B=41.26(5.01); G=39.52(1.32); Ra=34.51(9.48); Rd=33.55 (7.58); Ra=32.20(0.72). No differences were found.

TG analysis: Rd and Ra demonstrated the greatest thermal stability. The greatest filler content corresponded to Rd (79.76%) and the lesser, to G(73.88%), that also was the most unstable showing exothermal peaks corresponding with steps of mass loss.

**Conclusions:** Microhardness is better related to the thermal behavior than to conversion degree.

**Clinical Relevance:** Instructions in order to maximize the CD of orthodontics materials should be given.

## PP 9

Category: Biomaterials

EFFECT OF ZIRCONIA SURFACE TREATMENT AND THERMAL AGEING ON FLEXURAL STRENGTH, WETTING AND ROUGHNESS.

Juan Ignacio ROSALES LEAL<sup>1</sup>, Carlos GRAMANI GUEDES<sup>2</sup>, Javier MONTES RUIZ<sup>3</sup>, Miguel CABRERIZO VILCHEZ<sup>3</sup>, Santiago GONZÁLEZ LÓPEZ<sup>4</sup>, Ramón DEL CASTILLO SALMERÓN<sup>1</sup>

<sup>1</sup>Prosthodontics, University of Granada, Granada, Spain

<sup>2</sup>Prosthodontics, University of Brasilia, Brasilia, Brazil

<sup>3</sup>Applied Physics, University of Granada, Granada, Spain

<sup>4</sup>Operative Dentistry, University of Granada, Granada, Spain

**Objective:** To evaluate the surface treatment and thermal ageing effects on zirconia flexural strength, wetting and roughness. **Materials and Method:** Sintered zirconia specimens (Lava, 3M ESPE) were divided into five groups according to surface treatment (control [no treatment], 50 µm Al<sub>2</sub>O<sub>3</sub> sandblasting, 125 µm Al<sub>2</sub>O<sub>3</sub> sandblasting, 250 µm Al<sub>2</sub>O<sub>3</sub> sandblasting and tribochemical silica coating/silane coupling system [Rocatec System]). Five groups were subdivided into two subgroups each according to thermal ageing (no thermal ageing and thermal ageing [10,000 cycles at 5°C and 55°C, 30s dwelling time]). Flexural strength (three-points bending test), wetting (ADSA contact angle) and roughness (white light confocal microscope) were obtained. Data were statistically analyzed (ANOVA and student-newman-keuls tests, p<0.05). **Results:** Lowest flexural strength was obtained after 250 µm Al<sub>2</sub>O<sub>3</sub> treatment and no differences were found between other treatments. Wetting was similar for all surfaces treatments except for 125 µm Al<sub>2</sub>O<sub>3</sub> sandblasting, which increased wetting. Ageing increased wetting and reduced flexural strength for all groups. Surface treatment influenced roughness values (50 µm Al<sub>2</sub>O<sub>3</sub><control<="" span="">

## PP 10

Category: Biomaterials

CONSTANT AND DEFERRED PULP PRESSURE AFFECTS IN VITRO SEALING.

M<sup>a</sup> Ángeles MOLINO SERRANO<sup>1</sup>, Juan Ignacio ROSALES LEAL<sup>1</sup>, Ramón DEL CASTILLO SALMERÓN<sup>1</sup>

<sup>1</sup>Prosthodontics, University of Granada, Granada, Spain

**Objectives:** To assess the effect of constant and deferred pulp pressure on in vitro class V sealing over time. **Materials and Methods:** Prime&Bond[P&B], Xeno III [XNO], and Fluoro Bond[FLB] were assessed in class V cavities. Pulp pressure conditions were negative (no pressure); deferred (DP) (pressure activated after applying adhesive); or constant (CP) (pressure activated during application of the adhesive and maintained after its application). Time periods were 24 h and one month. Microleakage and dentin-permeability on the occlusal and gingival wall was measured. **Results:** Pulp pressure conditions only affected the gingival wall; in the occlusal wall, P&B and XNO obtained the highest sealing; gingival wall sealing was superior with XNO, followed by FLB and P&B. In the gingival wall, leakage was increased with P&B and FLB under DP and was even higher under CP. Lower gingival leakage was observed with XNO under both DP and CP. Immersion time reduced the sealing of the three

adhesives, more markedly under CP than DP. Conclusions: Constant and deferred pulp pressures produce a sealing deterioration that is worse under constant pressure. The greatest damage to the bond is produced by over-humidification at the time of adhesive application, while sealing deterioration over time is also caused by deferred pressure, which varies as a function of adhesive. Clinical relevance: Pulp pressure effect is significant at the moment of adhesive application and over time. A non affected adhesive at the moment of application can be deteriorated over time due to the pulp fluid continuum contact at the interface.

## PP 11

Category: Biomaterials

### IN VITRO BIOCOMPATIBILITY OF CURRENT ADHESIVE RESTORATIVE SYSTEMS

Tuğba TOZ<sup>1</sup>, Arlin KIREMITCI<sup>1</sup>, Erhan PALASKA<sup>2</sup>, Oya UNSAL TAN<sup>2</sup>, Anıl Sera KAHRAMAN<sup>3</sup>, Zeliha SOYSAL<sup>4</sup>

<sup>1</sup>Restorative Dentistry, Hacettepe University Faculty of Dentistry, Ankara, Turkey

<sup>2</sup>Pharmaceutical Chemistry, Hacettepe University Faculty of Pharmacy, Ankara, Turkey

<sup>3</sup>Chemical Engineering and Bioengineering, Hacettepe University Faculty of Engineering, Ankara, Turkey

<sup>4</sup>Molecular Biology, Hacettepe University Faculty of Biology, Ankara, Turkey

**Objectives:** The objective was to determine the quantity of leachable residual monomers responsible for toxicity of different types of current adhesive restorative materials and to compare these materials' biocompatibility in vitro. **Materials and Methods:** The extracts of the specimens collected after three time periods were analyzed by high performance liquid chromatography (HPLC) to determine residual monomers. Cytotoxicity of these adhesive restorative materials were evaluated with respect to L929 cells using the extract method and the methyltetrazolium (MTT) assay and the potential mutagenicity of the all materials' extracts from two time periods were tested by Ames Salmonella/microsome test. **Results:** All resin materials showed monomer release and the most release was observed from Ketac N 100 Primer; nor Bis-Phenol A (BPA) neither decamethylpentasiloxane (D5) was detected. Adhesive restorative materials showed different degrees of cytotoxicity; however no mutagenic effects were detected for any adhesive restorative material. Silorane Restorative and Quixfill were biocompatible to the cell culture and the cytotoxic effect of Fuji IX GP Extra observed at 48 and 72 hour was the highest due to its solubility and acidity.

**Conclusion:** The biocompatibility of adhesive restorative materials could be related with the monomer release and materials showed different degrees of cytotoxicity while they showed no mutagenic effects. **Clinical Relevance:** Clinicians must consider the toxicity of adhesive restorative materials on dental tissues occurred with residual monomer release during operative treatments.

## PP 12

Category: Biomaterials

### IMMEDIATE/AGED BOND STRENGTH OF A NEW ONE-STEP ADHESIVE TO DIFFERENTLY PREPARED TOOTH SURFACES

Yüji SUYAMA<sup>1</sup>, Atsushi KAMEYAMA<sup>1</sup>, Shuhei HOSHIKA<sup>1</sup>, Masanao INOKOSHI<sup>1</sup>, Jan DE MUNCK<sup>1</sup>, Toshimoto YAMADA<sup>2</sup>, Bart VAN MEERBEEK<sup>1</sup>

<sup>1</sup>Biomat, Kuleuven, Leuven, Belgium

<sup>2</sup>Dental, Toranamom Hospital, Tokyo, Japan

**Objectives:** To investigate to what extent the way of surface preparation affects the micro-tensile bond strength ( $\mu$ TBS) of a new all-in-one adhesive to dentin/enamel 'immediately' and after 'aging'. **Methods:** Thirty mid-coronal sound dentin surfaces were prepared from extracted human third molars using either a 100- $\mu$ m diamond bur (bur-cut), 600-grit silicon carbide (SiC) paper, or by fracturing (free of smear layer). For enamel, 20 teeth were prepared by bur or were left un-cut (solely prophylactically cleaned). Resin composite (Herculite XRV Ultra, Kerr) was bonded to the surfaces using either the 1-step self-etch adhesive 'exp. MTB-200' (Kuraray) or the 2-step self-etch adhesive 'Clearfil SE Bond' (C-SE; Kuraray) that served as gold-standard control. After 1-week water-storage at 37°C, specimens were serially cut into 1-mm<sup>2</sup> stick-shaped micro-specimens, of which per tooth half were further subjected to 20,000 thermo-cycles (medium-term aging), prior to  $\mu$ TBS testing. Two additional specimens per group were processed for TEM interfacial analysis. **Results:** Both adhesives bonded relatively effectively to the diversely prepared dentin/enamel surfaces. At dentin, a bur smear layer significantly reduced the  $\mu$ TBS of both 'mild' self-etch adhesives, except for C-SE when bonded 'immediately'. Only the latter was significantly reduced after aging. At enamel, no significant differences in  $\mu$ TBS were recorded for all groups. TEM revealed a tight, but superficial interaction of both adhesives with dentin/enamel. A submicron hydroxyapatite-rich hybrid layer was formed by MTB-200. **Conclusion & clinical relevance:** Regarding bonding performance, the new one-step adhesive approached the gold-standard, while both self-etch adhesives lost some bonding effectiveness at bur-cut dentin.

$\mu$ TBS to dentin and enamel in MPa (mean  $\pm$  SD (n))

		Bur-cut DENTIN	SiC-paper ground DENTIN	Fractured DENTIN	Bur-cut ENAMEL	Uncut ENAMEL
exp. MTB-200	'immediate'	31.3 $\pm$ 11.6 ac (23)	46.0 $\pm$ 9.9b (35)	40.4 $\pm$ 11.4ab (24)	22.9 $\pm$ 7.2A (17)	23 $\pm$ 11.8A (18)
	'aged'	29.6 $\pm$ 7.8a (23)	41.2 $\pm$ 10.3bc (33)	48.2 $\pm$ 12.4b (24)	16.0 $\pm$ 7.8A (17)	15.2 $\pm$ 9.2A (15)
Clearfil SE Bond	'immediate'	44.0 $\pm$ 9.9b (53)	49.1 $\pm$ 13.4b (35)	47.9 $\pm$ 16.2b (20)	16.7 $\pm$ 7.1A (18)	18.1 $\pm$ 9.2A (28)
	'aged'	36.0 $\pm$ 11.3 ac (52)	49.1 $\pm$ 10.5b (38)	47.3 $\pm$ 15.3b (18)	16.5 $\pm$ 6.6A (15)	19.1 $\pm$ 12.1A (30)

**PP 13**

Category: Biomaterials

## INVESTIGATIONS TOWARDS NANO-HYBRID RESIN-BASED COMPOSITES

Nicoleta ILIE<sup>1</sup>, Remhard HICKEL<sup>1</sup><sup>1</sup>Conservative Dentistry, LMU Munich, Munich, Germany

**Objective:** Clinical data indicate an increased trend in material fracture as reason for failure in composite restorations, questioning whether modern resin-based-composites (RBCs) are able to fulfil the rising aesthetical demands and to provide at the same time a sufficient mechanical stability also in larger cavities. The aim of this study was to analyse differences in mechanical properties within and between nano- and micro-hybrid RBCs as well as flowables nano- and micro-hybrid RBCs, by measuring mechanical properties at macro- and micro-scale. **Methods:** 34 RBCs - 15 nano-hybrid, 9 micro-hybrid and 10 flowable - were therefore considered. Flexural strength (FS), flexural modulus (Eflexural), indentation modulus (E), Vickers hardness (HV) and creep (Cr) were measured after the samples had been stored in water for 24 h at 37°C. Differences within the materials as well as within materials categories were statistically analyzed using one-way ANOVA with Tukey HSD post hoc-test ( $\alpha=0.05$ ). **Results:** As a material category the micro- and nano-hybrid RBCs performed in all properties superior compared to the flowable RBCs. The former two categories differ significantly only with regard to three parameters, with nano-hybrid RBCs showing higher HV respectively lower Eflexural and filler weight. **Conclusions:** Only few differences were found between nano-hybrids and micro-hybrid RBCs as a material category. However, several of the measured nano-hybrids RBCs showed consistently higher mechanical properties than the mean values of the micro-hybrid RBCs. **Clinical relevance:** From laboratory tests, no clear advantages in the mechanical stability in stress bearing areas of nano-hybrids RBCs as a material category are expected clinically.

**PP 14**

Category: Biomaterials

## HYDROPHOBIC DENTIN BONDING CONCEPT-FRACTURE TOUGHNESS OF RESIN-DENTIN INTERFACES

Muhammet AYAR<sup>1</sup>, Cemal YESILYURT<sup>1</sup>, Tahsin YILDIRIM<sup>1</sup><sup>1</sup>Operative Dentistry and Endodontics, Karadeniz Technical University, Trabzon, Turkey

**Objectives:** Hydrophobic Dentin Bonding (HDB) Concept also called "Ethanol-wet Bonding" allows establishing adhesion between hydrophobic resins and dentin. The aim of present study was to test the effect of HDB techniques on fracture toughness of the resin-dentin interface. **Materials and Methods:** Dentin surfaces were exposed by diamond disc under water. Following acid etching, dentin surfaces were treated using one of the following wet bonding techniques + hydrophilic or hydrophobic adhesive combinations. **Group I:** Water-wet bonding (WWB) + Single Bond 2 (3M ESPE, USA) **Group II:** Simplified dehydration technique of Ethanol-wet bonding (SEWB) + Single Bond 2 **Group III:** Full dehydration technique of Ethanol-wet bonding (FEWB) + Single Bond 2 **Group IV:** SEWB + Solvented Heliobond (Ivoclar Vivadent, USA) **Group V:** FEWB + Solvented Heliobond **Group VI:** SEWB + Heliobond Following bonding application, incrementally, composite resins were placed. For fracture toughness test, using of four teeth 7 compact test specimens were obtained (n=7). Interfacial fracture toughness was determined with universal test machine. As a control group, fracture toughness of bovine dentin was determined. One-way ANOVA and Tukey test were used for statistical analysis ( $p<0,05$ ). **Results:** The results were shown in Table 1. There was no difference among bonding techniques on fracture toughness values. **Conclusion:** Fracture toughness of the hydrophobic resin-dentin interfaces are comparable to those of hydrophilic resin-dentin interfaces. **Clinical Relevance:** Hydrophobic

dentin bonding techniques may improve the durability of resin-dentin bonds as it is well-known that water

absorption degree of hydrophobic resins by the time is more acceptable.

Table 1. The means, std deviations of KIC and fracture modes

Group No	Bonding Technique	Adhesive	N	Mean KIC (Mpa m <sup>1/2</sup> ) (SD)	Failure Modes		
					Cohesive in Composite	Adhesive	Mix
I	WWB	Single Bond 2	7	0,38 (0,22)	28,57	57,13	14,29
II	SEWB	Single Bond 2	7	0,43 (0,22)	28,57	57,13	14,29
III	FEWB	Single Bond 2	7	0,45 (0,16)	14,29	71,45	14,29
IV	SEWB	Heliobond (Solvented)	7	0,43 (0,22)	28,57	71,45	-
V	FEWB	Heliobond (Solvented)	7	0,56 (0,23)	28,57	57,13	14,29
VI	SEWB	Heliobond (Neat)	7	0,53 (0,26)	14,29	71,45	14,29
		Bovine Dentin	7	1,6 (0,27) *			

\* The mean difference is significant at the 0,05 level.

## PP 15

Category: Biomaterials

### THE EFFECT OF BORON ON DENTIN BOND STRENGTH OF AN ADHESIVE

Nimet ÜNLÜ<sup>1</sup>, Niyazi DÜNDAR<sup>1</sup>, Nuri BASPINAR<sup>2</sup>, Abdullah BASOGLU<sup>3</sup>, Sema HAKKI<sup>4</sup>

<sup>1</sup>Research Laboratory, Selcuk University, Faculty of Dentistry, Konya, Turkey

<sup>2</sup>Department of Biochemistry, Selcuk University, Faculty of Veterinary Medicine, Konya, Turkey

<sup>3</sup>Department of Internal Medicine, Selcuk University, Faculty of Veterinary Medicine, Konya, Turkey

<sup>4</sup>Periodontology, Selcuk University, Faculty of Dentistry, Konya, Turkey

**Objectives:** Although boron(B) intake has been shown to be beneficial to bone strength and structure in animals, there are no reports of effect of B intake on changes in bone or teeth caused by obesity in animals. The aim of this study was to evaluate the effects of B on the bond strength of a self-etching adhesive to dentin in rabbits with increased obesity induced by high energy diet. **MATERIALS AND METHODS:** Fifty incisors were obtained from rabbits which fed with food without and with different dosages of B for 7 months. Rabbits' teeth were vertically cut buccolingual two piece to obtain flat dentin surfaces. Teeth were divided into five groups according to dietary(n=50): Control1:fed alfalfa hay only, Control2:high energy diet (2800 kcal+3.88 mg boron/kg), B10:high energy diet +10 mg B, B30:high energy diet +30 mg B, B50:high energy diet +50 mg B. Each group consisted of 10 specimens.

The specimens of each group were applied a self-etching adhesive. All specimens were restored with a hybrid composite resin. Shear forces were measured with a universal testing machine. Data were analyzed by Kruskal Wallis and Friedman tests. **RESULTS:** While control groups and B10 showed the lowest bond strength, the highest mean bond strength to dentin was obtained with B30 and B50. **CONCLUSION:** Results of this experimental animal study showed that boron has positive effects on dentin bond strength of a self-etching adhesive. This subject needs to be studied more. **CLINICAL RELEVANCE:** Boron may be a beneficial bioactive element on tooth structures.

## PP 16

Category: Biomaterials

### SURFACE ROUGHNESS AND MORPHOLOGIC CHANGES OF ZIRCONIA AFTER DIFFERENT SURFACE TREATMENTS

Necla DEMİR<sup>1</sup>, Gülce SUBAŞI<sup>1</sup>, A. Nilgün ÖZTÜRK<sup>1</sup>  
<sup>1</sup>Prosthodontics, Selcuk University Faculty of Dentistry, Konya, Turkey

**Objectives:** The purpose of this study was to compare the effect of different surface treatments on zirconia ceramic roughness. **Methods:** Fifty sintered Y-TZP ceramics (Vita In-Ceram YZ) were divided into five groups according to the surface treatments received: none (control), Er:YAG laser irradiation (AT Fidelis Er:YAG) (10 Hz, 100 MPS, distance: 1 mm) at three different energy intensities (200 mJ, 300 mJ, 400 mJ) and air

abrasion with 110  $\mu\text{m}$  aluminium oxide ( $\text{Al}_2\text{O}_3$ ) particles. After the surface conditioning procedures; the surface roughness ( $R_a$  in  $\mu\text{m}$ ) of the specimens was evaluated using a surface texture measuring instrument (Mitutoyo Suftest 402). In addition, a specimen from each group was examined through atomic force microscope (AFM) and scanning electron microscope (SEM) analyses to evaluate the topographical surface characteristics of zirconia ceramics after different surface treatments. The surface roughness values were analyzed using the one-way analysis of variance (ANOVA), followed by Tukey post hoc test ( $p=0.05$ ). Results: One-way ANOVA revealed that there were significant differences among groups ( $p<0.05$ ). Air abrasion group presented the highest surface roughness value. However, except the air abrasion group, there were no significant differences among other groups ( $p>0.05$ ). Conclusion: According to the results of statistical and microscopic analyses, air abrasion is the most effective surface treatment method. The Er:YAG laser irradiation on zirconia ceramic surfaces is not found to be effective. Clinical relevance: Various surface treatments of zirconia have been recommended for veneering ceramics. However, it has not been determined which of these treatments produces the highest roughness

#### PP 17

Category: Biomaterials

#### AN EXPERIMENT ON HEAT CONDUCTION OF DIFFERENT FLOWABLE COMPOSITES

Muhammet YALÇIN<sup>1</sup>, Ali KELEŞ<sup>2</sup>, Reyhan GÖZLEK<sup>1</sup>, Şendoğan KARAGÖZ<sup>3</sup>

<sup>1</sup>Restorative Dentistry, Dentistry, Malatya, Turkey

<sup>2</sup>Endodonti, Dentistry, Erzurum, Turkey

<sup>3</sup>Thermodynamics, Mechanical Engineering, Erzurum, Turkey

Objectives: To investigate and to compare heat conduction of different flowable composites. Materials and Methods: In this study, four different flowable composites; GC Gradia Direct LoFlo(GC Corporation, Tokyo, JAPAN), Filtek Ultimate (3M ESPE, St.Paul, USA), Grandio Flow (VOCO GmbH, Cuxhaven, GERMANY) and SDI Wave(SDI, Victoria, AUSTRALIA) were used. Flowable composites were placed into standard molds and used according to manufacturer instructions. The samples were prepared for every brand of flowable composites. The Heat Conduction Unit's (P.A. Hilton Ltd., England) linear heat conduction module was used in determining the flowable composites heat conductivity. The data

were statistically analyzed by Mann-Whitney U test (SPSS 13.0, SPSS, Chicago). Results: Heat conduction values of flowable composites were found different each others. Results for GC Gradia Direct and Grandio Flow were significantly different from 3M ESPE and SDI( $p<0.05$ ). But result for 3MESPE was and nonsignificant different from SDI ( $p>0.005$ ). Conclusions: Within the limits of this study, flowable composites transmit the heat. But Gradia Direct is the most conductive and SDI is the least conductive among the flowable composites used in. Clinical relevance: Post filling process, especially composites are used hypersensitivity is one of the most annoying complications. Heat conductivity of dental filling materials may be the reason. Despite the wide application of these dental materials, the underlying mechanisms are far from clear. Therefore, there is a need to better understand heat conductivity process of filling materials in tooth.

#### PP 18

Category: Biomaterials

#### INHIBITION OF CELL SURVIVAL BY DENTIN ADHESIVES AFTER DIRECT EXPOSURE IN VITRO

Safa TUNCER<sup>1</sup>, Mustafa DEMIRCI<sup>1</sup>, Helmut SCHWEIKL<sup>2</sup>, Mine ERGÜVEN<sup>3</sup>, Ayhan BILIR<sup>4</sup>, Aysun TUNCER<sup>5</sup>

<sup>1</sup>Department of Operative Dentistry, University of Istanbul, Faculty of Dentistry, Istanbul, Turkey

<sup>2</sup>Department of Operative Dentistry and Periodontology, University of Regensburg, Regensburg, Germany

<sup>3</sup>Department of Clinical Biochemistry, Yeni Yüzyıl University, Faculty of Medicine, Istanbul, Turkey

<sup>4</sup>Department of Histology and Embryology, Istanbul University, Faculty of Medicine, Istanbul, Turkey

<sup>5</sup>Department of Endodontics, Medipol University, Faculty of Dentistry, Istanbul, Turkey

Objectives: Dentin bonding agents individually are prone to be cytotoxic. The influence of dentin adhesive systems (Scotchbond Multi-Purpose, XP Bond, Xeno V, Clearfil Protect Bond, AdheSE) on cell survival was characterized after direct exposure using cell culture insert techniques. Materials and Methods: The primers and cured bonding parts were directly exposed to cells using cell culture inserts. Cell responses were examined in 3T3 mouse fibroblasts after 24 h exposure period by the estimation of total cell numbers (survival). Cells from exposed cultures and untreated controls were collected by trypsinisation, and cell numbers indicating cell survival were counted with a haemocytometer Results: Cell numbers were efficiently reduced by the primers of AdheSE, Protect

Bond, and Scotchbond Multi-Purpose as well as XP bond after direct exposure in a cell culture insert test device. AdheSE primer caused cell numbers about 9-fold lower compared to untreated controls after a 24 h exposure. The primer parts of the dentin adhesive systems caused significantly lower cell numbers compared with the bonding counterparts. Conclusion: Unpolymerized primers of dentin adhesives were more cytotoxic than polymerized bonding counterparts in cell culture insert test systems allowing for direct exposure. Clinical Relevance: If dentin adhesives are planned to use in deep cavities clinicians should consider the application of a biocompatible lining agent.

#### PP 19

Category: Biomaterials

#### IN-VITRO STUDY OF ABSOLUTE MARGINAL DISCREPANCY IN IMPLANT-SUPPORTED ALL-CERAMIC RESTORATIONS.

Alberto FERREIROA<sup>1</sup>, Francisco MARTÍNEZ RUS<sup>1</sup>, Arelhys VALVERDE<sup>1</sup>, Beatriz GIMÉNEZ<sup>1</sup>, Guillermo PRADÍES<sup>1</sup>

<sup>1</sup>Buccofacial Prosthesis, Faculty of Odontology, University Complutense of Madrid, Madrid, Spain

Objectives: Evaluate the marginal adaptation of glass-ceramic and zirconia-based ceramic crowns on implanted-supported zirconia and titanium abutments. Materials and Methods: Using the CARES CAD/CAM technology, two groups of implant abutments were fabricated for the Straumann implant system with the same STL file (n=30): zirconia abutments (Z), and titanium abutments (T). Standardized maxillary central incisor all-ceramic crowns (n=10) were fabricated for the abutments using the following systems: heat-pressable lithium disilicate glass-ceramic (Zp and Tp), machinable lithium disilicate glass-ceramic (Zc and Tc), and zirconia based-ceramic (Zz and Tz). The crowns were cemented to the implant abutments with a resin luting agent. The absolute marginal discrepancy of the restorations was measured after cementation by scanning electronic microscopy (SEM) at 40 points along the circumferential margin. Data were analyzed using two-way ANOVA and Tukey post hoc tests ( $\alpha=.05$ ). Results: The mean marginal openings were  $148.37\pm 30.19$   $\mu\text{m}$  for group Tc,  $127.45\pm 14.71$   $\mu\text{m}$  for group Tp,  $101.86\pm 26.44$   $\mu\text{m}$  for group Tz,  $190.57\pm 16.38$   $\mu\text{m}$  for group Zc,  $88.23\pm 14.03$   $\mu\text{m}$  for group Zp, and  $95.75\pm 20.35$   $\mu\text{m}$  for group Zz. Significant differences were found among the tested groups ( $p=.0001$ ). Conclusions: The absolute marginal discrepancy of the single-tooth implant-supported all-

ceramic crowns was influenced by the all-ceramic crown system. Zirconia abutments restored with heat-pressable lithium disilicate exhibited the highest marginal accuracy. Clinical relevance: The marginal gap openings of tested implant-supported all-ceramic crowns were not all within the clinically acceptable limit (120  $\mu\text{m}$ ).

#### PP 20

Category: Biomaterials

#### WEAR BEHAVIOR OF DENTAL MATERIALS AND TOOTH STRUCTURES BY ZIRCONIA. A SYSTEMATIC REVIEW

Takuro TAKEICHI<sup>1</sup>, Christoph ZBAEREN<sup>2</sup>, Markus BLATZ<sup>2</sup>

<sup>1</sup>Fixed Prosthodontics, School of Dentistry, Aichi Gakuin University, Nagoya, Aichi, Japan

<sup>2</sup>Preventive and Restorative Sciences, Robert Schattner Center, University of Pennsylvania School of Dental Medicine, Philadelphia, Pennsylvania, USA

Objectives: Particularly in esthetic areas, patients are no longer satisfied with prostheses that restore function but fail to mimic their natural appearance. Increasing demand for esthetic restorations has driven the development of all-ceramic restorations with zirconia as the core material. Most recently, however, zirconia is used as the only material, fabricating a monolithic full-contour zirconia crown that eliminates any porcelain and, therefore, veneer chipping. The amount of wear of materials opposing the full-contour zirconia has come into question. The aim of this study was to systematically review the existing literature on in vitro assessments of antagonist wear of zirconia. Materials and methods: Research was conducted on PubMed and MEDLINE using key words “dental AND zirconia AND wear” to identify literature in English referring to *in vitro* studies published from 1950 through 2011. Results: This search provided 33 matches resulting in 5 studies. These studies concluded when opposing zirconia specimens with rough surfaces, human enamel exhibited high volume loss and high vertical loss. In contrast, when opposing polished zirconia specimens, human enamel, ceramics and artificial teeth exhibited low volume loss and low vertical loss. Conclusions: Based on the small number of studies, full-contour zirconia exhibits several benefits in terms of wear behavior of antagonistic dental materials and tooth structures. Additional well-designed *in vitro* and clinical studies are required to further investigate the wear behavior of other dental materials and tooth structures. Clinical Relevance: Limited studies suggested that polished zirconia may exhibit less wear than other dental materials and tooth structures.

**PP 21**

Category: Biomaterials

**EFFECT ON BOND STRENGTH OF DIFFERENT CONDITIONING METHODS OF ZIRCONIA-BASED CERAMICS**Simone Gonçalves MORETTO<sup>1</sup>, Patricia Moreira FREITAS<sup>1</sup>, Marina Stella BELLO-SILVA<sup>1</sup>, Paulo Francisco CESAR<sup>2</sup>, Carlos De Paula EDUARDO<sup>1</sup><sup>1</sup>Restorative Dentistry, University of São Paulo, São Paulo, Brazil<sup>2</sup>ResDental Materials, University of São Paulo, São Paulo, Brazil

Conventional conditioning methods for ceramics have been proven to be ineffective or insufficient in conditioning glass-infiltrated ceramics as they are unable to produce a selective etching of the ceramic surface. Objectives: To evaluate the effect of different conditioning methods of an alumina-based zirconia-reinforced glass infiltrated ceramic (ICZ) on the adhesive bond strength to a resin cement. Materials and Methods: Sixteen square-shaped blocks (5×5×4 mm) of ICZ obtained from CAD/CAM blocks were submitted to airborne particle abrasion with 110 μm Al<sub>2</sub>O<sub>3</sub> (APA) and randomly divided into 4 groups (n=4): G1 – APA (no further treatment); G2 (ROC) – Tribochemical silica-coating (Rocatec Plus, 3M ESPE); G3 (EY200) – Er:YAG 200 mJ, 15 Hz; G4 (EY250) – Er:YAG 250 mJ, 10 Hz. Composite resin blocks were bonded to the ceramic blocks with resin cement and submitted to microtensile bond strength (μTBS) test. Results: ANOVA (α=5%) showed that EY200 showed the highest μTBS values but they were not statistically different compared to ROC. The groups APA and ER250 showed lower μTBS values and proved to be less effective in conditioning this type of ceramic. Conclusion: Surface conditioning of ICZ with Er:YAG laser 200 mJ, 15 Hz should be considered an innovative alternative for improving the bond strength to the resin cement since it resulted in similar bond strength values compared to the tribochemical silica treatment. Clinical Relevance: Laser conditioning can preserve the marginal integrity of the ceramic restoration resulting in a better adaptation during adhesive cementation.

**PP 22**

Category: Biomaterials

**COLOR STABILITY OF ALL-CERAMICS AFTER TREATED WITH DIFFERENT SURFACE MATERIALS**Pelin MOTRO<sup>1</sup>, Pınar KURSOGLU<sup>1</sup>, Ender KAZAZOGLU<sup>1</sup><sup>1</sup>Prosthodontics Department, Yeditepe University, Istanbul, Turkey

Objectives: The purpose was to determine the color stability of all-ceramics against coffee after different surface treatments. Material and methods: Sixty discs (e.max ceram) were fabricated and glazed with their specific glaze materials according to the manufacturer's specifications and were randomly assigned to 6 groups (n=10). Group A, control, was not subjected to any procedure. All the other groups were abraded with diamond bur 10.000 rpm to imitate clinical application. Group B was reglazed, Group C was polished with Shofu polishing kit, Group D was polished with Ultradent polishing paste and Jiffy goat brush, Group E was polished with Bredent materials. Each instrument applied for 20 seconds. Group F was left without any treatment after abrasion with bur. The color parameters (L\*, a\*, b\*) of each specimen was measured with a spectrophotometer prior to and at the end of experiment (72hours at 37°C in a coffee solution after washed with tap water and dried with tissue paper). Color changes (ΔE) were calculated. Data were analyzed by Oneway ANOVA and Tukey HDS test. Results: Mean ΔE value of Group F (2,3) were significantly higher than the other groups. Group A (0,6) and B (0,6) were significantly lower than the other groups. There is no significant differences between Groups C,D and E (p<0.01). Conclusion: Group F, the roughest surface, showed the highest color change values which is clinically unacceptable. Clinical Relevance: Polishing or glazing should not be discarded after adjustments in order not to let any discoloration.

**PP 23**

Category: Clinical cases

**SEVERLY STAINED TEETH: A NEW MASKING TECHNIQUE WITH FELDESPATHIC VENEERS**Alberto ALBERO-MONTEAGUDO<sup>1</sup>, Vicente FAUS-MATOSSES<sup>1</sup>, María DOLZ-SOLSONA<sup>1</sup>, Nicolás COLLADO-CASTELLANO<sup>1</sup>, Vicente FAUS-LLÁCER<sup>1</sup><sup>1</sup>Restorative and Endodontics, Valencia University, Valencia, Spain

Authors: Alberto Albero-Monteagudo, Vicente Faus-Matoses, María Dolz-Solsona, Nicolás Collado-Castellanos, Vicente J. Faus-Llácser Objective: Masking tetracycline staining type IV located in the gingival third of the tooth preserving maximum healthy tooth structure with no-core feldspathic veneers. Materials and methods: After orthodontic treatment, impressions were taken for studying the case in experimental models, and then a mock-up was performed. Next, internal bevel gingivectomy was carried out in order to achieve a harmonious gingival scallop and to reduce gummy smile. Two months later, a clinical bleaching with Norblanc Office (Laboratorios

Normon, S.A. Madrid, España) activated with plasma light was realized and reinforced for 6 weeks with Whitening Polanight 16% carbamide peroxide (SDI Limited, Bayswater Victoria, Australia) at home. After the conservative preparation an immediate dentine sealing was carried out and final impressions were taken. The laboratory drew up the veneers with parallel stratification masking technique. Cementation of veneers was made with Variolink Veneer High Value +3 (Ivoclar Vivadent), after acid etching and adhesive application of Prime and Bond NT. Using modified Ryge criteria color satisfaction, marginal adaptation and cavosurface marginal discolouration were evaluated one week, one month and three months after the restorations were placed. Results: The results obtained by the modified Ryge test were favorable. Conclusions: Masking severe tetracycline stains with a conservative preparation for coreless feldspathic veneers is possible using “the parallel stratification masking technique” and an appropriate cement. Clinical relevance: Severe tetracycline stains can be masked using a very conservative preparation for feldspathic veneers without core

#### PP 24

Category: Clinical cases

#### NEW CONSERVATIVE MANAGEMENT FOR THE ESTHETIC REHABILITATION OF THE ANTERIOR DENTITION.

Neus ORTIZ-VERCHER<sup>1</sup>, Vicente FAUS-MATOSES<sup>1</sup>, Yasmine EL-MESSAOUDI<sup>1</sup>, Ana SALOM-FONTANA<sup>1</sup>, Vicente J FAUS-LLÁCER<sup>1</sup>, Teresa ALEGRE-DOMINGO<sup>1</sup>

<sup>1</sup>Medicine and Dental School, Valencia University, Valencia, Spain

Introduction and objective: Nowadays, thanks to the improvement of the adhesive techniques, the indications for full crowns in patients with severe dental erosion came down, carrying out more conservative treatments. The application of the Dahl principle allows the creation of interdental space for the dental restorative material in the palatal aspect, without having to remove healthy tooth structure and also the restoration of the buccal aspect with prep-less ceramic veneers. Materials and methods: A case of complete oral rehabilitation in a patient of 42 years old with large palatal erosion and loss of vertical dimension by bruxism was carried out. Clinical examination shows palatal erosion in the upper anterior teeth IV grade as related in ACE classification and absence of posterior teeth 2.4, 3.6 and 3.7. The treatment plan was: - Replacement of posterior absences with a fixed partial denture on implants, and ceramic onlays and overlays on eroded teeth. Raising the vertical dimension fulfilling the Dahl principle. - Restoration of the palatal aspect of the anterior teeth with

composite - Restoration of the buccal aspect of both, upper and lower incisors with prep-less feldspathic veneers. Results: It is able to achieve a full mouth rehabilitation by minimally invasive grinding and adhesive techniques applying the Dahl principle. Conclusions: The new adhesive techniques allow successful results in cases of full oral rehabilitations without having to remove healthy tooth structure. Clinical relevance: This clinical approach describes full mouth rehabilitation of patients with severe dental erosion achieving maximum preservation of tooth structure

Rehabilitation Prepress Veneers

#### PP 25

Category: Clinical cases

#### DIASTEMATA CLOSURE WITH DIRECT COMPOSITE RESIN VENEERS: FIVE CASE REPORTS

Emrullah BAŞI<sup>1</sup>, Mehmet DALLI<sup>1</sup>, Bayram İNCE<sup>1</sup>, Cafer ŞAHBA<sup>1</sup>, Sedat GÜVEN<sup>2</sup>, Mehmet ÜNAL<sup>3</sup>

<sup>1</sup>Operative Dentistry, Faculty of Dentistry, University of Dicle, Diyarbakır, Turkey

<sup>2</sup>Prosthetic Dentistry, Faculty of Dentistry, University of Dicle, Diyarbakır, Turkey

<sup>3</sup>Pedodontics, Faculty of Dentistry, University of Dicle, Diyarbakır, Turkey

Introduction Diastemata is a space between two teeth. Diastematas can be treated with conventional methods include periodontal, surgical, orthodontic and prosthetic procedures. Composite laminate veneers may be an alternative method for these patients. In these clinical case reports treatment of five patients that have diastematas between anterior teeth of both maxilla and mandible with composite veneers was presented. Case Reports Five cases complaining from esthetic problems because of diastematas between anterior teeth of maxilla and mandible applied Department of Operative Dentistry, University of Dicle. The periodontal health status of the patients were within the accepted limitations, and the teeth were without caries. After patients were informed about treatment choices which can overcome their complaints, with their acceptance diastematas were decided to be closed with composite resin veneers. Discussion Presence of diastemata causes aesthetic problems especially in adolescents. Usually prosthetic and conservative methods are used for diastemata treatments. As a conservative method closure of diastematas with resin veneers has many different advantages. The advantages of the direct laminate technique are its low cost, that the restoration may be evaluated as a reversible treatment procedure, and that the restoration may be repaired intraorally. The direct composite laminate tech-

nique has become more effective because of improvements in adhesive dentistry. Conclusion This clinical report describes a direct composite laminate technique for restoration of the anterior teeth of five patients with diastemata. These restorations are conservative and provide a one-chair time (one-visit) esthetic treatment alternative for anterior teeth.

#### PP 26

Category: Clinical cases

#### COMPARISON OF THE MICROABRASION WITH A COMBINED APPROACH FOR AESTHETIC MANAGEMENT OF FLUOROSSED TEETH

Esra UZER ÇELİK<sup>1</sup>, Gül YILDIZ<sup>1</sup>, Başak YAZKAN<sup>1</sup>

<sup>1</sup>Restorative Dentistry, Faculty of Dentistry, Suleyman Demirel University, Isparta, Turkey

Objectives: The aim of this study was to compare the efficacy of the microabrasion with a combined approach (microabrasion+in-office bleaching therapy) in the bleaching of fluorosed teeth. Materials and Methods: Ten patients with 1–7 scored fluorosed maxillary and mandibular incisors and canines according to the Tooth Surface Index of Fluorosis (TSIF) were first treated with microabrasion technique (Opalustre, Ultradent, USA), and after 24 hours an in-office bleaching technique (Opalescence Boost PF, Ultradent, USA) was performed (n=118). Standardized images were taken from the teeth with a digital camera before treatment and one day after microabrasion and in-office bleaching therapy. Two calibrated and blinded examiners evaluated the images in terms of improvement in appearance, changes in brown and opaque white stains using the visual analogue scales ranging from 1 to 7. The data were analyzed using two-sample paired Wilcoxon Signed Rank and Mann Whitney U tests (p<0.05). Results: Median (IQR) ratings of microabrasion and combined bleaching therapy were; 3.0 (2.0) and 6.0 (2.0) for improvement in appearance, 5.0 (2.0) and 7.0 (1.0) for brown stain removal, 4.0 (2.0) and 5.0 (1.0) for opaque stain removal, respectively. Microabrasion revealed significantly lower scores than the combined bleaching therapy in terms of all evaluated criteria (p<0.001). Conclusions: The combined bleaching therapy including microabrasion and in-office bleaching was more effective than the microabrasion in the aesthetic management of fluorosed teeth. Clinical Relevance: Although microabrasion improves the appearance of teeth with brown or opaque stains, the combination of microabrasion and in-office bleaching technique results in better aesthetics.

#### PP 27

Category: Clinical cases

#### A PROXIMAL FASIO-LINGUAL PREPARATION IN A POSTERIOR TOOTH WITH SONICSYS MICRO: A CASE REPORT

Uzay KOÇ<sup>1</sup>

<sup>1</sup>Conservative Dentistry, Hacettepe University, Ankara, Turkey

Objectives: Innovations of sonic system have permitted the clinician al the use of minimally invasive restorative philosophy in association with adhesive material development. Materials and Methods: A 45 years-old female patient attended the Conservative Dental Clinic of University of Hacettepe, Ankara, Turkey. The carious lesion was under the contact point of distal proximal surface of tooth 27. There was a visible discoloration associated with a slight cavitation. On x-ray examinations, the radiolucency was limited to the outer one-third of dentin. The lesion is was directly inaccessible. It was decided to use sonic system (AirsScaler 2000 N & SonicSys Micro, KaV6). The preparation tips operated with diamond coated working side and an uncoated non-working side pointing toward the adjacent tooth. Dentinal caries was excavated by using the hemispherical-tips with the lateral movements. Enamel walls were beveled with torpedo-shaped micro-tip. The cavity was conditioned with 37% phosphoric acid gel. Dentin adhesive (XP Bond, Dentsplay) was applied and cured (LED, SDI). This small cavity was restored with a flowable composite resin material (Premise, Kerr). Polishing was important to achieve a smooth, self-cleaning surface. An appropriate preventive care was applied (APF gel, Deepak) and home care was advised. Results: Three and 6 months after the restorative procedure, patient presented her restored tooth in good conditions. Conclusions: Improvements in technology, products, and procedural changes have allowed dentist to treat patients better, faster, with less trauma. Clinical Relevance: SonicSys Micro permits minimally invasive preparation without any risk of damaging the adjacent teeth.

#### PP 28

Category: Clinical cases

#### DIASTEMA TREATMENT WITH NANO-PARTICLE FILLED COMPOSITE RESIN

Enis AHMEDI<sup>1</sup>, Blerim KAMBERI<sup>2</sup>, Kujtim SHALA<sup>1</sup>, Jehona AHMEDI<sup>3</sup>, Edmond DRAGUSHA<sup>2</sup>, Ferit KOÇANI<sup>2</sup>

<sup>1</sup> Prosthodontics, University Dentistry Clinical Center of Kosova, Prishtina, Kosovo

<sup>2</sup> Dental Pathology and Endodontics, University Dentistry Clinical Center of Kosova, Prishtina, Kosovo

<sup>3</sup> Oral Surgery, University Dentistry Clinical Center of Kosova, Prishtina, Kosovo

**Objectives** This study was designed to assess the performance of a nanocomposite, in diastema treatment using adhesive techniques. **Material and Methods** Three patients aged 26, 30 and 35 diagnosed with anterior diastema were presented. Treatment option due to financial constraints and personal request were chosen to be adhesive technique. Tooth surface cleaning was performed using “Becht” brushes. Enamel conditioning was performed with Scotchbond etch for 5 seconds without grinding, followed by self etch agent Adper™ Prompt™ L-Pop™ 3M ESPE, layered in two layers (15 seconds each with agitation) intermediary boosted with air boost, and polymerized for 10 seconds. Free-hand technique modeling of Filtek™ Supreme Plus 3M ESPE, was performed, and then polished with Softlex™ polishing discs. Assessments after three years, were based on clinical assessments of leakage of filling after tooth impregnation with caries marker (Voco), and the border integrity with surface smoothness explored by dental explorer, performed by two calibrated examiners. Pictures with digital camera were taken at pre and post treatment, and after 3 years. **Results** Diastema closure continued to display good clinical parameters at 3 year post-op observation (good marginal integrity, color stability and high luster throughout the study). The clinical steps and technical details of the restorations conducted are compliant with current recommendations from authors in recent literature. **Conclusion** Using adhesive technique and high quality materials is the best approach for achieving long-term success in closing diastemas. These restorations are practically invisible and blend harmoniously with the natural dentition. **Clinical relevance** Minimal invasive technique represents treatment modality that is functionally acceptable, esthetically pleasing and cost-effective.

#### PP 29

Category: Clinical cases

BIOMIMETIC RESTORATIVE DENTISTRY: CLINICAL POSSIBILITIES WITH A RECENTLY DEVELOPED SHORT FIBRE-REINFORCED COMPOSITE.

Filip KEULEMANS<sup>1</sup>, Lippo LASSILA<sup>2</sup>, Pekka VALLITTU<sup>2</sup>, Roeland DE MOOR<sup>1</sup>

<sup>1</sup> Operative Dentistry and Endodontology, Ghent University, Ghent, Belgium

<sup>2</sup> Biomaterials Science, University of Turku, Turku, Finland

**Objectives:** Contemporary resin composites used in large restorations still demonstrate limitations due to their limited mechanical properties. Resin composite reinforced with

short randomly oriented glass fibres exhibit improved mechanical properties regarding flexural strength, fracture toughness and polymerisation shrinkage in comparison to particulate filler composite (PFC). Therefore short fibre-reinforced composite (SFRC) can be beneficial in stress-bearing applications. The aim of this case series is to assess the usefulness of SFRC within different restorative indications. **Materials and Methods:** Four patients presenting different restorative problems were selected. Direct composite restorations were used in each situation: a cusp-replacement, a post-and-core, an endocrown and a fibre-reinforced composite resin-bonded fixed dental prosthesis. For all indications biomimetic principles were applied i.e. dentin was replaced by SFRC that was entirely embedded with enamel-replacing PFC. **Results:** Handling and aesthetic characteristics of SFRC proved to be appropriate for application in biomimetic restorations. SFRC easily adapted to the dentine by additional use of a small amount of low viscosity PFC and did not interfere with the aesthetic outcome of the restorations. The obtained clinical results were highly assessed by each patient. No restoration failed after six months of function. **Conclusion:** It seems reasonable to use SFRC in a biomimetic treatment approach for stress-bearing applications. The benefits of SFRC-based biomimetic direct composite restorations needs to be investigated in a properly designed long-term random clinical trial. **Clinical Relevance:** The use of SFRC as dentin replacement within a biomimetic treatment approach provides a rationale for extended use of direct resin composite restorations in stress-bearing applications.

#### PP 30

Category: Clinical cases

THE USE OF LASER DOPPLER FLOWMETRY IN DIFFICULT CLINICAL APPLICATIONS

Herman J.J. ROEYKENS<sup>1</sup>, Roeland J.G. DE MOOR<sup>1</sup>

<sup>1</sup> Department of Operative Dentistry and Endodontology, Ghent University, Ghent, Belgium

**Objectives:** The aim of this poster is to demonstrate the accuracy of Laser Doppler Flowmetry (LDF) for cases with confusing sensibility tests and in technically complicated situations for assessment of accurate pulp diagnosis. **Materials and methods:** LDF evaluation was performed using a moorVMS-LDF2 (Moor Instr. Ltd) (785 nm, 1.0 mW) with 2xVP5a (90° right angle) probes. (Statistical analysis by moorVMS-PC software) **Case 1.** Complicated dental trauma after a horse

accident: a 13 years-old girl wearing orthodontic appliances with an alveolar bone fracture in the mandible, endodontically treated right incisors and absence of sensibility signs in the left incisors. Case 2. Luxation of a left central upper incisor after a fall of a staircase in a 40 year-old female and presenting with a grey discoloration of this tooth. Case 3. Extrusion of both central upper incisors, luxation of mandibular and maxillary front teeth. Results: Endodontic treatment was postponed in case 1 and 2 but advised in only one tooth in case 3 (right central incisor). Despite persisting confusing sensibility test vascular blood flow was recorded even after six months in case 1 and 3 and after one year in case 2. Conclusion: In cases with orthodontic appliances or splints on the vestibular side, a palatal approach with a green rubber splint and bended probes is helpful for the assessment of LDF. Clinical relevance: LDF has proven to be an accurate technology for the assessment of tooth vitality and hence will help to avoid endodontic treatment where sensibility tests may indicate the opposite.

### PP 31

Category: Clinical cases

#### NEW THIN CORE FOR HIGH ESTHETIC PREPLESS PORCELAIN VENEERS

María HERNÁNDEZ-MASET<sup>1</sup>, Vicente FAUS-MATOSSES<sup>1</sup>, Ana SALOM-FONTANA<sup>1</sup>, Sophie ROMÁN-RICHÓN<sup>1</sup>, Vicente FAUS-LLÁCER<sup>1</sup>

<sup>1</sup> Master in Restorative Dentistry and Endodontics, Medicine and Dental School University of Valencia, Valencia, Spain

Introduction and objective: Prove the benefits of a new lithium disilicate core for aesthetic and conservative restorations. This share at the same time the fracture resistance given by the core veneers and the aesthetic and conservative advantages of prep-less veneers Material and methods: Healthy 32 year old woman with direct composite restorations in the maxillary anterior teeth and incisal wear in mandibular anterior teeth whose desire was to improve the dental anatomy, size and a color changing. Proposed treatment plan: - Gingivectomy from 1.5 to 2.5 - Removal of old anterior and posterior direct composite restorations (1.2 to 2.2 // 3.6, 3.7, 4.6) - Placement of 20 e.max veneers with impulse O.1 core Results: Now it is possible to use a high fracture resistant restoration with core having also the benefits of a high conservative prep-less veneer. The patient was satisfied with her new smile which could reach without preparing her teeth Conclusions: e.max veneers with

impulse O1 core allows successful aesthetic results in cases of high aesthetic demand and prep-less restorations.

### PP 32

Category: Clinical cases

#### TOOTH-SUPPORTED FLAP

Maria Del Mar GARCIA HURTADO<sup>1</sup>, Santiago GONZALEZ LOPEZ<sup>1</sup>, Rosario CAPILLA MOLINA<sup>1</sup>, Carmez GONZALEZ<sup>1</sup>, Ana Belen MUÑOZ PUERTO<sup>1</sup>, Eva ROSEL GALLARDO<sup>1</sup>, Purificacion GONZALEZ VILAFRANCA<sup>2</sup>

<sup>1</sup> Aesthetic Multidisciplinary Master, School of Dentistry of Granada, Granada, Spain

<sup>2</sup> Department of Dentistry, School of Dentistry of Granada, Granada, Spain

Objective The objective of this case report is to describe the novel management of a lateral incisor with palato-radicular groove. Material and methods A 30-year-old male with a history of repeated abscesses associated with maxillary left lateral incisor and a 9-mm periodontal pocket was diagnosed with a palato-radicular groove. The tooth required extraction, and it was necessary to design a technique to avoid gingival collapse. We adopted a palatal approach, cutting the tooth below the enamel-cement line, extracting the tooth, and raising the vestibular flap to which the dental crown was joined. Guided bone regeneration technique was then applied and the flap was repositioned, attaching the crown to adjacent teeth with glass fibre. Results and discussion By means of this approach, in which the dental crown remained joined to the vestibular flap, it was possible to use adhesive techniques with glass-fibre mesh to attach it to neighbouring teeth, thereby preserving the aesthetics of periodontal tissues. Conclusion The tooth-supported flap proved useful to avoid the collapse of periodontal tissues. Clinical Relevance: The tooth-supported flap avoids gingival recession and maintains the gingival architecture.

### PP 33

Category: Clinical cases

#### UPPER ARCH REHABILITATION WITH A MODIFIED TECHNIQUE OF THE “TRHEE STEPS TECHNIQUE”

Ana SALOM-FONTANA<sup>1</sup>, Vicente FAUS-MATOSSES<sup>1</sup>, María HERNÁNDEZ-MASET<sup>1</sup>, Teresa ALEGRE-DOMINGO<sup>1</sup>, Vicente FAUS-LLÁCER<sup>1</sup>

<sup>1</sup> Master in Restorative Dentistry and Endodontics, Medicine and Dental School University of Valencia, Valencia, Spain

**Introduction and objectives:** Achieve excellent esthetics and function while retaining maximum remaining tooth structure with a modified technique of the “Three steps Technique” which is a new conservative way to rehabilitate the eroded teeth in young patients. **Material and methods:** It is shown a case of a 40 year old female presenting dental erosion in the upper palatal anterior sector, she was treated with implants in the first and second sector. Her wish was to change her smile. The treatment plan was: • Replace old restorations • Replace the absent posterior teeth with a fixed partial denture on implants (2.4, 1.4, 1.5 and 1.6) • Restoration of the buccal aspect of upper incisors and canines with prep-less feldspathic veneers and direct composite restorations in the palatal aspect, retaining maximum dental structure. **Results:** It was possible to achieve a successful rehabilitation of the upper arch by modifying the technique of the “Three steps technique”. **Conclusion and clinical relevance:** It is possible to achieve excellent esthetics and function while retaining maximum tooth structure with a modified technique of the “Three steps technique”.

#### PP 34

Category: Clinical cases

#### TREATMENT OF DISCOLORIZATION IN THE ADULT DENTITION: REPORT OF FOUR CASES

Evrım DALKILIÇ<sup>1</sup>, Özgür GENÇ<sup>2</sup>, Işıl TÜRK<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Yüzüncüyıl University Faculty of Dentistry, Van, Turkey

<sup>2</sup> Endodontics, Yüzüncüyıl University Faculty of Dentistry, Van, Turkey

**Objective:** Dental bleaching offers a conservative, simplified, and low cost approach to change the color of discolored teeth. Patients who present with discolored teeth represent a significant restorative challenge. These case reports describes four clinical cases in which two different types of bleaching techniques were used to improve the appearance of the patient's discolored anterior teeth. **Material-methods:** Firstly, teeth colours were determined using a porcelain scale and was photographed. The maxillary teeth (from 13 to 23) of 4 patients were bleached with hydrogen peroxide gel in a single visit treatment procedure. Two of the patients' teeth were treated with Opalescence Boost (Ultradent Products, Inc, South Jordan, USA) and Supra White (GDF- Private Label Chemistry, Germany) was used for the others. Both of the brands were used according to the manufacturers' instructions. After the procedure, teeth colour was determined and photographed again. **Results:** There was a significant whitening in the teeth of four patient. Both of the bleaching agents provided

satisfactory whitening. Acceptable recolorization was detected after 3 months in all of the patients. **Conclusion:** Opalescence Boost and Supra White were able to bleach the patients' teeth with a perceptible colour change noticeable by the patients. Both of the materials' costs are reasonable and were easy to use. **Clinical relevance** Nowadays tooth bleaching has grown in importance because of a growing interest of the patients and consumers of whitening products. This simple, conservative, and economic treatment modality may tremendously contribute to the quality of life of these patients.

#### PP 35

Category: Clinical cases

#### MULTIDISCIPLINAR MANAGEMENT OF TRAUMATIZED MAXILLARY CENTRAL INCISORS

Özge ÖZMEKİK<sup>1</sup>, Sıla YARDIMCI<sup>1</sup>, Evren ÖZTAŞ<sup>2</sup>, Korkud DEMİREL<sup>1</sup>, Işın ULUKAPI<sup>1</sup>, Haşmet ULUKAPI<sup>3</sup>

<sup>1</sup>Pedodontics, Istanbul University, Istanbul, Turkey

<sup>2</sup>Orthodontics, Istanbul University, Istanbul, Turkey

<sup>3</sup>Restorative Dentistry, Istanbul University, Istanbul, Turkey

**Objective:** Dental traumas are causing root and crown fractures in particularly at school age children and adolescents. Restorations of the tooth fracture below the gingival margin or alveolar crest requires comprehensive treatment plan. If remaining root portion is thought to be enough to support a definitive restoration, surgical crown lengthening and/or orthodontic forced eruption may be suitable approach after endodontic treatment. Surgical crown lengthening may reconstitute spontaneous positional changes of the free gingival margin but to reconstitute biological width due to passive eruption it is needed for a time period. Orthodontic forced eruption also may be performed to reestablishment of biological width for placement of the restorative margins. **MATERIAL AND METHODS:** This case report presents a patient with cervical horizontal crown fracture extending subgingivally of permanent maxillary central incisors after trauma. After the endodontic treatment, the patient was treated using the combination periodontal surgery (crown lengthening), orthodontic forced eruption, cast restoration and esthetic crown. **RESULTS:** The 1-year follow-up showed good stability of the restorations and good periodontal health. **CONCLUSIONS:** Dental trauma cases involving teeth with fractures extending subgingivally could benefit from multidisciplinary approaches, with good results. **CLINICAL RELEVANCE:** Crown fracture of the maxillary central incisors must be evaluated from several points of

view, such as topography, tissues involved, quality and the quantity of the remaining tooth structures and the patient's age.

### PP 36

Category: Clinical cases

#### BILATERAL TALON CUSP: TWO CASE REPORTS

Nimet UNLU<sup>1</sup>, Sevgi SENER<sup>2</sup>, Guldane BOZDAG<sup>2</sup>, Özgür GONLUM<sup>1</sup>

<sup>1</sup>Restorative Dentistry, Selcuk University, Konya, Turkey

<sup>2</sup>Dentomaxillofacial Radiology, Selcuk University, Konya, Turkey

**Objective** The aim of this report to present two cases of talon cusp in permanent dentition. The clinical and radiographic findings of this anomaly and mode of treatment was presented and discussed with the literature. **MATERIAL and METHODS** Talon cusps were gradually reduced and florid gel was used as a desensitizing agent. Minimally restorative and orthodontic treatments were applied to teeth. **RESULTS** Aesthetic appearance was enhanced. Tounge irritation and occlusal interference was eliminated. **CONCLUSION** Talon cusp is a relatively rare dental abnormality that affected maxillary anterior teeth frequently. Talon cusp cause clinical problems including dental appearance, occlusal interference, attrition, periodontopathy, irritation of the tongue and malocclusion. **CLINICAL RELEVANCE** This anomalous structure is composed of normal enamel and dentine and either has varying extensions of pulp tissue inside it or is devoid of a pulp horn. Early diagnosis and management are important to avoid complications. Multidisciplinary and long-term management protocol is necessary for the treatment of talon cusp.

### PP 37

Category: Clinical cases

#### A MINIMAL INVASIVE TECHNIQUE COMBINED WITH RESTORATIVE AND ORTHODONTIC APPLICATIONS: A CASE REPORT

Ozgur KANIK<sup>1</sup>, Emre OZEL<sup>1</sup>

<sup>1</sup>Operative Dentistry, Private Practice, Kocaeli University, Kocaeli, Turkey

<sup>2</sup>Operative Dentistry, University of Kocaeli, Kocaeli, Turkey

**Objectives:** A 42-year old female patient with an esthetic complaint of the presence of a diastema between maxillary left central and lateral incisors, was referred to our clinic. During intraoral and model analysis examination, it was observed that it is not possible to treat the diastema by only restorative applications. Therefore, restorative treatment was decided

after clear aligner technique. This technique can straighten the teeth using a series of clear, custom, removable aligners. Each aligner moves the teeth just a little bit at a time until the patient eventually gets straight teeth. **Material & Method:** Two different trays were prepared after mock-up was performed from the maxillary gyps model. The patient used the soft tray and hard tray for 3 months, respectively. A resin composite (Clearfil Majesty Esthetic, Kuraray, Japan) and a fiber splint (EverStick Ortho, Stick Tech Ltd Oy, Finland) were used for the treatment procedure. **Results:** 6 months later, the gap between the teeth was decreased. The diastema was closed by using resin composite and teeth were fixed with a fiber splint in the palatal region. The patient was recalled for a follow-up examination after 18 months. **Conclusion:** This combined treatment process provided successful and satisfactory results for teeth with extensive diastema. **Clinical Relevance:** Restorative treatment combined with simple orthodontic application is an effective appliance to obtain an esthetic view due to its low cost and less time consumption.

### PP 38

Category: Clinical cases

#### DENTAL BUR ASPIRATION: A CASE REPORT

Ertan ERTAŞ<sup>1</sup>, Ahmet BAŞOĞLU<sup>2</sup>, Murat YENİSEY<sup>3</sup>, Ebru ÖZSEZER DEMİRYÜREK<sup>4</sup>, Nihan KULACAOĞLU GÖNÜLÖL<sup>5</sup>, Uğur AYDIN<sup>5</sup>

<sup>1</sup> Restorative Dentistry, Ondokuz Mayıs University, Samsun, Turkey

<sup>2</sup> Thoracic Surgery, Ondokuz Mayıs University, Samsun, Turkey

<sup>3</sup> Prostodontics, Ondokuz Mayıs University, Samsun, Turkey

<sup>4</sup> Endodontics, Ondokuz Mayıs University, Samsun, Turkey

<sup>5</sup> Restorative Dentistry and Endodontics, Health Ministry, Dental Clinic, Samsun, Turkey

**Introduction** The report describes the aspiration of a dental bur into the distal part of the lung during dental cavity preparation and its surgical removal. **Material & method** A 46 year old male patient referred to the Ondokuz Mayıs University Faculty of Dentistry, Clinic of Restorative Dentistry and Endodontics to have teeth treated. The clinic supervisor's dental examination revealed limited mouth opening because of his joint disorder. The patient's medical history revealed an esophageal cancer followed by tuberculosis. The supervisor delivered the patient to a fourth year dental student to treat his carious upper left second premolar with dentin caries. During cavity preparation, the student reported that the bur had suddenly disappeared after detaching from the aerator hand piece. In case of possibility of ingestion or aspiration of the bur, the patient was

immediately sent to the emergency service of the Medical Faculty. The dental bur was located at the bottom of the left lung on plain radiographs. The bur was extracted under general anesthesia with thoracotomy by chest surgeon. The patient was discharged after an eight day recovery period. Result After thoracotomy, follow-up controls revealed no complication and the patient maintained in good health. Dental treatment of the patient was completed. Conclusion And Clinical Relevance Dentist should put all his efforts to reduce the risk of any such untoward outcomes. In this case, the importance of rubber dam application against foreign body aspiration is emphasized once again. In addition, using of an aerotor hand piece with push-button system may be useful for inexperienced dentist to attach the bur more proper.

### PP 39

Category: Clinical cases

#### ENDODONTIC TREATMENT OF TWO MANDIBULAR MOLARS WITH THREE ROOTS: TWO CASE REPORTS

Sheila TORRES AZNAR<sup>1</sup>, Vicente FAUS MATOSES<sup>1</sup>, Sophie ROMAN RICHON<sup>1</sup>, Teresa ALEGRE DOMINGO<sup>1</sup>, Jose Vicente FAUS LLACER<sup>1</sup>

<sup>1</sup> Master in Restorative Dentistry and Endodontic, Medicine and Dental School, University of Valencia, Valencia, Spain

Introduction and objectives: the major anatomical variant of mandibular molars is an additional third root, usually localized in a distolingual position: the radix entomolaris (RE). This additional root, first mentioned in the literature by Carabelli, can be found on the first, second and third mandibular molars, being the lowest incidence in second molars. Materials and methods: this report describes endodontic treatment of two mandibular left second and first molars with three roots and four and five canals respectively, in Caucasian patients. Diagnosis and treatment was carried out without any magnification in both cases and we used conventional digital radiographies in it. Results: both treatments have gone well and the patients have not had any further complaints up to now. We had not any problems while doing these treatments because we found the canals easily. Conclusions: although this macrostructure is rare in the Caucasian population, knowledge of its occurrence and its location are important. Anatomic variations can occur in any tooth. Clinical relevance: the presence of an RE has clinical implications in endodontic treatment. An accurate diagnosis of these supernumerary roots can avoid complications or a ‘missed canal’ during root canal treatment. A thorough inspection of the preoperative radiograph and a clinical inspection of the tooth

crown and the cervical morphology of the roots can facilitate the identification of an additional root. As far as the access was concerned, entering the root canal in the RE required a modification of the opening in a distolingual direction resulting in a trapezoidal cavity.

### PP 40

Category: Clinical cases

#### ODONTOGENIC KERATOCYST: A CASE REPORT

TUFAN CAN OKAY<sup>1</sup>, ŞEBNEM EROL<sup>1</sup>

<sup>1</sup>Restorative Dentistry and Endodontic, Gazi University, Ankara, Turkey

Objective: The odontogenic keratocyst is an epitelyumial developmental cyst of jaws. The cysts are most often seen in the mandibular ramus and angle. It can become quite large because of its potential for significant expansion, extension into adjacent tissues and rapid growth. Treatment modalities of odontogenic keratocyst are still controversial. The aim of this study was to evaluate odontogenic keratocyst treatment. Material and method: 51 years old male patient referred to Gazi University Faculty of Dentistry Department of Restorative Dentistry and Endodontic clinic with complaint of the swelling from his right mandibular premolar area. The patient recorded no pain. Mandibular teeth were carries free. It was determined impacted canine tooth and an expansive cystic lesion in radiographic examination. Before the surgical operation, endodontic treatment was performed to eleven teeth which associated with the lesion. Endodontic treatment was performed classical methods in six of eleven teeth. Rotary instruments were used during the other seven teeth endodontic treatment. Result: In 3-month and 6- month radiographic and clinical follow- up of the patient, no recurrence was detected and significant bone formation was observed. There wasn’t any difference in the clinical performance among the two endodontic treatments in this case after 3 or 6 months. Conclusion: There was no difference between rotary system and classic system. Clinical Relevance: It is possible to treat keratocyst by Endodontic and surgical intervention, no need to resection of mandible.

### PP 41

Category: Clinical cases

#### ONE-APPOINTMENT REHABILITATION WITH INDIRECT ADHESIVE TECHNIQUES OF AN ENDODONTICALLY TREATED MOLAR WITH SUBGINGIVAL MARGINS

Nicola SCOTTI<sup>1</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

**Objectives:** This report deals with one case of 2-year clinical follow-up of endodontically treated molars with subgingival distal margin that has been adhesively reconstructed in one-appointment. **MATERIALS AND METHODS:** The patient was a 24-years-old female with #46 endodontically treated one week before at the Department of Operative Dentistry and Endodontics of the University of Turin. After obtaining informed consent, the field was isolated through rubber dam and the distal carious lesion was removed with rotating burs. Because of the distal cervical margin was subgingivally placed once completed the cavity detersion, the rubber dam was removed and surgical crown lengthening was performed after implementation of local anesthesia. The rubber dam was immediately placed and the cavity preparation was completed. After the evaluation of the cavity wall thickness an indirect adhesive restoration with the coverage of both the distal cusps was chosen as definitive restoration. So a build up with resin composite was performed and the overlay preparation was completed. An impression with putty and light elastomer was taken and a gypsum model was done in order to immediately build a composite overlay that was immediately luted with a three-step adhesive procedure. One week later the surgical sutures were removed, the occlusion was checked and a Rx Bitewing was done. **RESULTS** Semidirect indirect techniques associated with crown lengthening procedures could be performed in a three-hours appointment with a compliant patient. **DISCUSSION** The 2-year recall evaluation was clinically conducted. The restoration resulted generally satisfactory. **CLINICAL RELEVANCE** The therapeutic approach described is an excellent restorative method with compliant patients.

#### PP 42

Category: Clinical cases

#### NON-CARIOUS CERVICAL LESIONS: A CASE REPORT Fehime ALKAN<sup>1</sup>, Şebnem EROL<sup>1</sup>

<sup>1</sup> Gazi University, Restorative Dentistry and Endodontics, Ankara, Turkey

**Objective:** Non-cariou cervical lesions are termed by the loss of dental hard tissue at the cemento-enamel junction. More recently it has been suggested that non-cariou cervical lesions have a multifactorial etiology, with contributions from occlusal loading, erosion and abrasions. The restoration of these lesions is specific, mostly because of the locations. This case report presents the treatment of abrasion and non-cariou cervical lesions. **Material & Method:** A 51-year-old male attended to Gazi University Faculty of Dentistry Department of Restorative Dentistry and Endodontics clinic with complaints of pain and sensitivity. The patient has wrong teeth brushing teeth,

acidic drink consuming patient and bruksizm habits. In intraoral examination non-cariou cervical lesions on 13, 23, 24, 34, 35, 44, 45, 46 and abrasion on 11, 12, 21, 22 were observed. Non-cariou cervical lesions were restored with composite resin and abrasions were restored with composite laminate veneer restorations. **Results:** In 1-, 3- and 6- months clinical follow-up all restorations were intact. The patient has no pain or sensitivity after 6 month follow-up. **Conclusion:** Composite resin restoration is a good choice for restoring abrasion and non-cariou cervical lesions. **Clinical relevance:** Non-cariou cervical lesions and abrasion can be well treated with composite resin restorations in a minimally invasive manner.

#### PP 43

Category: Clinical cases

#### ALTERATION OF TEETH FORMS BY USING ADHESIVE TECHNIQUE

Safa TUNCER<sup>1</sup>, Evren ÖZTAŞ<sup>2</sup>, Mustafa DEMIRCI<sup>1</sup>,  
Engin Fırat ÇAKAN<sup>1</sup>

<sup>1</sup> Department of Operative Dentistry, Istanbul University Faculty of Dentistry, Istanbul, Turkey

<sup>2</sup> Department of Orthodontics, Istanbul University Faculty of Dentistry, Istanbul, Turkey

**Objectives:** The aim of the study was to evaluate the success of reshaped laterals that facial surface and cusp angle was altered using two total etch dentin adhesives **Materials and Methods:** In 3 patient 6 lateral incisors were reshaped after orthodontic treatment. Preliminary procedures include cleaning the involved teeth, selecting the shade, and isolating the area. One bottle etch&rinse dentin adhesive (Xp Bond) was applied to one of both lateral incisor and another lateral was treated with a three step etch&rinse dentin adhesive (Scotchbond Multi-Purpose) according to manufacturers' instructions. A nano-hybrid composite (Ceramx-Duo) material was inserted to one of both lateral that applied one bottle dentin adhesives and another nano-filled composite (Filtek SupremeXT) was also inserted another lateral that applied three step dentin adhesive according to manufacturers' instruction. Then, the strip was closed during polymerization. The incisal embrasures of both laterals were corrected, and both restorations were finished by routine procedures. Occlusion was evaluated to assess centric contacts and functional movements. **Results:** After one years, there was not any color change, marginal discoloration, fracture and lots of restoration. According to oral health progress record patients have good periodontal health. Also, there was no difference between both laterals that reshaped with different dentin adhesives and composite materials. **Conclusion:** Reshaping anterior teeth with etches and rinse dentin bonding agents and composite materials is promising.

**Clinical Relevance:** Anterior teeth that have too open embrasures as a result of the shape or position of the teeth in arch may restore esthetically using adhesive technique.

#### PP 44

Category: Clinical cases

AN ALTERNATIVE BLEACHING APPROACH OF DISCOLORED EXTRACTED TOOTH FOR THE TREATMENT OF ANTERIOR EDENTULOUS SPACE  
Esra CAN<sup>1</sup>, Burcu DIKICI<sup>1</sup>, Nurhan GÜLER<sup>2</sup>

<sup>1</sup>Operative Dentistry, Dentistry, Yeditepe University, Istanbul, Turkey

<sup>2</sup>Maxillo-Facial Surgery, Dentistry, Istanbul, Turkey

**Objectives:** The present case described an extraoral, intra-coronal bleaching approach to enhance the esthetic quality of a severely discolored extracted tooth crown which was used as pontic for the treatment of an anterior edentulous space in conjunction with fiber reinforced composite. **Material-Method:** A severely discolored maxillary right incisor which was extracted due to the apical resorption, was cut 3 mm below the cemento-enamel junction. Then the apical part of the crown was restored with a resin modified glass ionomer (Vitramer, 3MESPE) and an endodontic access was prepared on the palatal side. For extraoral intracoronal bleaching, a 35% hydrogen peroxide (Opalescence Endo, Ultradent) gel was applied into the pulp chamber and the crown was temporarily sealed with glass ionomer cement and stored in distilled water at 37°C. After 2 days, bleaching agent was removed and the crown was sealed with cotton pellet and glass ionomer for 7 days at the same conditions. Then the bleached crown was used as pontic and attached on either side of the edentulous space with fiber reinforced composite. The clinical situation of the bleached pontic was confirmed by radiographic and photographic assessment after 1 and 12 months. **Conclusion:** Extraoral, intracoronal bleaching approach was found clinically successful and no discoloration was observed compared to the baseline situation at 12 months. **Clinical Relevance:** Extraoral intracoronal bleaching is a feasible and durable treatment option for enhancement of the esthetic quality of a severely discolored natural tooth crown which was used as pontic in conjunction with fiber.

#### PP 45

Category: Clinical cases

THE MODIFIED LAMINATE VENEER RESTORATIONS ON TRAUMATIC TEETH

Pinar CEVIK<sup>1</sup>, Filiz AYKENT<sup>1</sup>

<sup>1</sup>Prosthodontics, Selcuk University, Konya, Turkey

**Objective** Dental traumatic injuries are widespread among young patients. Coronal prosthetic restorations frequently need to prevent of fractures in endodontically treated teeth. As a result of access preparations for endodontic treatment, earlier reports describe post-like features called coronal posts in such clinical cases to enhance retention and resistance of laminate veneers. **MATERIALS AND METHODS** A 14-year-old boy was referred to prosthodontic clinic with a recent history of a traumatic injury on maxillary right central, lateral incisors and canine. A week after endodontic treatment of fractured teeth, a fiber reinforced composite post and composite core were built up for right canine prior to full crown preparation. The gutta-percha and endodontic cement of right central and lateral incisors were removed as a depth of 3 mm. A glass-ionomer cement placed into the canal to prevent discoloration and then laminate veneer preparations were completed. For the restoration of a single edentulous space in maxillary left lateral incisor, a full ceramic fixed bridge restoration was planned. **RESULT** One piece all ceramic coronal post and laminate veneer restorations were fabricated using an all ceramic system. A dual-polymerizing composite resin luting agent was used for the final cementation. **CONCLUSION** The restorations of anterior teeth with all ceramic system present esthetic challenge to the dentist. **CLINICAL RELEVANCE** One of the advantages of presented technique is using minimal invasive method and presenting esthetics for the fractured teeth. Patients must be informed about regular follow-up in such clinical cases.

#### PP 46

Category: Clinical cases

RESTORATION IN THE ANTERIOR TEETH WITH VITA VM®9 CERAMICS - REPORT CASES

Dana Andreea TUDOSE<sup>1</sup>, Comelia Florentina BICLESANU<sup>1</sup>, Anamaria FLORESCU<sup>1</sup>, Ana-Maria Pangica<sup>2</sup>, Gabriela DESPA<sup>3</sup>, Bogdan BLAJ<sup>4</sup>

<sup>1</sup> Restorative Odontotherapy, Titu Maiorescu University, Bucharest, Romania

<sup>2</sup> Endodontics, Titu Maiorescu University, Bucharest, Romania

<sup>3</sup> Prosthodontics, Titu Maiorescu University, Bucharest, Romania

<sup>4</sup> Periodontology, Titu Maiorescu University, Bucharest, Romania

**Objectives:** Selection of the appropriate materials requires the clinician to have a complete understanding of the biomechanical and optical properties of the ceramic material. This study aims to achieve an aesthetic restoration at the anterior teeth by means of ceramic bridges on VITA VM®9 ceramics. **Materials and methods** The study presents

a clinical case of a woman aged 37 who has a metal-ceramics bridge restoration on 13,11-21,22 and wished to have the aesthetic appearance improved. Following the Rx and the blood tests, it has been noticed that a dental implant treatment was impossible. It has been agreed to a restoration with a free-metal ceramics bridge on Zirconia support (13,11,21) and 2 all-ceramic crowns with framework of zirconia dioxide (21,22). VITAVM®9 ceramics has been used as it has the ideal thermal expansion coefficient for fusing onto Zirconia. Vita VM9 has a coefficient of thermal expansion of about 10 which is ideal for fusing onto Zirconia. The A3-A2-B2-T colors were blended together. Results and discussion The clinical steps and technical details of the restorations, as well as the protocols recommended will be presented and discussed. The obtained clinical effects were highly assessed by both, dentist and patient Conclusion: Using free-metal ceramics restoration represents an ideal aesthetic therapeutical method with a maximal aesthetic effect. Thanks to exclusive durability, zirconia crowns are also, long-lived. Clinical Relevance: In dentistry, zirconium oxide is being used more and more as the material of choice. For years, clinical tests and examinations were made to confirm the high quality of zirconium oxide.

#### PP 47

Category: Endodontics

#### INFLUENCE OF PHOSPHORIC ACID FORMULATION ON PUSH-OUT BOND STRENGTH OF FIBER POST.

Riccardo ROTA<sup>1</sup>, Nicola SCOTTI<sup>1</sup>, Lorenzo BRESCHI<sup>2</sup>, Giulio MARCHESI<sup>2</sup>, Damiano PASQUALINI<sup>3</sup>, Elio BERUTTI<sup>3</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> Medical Science, University of Trieste, Trieste, Italy

<sup>3</sup> Endodontics, University of Turin, Turin, Italy

**Objectives** The aim of this in vitro study was to evaluate the effect of phosphoric acid formulations on the bond strength of fiber post. The null hypothesis tested was that the etching formulation has no effect on the push-out bond strength of fiber posts luted with an etch-and-rinse adhesive system. **MATERIALS & METHODS** Forty-eight single-root extracted teeth were endodontically treated and a 10 mm post space was prepared with a calibrated bur. Specimens were then divided into 3 groups according to the etching procedure: A) 36% H3PO4 gel for 30s; B) 32% H3PO4 semigel for 30s; C) 36% H3PO4 water solution for 30s. Specimens were divided into 2 subgroups and randomly assigned different adhesive system: 1) All Bond 3 (Bisco); 2) XP Bond + Self Cure Activator (Dentsply). Fiber posts (RTD, Dentsply) were luted with a dual-cure resin-based

cement. Teeth were cut in 1 mm-thick slices and pushed until failure with an Instron Machine. Results were statistically analyzed with Two-Way ANOVA and Tukey test. Statistical significance was set at  $p=0.05$ . **RESULTS:** means and SD of push-out bond strength (MPa) of the different etching formulations are expressed in table 1. **CONCLUSIONS** The null hypothesis tested was rejected since the use of a water solution of H3PO4 (Group C) showed higher push-out bond strength than the use of gel or semi-gel formulation. No differences were observed between the 2 adhesive systems. **CLINICAL RELEVANCE** The use of a liquid formulation of phosphoric acid improves the bond strength of fiber posts compared to more viscous etching formulations

Table 1

H3PO4 formulation	All Bond 3 (MPa ± SD)	XP Bond (MPa ± SD)
gel	4,919 (±2.621)	4,685 (±2.351)
semi-gel	4,122 (±3.663)	3,209 (±2.68)
liquid	7,577 (±4.117)*	6,881 (±4.654)*

#### PP 48

Category: Endodontics

#### ASSOCIATION BETWEEN ORAL HEALTH STATUS, CD14 POLYMORPHISMS AND CORONARY HEART DISEASE IN YOUNG ADULTS.

Damiano PASQUALINI<sup>1</sup>, Nicola SCOTTI<sup>2</sup>, Mario ALOVISI<sup>1</sup>, Valentina DAMBRA<sup>1</sup>, Elio BERUTTI<sup>1</sup>

<sup>1</sup> Department of Endodontics, University of Turin Dental School, Turin, Italy

<sup>2</sup> Department of Operative Dentistry, University of Turin Dental School, Turin, Italy

**Objectives** Oral infections have been indicated as being potentially associated with coronary heart disease (CHD). Chronic periodontitis is associated with atherosclerosis and an increased prevalence and incidence of CHD. Apical periodontitis presents significant similarities with the inflammatory response involved in periodontal disease. Subjects presenting peri-radicular lesions of endodontic origin (LEO) or pulpal inflammation showed an increased risk of developing CHD. Findings concerning the systemic manifestations of LEO remain controversial. CD14 polymorphism has been associated with CHD and chronic periodontitis. The primary objective of this study was to evaluate the association between oral-health status, polymorphisms of CD14 and CHD. **Materials and methods** An

observational case-control prospective clinical trial was designed. 51 young adults (40 m, 11f, age  $48 \pm 5.7$ ) with a diagnosis of acute myocardial infarction or unstable angina were selected and compared to 49 healthy controls (39 m, 10f, age  $47 \pm 7.1$ ). Participants were matched for age, gender and socio-economic status and indicators of dental disease were evaluated. Results CHD subjects showed a higher prevalence of oral diseases. Multivariate analysis showed a positive association between missing teeth (OR=1.47; 95%CI 1.11-1.95), DMFT (OR=1.17; 95%CI 1.04-1.32), number of LEO (OR=1.63; 95%CI 1.04-2.54), chronic periodontitis (OR=5.25; 95%CI 1.18-23.2), and CHD. CD14 polymorphism analysis showed a higher percentage of T allele homozygotic subjects in CHD population. T allele frequency was higher in CHD group, although no positive association emerged with oral diseases. Conclusion Chronic oral diseases may increase the risk of CHD. Clinical relevance Chronic oral diseases may be considered among unconventional risk factors for CHD.

#### PP 49

Category: Endodontics

#### EVALUATION OF PENETRATION OF SODIUM HYPOCHLORITE INTO SIMULATED LATERAL CANALS AND UP TO WORKING LENGTH.

Pablo CASTELO<sup>1</sup>, Benjamín MARTÍN<sup>1</sup>, Cantatore GIUSEPPE<sup>2</sup>, Manuel RUÍZ<sup>1</sup>, José BAHILLO<sup>1</sup>, Purificación VARELA<sup>1</sup>, Elisardo LÓPEZ<sup>1</sup>, Berta RIVAS<sup>1</sup>

<sup>1</sup> Endodontics, Univesity of Santiago de Compostela, Santiago de Compostela, Galicia, Spain

<sup>2</sup> Endodontics, Univesity of Verona, Verona, Italy

Introduction and objective: The removal of any vital and necrotic pulp tissue, microorganisms and their toxins, along with the smear layer is essential for endodontic success. Instrumentation must be combined with adequate irrigation to complete the cleaning process and the microbial load within the root canal system. The purpose of this study was to evaluate the penetration of the irrigant into simulated lateral canals and up to working length using three different techniques in cleared teeth. Material and methods: Sixty single-rooted teeth were used for this study. A total of 360 simulated lateral canals were created, 6 in each tooth, with 2 lateral canals at 2, 4 and 6 mm of working length. Samples were randomly divided into 3 groups: group 1, Passive irrigation (PI), group 2, passive ultrasonic irrigation (PUI) and group 3, active ultrasonic irrigation (AUI). Results: We observed the penetration of the sodium hypochlorite with contrast solution that was introduced in at least 50% of the total

length of lateral canal. We also observed the arrival of irrigant to the working length. First group, PI, the irrigant didn't penetrate into lateral canals; PUI 30% of them and 67% in AUI. On the other hand, PI didn't reach to working length but ultrasonic groups arrive in most samples. Conclusion: Active ultrasonic irrigation penetrates in a higher number of lateral canals and arrives to the working length under the conditions of our study.

#### PP 50

Category: Endodontics

#### ANTIBACTERIAL EFFECTS OF GAALAS LASER IRRADIATION VS NAOCL IRRIGATION PROTOCOLS IN ENDODONTICS: IN VITRO STUDY

Luis FRANÇA-MARTINS<sup>1</sup>, Patricia MANARTE-MONTEIRO<sup>1</sup>, Maria Conceição MANSO<sup>2</sup>, Cristina PINA<sup>2</sup>, Alexandrine CARVALHO<sup>1</sup>

<sup>1</sup> Department of Dental Medical Sciences, Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal

<sup>2</sup> Faculty of Health Sciences, Fernando Pessoa, Porto, Portugal & REQUIMTE-UP

Objectives: The aim of this in vitro study was to evaluate the antibacterial effect of the 980 nm GaAlAs laser irradiation alone or combined with NaOCl solutions in experimentally infected root canals with *E. faecalis*. Materials and Methods: 60 single-rooted human teeth were selected. After sterilization and endodontic preparation (ProTaper<sup>®</sup>) specimens were inoculated with *E. faecalis* for 21 days at 37°C. Six groups (10 specimens) were formed; Control Groups: G0 (untreated) and G1 (NaCl irrigation); Test groups: G2 (5.25%NaOCl irrigation), G3 (laser; 2.0 W irradiation), G4 (laser and 5.25%NaOCl) and G5 (laser and 0.5%NaOCl). Samples were collected by sterile paper points, placed in sterile centrifuge tubes, diluted and spread on BHI agar-plates, incubated for 24hours/37°C. The colony forming units (CFU) were counted. The results were analyzed by Mann-Whitney test ( $p < 0.05$ ). Results:  $3.00E + 9$  CFU/ml were detected in control groups ( $p > 0.05$ ); G4 and G5 resulted in zero CFU/ml; G2 and G3 showed  $8.20E + 5$  and  $6.02E + 5$  CFU/ml, respectively; All test groups presented lower CFU/ml counts than control groups ( $p < 0.001$ ). Laser and 5.25%NaOCl, and laser and 0.5%NaOCl ( $p = 0.664$ ) eradicate *E. faecalis* (log kill of 6.91); Conventional 5.25% NaOCl and laser alone resulted in a log kill of 3.6 and 3.7, corresponding to a reduction of 99.97% and 99.98% ( $p = 0.970$ ), respectively. Conclusions: The use of 5.25% or 0.5% NaOCl irrigations combined with diode laser eradicate *E. faecalis* and resulted in significant higher antibacterial efficacy than NaOCl irrigation alone. Clinical Relevance: Diode laser application might be an adjunct to conventional endodontics when used in combination with NaOCl solutions.

**PP 51**

Category: Endodontics

**COMPARISON BETWEEN TWO SONIC IRRIGATION SYSTEMS: ENDOACTIVATOR AND VIBRINGE.**Francesco SOMMA<sup>1</sup>, Raffaella CASTAGNOLA<sup>1</sup>, Irene MINCIACCHI<sup>1</sup>, Daniele ANGERAME<sup>2</sup>, Luca MARIGO<sup>3</sup><sup>1</sup> Endodontics, Catholic University of the Sacred Heart, Rome, Italy<sup>2</sup> Biomedicine, University of Trieste, Trieste, Italy<sup>3</sup> Dental Materials, Catholic University of the Sacred Heart, Rome, Italy

**Objective:** The aim of this study is to evaluate the cleaning efficacy of two different sonic irrigation devices. **Materials and Methods:** Thirty single-rooted premolars, scheduled for the extraction for orthodontic reasons, were selected for this study. Each crown was cut and the working length was determined. Root canals were shaped with ProTaper instruments (Dentsply, Maillefer, Baillegues, Switzerland) under hypochlorite irrigation. The samples were then divided in three groups (n=10) and submitted to different agitation procedures with hypochlorite and EDTA solutions: no agitation (control), EndoActivator (Dentsply, Tulsa, OK) and Vibringe System (Vibringe B. V. Corp, Amsterdam, Netherlands). Each tooth was split longitudinally into halves; remaining dentinal debris and smear layer were evaluated with a 4-grade scoring system in the coronal, medium and apical third using scanning electron microscope (Philips SEM 515). **Results:** Concerning debris and smear layer removal, in the coronal and medium regions no statistically significant differences were detected among three groups (p>0.05). In the apical third both EndoActivator and Vibringe were significantly more effective than conventional syringe system (p<0.05). **Conclusion:** Sonic irrigation showed a major efficacy than conventional syringe irrigation in the cleaning of the apical region and can be considered a valid support in the root canal therapy.

**PP 52**

Category: Endodontics

**EFFICIENCY OF A SONIC ACTIVATION DEVICE ON THE SMEAR LAYER REMOVAL**Gabriele FALLITI<sup>1</sup>, Roberto BECCIO<sup>1</sup>, Franz STUFFER<sup>1</sup>, Damiano PASQUALINI<sup>1</sup>, Elio BERUTTI<sup>1</sup>, Nicola SCOTTI<sup>2</sup><sup>1</sup> Department of Endodontics, University of Turin Dental School, Turin, Italy<sup>2</sup> Department of Operative Dentistry, University of Turin Dental School, Turin, Italy

**Objective:** The aim of this study was to evaluate the efficiency to remove smear layer of a sonic activation device, the EndoActivator® system (EA; Dentsply Tulsa Dental Specialties, Tulsa, OK). **Materials and methods:** Forty-seven human permanent single-rooted teeth scheduled for extraction for periodontal reasons were selected, shaped in vivo and then extracted. **Instrumentation** was made with an initial manual preflaring and rotary Protaper® (Dentsply Maillefer). Canals were irrigated with NaOCl 5% alternated with EDTA 10%. Samples were then randomly assigned to 4 different groups, depending on the type of the final flush: group A (saline solution for 2 minutes), group B (EDTA 10% for 1 minute), group C (EDTA 10% for 1 minute activated by EndoActivator® system), group D (EDTA 10% for 2 minutes activated by EndoActivator® system). Samples were then examined in each sector (coronal, middle, apical) of the root canal with SEM on the basis of a standardized score. Data were analyzed with Kruskal Wallis test (p<0.05). **Results:** No differences have been found among B, C and D groups in the coronal third (p=0,472); while in the middle third differences were at the limit of the statistical significance (p=0,057). In the apical third, a significant difference was found between C and D groups (p=0,001) compared to group B. **Conclusion and Clinical Relevance:** Findings suggest that subsonic activation of a final flush of EDTA may enhance the smear layer removal from the root canal walls.

**PP 53**

Category: Endodontics

**ANTIMICROBIAL ACTIVITY OF LACTIC ACID AGAINST ENTEROCOCCUS FAECALIS BIOFILMS ENTEROCOCCUS FAECALIS**María Teresa ARIAS-MOLIZ<sup>1</sup>, Carmen María FERRER-LUQUE<sup>2</sup>, María Paloma GONZÁLEZ-RODRÍGUEZ<sup>2</sup>, Santiago ORDÓÑEZ-BECERRA<sup>2</sup>, Pilar BACA<sup>2</sup><sup>1</sup> Microbiology, School of Dentistry, Granada, Spain<sup>2</sup> Preventive and Operative Dentistry, School of Dentistry, Granada, Spain

**Objectives:** Lactic acid (LA) has been proposed as an irrigating solution due to its ability to remove the smear layer and improve the bond strength of the obturation material at concentrations of 20% and 10%. However, its antimicrobial activity against Enterococcus faecalis is unknown. The aim of this study was to evaluate the antimicrobial activity of LA alone or in combination with chlorhexidine (CHX) against E. faecalis ATCC 29212 and E. faecalis EF-D1 (from failed endodontic treatment).

**Materials and Methods:** The irrigating solutions tested were 20%, 15%, 10%, 5% and 2.5% LA, alone and in combination with 2% CHX. The single biofilms were grown in the MBECTM high-throughput device for 24 hours and exposed to the irrigating solutions for 30 seconds and 1 minute. “Eradication” was defined as 100% bacterial kill. **Results:** Twenty percent of LA eradicated the *E. faecalis* biofilms after 30 seconds contact time. At 1 minute of exposure it eradicated them at a lesser concentration, 15%. When combined with 2% CHX, 20% LA eradicated the biofilms after 1 minute. The association of lower concentrations of this acid with 2% CHX exhibited less antibiofilm efficacy than LA alone. **Conclusions:** LA is capable of eradicating *E. faecalis* biofilm at a concentration of 20%. Its combination with CHX did not enhance the antimicrobial properties. **Clinical Relevance:** LA eradicates *E. faecalis* biofilms at the recommended concentration for clinical use. *Enterococcus faecalis*.

#### PP 54

Category: Endodontics

#### DIRECT PULP CAPPING: POSSIBLE EFFECTS OF TNF-ALPHA AND IL-6 ON HUMAN DENTAL PULP STEM CELLS

Gabriel MAGNUCKI<sup>1</sup>, Tarek MUSTAFA<sup>2</sup>, Alexander NAVARRETE SANTOS<sup>3</sup>, Christian GERNHARDT<sup>1</sup>, Hans-Günter SCHALLER<sup>1</sup>, Cuong HOANG-VU<sup>4</sup>

<sup>1</sup> Operative Dentistry and Periodontology, MLU Halle-Wittenberg, Halle, Saxony-Anhalt, Germany

<sup>2</sup> Department of Oral and Maxillofacial Surgery, OvG University Magdeburg, Saxony-Anhalt, Germany

<sup>3</sup> Department of Cardiothoracic Surgery, MLU Halle-Wittenberg, Halle, Saxony-Anhalt, Germany

<sup>4</sup> Department of Experimental Surgery and Oncology, MLU Halle-Wittenberg, Halle, Saxony-Anhalt, Germany

**Objectives:** Direct pulp capping therapies to generate dentin bridging induce an intrapulpal necrosis and thereafter a differentiation of mesenchymal progenitors to odontoblast-like cells. The aim of our investigation was to elucidate the potential of necrotic and inflammatory mediators on DPSC. **Material and Methods:** The present study analyzed the effects of TNF-alpha and IL-6 on the differentiation, proliferation and migration of DPSCs. These effects were investigated by RT-PCR for odontoblastic markers DSSP and DMP-1 and promigratory MMPs. Furthermore, the intracellular pathways were evaluated. To investigate the proliferation a MTT-assay was performed and for the migration the Oris™-Migration-Assay was used. Extracellular calcium depos-

its were stained with Alzarin-red-S. **Results:** The results demonstrated a significant increased DSSP- and DMP-1-expression of TNF-alpha stimulated compared with not stimulated cells. This correlated with stained extracellular mineralization. Otherwise, IL-6 treatment demonstrated no significant differences. Both investigated cytokines increased the proliferation significantly. Accelerated migration mainly induced by IL-6 depended on an up-regulation of MMPs. TNF-alpha activated NF-betaB- and MKK4-pathway, whereas IL-6 showed no specific signalling. ( $p^* < 0.05$ ,  $p^{**} < 0.005$ , student's t-test) **Conclusion:** It could be demonstrated that TNF-alpha induced the differentiation of DPSCs to odontoblast-like cells. Therefore, it could be concluded the therapeutically induced necrosis influenced directly the dentin bridging via TNF-alpha. The accelerated migration and increased mitosis induced mainly by IL-6 might influence the recruitment of DPSCs after vital pulp capping. **Clinical Relevance:** Our study represented an in vitro model for necrotic effects on mesenchymal stem cells and may support future strategies in hard tissue engineering and pulp capping protocols.

#### PP 55

Category: Endodontics

#### COMPARATIVE ANALYSIS OF ROOT CANAL CHANGES AFTER PREPARATION WITH THREE SYSTEMS USING CONE-BEAM COMPUTED TOMOGRAPHY

Diane OGET<sup>1</sup>, Julien BRAUX<sup>2</sup>, Céline COMPAS<sup>1</sup>, Mathieu PÉRARD<sup>3</sup>, Martine GUIGAND<sup>4</sup>

<sup>1</sup> LACMDTI EA4302 LRC-CEA 0534, UFR Odontologie de Reims, Reims, France

<sup>2</sup> INSERM UMR-S 926, UFR Odontologie de Reims, Reims, France

<sup>3</sup> OCE, UFR Odontologie de Rennes 1, Rennes, France

<sup>4</sup> OCE, UFR Odontologie de Reims, Reims, France

**Introduction:** The aim of this study was to investigate the morphological changes in the root canal path on extracted teeth after preparation with Endoflare/Revo-S®, Endoflare/HeroShaper® and ProTaper® using Cone-Beam Computed Tomography. **Methods:** 51 root canals with curvatures ranging between 10 ° and 80 ° were divided into three homogeneous groups (n=17). Root canals in Group 1 were shaped with Endoflare/Revo-S®; Group 2 with Endoflare/Hero Shaper®, and Group 3 with ProTaper®. All specimens were scanned pre and postoperatively using the Kodak® 9000C 3D. Changes in both degree and position of the root canal curvature were assessed according to the method of Berbert and Nishiyama. Canal transportation was calculated for each slice by comparing the position of the root canal

centroid before and after preparation. Statistical analysis was carried out by the non-parametric Kruskal-Wallis test ( $p < 0.05$ ), and Mann-Whitney test with Bonferroni correction. Results: The mean of curvature's degree decreases significantly ( $p < 0.003$ ) for each group, without any statistical differences between the three groups. Mean canal transportation scores ranged from 65  $\mu\text{m}$  (Revo-S<sup>®</sup>) to 85  $\mu\text{m}$  (ProTaper<sup>®</sup>) in the apical third, 74  $\mu\text{m}$  (Revo-S<sup>®</sup>) to 111  $\mu\text{m}$  (ProTaper<sup>®</sup>) in the middle third and 77  $\mu\text{m}$  (HEROShaper<sup>®</sup>) to 114  $\mu\text{m}$  (ProTaper<sup>®</sup>) in the cervical third. In the middle part, Revo-S<sup>®</sup> produced statistically less transportation than HEROShaper<sup>®</sup> ( $p = 0.0096$ ) and ProTaper<sup>®</sup> ( $p = 0.0074$ ). Conclusion: All instruments produced small curvature's deviation and mild canal transportation. But Revo-S<sup>®</sup> preparation resulted in less transportation with reproducible results. Clinical Relevance: Revo-S<sup>®</sup> seems to be the most appropriate system for curved root canal preparation by inexperienced operators.

#### PP 56

Category: Endodontics

#### ROOT AND CANAL MORPHOLOGY OF MAXILLARY FIRST MOLARS

Ferit KOÇANI<sup>1</sup>, Blerim KAMBERI<sup>1</sup>, Edmond DRAGUSHA<sup>1</sup>  
<sup>1</sup> Conserv. Dent. and Endodontics, Univ. of Prishtina, Faculty of Medicine/Stomatology School, Prishtina, Kosovo

It is generally accepted that the most common form of the permanent maxillary first molar has three roots and four canals. The narrowness of the mesiobuccal root of maxillary first molar, mesiodistal flatness and the longitudinal groove along their length are responsible for the differences in the topography of canal morphology. Objectives To investigate the number of roots, prevalence, location, and pathway of the second mesiobuccal canal in first maxillary molars. Material and method 182 permanent first maxillary molars were analyzed using operating microscope (OP), computed dental radiography (CDR) and stereomicroscope. The root canal systems were classified according to the classification of Vertucci. Result The results of this research show that out of total 182 teeth, 98.90% had three roots and 1.10% had four roots (two palatal roots). Configuration of root canal system on mesiobuccal root shown 34.43% with one canal, and 65.57% with more complex system of two canals. Finally, Type I is present in 34.43% of the cases, Type II in 27.86%, Type IV in 29.06%, Type V in 6.73% and Type VI in 1.92%. Distobuccal root, out of total 182 teeth 98.34% with one simple canal, and only 1.66% with Type V. Conclusion The

maxillary first molar root anatomy is predominantly a three rooted form, mesiobuccal root contains a double root canal system more often than a single canal. Knowledge of these variations advances the concept for the successful endodontic treatment.

#### PP 57

Category: Endodontics

#### FTIR-ATR STUDY OF MOLECULAR CHANGES IN DENTINE PRODUCED BY DIFFERENT ENDODONTIC IRRIGANTS.

Purificacion GONZALEZ VILAFRANCA<sup>1</sup>, Pedro ALVEREZ LLORET<sup>2</sup>, Santiago GONZALEZ LOPEZ<sup>1</sup>, Alejandro RODRIGUEZ NAVARRO<sup>2</sup>, Purificacion SANCHEZ SANCHEZ<sup>3</sup>, Victoria BOLOÑOS CARMONA<sup>4</sup>

<sup>1</sup> Pathology and Dental Therapeutics, Faculty of Dentistry, Granada, Spain

<sup>2</sup> Department of Mineralogy and Petrology, Faculty of Sciences, Granada, Spain

<sup>3</sup> Department of Inorganic Chemistry, Faculty of Sciences, Granada, Spain

<sup>4</sup> Integrated Pediatric Dentistry, Faculty of Dentistry, Granada, Spain

Objectives: To study the effect of 5%NaOCl, 17% EDTA, 20% citric acid and 2% chlorhexidine (CHX) plus 20% citric acid, all used as endodontic irrigants, on the microstructural composition of human dentine. Material and methods We used enamel-, cement-, and pulp-free root dentine from two human teeth. Dentine samples were ground into a fine powder, selecting the 150- and 200- $\mu\text{m}$  fractions. The dentin was then immersed in independent solutions of 5% NaOCl, 17% EDTA, 5% NaOCl + 17% EDTA and 20% citric acid plus 2% CHX for 1 or 4 min. The chemical composition of the dentine powder was determined after each treatment by Fourier transform infrared spectrometry with attenuated total reflection (FTIR-ATR). Results These chemical agents altered the composition of the dentine: 5% NaOCl produced structural alterations in organic components of dentine through a time-dependent reduction in type I and II amides; 17% EDTA substantially reduced phosphates, localized in peaks corresponding to crystalline components; while 20% citric acid plus 2% CHX exerted the most intense demineralizing effect. Conclusions NaOCl produces major important structural changes in organic components of dentine, while EDTA, citric acid and citric acid plus CHX cause substantial demineralization. Clinical Relevance Endodontic irrigants produce major changes in the chemical composition of dentin that would affect sealing with the new endodontic sealants.

**PP 58**

Category: Endodontics

**PALATAL VENEERS: A CASE REPORT**

Rosalía MUÑOZ-ROMERO<sup>1</sup>, Vicente FAUS-MATOSES<sup>1</sup>, René D. BOTELLO-TORRES<sup>1</sup>, Ignacio FAUS-MATOSES<sup>2</sup>, Vicente J. FAUS-LLÁCER<sup>1</sup>

<sup>1</sup> Master in Restorative Dentistry and Endodontics, Medicine and Dentistry School University of Valencia, Valencia, Spain

<sup>2</sup> Master in Orthodontics, Medicine and Dentistry School University of Valencia, Valencia, Spain

**Objectives AND INTRODUCTION** The main objectives of this case were: Decreasing hypersensitivity reported by the patient by increasing the vertical dimension and restoring the palatal surfaces of upper incisors. The palatal wear of upper incisors associated with deep overbite can be corrected by increasing the vertical dimension, by extrusion of posterior teeth (Dahl's principle) creating a space to restore anterior interdental wear facets. **MATERIAL AND METHODS** We report a case of a patient with hypersensitivity of the upper incisors. The intraoral examination showed erosion of palatal surfaces, generated by excessive non-axial forces due to a deep overbite and a steep incisive guidance angle. **Treatment Plan:** • Placement of fixed orthodontic appliances using straight wire technique, accelerating the process of passive eruption touted by Dahl. • Roughening and restoration of the palatal surfaces of upper incisors (ACE II classification) with feldspathic ceramic veneers **Creation.** **RESULT** The increase in vertical dimension restored incisive guidance angle, allowing the restoration of the palatal surfaces and the disappearance of hypersensitivity, without removing healthy tooth structure. **CONCLUSION AND CLINICAL RELEVANCE** Palatal wear of upper incisors caused by increased overbite, can be restored by applying the Dahl's principle and taking advantage of new adhesive conservative techniques, by preparing ceramic veneers, thus maintaining the entire tooth structure.

**PP 59**

Category: Endodontics

**CHOOSING BETWEEN RETENTION OF TEETH VERSUS EXTRACTION AND IMPLANT PLACEMENT: TREATMENT PREFERENCES OF FLEMISH DENTISTS**  
Matthias NEUKERMANS<sup>1</sup>, Jacques VANOBBERGEN<sup>2</sup>,  
Roeland DE MOOR<sup>1</sup>

<sup>1</sup> Operative Dentistry and Endodontology, Ghent University, Dental School, Ghent, Belgium

<sup>2</sup> Community Dentistry and Oral Public Health, Ghent University, Dental School, Ghent, Belgium

**Objectives:** To determine treatment preferences amongst Flemish (Belgium) dentists for either retention of teeth by endodontic & restorative treatment or extraction & implant placement. **Materials and Methods:** A questionnaire was sent to 4468 active dentists in Flanders. Information on decision making based (1) on age of the patient; (2) medical back-ground, location of the tooth in the mouth and periapical pathology was collected. The participants were also asked if they could agree with 10 different guidelines according to AAE position statements regarding implants. Information was also collected regarding the estimation of tooth versus implant survival. **Results:** 827 questionnaires were returned. The majority of the respondents (81.7%) categorized themselves as general practitioners (GP); specific profiles for endodontics in 4.7% , prosthetics in 4.0% and implantology in 2.5%. Endodontic referrals were made by 60.2% of the GP, implant referrals by 89.5%. For 1/4th of the participants age was not important when choosing between endo and implants; between the age of 25 to 70 years implants were preferred by 1/5th in technically difficult situations. The more complicated the medical background the more endodontic treatment was preferred. Implant and crown build-up was performed less in front teeth than in posterior teeth ( $p < 0.05$ ). Only 10% of the GP fully agreed with the AAE statements. Survival of implants is estimated higher than of root filled teeth, especially in the posterior region. **Conclusions:** Choosing for implants is not always based on scientific evidence. **Clinical relevance:** The extraction of teeth is quite often performed without respecting clinical evidence.

**PP 60**

Category: Endodontics

**AN IN VITRO COMPARISON OF CYCLIC FATIGUE RESISTANCE OF PROTAPER, WAVE ONE AND TWISTED FILES.**

Ricardo CASTELLÓ ESCRIVÁ<sup>1</sup>, Teresa ALEGRE DOMINGO<sup>1</sup>, Vicente FAUS MATOSES<sup>1</sup>, Sophie ROMAN RICHON<sup>1</sup>, Vicente José FAUS LLACER<sup>1</sup>

<sup>1</sup> Master in Restorative Dentistry and Endodontics, Medicine and Dental School University of Valencia, Valencia, Spain

**Objective:** The aim of this study was to compare the cyclic fatigue resistance of three nickel-titanium (NiTi) endodontic instruments from Protaper, Wave One (WO) and Twisted Files (TF). **Materials and methods:** Cyclic fatigue testing was conducted by operating instruments from ProTaper F2 (Dentstply Maillefer, Ballaigues, Switzerland), WO

25 .08 (Dentsply Maillefer, Ballaigues, Switzerland) and TF 25 .08 (SybronEndo, Orange, CA). A total of 184 instruments were rotated in 4 curved artificial canals with different angles and radius of curvature. The time and cycles to failure were calculated. The data were compared for differences by using a t-Student and ANOVA test ( $p < 0.05$ ). Results: WO rotated for a significantly longer period of time before the separation occurred, thus WO was the most resistant to cyclic fatigue failure. The number of rotations to failure for TF was significantly higher than Protaper. Conclusions: Reciprocating movement of WO showed a longer cyclic fatigue life than conventional rotary movement of TF and Protaper. The new manufacturing twisting process of TF produced NiTi rotary instruments more resistant to fatigue than Protaper instruments produced with the traditional NiTi grinding process. Clinical relevance: The fatigue resistance of endodontic instruments affects the outcome of instrumentation in curved root canals. Several systems are available and their mechanical behaviour should be tested.

## PP 61

Category: Endodontics

### INFLUENCE OF POST MATERIAL AND LENGTH ON ENDODONTICALLY TREATED INCISORS WITH A CONSIDERABLY BONE LOSS

Carmen GONZÁLEZ-LLUCH<sup>1</sup>, Pablo-Jesús RODRÍGUEZ-CERVANTES<sup>1</sup>, Joaquín-Luis SANCHO-BRU<sup>1</sup>, Antonio PÉREZ-GONZÁLEZ<sup>1</sup>, Amaya BARJAU-ESCRIBANO<sup>2</sup>, Leopoldo FORNER-NAVARRO<sup>2</sup>

<sup>1</sup> Department of Mechanical Engineering and Construction, Jaume I University, Castellón de la Plana, Spain

<sup>2</sup> Department of Stomatology, University of Valencia, Valencia, Spain

**Objectives** To analyze, using a finite element (FE) approach, the influence of post material and length on the mechanical response of endodontically treated teeth, which have suffered a considerably bone loss. **Materials and Methods** A FE model of a maxillary central incisor, restored with a prefabricated post, was used. This model has been properly validated in previous works. A loss of the maxillary bone till half of the root length was considered. Simulations were performed for two different post materials: stainless steel and glass fiber. Three intraradicular post lengths were studied: 3.3, 6.6 and 10 mm. The tooth was loaded with a 300 N oblique force (50° to the radicular axis). **Results** Stresses in dentine and post cement were approximately three times higher in the case of the bone loss than those in the

intact bone case. For both post materials, a stress concentration was observed in the vestibular side of the dentine, around its insertion into the bone. For the stainless steel post, another stress concentration was observed around the apical post end, which increased with post length. Maximal stresses in dentine were not influenced by post length while maximal stresses in post cement were affected, especially in the case of stainless steel post. **Conclusions** Comparable root fracture resistance was found for both post materials. Debonding of the post depended on both length and post material. **Clinical relevance** For a long term restoration, when a maxillary bone loss may occur, fiber posts seem to be an interesting option.

### Maximum von Mises stresses (MPa) with bone loss

	Post length (mm)		
	3.3	6.6	10
Dentine (Stainless steel post)	223	231	245
Dentine (Glass fiber post)	223	230	245
Post cement (Stainless steel post)	85	209	310
Post cement (Glass fiber post)	54	105	138

## PP 62

Category: Endodontics

### INCIDENCE OF FRACTURED FILES OF TWO INSTRUMENTATION SYSTEMS WITH ALTERNATING MOVEMENT IN CURVED CANALS.

Carolina VILLASENÍN<sup>1</sup>, Purificación VARELA<sup>1</sup>, José BAHILLO<sup>1</sup>, Berta RIVAS<sup>1</sup>, Manuel RUÍZ<sup>1</sup>, Benjamín MARTÍN<sup>1</sup>

<sup>1</sup> Máster Endodoncia, Universidad de Santiago de Compostela, Santiago de Compostela, Spain

**Objective:** To evaluate the incidence of fracture of the files when the ProTaper® and WaveOne™ (Dentsply / Maillefer Ballaigues, Switzerland) systems are used with alternating movement in different degrees of rotation to instrument canals with 30 degrees of curvature. **Material and Methods:** Eighty radicular canals were classified into 8 groups (n=10) according to: 1) set of rotary system, 2) degrees of rotation of alternating movement (a-clockwise, CW, 30° and counter-clockwise, CCW, 150°; b- CW, 60° and CCW, 45°); 3) carrying or not preflaring rotary. Permeabilization was performed and determination the working length using a #10 K-file. **Results:** Fractured six F2; four files were fractured in canals without preflaring and alternating movement with CW 30° and CCW 150°; two files was fractured without preflaring and alternat-

ing movement with CW 60° and CCW 45°. Conclusions: The WaveOne™ file was resistant to fracture with both types of alternating movement. Higher risk in using greater degrees in counterclockwise rotation, that increases the incidence of fracture in the F2 file and also higher risk when the preflaring was not made. Clinical relevance: According to our study and following the manufacturer's instructions, the use of the WaveOne™ file is safe for endodontic instrumentation.

#### PP 63

Category: Endodontics

COMPARISON OF APICAL EXTRUSION OF NaOCl USING DIFFERENT INTRACANAL IRRIGATION SYSTEMS.

Jose CONDE<sup>1</sup>, Purificación VARELA<sup>1</sup>, Benjamín MARTÍN<sup>1</sup>, José BAHILLO<sup>1</sup>, Berta RIVAS<sup>1</sup>, Manuel RUIZ<sup>1</sup>, Manuel M. GARCÍA<sup>1</sup>

<sup>1</sup> Dental Pathology and Therapy, Faculty of Medicine, and Odontology Universidad Santiago Compostela, Santiago de Compostela, Spain

- Objectives: The purpose of this study is to compare extrusion of irrigants delivered with different intracanal irrigation systems in same conditions. - MATERIALS AND METHODS: One hundred single canal, extracted human mature teeth were divided into five sample groups (n=20) and instrumented to F3 Protaper Universal (Dentsply Maillefer, Ballaigues, Switzerland). Teeth were secured and embedded in 0.2% agarose gel (ph=7.3-7.4) containing 1 ml 0.1% m-cresol purple, which changes color at a pH 9.0. Teeth received NaOCl irrigation with the EndoVac system (Discus Dental, Culver City, CA), Max-Iprobe needle (Dentsply Rinn, Elgin, IL), Kendall monoject (Kendall, Mansfield MA), Proultra Piezoflow (Dentsply Tulsa Dental; Tulsa, OK) and Endoactivator (Dentsply Tulsa Dental Specialties, Tulsa, OK). The amount of irrigation was controlled for each sample. - RESULTS: Data from sample groups show the following: Endovac Macro Cannula group produced 10% apical extrusions; Max-Iprobe group produced 10% apical extrusions; Kendall monojet group produced 20% apical extrusions; Proultra Piezoflow group produced 45% apical extrusions and endoactivator group produced 15% apical extrusions. - CONCLUSIONS: All groups produced apical extrusion. However Proultra Piezoflow produced more apical extrusions than the other groups in same conditions. - CLINICAL RELEVANCE: The dynamic irrigation is a good technique for root canal system disinfection. According to the results of our study this irrigation technique produces more apical extrusion than

the passive irrigation. The clinician must be carefully using active irrigation to avoid apical extrusion.

#### PP 64

Category: Endodontics

EFFECTIVENESS OF DIFFERENT IRRIGATION SYSTEMS IN THE SMEAR LAYER REMOVAL AFTER ROOT CANAL INSTRUMENTATION.

Jesus BALO<sup>1</sup>, Purificación VARELA<sup>1</sup>, José GONZÁLEZ<sup>1</sup>, Berta RIVAS<sup>1</sup>, Manuel RUIZ<sup>1</sup>, Benjamín MARTÍN<sup>1</sup>

<sup>1</sup> Máster Endodoncia, Universidad de Santiago de Compostela, Santiago de Compostela, Spain

Introduction: During the mechanical preparation of the root canal it is generated smear layer that must be removed by mechanical and chemical form. According to the method of irrigation used, the degree of elimination of smear layer in the surface of the root canal changes. Objective: Evaluate the effectiveness of the smear layer removal of different irrigation systems after the mechanical rotary instrumentation. Materials and Methods: 100 single-canal extracted human teeth were decoronated and randomly divided into 5 groups (n=20). All groups were instrumented using Protaper Universal®. At final irrigation, NaOC15.25% and EDTA17% were combined with different systems; the used systems were: passive, passive with needle Max-I-Probe, Irrisafe, Endovac and Proultra Piezoflow. The teeth were longitudinally split and grooved to 3 levels: apical, middle and coronal third by means of Scanning electron microscopy (f-SEM, CarlZeiss). Photomicrographs were taken at 1000×, 2000× and 8000× to evaluate smear layer removal. Results: After the observation, there are no significant differences in the smear layer removal at frontal third; furthermore, notable differences exist in the cleanliness with active and dynamic irrigation at apical and middle thirds. Conclusions: The method that is more effective in the totality of the root canal is the Proultra Piezoflow. Clinical relevance: The persistence of smear layer inside the system radicular can compromise the success of the endodontics treatment for treating itself about an active area of infection. His complete elimination increases the efficiency of the disinfectants and the success of the treatment.

#### PP 65

Category: Endodontics

NON-SURGICAL TREATMENT OF MANDIBULAR CENTRAL TEETH WITH A LARGE PERIAPICAL LESION (CASE REPORT)

**Evren OK<sup>1</sup>**<sup>1</sup> Endodontics, Şifa University, Izmir, Turkey

**Objectives:** This case report presents the treatment of a large periapical lesion with non-surgical root canal therapy. **Materials and Methods:** A 22 year old female was referred to our clinic for treatment of mandibular anterior incisor teeth. She said that two times periapical surgery had done to her anterior teeth after root canal therapy, but her complaints didn't change. The radiographic examination showed a large and localized periapical lesion around the apices of the mandibular anterior incisor teeth. Gutta-percha was removed from root canals and irrigated with 5.25% sodium hypochlorite solution (NaOCl). Calcium hydroxide (Sultan Healthcare Inc, Germany) was placed twice as an intracanal dressing with an interval of two weeks. At the third visit root canals were obturated with lateral condensation technique. Coronal restoration was completed using a self-etching, adhesive and composite hermetically. At 3 and 12 months follow up, teeth were asymptomatic and clinical and radiographic investigation of the teeth revealed healing. **Conclusions:** This case report shows satisfactory periapical wound healing in periapical lesions can be achieved with non-surgical root canal treatment and hermetically coronal restoration. **Clinical Relevance:** In recent years, periapical lesions have treated with non-surgical root canal treatment successfully. So clinicians need to be familiar with non-surgical root canal treatment for periapical lesion.

**PP 66**

Category: Endodontics

**EFFECT OF DIFFERENT NAOCL CONCENTRATION ON MTBS OF A DUAL-CURING DENTIN ADHESIVE**  
Katrin BEKES<sup>1</sup>, Joerg HAPPRICH<sup>1</sup>, Thomas WRBAS<sup>2</sup>, Hans-Günter SCHALLER<sup>1</sup>, Christian GERNHARDT<sup>1</sup>

<sup>1</sup> Department of Operative Dentistry and Periodontology, Martin-Luther-University Halle-Wittenberg, Halle, Germany<sup>2</sup> Department of Operative Dentistry and Periodontology, Albert-Ludwigs-University Freiburg, Freiburg, Germany

**Objectives:** The aim was to evaluate the effect of different concentrations of NaOCl on microtensile bond strength (mTBS) of a dual-curing total-etch adhesive (LuxaBond-Total Etch) in combination with a dual-curing composite (Luxacore Z-Dual) on pulpal dentin in vitro. **Material and Methods:** Seventy-two extracted third molars were included. Dentin specimens of the pulp chamber were obtained

under standardized conditions. The specimens were randomly assigned to one of the six groups of twelve samples each: L-C: Luxabond/Luxacore (light-curing), control (no NaOCl-application); L-1: immersion in 1% NaOCl (24 hours) before bonding, L-5: immersion in 5% NaOCl (24 hours) before bonding; groups C-C, C-1, C-5 followed the same procedure using the self-curing mode. **Results:** After light-curing following mTBs could be observed (MPa): L-C: 30.9 (+/-3.7); L-1 26.6 (+/- 4.8); L-5: 19.8 (+/- 2.0). After using the self-curing mode mTBS was as followed: C-C:23.1 (+/- 4.4); C-1: 21.5 (4.6); C-5: 18.3 (2.1). Statistical analysis showed a significant influence of the used curing method and the different NaOCl concentrations ( $p < 0.001$ , ANOVA). The application of 1% and 5% NaOCl before bonding resulted in a reduction of mTBS. In the case of 5%, this difference was significant. Pairwise comparison between both curing groups showed no significant differences between L-C/C-C and L-1/C-1 ( $p < 0.05$ , Tukey's test). **Conclusions:** It can be concluded that the curing method might have an influence on mTBS. The application of higher concentrations of NaOCl prior to bonding decreases mTBS. **Clinical relevance:** NaOCl is commonly used in endodontic treatment and might have an influence on mTBs.

**PP 67**

Category: Endodontics

**CYCLIC FATIGUE RESISTANCE OF GT AND GTX FILES, AFTER CLINICAL USAGE.**

Ana ARIAS<sup>1</sup>, Jose C DE LA MACORRA<sup>1</sup>, Juan J. PEREZ-HIGUERAS<sup>1</sup><sup>1</sup> Conservative Dentistry, Complutense University, Madrid, Spain

**Objectives.** To compare cyclic fatigue resistance of conventional NiTi GT and M-Wire GTX files, after clinical usage. **Materials and Methods.** 57 GT and 49 GTX files were used. They were discarded after shaping from 10 to 15 canals in vivo. Files were fixed to a specially designed setup and rotated in a tempered steel canal, with a curvature angle of 60°. Each file was rotated at a constant speed of 300 rpm and with a torque control of 2Ncm. Time to failure was registered. Using Weibull analysis mean half life, beta (shape parameter, related to variability of time to fracture values) and eta (scale parameter, the fracture stress that one can expect that 63.2% of the specimens will reach. At this stress the probability of failure is 0.632) were calculated for each type. **Results.** See table. Probability of GT files mean life being higher

tan GTX is 57,6%. This difference is not statistically significant. Conclusions. Within the range of uses of the study, cyclic fatigue breakage does not seem to be related to different treatments of NiTi alloys used in the manufacturing of files (conventional or new thermal process). Clinical Relevance. New manufacturing developments involving thermal processes don't appear to signifextend mean life of NiTi rotary files, when used files within a clinically normal range of canals treated are compared.

	Beta (max-min)	Eta (max-min)	Mean life (s)
GT	3.06 (2.65-3.53)	4.66 (4.2-5.18)	4.17 (3.7-4.69)
GTX	3.37 (2.88-3.95)	4.2 (3.7-4.78)	3.77 (3.27-4.35)

**PP 68**

Category: Endodontics

CYCLIC FATIGUE RESISTANCE AT APICAL AND CORONAL PARTS OF RECIPROC AND WAVEONE NEW FILE

Ana ARIAS<sup>1</sup>, Jose C. DE LA MACORRA<sup>1</sup>, Juan J. PEREZ-HIGUERAS<sup>1</sup>

<sup>1</sup> Conservative Dentistry, Complutense University, Madrid, Spain

Objectives. To compare cyclic fatigue resistance of new M-Wire reciprocating WaveOne and Reciproc files at two different –coronal and apical- levels. Materials and Methods. 60 files of each brand were in a tempered steel canal with a curvature angle of 60°. Motor followed each specific reciprocating motion. 30 files of each brand were tested at 5 or at 13 mm from their tips, registering time to failure. Using Weibull analysis mean half-life, beta (shape parameter, related to variability of time to fracture values) and eta (scale parameter, the expected stress that 63.2% of the files reach until breakage, being at this stress 0.632 the probability of failure) were calculated for each group. Results. See table. Probability of Reciproc files mean life being higher than Wave One was found to be of 62.44% at 5 mm from tip, and of 99.9% at 13 mm from tip (both statistically significant). Probability of mean life being higher at 5 mm than at 13 mm from tip was statistically significant for both systems (72.56% for Reciproc and 99.8% for WaveOne). Results may be partially conditioned by the different movement kinematics that manufacturers propose for each system. Conclusions. Reciproc was more resistant to cyclic fatigue than WaveOne at both distances from the tip. Both systems

were more resistant at apical than at coronal levels. Clinical Relevance. Although both tested systems were designed to prepare full length of canals with one single file, their resistance to cyclic fatigue appears to vary at different level of files.

	Beta (max-min)	Eta (Max-min)	Mean life (s)
Reciproc 5 mm	9.63 (7.43-12.47)	5.85 (5.6-6.12)	5.56 (5.26-5.87)
Reciproc 13 mm	5.37 (4.09-7.04)	5.21 (4.85-5.6)	4.81 (4.42-5.22)
WaveOne 5 mm	6.38 (5.07-8.02)	5.56 (5.19-5.95)	5.17 (4.77-5.61)
WaveOne 13 mm	5.1 (3.99-6.53)	1.37 (1.26-1.48)	1.25 (1.14-1.38)

**PP 69**

Category: Endodontics

THE INVESTIGATION OF C-SHAPED CANAL SYSTEM IN MANDIBULAR SECOND MOLARS BY CONE BEAM COMPUTED TOMOGRAPHY

Ozkan MILOGLU<sup>1</sup>, Eren YILDIRIM<sup>1</sup>, Omer DEMIRTAS<sup>1</sup>, Hayati Murat AKGUL<sup>1</sup>

<sup>1</sup> Dentomaxillofacial Radiology, Health Sciences, Erzurum, Turkey

Objectives The objective of this cone beam computed tomography study (CBCT) is to evaluate the frequency of C-shaped canals in mandibular second molars (MSMs) in a Turkish population with respect to gender, sex and tooth position (unilateral (left versus right) and bilateral) in addition to root morphology. Materials and Methods The samples include 400 CBCT images of MSMs; 86 subjects had unilateral molars and 157 subjects had bilateral molars. Results Of 243 patients, 34 (14.0%) had C-shaped MSMs. This frequency did not differ with gender and age. C-shaped canal system were determined in 36 (9.0%) of the teeth. Thirty-two cases (94.1%) were unilateral and 2 (5.9%) were bilateral. Of the 32 unilateral cases, 15 (46.9%) were on the left and 17 (53.1%) were on the right side. Single roots were present in 47.3% (30.6% several canals and 16.7% one canal) of MSMs with C-shaped canal. In contrast, this rate was only 1.6% in MSMs without C-shaped canal. Conclusion This C-shaped canal system tends to vary considerably in their anatomical configuration and thus leads to difficulties in debridement, filling and restoration. The CBCT could be suggested as the effective diagnostic modality for root and canal configuration. Clinical relevance: The main advantages of CBCT images are that it is nondestructive and allows 3D reconstruction and visualization of the external and internal anatomy of the teeth. Clinicians should be considered the potential

value of CBCT when more information is needed for diagnosis or treatment planning beyond that obtained from conventional radiographs.

## PP 70

Category: Endodontics

### ROOT CANAL ANATOMY OF TURKISH MAXILLARY FIRST MOLARS: A RETROSPECTIVE CONE BEAM COMPUTED TOMOGRAPHY STUDY

Ozkan MILOGLU<sup>1</sup>, Omer DEMIRTAS<sup>1</sup>, Eren YILDIRIM<sup>1</sup>, Ahmet Berhan YILMAZ<sup>1</sup>

<sup>1</sup> Dentomaxillofacial Radiology, Health Sciences, Erzurum, Turkey

**Objectives** The aim of this study was to investigate root and canal morphology of permanent maxillary first molars (MFMs) in a Turkish population using cone beam computed tomography (CBCT). **Materials and Methods** The samples include 413 CBCT images of MFMs; 67 subjects had unilateral molars and 173 subjects had bilateral molars. The following observations were made: (i) root number, (ii) number of canals per root, and (iii) root canal configuration in each root using Vertucci's classification with additional modifications. **Results** Of the examined 413 MFMs, 2 roots were present in 1.9%, 3 roots in 97.6% and 4 roots in 0.5%. Multiple canals were available: two canals in 0.7%, three canals in 46.0%, four canals in 50.9%, five canals in 2.2% and six canals in 0.2% of teeth. Additional canals were detected in 51.1% of mesiobuccal roots. The most common canal morphology in the mesiobuccal roots was Vertucci types II, IV and V. However, the distobuccal and palatal roots showed predominantly type I. **Conclusion** The root and canal configurations of MFMs in Turkish population were consistent with previously reported data. CBCT can enhance detection and mapping of the mesiobuccal root canal system with the potential to improve the quality of root canal treatment.

## PP 71

Category: Endodontics

### ANTIMICROBIAL EFFICACY OF HYDRODYNAMIC AND ULTRASONIC IRRIGATION IN ROOT CANALS – AN IN VITRO STUDY

Georg CACHOVAN<sup>1</sup>, Sigrun EICK<sup>2</sup>, Saskia ALTENHOF<sup>1</sup>, Wolfgang PFISTER<sup>3</sup>, Ulrich SCHIFFNER<sup>1</sup>

<sup>1</sup> Department of Restorative and Preventive Dentistry, Center for Dental and Oral Medicine, University Medical Center Hamburg-Eppendorf, Germany

<sup>2</sup> Department of Periodontology, Laboratory of Oral Microbiology, University of Bern, Bern, Switzerland

<sup>3</sup> Institute of Medical Microbiology, University Hospital of Jena, Jena, Germany

**Objectives:** To compare the effectiveness of a hydrodynamic (RinsEndo™) versus an ultrasonic irrigation (piezo smart™) in reducing of *E. faecalis* and other microflora. **Materials and Methods:** 250 human single-rooted permanent teeth were endodontically treated. Afterwards they were contaminated with *E. faecalis*, aerobic and anaerobic mixed bacterial cultures. First, the bacteria-reducing effects of the irrigation systems were evaluated versus a manual irrigation by using 0.9% NaCl each (Mann-Whitney test). Colony forming units (cfu) counts were assessed. Second, the bactericidal effects of all systems were compared up to 5 days after usage to a control group using 1.5% NaOCl alone and in combination with 0.2% CHX. Statistical analysis was performed by chi-square test including the method of rinsing, irrigants and microflora. **Results:** Mechanical irrigation methods using a system reduced significantly more the cfu counts than manual rinsing (each  $p < 0.001$ ). Comparison within the systems showed that after ultrasonic activated irrigation cfu counts were significantly lower than after the hydrodynamic one ( $p = 0.011$ ). The second part of the study demonstrated equal reduction of bacteria for both systems, whereas the application of NaOCl and CHX was more effective than application of NaOCl alone. **Conclusions:** Hydrodynamic and the ultrasonic irrigation support elimination of microbes from the root canal. **Clinical Relevance:** Hydrodynamic or ultrasonic irrigation in endodontic treatment should be combined with application of 1.5% NaOCl and 0.2% CHX.

## PP 72

Category: Endodontics

### PREVALENCE OF VERTICAL ROOT-FRACTURES IN EXTRACTED ENDODONTICALLY TREATED TEETH: A CLINICAL STUDY IN KOREAN PATIENTS

Ji-Hyui LIM<sup>1</sup>, Seok-Woo CHANG<sup>1</sup>, Hyun-Mi YOO<sup>1</sup>, Dong-Sung PARK<sup>1</sup>, Tae-Seok OH<sup>1</sup>

<sup>1</sup>Conservative Dentistry, Samsung Medical Center, School of Medicine, Sungkyunkwan University, Seoul, Korea

**Objectives** The purpose of this study was to investigate prevalence of vertical root fractures in extracted endodontically treated posterior teeth in Korean patients and to evaluate the clinical features associated with vertical root fractures. **Materials and Methods** A total of 1095 extracted endodontically treated posterior teeth from January 2008 to December 2010 were reviewed. The final diagnosis of

vertical root fracture in all cases was based on the findings from the extracted tooth. Clinical data was collected from each patient's dental history, clinical examination, and radiographs before extraction. Results The major reasons for extraction of the endodontically treated teeth were restorative (30.5%), endodontic-periodontal (25.4%), and periodontal problem (15.5%), followed by vertical root fractures (14.8%). Vertical root fractures in endodontically treated teeth tended to occur in patients with a mean age of 57 years old and were more frequent in male patients. The clinical symptoms and signs most often found are mild pain to percussion, formation of sinus tract, extensive restorations in the area of the fractured tooth, and periradicular bone loss revealed by periapical radiograph. Conclusions The prevalence of vertical root fractures in endodontically treated posterior teeth was 14.8% in Korean patients. Making a clinical diagnosis of vertical root fractures before extraction is difficult, so frequent recalls and careful observation are recommended for susceptible teeth. Clinical relevance There was relatively high prevalence of vertical root fractures in endodontically treated posterior teeth. This may be due to the difficulties in making a diagnosis of vertical root fractures before extraction.

#### PP 73

Category: Endodontics

MANAGEMENT OF THE SUBGINGIVALLY FRACTURED CENTRAL INCISOR USING FRAGMENT RE-ATTACHMENT: 8 YEAR FOLLOW-UP CASE REPORT  
Mert Gokay EROGLU<sup>1</sup>, Betül OZCOPUR<sup>2</sup>

<sup>1</sup>Endodontics, Yeditepe University Faculty of Dentistry, Istanbul, Turkey

<sup>2</sup>Endodontics, Yüzüncü Yıl University Faculty of Dentistry, Van, Turkey

Objectives: This case report describes a successful treatment of vertically fractured tooth which was reconstructed with a self-cure adhesive resin cement using fractured tooth fragment. Materials and Methods: This case report presents a 29 year old female with an oblique crown-root fractured maxillary left central incisor and a horizontal root fracture in the apical third of the right maxillary central incisor. Clinically there was mobility in left central incisor, it was devital and it had swelling through the palatal surface. , whereas right central incisor showed physiological mobility, responded to pulp testing and surrounding periodonal tissues were healthy. Fractured fragment of the 21 was removed after anesthesia. The root canal was filled with AH Plus sealer and gutta-percha. After setting of the sealer, 3 mm of the gutta-percha was removed and fragment was luted with SuperBond C&B (Sun Medical, Japan). Buccal

surface of the 21 was restored with composite material (Clerafil SE Bond, Clearfil AP-X, Kuraray). Right central incisor was unrestored and recalled. Results: The radiographic and clinical examinations on the 24-month, 48-month and 8 year follow-ups showed that the fractured tooth remained functional, re-attachment of the fragment was stable and aesthetic and periodontal health were optimal. Additionally, fractured apical third of the right maxillary central incisor indicated no clinical symptom, obtained vital but resorption has been seen on fractured apical third. Conclusions: Adhesive resin systems can be considered as a good choice for restoring complicated crown root fracture with excellent biological and physical properties.

#### PP 74

Category: Endodontics

COMPARISON OF THE FRACTURE RESISTANCE OF FIBER POST SYSTEMS WITH DIFFERENT SHAPE AND CONTENT

Ilgin AKÇAY<sup>1</sup>, Hande KEMALOĞLU<sup>2</sup>, Oğuz AKTENER<sup>1</sup>, Banu ÖNAL<sup>2</sup>

<sup>1</sup>Endodontology, Ege University, Izmir, Turkey

<sup>2</sup>Restorative Dentistry, Ege University, Izmir, Turkey

Objectives: It still remains unclear as to whether tapered post design compatible with the rotary systems will significantly improve the fracture resistance of endodontically treated teeth. This study compared the fracture resistance of teeth restored with different post systems. Materials and Methods: Fifty extracted mandibular premolars, amputated at the cemento-enamel junction were endodontically treated. Five groups of 10 specimens were formed. Four fiber post systems with various designs/content were tested: group-1: Unicore (Ultradent, USA), group-2: DT Light-post (Bisco Inc., USA), group-3: Snowlight® (Carbotech, France), group-4: Exacto Translucido (Angelus®, Brazil). group-5: composite resin core without post served as negative control. Posts were cemented with self-adhesive, dual-cure resin cement. Teeth were restored with composite cores. Specimens were embedded in acrylic resin and secured in a universal-testing machine. A compressive load was applied at 90° to the long axis of the tooth, at a crosshead speed of 0,5 mm/min, until fracture occurred. Statistical analysis was performed by using One-way-ANOVA and Dunnett-T3 tests. Results: The mean failure loads (N) were 111.34, 115.19, 77.99, 120.96 and 39.70 for groups 1 to 5, respectively. Teeth restored with Exacto-Translucido exhibited significantly higher resistance to fracture (P<.05) than the other 4 groups. However, fractures that would allow repair were observed in each post systems. Conclusions: Significantly

higher failure loads were recorded for teeth restored with Exacto-Translucido fiber posts. Nevertheless, the fracture modes were repairable in nature, for all of the post systems. Clinical Relevance: Tapered fiber post design compatible with the rotary systems may not improve the fracture resistance.

#### PP 75

Category: Endodontics

#### THE ASSESSMENT OF ACCESSORY MENTAL FORAMINA USING CONE BEAM COMPUTED TOMOGRAPHY

Özkan MILOGLU<sup>1</sup>, İbrahim Sevki BAYRAKTAR<sup>1</sup>, Sevcihan GÜNEN<sup>1</sup>

<sup>1</sup>Dentomaxillofacial Radiology, Health Sciences, Erzurum, Turkey

**Objectives** In this retrospective study, we aimed to examine the accessory mental foramen (AMF) using cone beam computed tomography (CBCT). **Materials and Methods** A total of 315 patients (129 females and 186 males) were analyzed. The mental foramen (MF) and AMF were investigated using axial and cross-sectional images. The relationship between the sizes of MF and AMF presence and absence was searched. **Results** 22 AMF were found in 20 (6.3%) patients. There was no significant difference between the sizes of MF and AMF presence and absence. **Conclusion** Confirmation of the existence of the accessory mental foramen could avoid nerve injury during periapical surgery. CBCT is effective for presurgical 3-dimensions assessment of the neurovascular structures in dentoalveolar treatment. **Clinical relevance:** It is important to recognize anatomical variations that may influence diagnosis and treatment planning in dentistry. The recognition of accessory mental foramen may contribute to adequate anesthetic techniques and help to avoid misdiagnosis of bone lesions and eventual damages to the nerves and vessels during periapical surgical procedures. Additionally, the possibility of accessory mental foramen-related sensory disturbance is low during root canal treatment unless the mental foramen and mandibular canal are injured.

#### PP 76

Category: Endodontics

#### IN VITRO EVALUATION OF 1%, 2% AND 5% OREGANO SOLUTION AS AN ENDODONTIC IRRIGANT SOLUTION

Necdet ADANİR<sup>1</sup>, Evren OK<sup>2</sup>, Tuba OZTURK<sup>3</sup>

<sup>1</sup>Department of Endodontics, Gaziantep University, Faculty of Dentistry, Gaziantep, Turkey

<sup>2</sup>Department of Endodontics, Sifa University, Faculty of Dentistry, Izmir, Turkey

<sup>3</sup>Department of Microbiology, S. Demirel University, Faculty of Medicine, Isparta, Turkey

**Objectives:** The aim of this in vitro study was to compare the effectiveness of Oregano extract solution (*Origanum minutiflorum*) (OES) with chlorhexidine gluconate (CHX) and sodium hypochlorite (NaOCl) to remove the smear layer and to eradicate *Enterococcus faecalis* from the root canals. **Materials and Methods:** In this study, a total of 180 human maxillary central incisors teeth were used in 15 groups. Antimicrobial evaluations were performed by colony-forming units (CFUs) counts in the first seven groups. In the other eight groups, effect of the solutions on the smear layer was studied. Examination was made with SEM **Results:** CHX, 5% and 2% OES wasn't found to be statistically significant regarding their antibacterial activities against *E. faecalis*. 1% OES and NaOCl showed similar antimicrobial effect, and 1% OES and NaOCl were better than EDTA and saline but not as successful as CHX. According to the results obtained from dentin, CHX is the most effective solution within dentinal tubules. Different concentrations of OES weren't achieved smear layer removal alone but OES in conjunction with 17% EDTA was the final irrigating solution achieved the smear layer removal. **Conclusions:** Within the limitations of this study, while 1% OES and 5,25% NaOCl showed similar results in terms of antimicrobial effect, 2% and 5% OES showed a better effect compare with 5.25%NaOCl within the root canal. CHX is a highly effective irrigation solution in eradicating *E. faecalis* from root canal. **Clinical relevance:** OES appears a possible alternative to the use of NaOCl as a root canal irrigant.

#### PP 77

Category: Endodontics

#### CLINICAL STUDY ON THE ENDODONTIC IMPLICATIONS IN PATIENTS TAKING IV BISPHOSPHONATES

Paola FRANCO<sup>1</sup>, Damiano PASQUALINI<sup>1</sup>, Paolo AMBROGIO<sup>1</sup>, Elio BERUTTI<sup>1</sup>

<sup>1</sup>Endodontics, University of Turin Dental School, Turin, Italy

**Objectives:** Bisphosphonates are pharmacological compounds of which the most important biological effect is bone remodelling reduction. Bisphosphonates are associated with a rare adverse event called osteonecrosis of the jaws (ONJ). The purpose of this study was to evaluate healing potential of periradicular lesions after root canal therapy in

patients taking endovenous bisphosphonates and to assess the correlation between ONJ and periradicular lesions. **Materials and Methods:** Teeth with or without preoperative periradicular radiolucency identified in patients undergoing endovenous bisphosphonate therapy. Each case was examined clinically and radiographically in order to determine the treatment outcome. Non-surgical root canal treatments and retreatments were performed by a single endodontic operator at the Lingotto Dental School of Turin **Results:** in the retreatments group 77% of lesions healed, whereas the root canal treatments group had a healing rate of 100%. Patients suffering from post extraction ONJ showed periradicular lesion in 57% of extracted teeth. **Conclusion:** The results of this preliminary short-term study suggest that patients taking endovenous bisphosphonates could expect a satisfying outcome, with evidence of periradicular healing, after undergoing conventional root canal treatment or retreatment and that there is a higher possibility of presenting ONJ if the tooth extracted was already affected by periradicular lesion. **Clinical Relevance:** Impact of endovenous bisphosphonates on periradicular lesions has not been studied yet and it has been demonstrated that there is a higher possibility of future ONJ when the extracted tooth has already been affected by a periradicular

#### PP 78

Category: Endodontics

#### COMPARATIVE EVALUATION OF THE DIMENSIONAL CHANGES OF PULP CHAMBER IN HEMODIALYSIS AND TRANSPLANTED PATIENTS

Y. BENDERLI<sup>1</sup>, T. ERDEM<sup>1</sup>, D. ERDILEK<sup>2</sup>, M. GEREK<sup>2</sup>

<sup>1</sup>Faculty of Dentistry, Istanbul University, Istanbul, Turkey

<sup>2</sup>Faculty of Dentistry, Yeditepe University, Istanbul, Turkey

**Objective:** The purpose of this study is to identify dimensional changes in pulp chamber on hemodialysis or transplanted patients due to renal disease. **Materials and Methods:** Forty-four patients with chronic renal disease over one year who are undergoing dialysis or renal transplantation, between the ages of 20–55, were examined. Full-mouth periapical radiographs of all patients were taken. The obtained images were digitalized and adapted to software program. Appropriate to the measurement of the software program, outer lines of images of the teeth were determined and drawn digitally. The inner areas were measured automatically. The outer lines of images of pulp chamber were marked and also determined as the same way. Afterwards, ratio between areas of the pulp chamber and the tooth were calculated for each tooth. Areas of dental hard tissue

and the pulp chamber were identified as two dimensional. The measurements were obtained according to the ratio of these values. The findings were evaluated statistically by ANOVA. **Results:** Comparison of dimensional changes of pulp on hemodialysis, transplanted patients and healthy individuals; there were more significant statistical differences between healthy individuals and both of hemodialysis and transplanted patients ( $p < 0.001$ ). Otherwise, no significant difference was found between hemodialysis and transplanted patients ( $p = 0.145$ ). **Conclusion:** Dimensional changes of pulp chamber on end-stage renal disease patients were observed as pulp narrowing in contrast with healthy individuals. **Clinical Relevance:** Pathological narrowing of pulp chamber, without local etiological factors, may point to a failure of renal metabolism.

#### PP 79

Category: Endodontics

#### ACCURACY OF POSTENDODONTIC PAIN PREDICTION WITH A FREE SOFTWARE APPLICATION: P3

Ana ARIAS<sup>1</sup>, Jose C. DE LA MACORRA<sup>1</sup>

<sup>1</sup>Conservative Dentistry, Complutense University, Madrid, Spain

**Objectives.** To present a free Microsoft Windows® based computer application (P3) to ease calculations based in predictive models for incidence, intensity and duration of PP and to validate the preexisting formulas. **Materials and Methods.** 100 one-visit root canal treatments were carried out with manual shaping and lateral condensation. Apical patency was maintained, 5% NaOCl was used for cleaning. PP characteristics (incidence, intensity and duration) were surveyed. 58 answered questionnaires were valid. Factors needed to validate these formulas were collected in medical records. Predictive factors registered were inherent to patients (age and gender), to tooth to be treated (group, location, presence of preoperative pain and presence of periapical radiolucencies) and to clinical procedures (previous endodontic access and occlusal reduction). These values were introduced in the P3 software application and probabilities for incidence, intensity and duration of postendodontic pain were calculated. The validity of the preexisting models was statistically tested with the Hosmer-Lemeshow goodness-of-fit test. **Results.** Results of the test were  $p = 0.73$  for the incidence,  $p = 0.92$  for the intensity and  $p = 0.76$  for duration of postendodontic pain, showing a good fit of models. **Conclusions.** Predictive formulas for incidence, intensity and duration of PP were validated with external data. **Clinical Relevance.** Taking a couple of minutes after a root canal to introduce data referring to patient, tooth to

be treated and clinical procedures in a free PC application (P3), patients can be rationally informed of the probability of the incidence, the intensity and the duration of PP.

**PP 80**

Category: Operative dentistry

**INFLUENCE OF COATING SURFACE SEALER ON COMPOSITE RESIN WATER ABSORPTION: AN IN VITRO STUDY.**

Allegra COMBA<sup>1</sup>, Damiano PASQUALINI<sup>2</sup>, Elio BERUTTI<sup>2</sup>, Nicola SCOTTI<sup>1</sup>

<sup>1</sup>Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup>Endodontics, University of Turin, Turin, Italy

**Objectives** The aim of this in vitro study was to evaluate the effect of a coating sealer in reducing composites water absorption. The null hypothesis is that coating sealer is able to reduce water absorption. **Materials and methods** Forty anterior extracted teeth were selected and sectioned 1 mm under the CEJ. On each sample a standard cavity (2×2×

2 mm) was prepared on the buccal surface, filled with composite and then, finished and polished. The pulp chamber and the whole crown was made waterproof with nail polish until 1 mm from the restoration margins. Samples were randomly divided into 4 groups (n=10) according to the resin composite employed: 1) nano-hybrid composite, 2) micro-filled composite, 3) nano-filled composite and 4) glass-ionomer. Each group was then divided into subgroup A, where coating sealer was placed on the restoration, and subgroup B, where coating was not used. Teeth were weighed with a precision scales at T=0, stored in distilled water and reweighed at 7,14, 21 and 28 days. Results were statistically analyzed with two-way ANOVA test (p<0,05). Results: Mean weight variance and SD are expressed in table 1. Statistical analysis showed that there was no significant difference between subgroup A and subgroup B. **Conclusions** The null hypothesis was rejected since coating sealer did not influence composite water absorption. However, all specimens showed an increase in weight after one month water storage. **Clinical relevance:** Composite resins absorb water and that can modify their mechanical properties.

Table 1 - Mean weight variance and standard deviation

Composite	Coating	Weigh (g) Δ T0-T1	Weigh (g) Δ T0-T2	Weigh (g) Δ T0-T3	Weigh (g) Δ T0-T4	Weight Increase T0-T4 (%)
NANO-HYBRID (Estelite, Tokuyama, Japan)	YES	0,0037 (±0,0023)	0,0067 (±0,0033)	0,0082 (±0,0045)	0,0100 (±0,0041)	2
NANO-HYBRID (Estelite, Tokuyama, Japan)	NO	0,0053 (±0,0020)	0,0077 (±0,0027)	0,0095 (±0,0039)	0,0112 (±0,0017)	2,41
NANO-FILLED (Filtek Supreme XTE, USA)	YES	0,0046 (±0,0010)	0,0068 (±0,0012)	0,0091 (±0,0026)	0,0120 (±0,0026)	2,79
NANO-FILLED (Filtek Supreme XTE, USA)	NO	0,0086 (±0,0012)	0,0108 (±0,0031)	0,0153 (±0,0062)	0,0159 (±0,0069)	3,38
MICRO-FILLED (Dei, Italy)	YES	0,0040 (±0,0009)	0,0075 (±0,0018)	0,0115 (±0,0045)	0,0149 (±0,0064)	3,28
MICRO-FILLED (Dei, Italy)	NO	0,0058 (±0,0021)	0,0085 (±0,0032)	0,0117 (±0,0031)	0,0140 (±0,0056)	2,52
GLASS-IONOMER (GC, Tokyo, Japan)	YES	0,0045 (±0,0018)	0,0050 (±0,0018)	0,0080 (±0,0030)	0,0118 (±0,0035)	2,93
GLASS-IONOMER (GC, Tokyo, Japan)	NO	0,0068 (±0,0018)	0,0068 (±0,0018)	0,0160 (±0,0007)	0,0160 (±0,0035)	2,49

**PP 81**

Category: Operative dentistry

**STRONTIUM, MAGNESIUM AND ZINC CONCENTRATION MEASUREMENTS IN HUMAN PERMANENT TEETH IN KOSOVO AND AUSTRIA**

Blerim KAMBERI<sup>1</sup>, Veton HOXHA<sup>1</sup>, Ariana KAMERI<sup>1</sup>, Lumnije KQIKU<sup>1</sup>

<sup>1</sup>Dental Pathology and Endodontics, University Dentistry Clinical Center of Kosova, Prishtina, Kosovo

**Objectives** The purpose of this to study was to determine the Sr, Mg and Zn concentrations in human permanent teeth from residents in Kosovo and Austria. **Materials and Methods** In this study we selected 31 permanent extracted teeth from residents in Mitrovica, (Kosovo) and 23 teeth from residents in Graz (Austria). The age range of humans concerned was from 18 to 52. The comparisons were based on the geographic area, age and gender. The content of Sr, Mg and Zn has been determined by Agilent 7500c inductively coupled plasma mass spectrometer (Agilent, Waldbronn, Germany). The data were assessed statistically

using t-tests. Results We found that, in comparison to teeth from Graz, teeth from Mitrovica contained higher concentrations of Sr and Mg. According to age we found statistically significant differences in the concentrations of Sr ( $p < 0.001$ ) for the 30–39 years, while for Mg values there was significant difference for all age groups of Mitrovica compared to Graz ( $p < 0.001$ ). There were no significant differences in Sr levels according to gender. However, the concentration of Mg in teeth of males from Mitrovica was significantly higher than in females ( $p < 0.001$ ), while for samples of Graz there was no statistically significant difference. Zinc values were higher in samples of Mitrovica than Graz, without significant differences. Conclusion Our results suggest that place of residence is related to the Sr and Mg concentration in human permanent teeth. Clinical Relevance Determination of Sr, Mg and Zn in human teeth is important to evaluate the level of body supply with essential trace elements.

#### PP 82

Category: Operative dentistry

#### A SUBSTANTIAL MESENCHYMAL STEM CELL SOURCE: DENTAL PULP

Cigdem ATALAYIN<sup>1</sup>, Taner DAGCI<sup>2</sup>, Gulperi OKTEM<sup>3</sup>, Huseyin TEZEL<sup>1</sup>

<sup>1</sup>Restorative Dentistry, Ege University, Faculty of Dentistry, Izmir, Turkey

<sup>2</sup>Physiology, Ege University, Faculty of Medicine, Izmir, Turkey

<sup>3</sup>Histology and Embryology, Ege University, Faculty of Medicine, Izmir, Turkey

Objectives: Human dental pulp stem cells (DPSC) have been shown to be a significant source of adult stem cells for regenerative medicine and dentistry. The aim of this study was to isolate and characterize/identify DPSC derived from human impacted third molar teeth with flow cytometry analysis. Materials and Methods: DPSC isolated from extracted human third molar teeth were assessed for cell morphology and colony forming with inverted microscopy and analyzed for hematopoietic and mesenchymal clusters of differentiation (CD34, CD45, CD73, CD90) with flow cytometry after 72 hours and 21 days (first passage) culture periods. Results: The cells depicted fibroblast-like appearances and colony forming increased following culture days. Isolated DPSC were highly positive for mesenchymal cell markers (CD73, CD90), but negative for hematopoietic markers (CD34, CD45). The ratio of the CD73 and CD90 positive DPSC increased during the culture period by selective cell proliferation. Con-

clusion: Considering the high rate of CD73 and CD90 positive cells, dental pulp can be used as a source of mesenchymal stem cells which we could isolate and culture. Clinical Relevance: Dental pulp has the potential to form dentin as a regenerative response to caries. This regeneration is mediated by mesenchymal stem/progenitor cells. Easy accessibility of DPSC makes these cells a suitable source of stem cells for dental tissue engineering. Thus, DPSC based on dental therapy models might be of potential utility in induction of reparative dentin for regenerative dentistry.

#### PP 83

Category: Operative dentistry

#### FRACTURE STRENGTHS OF COMPOSITE LAMINATE VENEERS FABRICATED BY DIFFERENT PREPARATION TECHNIQUES

Banu ONAL<sup>1</sup>, Tijen PAMIR<sup>1</sup>, Ipek BOLUKBASI<sup>1</sup>

<sup>1</sup>Restorative Dentistry, Ege University Faculty of Dentistry, Izmir, Turkey

Objective: This study evaluated the fracture strengths of laminate veneers produced by two different types of composites and four different preparation techniques. Material and Methods: One-hundred and thirty-five caries-free human maxillary central incisors were randomly divided into nine groups each containing of 15. Group 1 and 5 were designed with window type; Group 2 and 6 with facial surface; Group 3 and 7 with bevel; Group 4 and 8 with incisal overlap preparations. A nanofil composite (Filtek Supreme XT) was used in Group 1, 2, 3 and 4 while a nanohybrid composite (Clearfil Majesty Esthetics) used in Group 5, 6, 7, and 8. Group 9 was the control and remained intact. Following to thermocycling, all specimens were mounted in acrylic resin, loaded incisally by universal testing machine and the failure-loads (N) were determined. Statistical analyses were performed with two-way ANOVA including Tukey post-hoc test ( $p < 0.05$ ). Results: There were no significant differences between the composites ( $p > 0.05$ ) while the preparation techniques affected maximum fracture loads of the laminate veneers ( $p < 0.05$ ). Maximum forces among the control and experimental groups were found different ( $p < 0.01$ ). Multiple comparisons revealed that maximum forces of the samples for Group 4 and 8 were higher than 1, 2, 5 and 6 ( $p < 0.05$ ). Conclusion: Within the limitation of this study, the preparation techniques seem to affect the maximum failure load of the laminate resin composite veneers. Clinical Relevance: Incisal overlap preparations increase the mechanical strength of laminate

veneers independent of the resin composites used in this study.

#### PP 84

Category: Operative dentistry

#### A SCANNING ELECTRON MICROSCOPE EVALUATION OF INFILTRATION OF NATURAL CARIES LESIONS

Grigoria GKAVELA<sup>1</sup>, Christos RAHIOTIS<sup>2</sup>, Georgios MOUNTOURIS<sup>1</sup>

<sup>1</sup>Operative Dentistry, School of Dentistry, University of Athens, Athens, Greece

<sup>2</sup>Oral Biology, School of Dentistry, University of Athens, Athens, Greece

**Objectives:** The aim of this study is to evaluate qualitatively the penetration of a commercially available infiltrant into natural caries of proximal surfaces in human extracted teeth with the use of scanning electron microscope. **Materials and Method:** Ten human freshly extracted teeth with not cavitated incipient caries in proximal surfaces were used in this study (n=10). The carious lesions were examined by two operators with ICDAS visible clinical criteria, the use of the DiagnodentPen (Kavo) device and video microscope observation in 4× magnification. Then, the teeth were divided randomly in two groups. The first group was treated with ICON system according to the manufacturers' instructions and the other group (control group) was treated with 15% hydrochloric acid for 120 seconds. Then, the samples were prepared for SEM observation and analyzed both in SEI and BEI images. **Results:** The SEM images in the test group showed that resin penetration into natural caries lesions was inhomogeneous and not complete. The SEM images also revealed various regions that were not infiltrated with resin but were etched with hydrochloric acid. SEM images from the control group showed that the lesions were not etched homogeneous. **Conclusions:** The results of this in vitro study indicated that ICON resin cannot infiltrate to a full extend the carious lesions and also the etching acid could not fully penetrate the whole lesion. **Clinical Relevance:** In clinical conditions the results of this study could mean that carious lesions treated with ICON system could be susceptible to caries.

#### PP 85

Category: Operative dentistry

#### INCREMENTAL FILLING TECHNIQUES IN CLASS II COMPOSITE RESTORATIONS PERFORMANCE: 2-YEARS CLINICAL OUTCOME

Patrícia MANARTE-MONTEIRO<sup>1</sup>, Maria Conceição MANSO<sup>2</sup>, Sandra GAVINHA<sup>1</sup>, Sandra FARIA<sup>1</sup>, Paulo MELO<sup>3</sup>

<sup>1</sup> Department of Dental Medical Sciences, Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal

<sup>2</sup> Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal & REQUIMTE-UP, Porto, Portugal

<sup>3</sup> Faculty of Dental Medicine, University of Porto, Porto, Portugal

**Objectives:** This prospective clinical trial aim to evaluate class II composite restorations performance and compare the oblique and modified incremental fillings, over 2 years. **Materials and Methods:** One-hundred and five restorations were performed in premolar teeth of 26 adults. By randomized allocation, three groups (composite/incremental filling) with 35 restorations were formed: Two groups (nano-structured, average-consistency, Ceram-XTMmono; Packable, high-consistency, SureFilTM; Dentsply) using the incremental oblique filling (OIF); one group (high- and average-consistency, CXm and SU) by the modified incremental filling (MIF). Restorations were evaluated at baseline and 2-years, by two calibrated examiners ( $\kappa$  of 0.90), according to modified USPHS-criteria; and rated to aesthetic, functional and biological parameters, by fillings (OIF/MIF). **Results:** At 2-years OIF (n=61; 12.9% dropout) and MIF (n=31; 11.5% dropouts) restorations showed success rates of 98.3% and 96.8%, respectively; OIF restorations registered better aesthetic performance (T.Fisher, p=0.016); No functional and biological differences (p>0.05) between OIF/MIF. Face to baseline, OIF restorations showed aesthetic and functional changes (T.McNemar, p<0.025), 1.7% functional (T.Wilcoxon, p=0.016) and 1.6% biological (T. McNemar, p>0.05) failure; MIF restorations revealed aesthetic and functional changes (p=0.031) and 3.2% showed biological failure (p>0.05). **Conclusions:** After 2-years, there are differences in restorations clinical performance by incremental fillings for an aesthetic parameter. Efficiency is higher in OIF than in MIF restorations. However, a longer-term assessment of the effect it is essential. **Clinical Relevance:** Both incremental fillings can be successfully used in restoring posterior teeth with composite.

#### PP 86

Category: Operative dentistry

#### ONE-STEP SELF-ETCH VERSUS ETCH-AND-RINSE ADHESIVE STRATEGIES IN NONCARIOUS CERVICAL LESIONS: CLINICAL REPORT OVER 18-MONTH

Patricia MANARTE-MONTEIRO<sup>1</sup>, Sandra FARIA<sup>1</sup>, Sandra GAVINHA<sup>1</sup>, Liliana COSTA<sup>1</sup>, Maria Conceição MANSO<sup>2</sup>

<sup>1</sup>Department of Dental Medical Sciences, Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal

<sup>2</sup>Faculty of Health Sciences, University Fernando Pessoa, REQUIMTE-UP, Porto, Portugal

**Objectives:** This study aim to evaluate and compare the noncarious cervical lesions composite restorations performance by applying one-step Self-Etch (SE) or Etch-and-Rinse (ER) adhesives for 18 months. **Materials and Methods:** For this prospective clinical trial, 29 adult patients received 77 restorations randomly allocated to two groups (microhybrid composite/adhesive system); SE Group: 43 restorations, Amaris®/ FuturabondNR; ER Group: 34 restorations, Amaris®/SolobondM (Voco GmbH). All restorations were evaluated (aesthetic, functional and biological parameters) at baseline, 12th and 18-months by three calibrated (ICC $\geq$ 0.928) examiners (modified USPHS-criteria and Hickel and colleagues (2007) recommendations). SE and ER efficacy (success rate) was determined over 18-months. **Results:** At 18 months, the SE (n=40; 7% dropout) and ER (n=34) restorations showed success rates of 97.5% and 100% (T. Fisher/Mann-Whitney,  $p>0.05$ ), respectively, with no significant differences between SE/ER regarding aesthetic, functional and biological restorations performance. Face to baseline and 18th-month registers, SE restorations showed significant aesthetic (T.Friedman,  $p<0.002$ ), functional ( $p<0.002$ ) and biological ( $p=0.001$ ) changes; 2.5% were unsatisfactory but repairable (Charlie, score 4) regarding the marginal adaptation ( $p<0.001$ ); ER restorations experienced significant aesthetic ( $p<0.002$ ) and functional ( $p<0.007$ ) changes. **Conclusions:** At 18th months, SE and ER restorations show similar performance, though aesthetic, functional and biological changes face to baseline and 12-month follow-up; Although no significant differences between SE/ER, efficacy seems to be higher for ER restorations. However, is essential to assess these restorations performance in a longer term. **Clinical Relevance:** The SE and ER adhesives show acceptable performances in composite restorations of noncarious cervical lesions. **Acknowledgment:** VOCO GmbH

#### PP 87

Category: Operative dentistry

ELUTION AND ANTIBACTERIAL EFFECT OF MONOMERS FROM THREE DIFFERENT BONDING SYSTEMS

Olga POLYDOROU<sup>1</sup>, Philipp ROGATTI<sup>1</sup>, Martin WOLKEWITZ<sup>2</sup>, Klaus KUMMERER<sup>3</sup>, Elmar HELDWIG<sup>1</sup>

<sup>1</sup>Department of Operative Dentistry and Periodontology, University Medical Center Freiburg, Dental School and Hospital, Freiburg, Germany

<sup>2</sup>Institute of Medical Biometry and Medical Informatics, Albert-Ludwigs-University Freiburg, Freiburg, Germany

<sup>3</sup>Department of Environmental Health Sciences, University Medical Center Freiburg, Freiburg, Germany

**Objectives:** The aim of this study was to evaluate the release of monomers from three bonding systems and correlate it with their antibacterial effect. **Materials and Methods:** Three bonding systems (Optibond FL®, Xeno III® and Clearfil™ Protect Bond) were tested regarding the release of monomers after storage in ethanol 75% and human saliva. Twenty samples (n=10/medium) of each bonding material were prepared and polymerised according to the manufacturers' instructions. Each sample was stored in 1 ml storage medium. The medium was renewed after 24 hours, 7 days, and 28 days and was analyzed by LC-MS/MS. Additionally, the antibacterial effect of the unpolymerised components of each bonding system and their polymerised mixture were tested with Agar disc-diffusion Test. **Results:** Only HEMA was released from the materials. The amount of HEMA detected in the ethanol samples was significantly higher compared to the saliva samples ( $p<0.0001$ ). The release of HEMA ( $p\leq 0.05$ ) decreased significantly by increasing the storage time. The highest release of HEMA was from Xeno III® followed by Optibond FL® and then by Clearfil™ Protect Bond. No MDPB was found to be eluted from Clearfil™ Protect Bond. According to the Agar disc-diffusion test all materials exhibited certain antibacterial activity. **Conclusions:** HEMA was released in ethanol and human saliva. However, the antibacterial activity of the bonding systems seems not to be based on the elution of monomers. **Clinical significance:** The release of HEMA from all tested bonding systems even after storing in human saliva increases the concerns about the toxicity of the bonding systems.

#### PP 88

Category: Operative dentistry

EFFECT OF DIFFERENT BONDING TECHNIQUES ON THE BOND STRENGTH OF TWO DIFFERENT POST FIBER POSTS.

Kansat PALA<sup>1</sup>, Sezer DEMIRBOGA<sup>1</sup>, Hasan Onder GUMUS<sup>1</sup>, Soley ARSLAN<sup>1</sup>, Yahya Orcun ZORBA<sup>1</sup>

<sup>1</sup>Department of Restorative Dentistry, Erciyes University, Faculty of Dentistry, Kayseri, Turkey

**Objectives:** The aim of this study was to investigate the effect of three different bonding techniques on the bond

strength of two different fiber posts to root dentin with micro push out test. **Materials and Methods:** Eighteen teeth with single root were decoronated, prepared and root filled with 18 mm root length. The roots were prepared with using Rebuilda DC (VOCO, Germany) or UniCore (Ultradent, UT) drills, and were divided three subgroups of three each. Luting of the posts were completed with Rebuilda DC(self-etch) in group 1 and 4; BisCem (self-adhesive, Bisco, USA) in group 2 and 5 and Duo-Link (etch&rinse Bisco, USA) in group 3 and 6. After 24 h storage in 100% humidity at 37 °C, serial slices were taken and micro push out test was performed. Data were statistically analyzed with three way ANOVA using posts, luting system and root region (apical and coronal) as factors. **Results:** Bond strengths of fiber posts were affected by the type of post and the resin cement ( $p < 0.05$ ). Push out bond strengths of UniCore groups were higher than Rebuilda DC groups ( $p < 0.05$ ). Push out bond strength of BisCem groups were lower than DuoLink and Rebuilda DC groups. There was no statistically significant differences between DuoLink and Rebuilda groups in addition between apical and coronal sections ( $p < 0.05$ ). **Conclusion:** Bond strength of the fiber post affected by the using of different post and bonding techniques. **Clinical Relevance:** Both self-etch and etch&rinse techniques were showed higher bond strength than self-adhesion technique.

#### PP 89

Category: Operative dentistry

#### MICROTENSILE DENTIN BOND STRENGTHS AFTER FOUR YEARS OF WATER STORAGE

Nimet ÜNLÜ<sup>1</sup>, Zeynep ÜRE<sup>1</sup>, Zeynep ERGÜCÜ<sup>2</sup>, L. Şebnem TÜRKÜN<sup>2</sup>

<sup>1</sup>Restorative Dentistry, Selcuk University, Faculty of Dentistry, Konya, Turkey

<sup>2</sup>Restorative Dentistry, Ege University, Faculty of Dentistry, Izmir, Turkey

**Objectives:** The aim of this study was to evaluate the resin-dentin bond strengths of six adhesive systems after four years of water storage. **Materials and Methods:** Dentin surfaces of eighteen human molars were exposed and flattened with 600 grit SiC paper. The teeth were randomly assigned into six groups. Flat surfaces of dentin were treated with two etch & rinse and four self-etch adhesive systems according to the manufacturer's instructions: Adper Scotchbond Multi-Purpose Plus (SBMP), Adper Single Bond 2 (ASB), Adper SE Adhesive (ASE), Peak LC Bond (PLC), Clearfil S3 Bond (CS3), Xeno V (XV). A resin composite crown was formed about 3 mm high and light cured. Afterwards teeth were stored in distilled water at 37°C for a period of four years. After four years, specimens were prepared and subjected to  $\mu$ TBS test at

1 mm/min cross-head speed. The results were analyzed with One-way ANOVA and Post Hoc Tukey tests ( $\alpha = 0.05$ ). **Results:** After 4 years of water storage, the bond strengths of the tested adhesives were significantly increased compared to their control groups' results except for ASE ( $p < 0.05$ ). **Conclusion:** After 4-year of direct water exposure, the bond strength produced by ASE was unable to resist the deterioration. The increase of bond strengths in all of the other adhesive systems after 4 years of water storage was found to be quite an interesting result. **Clinical Relevance:** The bond strengths of the adhesive systems on dentin may be affected differently by long-term water storage. **Key words:** Water storage, bond strength, dentin adhesives, degradation

#### PP 90

Category: Operative dentistry

#### COLOR DETERMINATION OF REMINERALIZED WHITE SPOT LESION BY SPECTRORADIOMETER

Juhea CHANG<sup>1</sup>, Younju KIM<sup>2</sup>, Keewook YI<sup>3</sup>, Jung-Hyun LEE<sup>2</sup>, Ho-Hyun SON<sup>2</sup>

<sup>1</sup>Clinic for Persons with Disabilities, Seoul National University Dental Hospital, Seoul, Korea

<sup>2</sup>Department of Conservative Dentistry, Seoul National University, Seoul, Korea

<sup>3</sup>Geochronology Team, Korea Basic Science Institute, Daejeon, Korea

**Objectives** The purpose of this study was to evaluate the effects of demineralization on the color of white spot lesion. **Materials & Methods** Human premolars were sectioned into quarters with a 2×4 mm window on the enamel surface. All specimens were subjected to pH cycling to produce artificial caries lesion. Each four specimens were randomly allocated into four groups (n=10/group): group 1; immersion in deionized water, group 2; pH cycling without fluoride (F) application, group 3; immersion in 1000 ppm NaF solution for one hour during a pH cycling, group 4; immersion in 5000 ppm NaF solution for one hour during a pH cycling. At the baseline, after caries formation, and after pH cycling, color of the enamel-dentin complex was determined using a spectroradiometer. The extent of demineralization was evaluated by scanning electron microscopy and electron probe microanalysis. **Results** Significant changes in color ( $\Delta E^*$ ) were observed after formation of white spot lesion ( $p < 0.05$ ). The color change was mainly due to  $\Delta L^*$  and  $\Delta b^*$ . F application induced a significant change in  $\Delta E^*$  in the group 4, compared to  $\Delta E^*$  in the group 1 ( $p < 0.05$ ). SEM showed the signs of demineralization. Net mineral gain was determined using EPMA. **Conclusion** Whiteness of initial caries lesion was resulted from decreases of lightness ( $L^*$ ) and yellowness ( $b^*$ ). Remineralization

by F treatment partly restored the color of white spot lesion. Clinical relevance F treatment may serve as non-invasive treatment for esthetic enhancement of white spot lesion.

#### PP 91

Category: Operative dentistry

#### CLINICAL EVALUATION OF THREE OVER THE COUNTER (OTC) BLEACHING PRODUCTS

Maria ANTONIADOU<sup>1</sup>, Antonios KONIARIS<sup>1</sup>, Charikleia PAXIMADA<sup>1</sup>, Gerasimos DOUVITSAS<sup>1</sup>, Afroditi KAKABOURA<sup>1</sup>

<sup>1</sup>Operative Dentistry, Dental School of Athens, Athens, Greece

**Objective:** The aim of the clinical study was to compare the efficiency of over the counter bleaching products (OTC) with 10% carbamide peroxide. **Methods:** Subjects were Caucasian males (n=32) and females (n=68), 20 to 30 years old. Teeth #12,21,23,33,41 were measured in every subject. Four groups were randomly formed (n=25): toothpaste (P) (Herbal White), whitening toothpaste (Propoline) (T), whitening varnish (V) (Unipen), 10% carbamide peroxide in splints (S). P and T were used for 30, V and S for 15 days. Color assessment was performed with: spectroshade device (Sp) (MHT Optic Research) and 3-D Master guide (Vi) (Vitapan). The L, a\*, b\* values of Vi shades were determined by colorimeter.  $\Delta E$  values were calculated at 0–15, 15–30, 30–90 day intervals. Values were analyzed by three-way Anova and Tukey (p=0.05). **Results:** P revealed higher  $\Delta E$  values than T in all teeth, sexes, intervals and methods. OTC products provided higher  $\Delta E$  in #12, 41 and in #23, 33, for males and females, accordingly. Higher  $\Delta E$  values recorded by S relative to OTC treatments at 90-day post-treatment for all teeth and sexes. Vi and Sp presented similar  $\Delta E$  changes for same groups although Vi recorded higher numerical  $\Delta E$  than Sp. **Conclusions:** Bleaching effect by OTC is tooth type and sex and treatment method depended. Carbamide peroxide causes longer bleaching results than OTC. Bleaching color changes can be reliably detected by 3-D Master. **Clinical Relevance:** OTCs are efficient bleaching means for short time and carbamide peroxide for longer time periods.

#### PP 92

Category: Operative dentistry

#### RELATION OF COLOR DISCRIMINATION ABILITY TO COLOR MATCHING PERFORMANCE OF DENTAL STUDENTS

Aggeliki FOUGIA<sup>1</sup>, Panagiotis LAGOUVARDOS<sup>1</sup>

<sup>1</sup> Operative Dentistry, Dental School, University of Athens, Athens, Greece

**Objectives** The purpose of this study was to investigate the relationship of color vision deficiency and color discrimination ability of dental students, with their tooth color matching ability using customized shade guides. **Materials and methods** 150 dental students, aged 19–25 years old, were tested a) for red-green color vision deficiency using the Ishihara test, and b) for color discrimination ability using the Farnsworth-Munsell 100 Hue test. Both tests were conducted in a booth with D65 illumination. Then students were asked to match 12 porcelain disks to a custom made 16-disk Vita Lumin Vacuum shade guide. **Results** According to Ishihara test, only 2% of the students found to have red-green color vision deficiency and 4% normal color vision in doubt. According to Farnsworth-Munsell 100-Hue test, 60% of males and 49% of females had superior color discrimination ability, with no statistically significant difference between sexes (p=0.171). According to matching test, no difference was found between sexes in respect to their matching ability (p=0.338). Most of the students matched correctly the disks, but with differences between different shades (p<0.05) or color discrimination ability groups (p<0.05). Best matching was associated with superior performers in FM-100 Hue test (p=0.027) and shades C4, C3, A4, A1 and B1. **Conclusions** Most of the students matched correctly the disks, but the best matching score was associated with those of superior color discrimination ability or “wingers” of shade guide. **Clinical relevance** In clinical practice, average and low discrimination ability affects significantly the correct color matching.

#### PP 93

Category: Operative dentistry

#### EVALUATION OF OPTICAL PROPERTIES OF CONTEMPORARY RESIN COMPOSITES AFTER WATER-AGING

Sofia DIAMANTOPOULOU<sup>1</sup>, Stratis PAPAZOGLOU<sup>1</sup>, Afrodite KAKABOURA<sup>1</sup>

<sup>1</sup>Operative Dentistry, School of Dentistry, University of Athens, Athens, Greece

**Objectives:** To compare color and translucency changes after water-aging for 1-week and 1-month in various shades of nano-hybrid, nano-filled and hybrid resin composites. **Methods:** Enamel (e) and dentin (d) A1 (light) and A4 (dark) (or equivalents) shades were selected from the composites Enamel Plus HRi/Micerium, Miris 2/Coltene, IPS Empress Direct/Ivoclar, Filtek Supreme/3M ESPE and TPH Spectrum/Densply. 10

sample disks ( $d=10$  mm,  $h=1$  mm) per material and shade were prepared. A colorimetric evaluation, over white and black background, according to the CIE- $L^*a^*b^*$  system was performed before and after 1-week and 1-month dark water-storage at  $37^\circ\text{C}$ . Color ( $\Delta E$ ) and translucency ( $\Delta TP$ ) differences were calculated. Results were analyzed by one way Anova and Scheffe's tests, paired t-test and linear regression analysis ( $\alpha=0.05$ ). Results: 1-week water-aging provided a wide range of  $\Delta E$  values ( $0.79\pm 0.20$  Filtek-e/D2 –  $5.19\pm 0.15$  Filtek-d/A1) and  $\Delta TP$  values ( $-2.74\pm 0.68$  Hri/UD1 –  $1.03\pm 1.62$  TPH/A1). After 1-month water-aging  $\Delta E$  values ranged from  $1.09\pm 0.46$  Filtek-e/D2 to  $7.94\pm 0.62$  Filtek-d/A1 and  $\Delta TP$  values from  $-2.71\pm 0.93$  Hri/UD1 to  $1.07\pm 0.10$  Filtek-d/A4. Significant changes in  $\Delta E$  between 1-week and 1-month water-aging were noted for Filtek and Miris dentin and for Miris light enamel shades. As for  $\Delta TP$ , significant difference was recorded only for IPS e/A4.  $\Delta E$  was significantly correlated with  $\Delta L$ ,  $\Delta b$  and  $\Delta TP$  after 1-week and with  $\Delta L$  and  $\Delta a$  after 1-month aging. Conclusions: Water-aging caused remarkable color and translucency changes, which were material and shade depended. Clinical Relevance: Most of the contemporary composites exhibit clinically visible ( $\Delta E>3.3$ ) color changes even after short water-aging period.

#### PP 94

Category: Operative dentistry

#### EFFECT OF COMPOSITE PREHEATING ON THE DEGREE OF POLYMERIZATION THROUGH 7 DAYS AFTER POLYMERIZATION

Hyun-Sook JUNG<sup>1</sup>, Gi-Woon CHOI<sup>1</sup>, Sun-Young KIM<sup>1</sup>

<sup>1</sup>Conservative Dentistry, Kyung Hee University, Seoul, Korea

Objectives: To compare the degree of polymerization (DP) between the composite preheated to  $60^\circ\text{C}$  and non-heated through 7 days after polymerization under the  $37^\circ\text{C}$  storage condition. Materials and Methods: The composites used are Z-350 (nanohybrid type, 3 M ESPE), EcuSphere (hybrid type, DMZ), DenFil (hybrid type, Vericom). Thin layer of composite resin was made by being pressed between two transparent polyethylene films. Composite specimens for preheating group were heated in the  $60^\circ\text{C}$  chamber for 10 minutes. The composite was then cured using an LED light-curing unit (Bluephase, Ivoclar Vivadent) for 30 seconds. DP was measured using Fourier transform infra-red spectroscopy at immediate, 24 hour and 7 day after polymerization. During the storage, all specimens were placed in  $37^\circ\text{C}$  heat chamber with being blocked from ambient light to simulate the

condition of oral cavity. The number of specimens for each group was five. Results: Whereas DP of EcuSphere and DenFil preheated was significantly higher than that non-heated at immediate measurement ( $P<0.05$ ), there was no significant difference at 24 hour and 7 day after polymerization. Z-350 showed no significant difference between preheated composite and non-heated composite at all measurement ( $P>0.05$ ). Conclusion: Although some composite preheated showed higher DP than that non-heated at immediate after polymerization, the difference could not be seen from 24 hours after polymerization. Clinical Relevance: Preheating of composite does not seem to have advantage in DP after 24 hours in the oral cavity of  $37^\circ\text{C}$ .

#### PP 95

Category: Operative dentistry

#### PREVALENCE OF DENTINE HYPERSENSITIVITY IN POSTGRADUATE DENTAL CLINICS IN TURKEY

Hakan ÇOLAK<sup>1</sup>, Mehmet Mustafa HAMIDI<sup>1</sup>, Berna ARFAT<sup>1</sup>

<sup>1</sup>Restorative Dentistry, Kırıkkale University, Kırıkkale, Turkey

Objectives: The aim of the this study was to determine the prevalence of dentine hypersensitivity and to examine some associated factors such as initiating stimuli among adult patients attending the Restorative Clinic of the Kırıkkale University Dental Faculty, Turkey. Methods: Questionnaires for 1169 patients, 678 men and 491 women were completed and necessary clinical examinations performed during a one year period and patients who were diagnosed with DH were questioned further about their occupation and smoking habits. The amount of cervical lesions, buccal gingival recession and initiating factors associated with the sensitive teeth was also recorded. Results: Of the 1169 patients examined, 89 were diagnosed as having dentine hypersensitivity, giving a prevalence figure of 7.6%. The commonest teeth affected were the upper premolars and the commonest initiating factor was cold drinks. Conclusions: The prevalence of dentine hypersensitivity in postgraduate clinic in the Turkey was 7.6%. The prevalence of dentine sensitivity in this sample was lower compared to studies carried out previously in different populations both general practice and hospital clinics.

#### PP 96

Category: Operative dentistry

#### IN VIVO COMPARATIVE STUDY AMONG DIFFERENT EARLY CARIES DIAGNOSTIC METHODS

Maria MELO<sup>1</sup>, Isabel CAMPS<sup>1</sup>, Agustín PASCUAL<sup>1</sup>, Angel DEL CAMPO<sup>1</sup>

<sup>1</sup>Dental Pathology and Therapeutics, Valencia University, Valencia, Spain

**Objectives:** To assess the sensitivity and specificity that allow us to evaluate different diagnostic methods. Decide which one performs better in clinic, for our daily practice. **METHODS:** In vivo study approved by the Universidad de Valencia's Ethics Committee. There were included posterior teeth (molars and premolars) previously diagnosed for filling or be used as bridge abutment. Visual and tactile diagnosis methods, Diagnodent (Kavo), CarieScan (IdMos) and Vista-proof (Dürr Dental) were used. Fissurotomy was done with diamond burs for histologic assessment, and compared with ICDAS II. All results were collected and statistically analyzed. **RESULTS:** Visual inspection had an area under the receiver operating characteristic curve (ROC) of  $A=0.864$ , a sensitivity of 0.79 and specificity of 0.93. Tactil diagnosis had a ROC of  $A=0.753$ , a sensitivity and specificity of 50.7% and 100% respectively. Diagnodent (cutoff point=22.5) and Vista-proof (cutoff point=1.35) showed a ROC of  $A=0.898$  and  $A=0.970$  respectively, and CarieScan (cutoff point=22) had a ROC of  $A=0.883$ . These last three methods showed a sensitivity above 82%. Vista-proof and tactil diagnosis specificity was maximum. **CONCLUSIONS:** VistaProof shows the top sensitivity (93%, with cutoff point 1.35), followed by CarieScan system, which has 91.8% (cutoff point=22.0). Tactil has the less sensitivity, although it shows a specificity of 100% (as VistaProof). **CLINICAL RELEVANCE:** The earlier caries diagnostic and its histologic translation allow more efficient and accurate minimally invasive dentistry.

#### PP 97

Category: Operative dentistry

#### BONDING PERFORMANCE BETWEEN TWO-STEP AND NEWLY DEVELOPED ONE-STEP SELF-ETCHING ADHESIVES

Jiale FU<sup>1</sup>, Anri FUKUOKA<sup>1</sup>, Yasuhiro MATSUDA<sup>1</sup>, Yasuko NAKAOKI<sup>1</sup>, Takatsumi IKEDA<sup>1</sup>, Chiharu KAWAMOTO<sup>1</sup>, Satoshi INOUE<sup>1</sup>, Shinichi KAKUDA<sup>1</sup>, Feng PAN<sup>1</sup>, Toru TANAKA<sup>1</sup>, Shihchun DING<sup>1</sup>, Hisanori KOMATSU<sup>1</sup>, Katsushi OKUYAMA<sup>1</sup>, Hidehiko SANO<sup>1</sup>

<sup>1</sup>Department of Restorative, Graduate School of Dental Medicine Hokkaido University, Sapporo, Hokkaido, Japan

**Objective:** The objective of present study was to evaluate the bonding performance of six different

bonding systems. Especially, two newly developed experimental one-step self-etching adhesives were evaluated in this study. **Materials and Methods:** Twelve human third molars were used in this study and every two teeth were randomly assigned to each adhesive. The six adhesives employed were two 2-step self-etching adhesives: MG (Mega Bond, Kuraray) and MGFA (Mega Bond FA, Kuraray); and four 1-step self-etching adhesives: MTB200 (Kuraray), LLB-2 (Tokuyama), BB (BeautiBond, SHOFU) and EB (EasyBond, 3M). The former two 1-step self-etching systems are experimental systems. The adhesives were used under the instruction of each manufacturer and followed by the resin composite build-up. After storage in 37°C distilled water for 24 hours, the specimens were sectioned into beams with the cross sectional area 1.0 mm<sup>2</sup> for the micro-tensile bond strength test (MTBS). The obtained data was expressed as MPa and statistically analyzed with one-way ANOVA and Games-Howell test ( $p<.05$ ). **Results:** The mean±SD of MTBS were: 76.7±26.8 (MG), 68.5±20.4 (EB), 66.9±14.7 (MTB200), 61.2±28.9 (LLB-2), 26.7±15.3 (MGFA), and 24.8±12.8 (BB). In statistical analysis, MG, EB, MTB200 and LLB-2 showed significantly higher bonding performance than both of MGFA and BB ( $p<.001$ ). It was indicated that there is no significantly difference between MG, EB, MTB200, and LLB-2 ( $p>.05$ ), neither between MGFA and BB ( $p>.05$ ). **Conclusion:** Newly developed 1-step self-etching adhesives could have similar bonding performance compared with that of 2-step self-etching adhesive (MG) in present study.

#### PP 98

Category: Operative dentistry

#### 5-YEAR CLINICAL RESULTS OF COMPOSITE INLAYS IN POSTERIOR CAVITIES PLACED BY DENTAL STUDENTS

Juergen MANHART<sup>1</sup>, Hong-Yan CHEN<sup>1</sup>, Albert MEHL<sup>1</sup>, Reinhard HICKEL<sup>1</sup>, Karin HUTH<sup>1</sup>

<sup>1</sup>Restorative Dentistry, LMU University, Munich, Germany

**Objectives:** Determination of clinical performance of composite inlays. **Materials and Methods:** 21 students placed adhesively 75 Artglass (A; Heraeus Kulzer) and 80 Charisma (C; Heraeus Kulzer) composite inlays in class I and II cavities (89 adult patients). Clinical evaluation was performed baseline and at 5 years by 2 independent dentists (mod. USPHS: surface texture ST; color match CM; anatomic form surface AS; anatomic form marginal step AM; marginal

integrity MI; marginal discoloration MD; tooth integrity TI; restoration integrity RI; occlusion OC; sensitivity SE; postop. symptoms PS) and statistically analyzed (Mann-Whitney U-test,  $p < 0.05$ ). At 5 years, 43 A and 45 C inlays were rated. Results: A total of 88.4% A and 75.6% C inlays were scored clinically excellent or acceptable. 5 A and 11 C inlays failed up to 5 years. Results are listed in the table [(alpha / bravo / charlie / delta) in %]. No significant differences between A and C could be detected at 5 years for all clinical criteria ( $p > 0.05$ ). A significant influence of cavity size and tooth type on the performance of A inlays in favor of small and premolar restorations compared to large and molar restorations could be shown ( $p < 0.05$ ). Fisher's exact test showed no significant differences between A and C concerning the failure rates ( $p > 0.05$ ). Conclusion: At 5 years, the clinical performance of A and C exhibited an annual failure rate of 2.3% and 4.9%. Clinical relevance: composite inlays are a competitive restorative procedure in stress-bearing preparations. Sponsored by Heraeus Kulzer, Germany.

Modified USPHS criteria

	ST	CM	AS	AM	MI	MD
A	86/14/-/-	98/2/-/-	100/-/-/-	93/7/-/-	54/46/-/-	37/63/-/-
C	84/16/-/-	96/4/-/-	96/4/-/-	96/4/-/-	56/33/9/2	47/47/6/-
	TI	RI	OC	SE	PS	
A	95/5/-/-	93/2/5/-	98/2/-/-	98/-/2/-	84/9/-/7	
C	96/2/-/2	82/7/4/7	89/11/-/-	98/-/-/2	93/4/2/-	

(alpha / bravo / charlie / delta) in %

**PP 99**

Category: Operative dentistry

EFFECT OF CURING METHODS ON THE CLINICAL PERFORMANCE OF PORCELAIN LAMINATE VENEERS

Bilal YAŞA<sup>1</sup>, Murat TÜRKÜN<sup>1</sup>

<sup>1</sup>Restorative Dentistry, Ege University Faculty of Dentistry, Izmir, Turkey

Objectives: The purpose of this study was to evaluate the effect of luting agents with different polymerization mechanisms on the clinical performance of laminate veneers for one year. Materials and Methods: Sixteen patients (5 men, 11 women) were participated in the study. A total of ninety-two IPS Empress 1 restorations were cemented with Variolink 2 for one quadrant (Grup A) and Variolink Veneer for the other quadrant (Grup B) by the same dentist. The restorations were evaluated at baseline and after 6, 12 months later by two dentists using USPHS criteria (marginal adaptation, cavo-surface marginal

discoloration, secondary caries, postoperative sensitivity, satisfaction with restoration shade and gingival tissue response). The data were statistically analyzed using one-way analysis of variance (ANOVA). Results: The results showed that there was no significant difference among groups. The success rate of the porcelain laminate veneers was % 100. Conclusions: At one year follow-up, teeth were presented normal function and had a good esthetic. Porcelain veneers exhibited successful clinical performance with both resin cement groups. Clinical Relevance: The clinical success for porcelain laminate veneer restorations depends on case selection, treatment planning, laboratory process, adhesive bonding techniques. These restorations can be applied successfully by the improved adhesive systems. Porcelain laminate veneers are esthetic, biocompatible, stable and cause minimal gingival irritation.

**PP 100**

Category: Operative dentistry

TOTAL-ETCH VS SELF-ETCH APPROACH: POSTOPERATIVE PAIN AND SENSITIVITY AFTER DEEP CARIOUS LESIONS TREATMENT

Roberta GIOVANNINI<sup>1</sup>, Damiano PASQUALINI<sup>2</sup>, Elio BERUTTI<sup>2</sup>, Nicola SCOTTI<sup>1</sup>

<sup>1</sup>Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup>Endodontics, University of Turin, Turin, Italy

Objectives The aim of this in vivo study was to evaluate the influence of the adhesive system on post-operative sensitivity and pain in deep cavities restorations. The null hypothesis is that the self-etch approach induces a lower post-operative sensitivity and pain compared to total-etch adhesives in deep cavities. MATERIALS AND METHOD Sixty patients were selected for deep carious lesions treatment. Exclusion criteria were: general health problems, lack of proper oral hygiene, bruxism, pregnancy, altered sensitivity, previous restorations, enamel-dentin fractures or crack, periodontal problems, absence of pulpal vitality, abutment of a fixed or removable prosthesis. Carious lesions closed 1 mm or less from the pulp were included in the study. They were randomly divided into two groups according to the adhesive system used: total-etch 3 step (Optibond FL, Kerr) or self-etch 2 step (Adper SE,3M ESPE). VAS questionnaire was given to assess the post-operative pain and thermal sensitivity during the 2 weeks after treatment. The data were analyzed by cross-tabulation analysis and Pearson Chi-square test ( $p < 0.05$ ). RESULTS Statistical analysis showed a statistically significant difference between groups ( $p = 0.02$ ) only for post-operative sensitivity (graph 1). CONCLUSIONS The null hypothesis

is partially rejected because post-operative pain was not influenced by the adhesive system; instead thermal sensitivity showed lower values with the self-etch approach, probably because total-etch adhesives induced a reversible pulp inflammation caused by acid conditioning. CLINICAL RELEVANCE Self-etch two step adhesive systems are indicated in cases of deep cavities restorations, where the maintenance of the dentin smear layer reduce post-operative sensitivity.

#### PP 101

Category: Operative dentistry

#### INFLUENCE OF PREPARATION DESIGNS/ CEMENTATION TYPES ON THE GAPS/FRACTURE ASPECTS IN DENTAL CAD/CAM PARTIAL CERAMIC CROWNS

Youngah YI<sup>1</sup>, Jinhee LEE<sup>2</sup>, Deogyu SEO<sup>2</sup>

<sup>1</sup>Prosthetic Dentistry, Yonsei University, Seoul, Korea

<sup>2</sup>Conservative Dentistry, Seoul National University, Seoul, Korea

**Objectives:** The purpose of this study was to analyze the marginal and internal gaps after cementation in partial ceramic crowns (PCC) of two different preparation designs using microcomputed tomography (MCT) and to determine fracture strength and pattern after two different adhesive cementations. **Materials and Methods:** PCCs of two different preparation designs were divided into four groups (N=10); Group I-Traditional cups capping design, 3-step resin cement (VäriolinkII), Group II-Traditional cups capping design, 1-step self etching adhesive resin cement(Smartcem), Group III-simple shoulder bevel design, VäriolinkII, Group IV-simple shoulder bevel design, Smartcem. For 2-dimensional (2D) MCT views, seven bucco-lingual sections and three mesio-distal cross sections were obtained at predetermined key points. The gaps were measured using MCT at each reference point. After fracture test, strength and pattern was estimated. Statistical analysis was performed using one-way ANOVA and Tukey's test. **Results:** For the 2D MCT views, the gaps of each group were smallest on the margins (136±48um), and largest on the horizontal or angle walls (298±64um). For the fracture test, Group II indicated the lowest strength (1052±287Mpa) and PCC fracture at all specimens. Mixed patterns occurred as PCC was fractured or fell out at Group IV only. **Conclusions:** Traditional cups capping designs accompanied by 1-step self etching adhesive resin cement was easily broken at thin ceramic area like horizontal or angle wall. Simple shoulder bevel designs with 1-step self etching adhesive resin cement had a tendency to fall out with ceramic restoration. The marginal gaps were smaller than the internal gaps. Supported by NRF Grant 860–20100054.

#### PP 102

Category: Operative dentistry

#### IN VITRO COMPARISON OF MICROCT, HISTOLOGICAL EXAMINATION AND ICDAS II FOR PROXIMAL CARIES DETECTION

Faruk ER<sup>1</sup>, Kaan ORHAN<sup>2</sup>, Hikmet SOLAK<sup>1</sup>, Hakan Hamdi ÇELİK<sup>3</sup>, Ilkan TATAR<sup>3</sup>

<sup>1</sup>Restorative Dentistry, Near East University Dentistry Faculty, Mersin, Turkey

<sup>2</sup>Oral, Teeth and Jaw Radiology, Near East University Dentistry Faculty, Mersin, Turkey

<sup>3</sup>Anatomy, Hacettepe University, Ankara, Turkey

**Objective** Early detection of proximal caries detection is crucial to prevent caries progression and to choose adequate treatment modality. The aim of the present study was to compare the diagnostic performance of visual caries classification system ICDAS II vs. Micro CT and histological examination and also to compare Micro CT with histological examination for the in vitro caries assessment. Design Thirty extracted human premolars and molar teeth with natural proximal caries were involved the study. The presence or absence of caries was scored according to ICDAS II by two examiners. True caries depth was determined by histological examination. The teeth also radiographed with Micro CT (Skyscan 1174, Aartselaar, Belgium). The diagnostic accuracy of each radiographic system was assessed by means of a Kappa values. **Results** The kappa values for inter-examiner reproducibility for all diagnostic modalities were moderate to good. ICDAS II reached significant higher kappa values for both inter and intra-observer comparison. Micro CT did not agree with histological examination at each disease severity scale. **Conclusions and Clinical Relevance** ICDAS II criteria are a promising tool for caries diagnosis on caries detection of premolar and molar teeth surfaces. In the meantime, the histological examination seems to be still Gold standard for this kind of researches than Micro-CT.

#### PP 103

Category: Operative dentistry

#### CLORHEXIDINE INFLUENCE ON BOND STRENGTH AND AGING OF A SILORANE-BASED SYSTEM

Cristina RODRIGUEZ-VICO<sup>1</sup>, Maria Victoria BOLAÑOS-CARMONA<sup>1</sup>, Santiago GONZALEZ-LOPEZ<sup>1</sup>, Ramon DEL CASTILLO<sup>1</sup>, Esther RODRIGUEZ-PRIEGO<sup>1</sup>

<sup>1</sup>Estomatología, University of Granada, Granada, Spain

1. Objectives To know the influence of chlorhexidine (CHX) on bond strength and aging of a low shrinkage adhesive-composite system (Filtek Silorane, 3M ESPE, St. Paul MN, USA). 2. MATERIAL AND METHODS Eighteen third molars were randomly divided in two groups: Filtek Silorane (F) and F with the prior scrub with 2% CHX (Hibimax, AstraZeneca, Madrid, Spain) for 60 s (FC). Five-mm builds-up were constructed on flat middle-crown dentin surfaces. Nine molars (Three molars per group) were assigned to be aged by thermocycling : Immediate (FI and FCI), 5000 (F5000 and FC5000) or 10000 (F10000 and FC10000) cycles (5 and 55°C and 30s dwell time). Bars of 0,8 mm<sup>2</sup> were obtained and submitted to a  $\mu$ TBS-test (cross-head speed 0.5 mm/s) in a 3345 Instron machine. Failure patterns were classified as adhesive, mixed or cohesive. (40 $\times$ ). Two-way ANOVA, One-way ANOVA and Bonferroni's posthoc test allowed for comparisons between groups. 3. RESULTS Interaction between aging and CHX application was significant. ( $F=5.64$ ,  $p<0.005$ ). In F groups, the best bond-strength was achieved in FI (19.33 $\pm$ 9.12). In CHX groups CHX did not affect the immediate bond strength, but statistically significant differences were detected between aged groups (FC5000=22.50 $\pm$ 7.78 $>$ FC10000=15.64 $\pm$ 8.86). CHX application didn't affect significantly on failure pattern distribution according to aging. 4. CONCLUSIONS The silorane-based adhesive system degrades after aging. 5. CLINICAL RELEVANCE CHX application prior bonding does not affect the immediate bond strength, but protects from the bond degradation of a silorane-based adhesive system.

#### PP 104

Category: Operative dentistry

#### PORCELAIN LAMINATE VENEERS AS AN ALTERNATIVE TREATMENT TO PATIENTS WITH ORTHODONTIC PROBLEMS

Eva-Eleni ACHILLEOS<sup>1</sup>, Sofia DIAMANTOPOULOU<sup>1</sup>, Iwanna SAMPRI<sup>1</sup>, Stratis PAPAZOGLOU<sup>1</sup>

<sup>1</sup>Operative Dentistry, School of Dentistry, University of Athens, Athens, Greece

Objectives: Porcelain laminate veneers can achieve optimal esthetic results with minimum teeth preparation and serve as an alternative treatment to patients with orthodontic problems such as malaligned, crowded teeth, diastemas or even cases with anterior crossbite. Materials and Methods: Three patients with orthodontic problems desired to improve their smile appearance were treated with porcelain laminate veneers in the postgraduate clinic of Operative Dentistry. Case 1: a patient with anterior crossbite and large

diastemas restored exclusively with porcelain veneers. Case 2: a patient with Angle class III treated with veneers after the completion of the orthodontic therapy to close the diastemas and to improve the shape of the teeth. Case 3: a patient with crowded and malaligned anterior teeth who refused to undergo orthodontic therapy, treated with veneers on his upper incisors. For each patient, a standard clinical procedure was followed based on diagnostic wax-ups to include the desired changes and on silicon indices to ensure minimum tooth preparation. Results: Patients had a significant improvement of their esthetics by the use of porcelain laminate veneers. Conclusions: Porcelain laminate veneers are a viable and minimal invasive treatment for patient who need to improve their smile that can be used complementary or as an alternative to orthodontic therapy. Clinical Relevance: Veneers can be used as an alternative treatment to orthodontic problems in patients who do not accept orthodontic treatment or as an additional treatment in orthodontic therapy to improve the final esthetic result in complex cases.

#### PP 105

Category: Operative dentistry

#### TOOTH-COMPOSITE INTERACTION AND SHEAR BOND STRENGTH WITH ALL-IN-ONE ADHESIVES Hartmut SCHNEIDER<sup>1</sup>, Vogel FRANK<sup>2</sup>, Holger JENTSCH<sup>1</sup>

<sup>1</sup>Department of Conservative Dentistry and Periodontology, University of Leipzig, Leipzig, Germany

<sup>2</sup>Dental Practice, Leipzig, Germany

Objectives: Assessment of (a) tooth-composite interaction, (b) adhesive defects/microleakage and (c) shear bond strength with two composite-filling systems based on all-in-one adhesives. Methods: On 8 extracted, non-carious human molars each, a mixed Class-V-cavity was prepared (bevel) and restored with Tokuyama<sup>®</sup> Bond Force/Estelite<sup>®</sup> Signal (G1) or iBond<sup>®</sup> Self Etch/Venus<sup>®</sup>2 (G2, control) according to manufacturer's instructions. Adhesive layer formation and tags at enamel (E) and dentin (D), lateral, peri- and intertubular adhesive penetration (a), adhesive defects (b, sum score, scanning electron microscopy) and microleakage (b, AgNO<sub>3</sub>, light microscopy) were assessed at sections and after acid dissolution of enamel micro-retentive structures (a). Shear bond strength (c) was measured according to ISO/TS 11405 (SBS, nE,D=10 each, 24 h, 37°C, A. dest.; Zwick). Statistics: U-test,  $\alpha$ Morph/SBS=0.008/0.0253, tendency:  $\alpha$ adj<PI

Results: (a) In G2, enamel and dentin were more extensively coated with adhesive (pE,D<0.0005) and adhesive

layers appeared as more porous. In both groups at enamel interface micro-retentive structures appeared after enamel dissolution. Dentin tags arised irregularly at sections (no peritubular/lateral penetration) as did a non-determinable hybrid layer ( $d < 2 \mu\text{m}$ ).

(b) In G2, adhesive defects and microleakage were enhanced at enamel and dentin (adhesive defects:  $pE,D = 0.043/0.019$ , microleakage:  $pE,D < 0.0005$ ) as was (c) the SBS ( $pE/D: < 0.0005/0.041$ ).

Conclusions: Group-specific adhesive defects and microleakage indicate distinctions in deficient micro-retentive tooth-composite anchorage, but are not reflected by the SBS found at flats.

Clinical Relevance: For in-vitro assessment of composite-filling systems, testing at the clinically relevant Class-V-geometry must be taken into account.

1Tokuyama Corp., Tokyo, J (Sponsor); 2Heraeus Kulzer GmbH, Hanau, G; 3Bonferroni-Adjustment

#### PP 106

Category: Operative dentistry

#### BOND STRENGTH OF NEWLY DEVELOPED SELF-ADHESIVE RESIN COMPOSITE TO DENTIN

Yasuko NAKAOKI<sup>1</sup>, Anri FUKUOKA<sup>1</sup>, Jiale FU<sup>1</sup>, Shinichi KAKUDA<sup>1</sup>, Yasuhiro MATSUDA<sup>1</sup>, Katsushi OKUYAMA<sup>1</sup>, Chiharu KAWAMOTO<sup>1</sup>, Takatsumi IKEDA<sup>1</sup>, Toru TANAKA<sup>1</sup>, Satoshi INOUE<sup>1</sup>, Hisanori KOMATSU<sup>1</sup>, Hidehiko SANO<sup>1</sup>

<sup>1</sup>Restorative Dentistry, Hokkaido University, Sapporo, Hokkaido, Japan

Objectives: The purpose of this study was to evaluate the influence of rough/fine dentin surface on self-adhesive resin composite system. Materials and Methods: A newly developed self-adhesive resin composite BONDIFILL SB (SUN MEDICAL Co., Ltd) was used in this study. Flat coronal dentin was produced with extracted human third molars, perpendicular to the long axis of tooth. They were divided into three groups and their surfaces were prepared with 180, 600 and 1200-grit SiC paper respectively. Self-etching primer was applied on dentin surfaces and then, resin composite was mounted with brush-dip technique according to the manufactures' instruction. Following that, PMMA rod was placed on resin-applied surface. After 24 h immersion in water, micro-tensile bond test was carried out at a crosshead speed of 1.0 mm/min to assess the bond strength. The data was analyzed by one-way ANOVA and Games/Howell tests. Results: Micro-tensile bond strengths of resin composites to dentin were  $39.8 \pm 7.1$  (180-grit),  $37.5 \pm 6.3$  (600-grit),  $40.7 \pm 6.6$  (1200-grit) (mean + SD in MPa). These values indicated no significant difference among each other ( $p > 0.05$ ).

Conclusions: The resin composite BONDIFILL SB showed equivalent bond strength for every roughness of dentin surface prepared in this study. Clinical relevance: This study suggested that the newly developed self-adhesive resin composite would be available independent of smear layer condition, i.e. bur-cut dentin surface, smooth dentin surface as attrition defect both.

#### PP 107

Category: Operative dentistry

#### A FIVE-YEAR CLINICAL EVALUATION OF POSTERIOR COMPOSITE RESIN RESTORATIONS

Ali Riza CETIN<sup>1</sup>, Nimet UNLU<sup>1</sup>, Nevin COBANOGLU<sup>1</sup>  
<sup>1</sup>Restorative Dentistry, Selcuk University Faculty of Dentistry, Konya, Turkey

Objectives: To assess the clinical efficacy of posterior composite resin restorations placed directly and indirectly in posterior teeth, after five years. Materials and Methods: One hundred eight Class I-II molar cavities in 54 patients were restored with three direct composite resins (Filtek Supreme XT(FSXT), Tetric Evo Ceram(TEC), Aelite Esthetic(AE)) and two indirect composite resins (Estenia(E) and Tescera ATL (TATL) by one operator. All restorations were evaluated by two examiners using the following modified USPHS criteria: surface texture, marginal integrity, marginal discoloration, gingival adaptation, postoperative sensitivity, color match, secondary caries and retention. The all restorations were evaluated at base line and after 5-year. Statistical analysis was completed with Fisher's exact and McNemar Chi-square tests. Results: At baseline, 4% (5 teeth) of the teeth restored presented postoperative sensitivity; however only two of them required canal treatment and replacement after two years. At 5-year, all restorations were available for evaluation of retention that remained with 100% Alpha-ratings. Only one tooth required replacement after three years in TEC group because of secondary caries. Marginal discoloration for AE was scored as 64%, for TATL was 70%, for E was 73%, for FSXT was 87% Alpha after 5-year. Conclusions: Color match, surface texture, and marginal integrity were predominantly scored as Alpha after 5-year for all groups. There were no Charlie score for all of the restorative systems.

#### PP 108

Category: Operative dentistry

#### A 24-MONTH CLINICAL EVALUATION OF AN ETCH-AND-RINSE AND A SELF-ETCH ADHESIVE IN NON-CARIOUS CERVICAL LESIONS

A. Ruya YAZICI<sup>1</sup>, Duygu TUNCER<sup>1</sup>, Gul OZGUNALTAY<sup>1</sup>, Berrin DAYANGAC<sup>1</sup>

<sup>1</sup>Conservative Dentistry, Hacettepe University, School of Dentistry, Ankara, Turkey

**Objectives:** The aim of this study was to compare the twenty-four month clinical performance of cervical restorations placed with the use of an etch-and-rinse and a self-etch adhesive. **Subjects and Methods:** Twenty-four patients (mean age: 58 years) with at least one pair of non-carious cervical lesion participated in this study. A total of 123 cervical lesions were restored (62 with a two-step etch-and-rinse adhesive, Solobond M; 61 with a self-etch adhesive, Futura Bond NR). A nanohybrid resin composite, Grandio was used as a restorative material for both adhesive systems. All restorations were placed by one investigator. The restorations were blindly evaluated by two independent examiners using modified USPHS criteria at baseline, and after 6, 12 and 24 months. The data were statistically analyzed by the Chi-square and Fisher's exact test. **Results:** All patients were available during all evaluated periods, resulting in a recall rate of 100%. The retention rates for Solobond M and Futura Bond NR was 69% and 51%, respectively after 24 months and statistically significant differences were observed ( $p < 0.05$ ). For marginal discoloration, marginal adaptation and color match, no statistically significant differences were found between adhesive systems ( $p > 0.05$ ). No secondary caries was detected in association with any restoration. **Conclusion:** Restorations placed with etch-and-rinse adhesive system showed a higher retention rate after 24 months of clinical service. **Clinical relevance:** The use of etch-and-rinse adhesive system could be a good choice for the restoration of non-carious cervical lesions due to the higher retention rates compared to self-etch adhesive.

#### PP 109

Category: Operative dentistry

#### SEVENTY TWO- MONTHS OBSERVATION OF DIRECT COMPOSITE RESTORATIONS: PRELIMINARY RESULTS

Elena MARCHETTI<sup>1</sup>, Andrea GUIDA<sup>1</sup>, Stefano ERAMO<sup>1</sup>  
<sup>1</sup> Restorative, Material Science, Perugia, Italy

**Objectives:** The aim of this study was to evaluate the clinical acceptability of direct reconstructions of posterior class II large cavities., **Materials and Methods:** 55 direct reconstructions were performed in thirty patients, eighteen females and twelve males, using the nano-hybrid composite Grandio(Voco GmbH Cuxhaven Germany) following the manufacturers' instructions. At subsequent checkups (carried out at 6,12,18,24,30,36,42,48,54,60,66,72, months) clinicians evaluated six parameters, rating each on a three-point scale as :A)

optimal,B)good ,or C) unacceptable. **Results :** At the end of 72 months observation period, "A" ratings were recorded in the following percentages : integration of colour 82%,loss of colour 96%, secondary caries 96%, anatomy 90%,integrity of margins 91%. In relation to these parameters, statistical analysis, did not reveal the presence of significant differences at 72 months follow up. Post-intervention hypersensitivity was reported initially by 3 patients, one of these patients was submitted to endodontic therapy, whereas in the others the sensitivity diminished gradually and was not reported at 72 months follow up. **Conclusions:** The outcome of the direct reconstructions executed in these patients with serious destruction of tooth tissue, was found satisfactory. **Clinical Relevance:** The use of nanoybrid composite resin is recommended in all cases of posterior restorations for its clinical good behavior

#### PP 110

Category: Operative dentistry

#### CLINICAL PERFORMANCE OF A SILORANE BASED AND A SUBMICRON FILLED RESIN COMPOSITE AT ONE YEAR

Esra YILMAN RAHIMI ALAGHA<sup>1</sup>, Ferit ÖZATA<sup>1</sup>, L. Şebnem TÜRKÜN<sup>1</sup>

<sup>1</sup> Department of Restorative Dentistry, Ege University School of Dentistry, Izmir, Turkey

**Objectives:** The objective of this clinical trial was to evaluate the one year clinical performance of a silorane based and a submicron filled resin composite in posterior restorations. **MATERIALS & METHODS:** 35 patients having two to six small or moderate size posterior restorations/caries were included in the study. 152 restorations were performed with Filtek Silorane (3M ESPE) resin composite with Silorane adhesive system or Estelite  $\Sigma$  Quick (Tokuyama) resin composite with Estelite adhesive system. The restorations were evaluated at baseline, 6 and 12-months after placement using USPHS criteria. All restorations were checked by independent evaluators at each recalls. The results were evaluated with Chi square, Cochran Q and Mc Nemar tests at a significant level of 0.05. **RESULTS:** All the patients were evaluated after 12-months. There were no statistical differences between the materials. However four restorations of Silorane and one of Estelite were rated Bravo for color-matching ability and marginal adaptation. Three restorations of Silorane were rated Bravo for anatomical form; two restorations of Silorane and one of Estelite were rated Bravo for marginal discoloration; one of Silorane was rated Bravo for postoperative sensitivity **CONCLUSIONS:** Both materials were found to be successful after one year. However with its color-matching, marginal adaptation and ease of manipulation, Estelite  $\Sigma$  Quick was found to be more appropriate for

posterior restorations. CLINICAL RELEVANCE: The silorane based resin composite material was more difficult to handle and its color-matching was inappropriate compared to Estelite  $\Sigma$  Quick.

### PP 111

Category: Operative dentistry

#### EFFECTS OF DIFFERENT PH ON MICROHARDNESS AND FLUORIDE RELEASE OF RESTORATIVE MATERIALS

Elif YASA<sup>1</sup>, Tijen PAMİR<sup>1</sup>, Şükriye ULUBAY<sup>2</sup>, Ayşegül Demirbaş KAYA<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Ege University Faculty of Dentistry, Izmir, Turkey

<sup>2</sup> Chemistry, Ege University Faculty of Science, Izmir, Turkey

**Objective:** The aim of the study was to investigate the effects of different pH and immersion times on the microhardness and fluoride release of restorative materials. **Materials and Methods:** Three compomers and five fluoride releasing composite resins were used in the study. An amalgam and a non-fluoride releasing composite resin were used as control groups. Nine specimens of each material were prepared and the initial surface microhardness measurements were determined. After that, specimens were immediately placed into artificial saliva at pH 4, 5.5 and 7. Fluoride concentrations were measured at immersion times of 1, 2, 3, 4, 5, 6, 7, 14 and 28 days. The amount of fluoride released from restorative materials was measured by using fluoride specific electrode. After 28 days, the final surface microhardness was measured. Statistical analyses were performed with one and two way variance analysis and paired-sample t test ( $p < 0.05$ ). **Results:** A significant difference was found between initial (1th day) and final (28th day) microhardness measurements for all materials. Significant differences were observed between the microhardness measurements of pH 4–5,5 and ph 4–7 groups. But no significant difference was found between the other groups. Different pH levels have affected the fluoride released from restorative materials. **Conclusion:** Within the limitation of this study, different pH levels do affect the microhardness and fluoride release of restorative materials. **Clinical relevance:** It is clinically important to use restorative materials that show an increase in fluoride release and a slight change in their microhardness when the pH of the medium decreases.

### PP 112

Category: Operative dentistry

#### EVALUATION OF TRANSLUCENCY OF RESIN COMPOSITES BY TWO DIFFERENT METHODS

Dohyun KIM<sup>1</sup>, Sungho PARK<sup>1</sup>

<sup>1</sup> Department of Conservative Dentistry, Yonsei University College of Dentistry, Seoul, Korea

**Objectives** To compare the translucency among different kinds of composite materials and shade categories by determining translucency parameter (TP) and light transmittance (%T), and to evaluate the correlation between the results of two evaluation methods. **-Materials and methods** Certain 3 shades (dentin, enamel, translucent) of 7 composite materials from different manufacturers (Beautiful II, Denfil, Empress Direct, Estelite Sigma Quick, Gradia Direct, Premisa, Tetric N-Ceram) were screened in this study. 10 disk-shaped specimens were prepared for each material. For TP measurement, values for color of each specimen were recorded against white and black backgrounds with a colorimeter, and TP values were calculated. For %T measurement, by using spectrometer, the light spectrum passed through the specimen was analyzed by determining the mean percentage of direct light transmittance in the range between 380 and 780nm. Two-way ANOVA, one-way ANOVA and Tukey's test was performed to compare TP and %T respectively. Correlation between two evaluation methods was determined by Pearson correlation coefficient. **-Results and conclusions** TP and % T showed significant differences among the composite materials and shade categories ( $p < 0.05$ ). There was positive correlation between two evaluation methods ( $r = 0.626$ ,  $p < 0.05$ ). **-Clinical Relevance** In this study, two methods showed much stronger correlation when analyzed in each composite material respectively ( $r = 0.763-0.992$ ,  $p < 0.05$ ) rather than analyzed together, therefore the results suggest that we should use a method that can measure translucency more quantitative in evaluating different kinds of composite materials and it is necessary to establish the standard evaluation for the translucency of composite materials. **-Acknowledgement** This work was supported by Korea Science and Engineering Foundation (KOSEF) grant funded by Korean Government (MEST) (No R13-2003-013-05002-0).

### PP 113

Category: Operative dentistry

#### CLINICAL EVALUATION OF NEW ENCAPSULATED GLASS IONOMERS AND SURFACE COATING COMBINATIONS FOR 24-MONTHS

Ozgur KANIK<sup>1</sup>, L. Sebnem TURKUN<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Ege University, Izmir, Turkey

**Objectives:** To evaluate the clinical performance of two encapsulated glass ionomer cements and two surface coating material combinations for 24-months. **Materials and Methods:**

Fifty-four patients having four to eight small or moderate size Class I and II restorations/caries were included. After removal of the caries/restorations with conventional procedures, 256 restorations were randomly made with Fuji IX GP eXtra (GC, Japan) or Riva SC (SDI, Australia) and coated with G-Coat PLUS (GC) or Fuji Varnish (GC). The combination of Fuji IX GP eXtra + G-Coat PLUS is called as Equia system. The restorations were scored at baseline, 6, 12, 18 and 24 months after placement using modified USPHS criteria by two evaluators. The results were evaluated with Chi square,

Kaplan-Meier and log-rank tests ( $p \leq 0.05$ ). Results: Fifty-two patients and 248 restorations were evaluated after 24 months. There was no caries formation and postoperative sensitivity. Conclusions: Some large Class II restorations of both groups were broken from their marginal ridges leading to replacement. The color match of Fuji IX GP eXtra was better than Riva SC ( $p \leq 0.05$ ). Clinical Relevance: Encapsulated GICs and light-cured nano-filled coating combinations were found to be suitable permanent restorative options for Class I and small to medium Class II restorations.

USPHS criteria values of groups.

Groups	USPHS Criteria	Color Match	Marginal Adaptation	Anatomical Form	Retention Loss	Marginal Discoloration
Fuji IX+G-Coat	A/B/C	19/36/7	56/1/5	56/1/5	52/5/5	62/0/0
Fuji IX+Varnish	A/B/C	16/36/10	59/1/2	59/1/2	58/2/2	61/1/0
Riva+G-Coat	A/B/C	0/8/54	60/1/1	60/1/1	55/6/1	60/2/0
Riva+Varnish	A/B/C	1/6/55	61/1/0	61/1/0	57/4/1	62/0/0

PP 114

Category: Operative dentistry

SHELF-LIFE OF DENTIN ADHESIVE SYSTEMS AFTER TWO STORAGE TIME PERIODS

Mahmut KUSDEMIR<sup>2</sup>, Fusun OZER<sup>1</sup>, Leyla DANESHMEHR<sup>1</sup>, Solen KARAKAYA<sup>3</sup>, Nimet UNLU<sup>4</sup>, Markus B. BLATZ<sup>1</sup>

<sup>1</sup> Department of Preventive and Restorative Sciences, University of Pennsylvania School of Dental Medicine, Pennsylvania, PA, USA

<sup>2</sup> Department of Restorative Dentistry, University of Yeditepe, Faculty of Dentistry, Istanbul, Turkey

<sup>3</sup> Department of Dentistry, Acibadem International Hospital, Istanbul, Turkey

<sup>4</sup> Department of Restorative Dentistry, University of Selcuk, Faculty of Dentistry, Konya, Turkey

Objectives: The aim of this study was to determine the shear bond strength of adhesive systems to human dentine after two storage time periods. Material and Methods: Self-etch adhesives Clearfil Protect Bond (CPB) and Clearfil SE Bond (CSE) and total-etch adhesives Optibond Solo Plus (OSP) and Prime&Bond (PB) were tested. In the first test group (FT), adhesives were applied immediately after they were received from the manufacturer. For the second test (ST) group, the adhesives were used after 24 months following their expiration date. The adhesives were stored at 4°C. Flat occlusal dentin surfaces were created directly

below dentino-enamel junction of 128 extracted molar teeth. The teeth were divided into eight groups and were treated according to the manufacturers' instructions. Composite material was applied (2 mm in diameter and 2 mm in height) and light cured. Bond strengths were determined at a crosshead speed of 0.5 mm/min in an Instron universal test system and converted into MPa. The data were analyzed using ANOVA and Post Hoc Tukey tests. Results: Groups N Mean±SD Mean±SD FT ST CPB 16 34,3±7,4 a 36,3±9,6 a OSP 16 16,4±3,3 bcd 10,0±3,0 e CSE 16 20,7±3,0 b 20,0±3,6 bc PB 16 14,4±3,5 cde 13,9±3,2 de CPB showed highest bond strength values in both test groups. OSP, which contains ethanol as a solvent, was the only adhesive that revealed significant reduction in bond strengths after expiration date. Conclusion: The chemical composition plays in important role in the shelf life of dentin adhesives. Clinical Relevance: Long periods of storage have a detrimental effect on the performance of some dentin adhesives while others seem to be unaffected.

Shear bond strength values of adhesive systems (Mean±SD)

Groups	N	FT	ST
CPB	16	34,3±7,4 a	36,3±9,6 a
OSP	16	16,4±3,3 bcd	10,0±3,0 e
CSE	16	20,7±3,0 b	20,0±3,6 bc
PB	16	14,4±3,5 cde	13,9±3,2 de

**PP 115**

Category: Operative dentistry

THE INFLUENCE OF DENTIN PIECES ON THE SHEAR BOND STRENGTH OF DIFFERENT DENTIN BONDING SYSTEMS

Evrin DALKILIÇ<sup>1</sup>, Özgür GENÇ<sup>2</sup>, Betül ÖZÇOPUR<sup>2</sup>, Sema BELLI<sup>3</sup>, Mutlu ÖZCAN<sup>4</sup>, Gurcan ESKITAŞÇIOĞLU<sup>5</sup>

<sup>1</sup> Restorative Dentistry, Yüzüncüyıl University Faculty of Dentistry, Van, Turkey

<sup>2</sup> Endodontics, Yüzüncüyıl University Faculty of Dentistry, Van, Turkey

<sup>3</sup> Endodontics, Selçuk University Faculty of Dentistry, Konya, Turkey

<sup>4</sup> Fixed and Removable Prosthodontics and Dental Materials Science, 4 Zürich University, Dental Materials Unit, Zurich, Switzerland

<sup>5</sup> Prosthetic Dentistry, Yüzüncüyıl University Faculty of Dentistry, Van, Turkey

**Objectives:** To determine the effect of dentin pieces with different weights added to the dentin bonding systems on the shear bond strength of different types of adhesive systems. **Materials and Methods:** A total of 96, extracted third molars were exposed the mid-coronal dentin and were randomly separated into 8 experimental groups. Group 1: Clearfil SE Bond, Group 2: Clearfil SE Bond+1.5 mg dentin pieces, Group 3: Clearfil SE Bond+3 mg dentin pieces, Group 4: Clearfil SE Bond+4.5 mg dentin pieces, Group 5: Single Bond, Group 6: Single Bond adhesive+1.5 mg dentin pieces, Group 7: Single Bond+3 mg dentin pieces, Group 8: Single Bond+4.5 mg dentin pieces. All groups were restored with Filtek Z250. Ten teeth from each group were attached to a universal testing machine. The results were analyzed with ANOVA and Tukey tests. The remaining 2 teeth from each group were sectioned perpendicularly to the bonding interface and coated with gold for SEM examinations. **Results:** The mean shear bond strength values and significant differences between the groups are shown in Table 2. The hybrid layer thickness was about 0.9, 8, 3.16, 5.7, 2.1, 3.8, 3.5, and 4.6  $\mu\text{m}$  for group 1–8, respectively. **Conclusions:** Shear bond strength of the groups with added dentin pieces did not indicate significant improvement, but dentin pieces increased the hybrid layer thickness of adhesive systems. **Clinical relevance:** To create a high quality hybrid layer which may tolerate the stress of the resin-dentin bonding area and would probably improve the longevity of the restoration.

Table 1: Shear bond strength results of the groups

Groups (n:10)	Mean (MPa)	Standard Deviation
Group 1	15.1 ac	1,2
Group 2	13.47 ac	2,7
Group 3	16.41 a	4,7
Group 4	9.95 bc	4,5
Group 5	12.6 c	4,03
Group 6	5.5 d	3,6
Group 7	5.6 d	1,97
Group 8	4.04 d	1,6

Different lower cases represent the significant difference b

**PP 116**

Category: Operative dentistry

MICROLEAKAGE OF GUM-COLORED RESIN COMPOSITES IN CLASS V CAVITIES

Zeynep ERGÜCÜ<sup>1</sup>, Tijen PAMİR<sup>1</sup>, Elif ERCAN<sup>1</sup>, Banu ÖNAL<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Ege University School of Dentistry, Izmir, Turkey

**Objectives:** The aim of this study was to compare the microleakage of class V resin composite restorations prepared with different gum-colored resin composites. **Methods:** Thirty human maxillary premolars were used in this study. Class V cavities were prepared on buccal and lingual surfaces of each teeth. Clearfil SE Bond (Kuraray) was used as an adhesive system. In the control group, cavities were restored with Filtek Ultimate (3M ESPE) using bulk technique. In the test groups, one half of the cavities were restored with Filtek Supreme while the remaining parts were filled using either Perma Flo Pink (Ultradent) or Gradia Gum Shades (GC), so as to evaluate the microleakage at the junction line between two different materials as well as at the gingival and occlusal margins. The teeth were finished, thermocycled and evaluated for leakage using Indian ink. Dye penetration at the gingival, occlusal margins and at the junction line was evaluated at  $\times 40$  magnifications with a stereomicroscope. The results were statistically analyzed using Kruskal Wallis, Mann Whitney-U and Wilcoxon tests ( $p=0.05$ ) **Results:** No statistically significant differences were determined between the microleakage values at the gingival and occlusal margins of the control and test groups ( $p>0.05$ ). Furthermore, no microleakage was observed at the junction lines in both test groups. **Conclusion:** Both gum-colored resin composites demonstrated similar performance regarding marginal microleakage. **Clinical Relevance:** Gum-colored resin composites may be an esthetic alternative to restore Class V cavities in gum recession cases.

**PP 117**

Category: Operative dentistry

EFFECT OF PVM/MA COPOLYMER ON BOND STRENGTH OF A SELF-ETCH ADHESIVE TO DENTIN  
Füsün ÖZER<sup>1</sup>, Batu Can YAMAN<sup>2</sup>, Andrea FERNANDES<sup>1</sup>, Marcus BLATZ<sup>1</sup>

<sup>1</sup> Dept. of Operative, University of Pennsylvania SDM, Pennsylvania, PA, USA

<sup>2</sup> Dept. of Operative, Istanbul University Faculty of Dentistry, Istanbul, Turkey

**Objective:** This study was investigated the effect of a new PVM/MA copolymer, which has capability of adhering to dental surfaces, on the shear bond strengths of a self-etch adhesive to human dentin. **Material and Method:** Twenty non-carious human molar teeth were sectioned mesio-distally below the dentino-enamel junction to obtain two dentin slabs. All slabs were sectioned mesio-distally again and embedded in acrylic resin by leaving occlusal dentin surfaces uncovered. The dentin surfaces were abraded with #60 SiC-papers. Each test group comprised 5 teeth and 20 dentin sections. A self-etching adhesive (Clearfil SE Bond; CSE) was applied to dentinal surfaces as follows. Group1: pure bonding agent was used; Group2:the bonding (CSE Bond) of self-etch adhesive was mixed with 30 mg/ml PVM/MA polymer; Group3:40 mg/ml PVM/MA polymer was added to bonding material; Group4:bonding of self-etching adhesive was composed of 50 mg/ml PVM/MA polymer. Following bonding applications, a composite material (Clearfil Majesty Posterior) was applied to dentin surfaces (2 mm in diameter and 2 mm in height) and light cured. Bond strengths were measured at a crosshead speed of 0.5 mm/minute in an Instron universal test system. Bond strengths were expressed in MPa. Data were analyzed with ANOVA and Tukey's HSD. **Results:** Mean bond strength values (MPa) of groups were: Group1=25.6, Group2=24.2, Group3=26.4, Group4=30.4. The self-etch adhesive CSE Bond with 50 mg/ml PVM/MA copolymer showed highest bond strength to dentinal surfaces. Bond strengths of CSE with 50 mg/ml PVM/MA were significantly higher than pure CSE and 30 mg/ml groups ( $p < 0.05$ ). **Conclusion:** PVM/MA copolymer has the potential to increase bonding performance of dentin adhesives.

**PP 118**

Category: Operative dentistry

ANALYSIS OF HEMA RELEASED FROM ADHESIVES AT DIFFERENT DENTIN THICKNESS

Bora ÖZTÜRK<sup>1</sup>, Atiye Nilgün ÖZTÜRK<sup>2</sup>, Füsün ÖZER<sup>3</sup>

<sup>1</sup> Restoratif Dentistry, Selcuk University Faculty of Dentistry, Konya, Turkey

<sup>2</sup> Prosthetic Dentistry, Selcuk University Faculty of Dentistry, Konya, Turkey

<sup>3</sup> Restoratif Dentistry, Pennsylvania University Faculty of Dentistry, Pennsylvania, PA, USA

**Objectives:** The aim of this study was to determine the HEMA amounts released from three adhesive systems polymerized with different light sources at four different dentin thicknesses. **Materials and methods:** Two hundred forty extracted human molar teeth from patients aging between 25–45 years were used. Dentin discs with four different thicknesses (0.3 mm perforated, 0.5, 1.0, and 2.0 mm) were fixed to the ends of silicon hoses filled with distilled water. Adhesive systems, Clearfil™ S3 Bond (CS3), XP Bond™, Adper SE Plus Bond (ASEP) were applied on the discs. The samples were kept in distilled water for 3 minutes, 24 hours, 7 days and 30 days after the application of adhesive systems and the monomer concentration levels in distilled water were determined with High Performance Liquid Chromatography. **Results:** As the dentin thickness decreased, the HEMA released from adhesive systems were observed to increase ( $p < 0.05$ ). HEMA release for the XP Bond™ (2.62E-03M) was higher than the other two adhesive systems (CS3=2.71E-04M; ASEP=2.80E-04M) ( $p < 0.05$ ). HEMA amounts released from adhesives cured with the QTH (8.28E-04M) were higher compared to LED (7.55E-04M) ( $p < 0.05$ ). **Conclusions:** Different dentin thicknesses, adhesive systems, and light sources affected HEMA release from the adhesive systems. Particularly, HEMA releases from some of adhesive systems at decreased dentin thicknesses are needed to be pointed out. **Clinical Relevance:** HEMA release from some of adhesive systems at decreased dentin thicknesses need to be highlighted as the pulp is to be protected with cavity liners in deep perforated cavities.

**PP 119**

Category: Operative dentistry

EFFECTS OF IN SITU BLEACHING WITH HYDROGEN PEROXIDE ON ENAMEL MICROHARDNESS AND SURFACE MORPHOLOGY.

Leticia PAN<sup>1</sup>, Dilcele DZIEDZIC<sup>1</sup>, Neide KUROMOTO<sup>2</sup>, Yuri ARAKAKI<sup>3</sup>, Carlos EDUARDO<sup>4</sup>, Patricia FREITAS<sup>4</sup>

<sup>1</sup> Restorative Dentistry, Positivo University, Curitiba, Paraná, Brazil

<sup>2</sup> School of Physics, Federal University of Paraná, Curitiba, Paraná, Brazil

<sup>3</sup> Private Practice, Private Practice

<sup>4</sup> Restorative Dentistry, University of São Paulo, São Paulo, Brazil

This in situ study aimed to evaluate the microhardness and topographical changes of enamel throughout in-office bleaching with different concentrations of hydrogen peroxide (HP). Eighty enamel slabs were polished and the Knoop microhardness was measured (to- baseline). The slabs were randomly divided into two groups and bleached with 25% or 35% HP. After that, the microhardness was also measured (t1). Four slabs were cemented onto teeth's buccal surface of twenty volunteers. The microhardness was measured in different periods (n=10) corresponding to: 48 hours (t2) and 7 days after the in vitro bleaching session (t3), immediately (t4) and 7 days (t5) after the second bleaching session. The mean hardness values were analyzed using ANOVA and Tukey's test ( $p < 0.05$ ). Nine enamel slabs (n=3) were obtained to qualitatively observe, under atomic force microscopy, the topographical differences between experimental groups. For both groups, the microhardness values of the enamel slabs were lower at t1 when compared to baseline values. In the group treated with 25% HP, the microhardness in periods t2 and t4 decreased compared to t1. In the group treated with 35% HP, it was observed a reduction on microhardness immediately after the first bleaching (t1), with no statistical difference compared to the other time periods (t2 - t5). Both concentrations led to a more roughened enamel surface when compared to control group. It was concluded that in situ bleaching with HP reduces the enamel microhardness, which was not reestablished one week after completion of the treatment and exposure to saliva.

#### PP 120

Category: Operative dentistry

#### INFLUENCE OF ANKAFERD BLOOD STOPPER ON SHEAR BOND STRENGTH OF BONDING SYSTEMS

Soley ARSLAN<sup>1</sup>, Hüseyin ERTAŞ<sup>1</sup>, Yahya Orçun ZORBA<sup>1</sup>

<sup>1</sup> Restorative Dentistry and Endodontics, Erciyes University, Faculty of Dentistry, Kayseri, Turkey

**Objectives:** This study investigated the effect of Ankaferd Blood Stopper (ABS) contamination on bond strength of total-and self-etching systems. **Materials and Methods:** Seventy caries-free human third mandibular molars sectioned in a mesio-distal direction were mounted in acrylic resin, and flat dentin surfaces were exposed. The specimens were randomly assigned to seven groups (n=20), according to the surface treatment: Group I, ABS contamination + 37% phosphoric acid + Solobond M; Group II, ABS contamination + Clearfil SE Bond; Group III, ABS contamination + All Bond SE; Group VI, 37% phosphoric acid + ABS contamination + Solobond M; Group V, Solobond M; Group VI, Clearfil SE Bond; and Group VII, All Bond SE. In contaminated groups, one drop of ABS solution was applied directly to the

dentin surface and air-dried. The dentin bonding systems were then applied, also according to manufacturer's instructions. Grandio was condensed into a mold and polymerized. After storage at 37°C for 24 h, the specimens were tested in shear mode at a crosshead speed of 1 mm/min. The results were analyzed by one-way ANOVA at  $p < 0.05$ . **Results:** There were significant differences in bond strengths between the control and ABS-contaminated samples. Adhesive failure was the most common mode of failure. **Conclusions:** ABS contamination reduced bond strength of total- and self-etching adhesives. **Clinical relevance:** Ankaferd Blood Stopper contamination led to decrease on bond strength of bonding systems.

#### PP 121

Category: Operative dentistry

#### EFFECT OF PVM/MA COPOLYMER ON BOND STRENGTH OF SELF-ADHESIVE RESIN CEMENTS TO DENTIN

Fusun OZER<sup>1</sup>, Batu YAMAN<sup>2</sup>, Takura TAKEICHI<sup>3</sup>, Andrea FERNANDES<sup>1</sup>, Markus B BLATZ<sup>1</sup>

<sup>1</sup> Restorative Dentistry, University of Pennsylvania, Pennsylvania, PA, USA

<sup>2</sup> Operative Dentistry, Istanbul University, Istanbul, Turkey

<sup>3</sup> Prosthodontics, Aichi Gakuin University, Nagoya, Aichi, Japan

**Objectives:** The aim of this study was to investigate the effect of PVM/MA copolymer, which has capability of adhering to dental surfaces, on bonding performance of three self-adhesive resin cements to human dentin. **Materials and Methods:** Occlusal, buccal, lingual, mesial and distal dentin surfaces of thirty-six human molar teeth were abraded with #600 SiC-paper. Each test group comprised 6 teeth and 20 dentin sections (4 sections for each surface). The sections were divided into two test groups. In the first test group (FTG), the cements ICem(IC), Bis-Cem(BC) and G-Cem (GC) were applied according to manufacturers' instructions. In the second polymer test group (PTG), the self-adhesive cements were mixed with PVM/MA (600 mg cement, 30 mg copolymer). Cylindrical composite samples (2.3 mm in diameter, 3 mm in height) were bonded to the flat dentin surfaces with one of the study cements according to manufacturer's instructions. A load of 1000 g was applied for 10 minutes during the cementation and bonded composites were light cured. Bond strengths were expressed in MPa. Data were analyzed with ANOVA and Tukey's HSD test. **Results:** PVM/MA copolymer significantly increased bonding performance of IC and BC ( $P < 0.05$ ). Cements Bond strength [MPa]±SD IC (FTG):6.5±4.1 and (PTG):15.3±4.7 BC (FTG):3.8±1.5 and (PTG):7.7±3.9 GC (FTG):3.5±1.9 and (PTG):4.2±2.1 **Conclusion:**

Two out of three self-adhesive resin cements revealed higher bond strengths to dentin with PVM/MA copolymer than same cements without the copolymer. Clinical Relevance: The addition of PVM/MA into self-adhesive resin cements has the potential to increase their clinical performance and durability.

#### PP 122

Category: Operative dentistry

#### BIOCOMPATIBILITY OF DIFFERENT TYPES OF ADHESIVE RESTORATIVE SYSTEMS ON HUMAN PULP

Tugba TOZ<sup>1</sup>, Arlin KIREMITCI<sup>1</sup>, Alp USUBÜTÜN<sup>2</sup>

<sup>1</sup> Restorative Dentistry, Hacettepe University, Ankara, Turkey

<sup>2</sup> Pathology, Hacettepe University, Ankara, Turkey

Objective: The objective of this experiment was to assess the pulpal reactions of 48 human premolar teeth after two time periods (1 week and 1 month) to four different restorative systems histopathologically. Methods: Orthodontic patients who required premolar extractions were selected for the study and class V cavities were prepared in 2 mm depth, 3 mm length, 1.5 mm width. 48 class V medium depth cavity preparations were divided into four groups according to the adhesive restorative systems: group 1: Xp Bond + Quixfill; group 2: Silorane; group 3: Equia; group 4: Ketac N 100. Four groups were divided into 8 subgroups due to the extraction periods. After 7 and 30 days the teeth were extracted then fixed in 10% buffered formalin solution and prepared according to routine histological techniques. Five micrometer sections were stained with hematoxylin and eosin or Brown and Brenn gram stain for bacterial observation. Results: According to Kruskal-Wallis analysis, there was no statistical difference in pulpal histopathology of the teeth restored with four different adhesive restorative systems. No inflammatory reaction of the pulp and bacterial penetration along the cavity walls observed in any of the experimental groups. Conclusion: Different adhesive restorative systems did not lead pulpal inflammation in medium depth cavities. Clinical Relevance: There is no need to a biocompatible liner before the adhesive restorative systems tested in the present study in medium depth cavities.

#### PP 123

Category: Operative dentistry

#### THE EFFECT OF POLISHING PROCEDURES AND ALCOHOL ON THE ADHESION STRENGTH OF DIFFERENT GLAZE MATERIALS

Hande KEMALOGLU<sup>1</sup>, Ilgın AKCAY<sup>2</sup>, Banu ONAL<sup>1</sup>, Oguz AKTENER<sup>2</sup>

<sup>1</sup> Restorative Dentistry, Ege University, Izmir, Turkey

<sup>2</sup> Endodontology, Ege University, Izmir, Turkey

Objectives: The aim of the study is to evaluate the adhesion strength of three glaze materials (BiscoverLV, GC-Coat-Plus or Fortify-Plus) on differently treated surfaces of two composite brands (Aelite-AestheticEnamel, Spectrum-TPH3) using scratch test. Materials and Methods: Specimens (n=168) measuring 10 mm in diameter×2 mm in thickness were fabricated using two composite resins and finished with diamond finishing bur. Then they were divided into different polishing groups (n=7) as follows: Groups 1-6: Treatment with/without alcohol+3 different glazes, Groups 7-12: Soflex +treatment with/without alcohol+3 different glazes. The adhesion strength of the glazes was measured by a scratch-tester. Critical forces that peeled-off the glazes from surfaces were recorded. The results were analyzed using One-Way ANOVA followed by Tukey-HSD test. Results: There were no significant differences between two composite brands for all test groups except Soflex+GC Coat-Plus group with/without alcohol (p<0.05). Alcohol application increased the adhesion strength in all groups however the difference was not significant (p>0.05). The adhesion strength increased when glaze materials were applied to polished surfaces (p<0.05). The highest adhesion values were observed in Fortify-plus applied group for both composites (p<0.05). Conclusions: Highest glaze adhesion was achieved on surfaces treated with Soflex+alcohol whereas Fortify-plus showed the highest adhesion strength. Dehydration of surfaces with alcohol prior to glaze application inconsiderably increased the adhesion strength. Therefore, it is necessary to test the effect of agents with high dehydrating efficacy on glaze adhesion. Clinical Relevance: The combined application of polishing discs and alcohol as a dehydrating agent prior to application of glazes can be recommended for a longer durability.

#### PP 124

Category: Operative dentistry

#### EFFECT OF EROSION / REMINERALISATION CHALLENGES ON MICROTENSILE BOND STRENGTH OF TWO DENTIN ADHESIVES

Katrin BEKES<sup>1</sup>, Kristina UNVERRICHT<sup>1</sup>, Hans-Günter SCHALLER<sup>1</sup>, Christian R. GERNHARDT<sup>1</sup>

<sup>1</sup> Department of Operative Dentistry and Periodontology, Martin-Luther-University Halle-Wittenberg, Halle, Germany

Objectives: To investigate the effect of erosion / remineralisation challenges on microtensile bond strength (mTBS)

of two dentin adhesives (Optibond FL, Futurabond M) in vitro. Material and Methods: 150 extracted third molars were included. The specimens were randomly assigned to one of the five challenges of thirty samples each: G-1: control; groups G-2/-3: 10-minute immersion 4×/day in Sprite Zero for 7 days; G-4/-5: 5-minute immersion 6×/day in citric acid for 10 days. In G-3/G-5 the first and the last erosive challenge was followed by 2-minute remineralisation challenge in elmex EROSION PROTECTION dental rinse. Between the erosive/remineralisation challenges, the specimens were immersed in artificial saliva. Subsequently, the dentin specimens were restored with either Optibond/Grandio (O) or Futurabond/Grandio (F). Results: Following mTBS were evaluated (in MPa): G1-O: 25.46 (+/-5.02); G2-O: 18.59 (+/- 4.77), G3-O: 22.94 (+/-3.87), G4-O: 11.02 (+/-2.62); G5-O: 16.00 (+/-3.53); G1-F: 20.91 (+/-4.53); G2-F: 15.20 (+/-3.62); G3-F: 17.04 (+/-5.32); G4-F: 5.05 (+/-1.03); G5-F: 11.71 (+/-2.24). Statistical analysis showed a significant influence of the used adhesive and the challenge on mTBS ( $p < 0.001$ , ANOVA). Erosive challenges resulted in a significant reduction of mTBS compared to the untreated controls. Remineralisation with elmex dental rinse increased mTBS significantly in G-5 compared to G-4 ( $p < 0.05$ , Tukey's test). Conclusions: Erosion affected the mTBS of both adhesives in vitro. Remineralisation with elmex dental rinse might be a solution to increase mTBS of adhesives on eroded dentin. Clinical relevance: Adhesive fillings are commonly used to restore eroded dentin.

#### PP 125

Category: Operative dentistry

EFFECTS OF VARIOUS ACIDIC SPORTS DRINKS ON THE MICROHARDNESS OF COMPOSITE MATERIALS  
Ugur ERDEMİR<sup>1</sup>, Esra YILDIZ<sup>1</sup>, Meltem MERT EREN<sup>1</sup>, Sevdâ OZEL<sup>2</sup>

<sup>1</sup> Operative Dentistry, University of Istanbul Faculty of Dentistry, Istanbul, Turkey

<sup>2</sup> Department of Biostatistics and Medical Informatics, Istanbul University Faculty of Medicine, Istanbul, Turkey

Objectives: The purpose of this study was to determine the effect of acidic sports drinks on surface hardness of polyacid-modified resin composite, microhybrid composite and nanofilled composites. Methods: Forty-two disc-shaped specimens; polyacid-modified resin composite (Compoglass), microhybrid composite (Filtek Z250) and nanofilled composites (Filtek Supreme XT and Premise), 8-mm in diameter and 2-mm in thickness, were divided into six groups (7 discs/group). Specimens were then immersed for

6 months into six storage solutions; distilled water (control), Powerade, Ixir, Gatorade, Burn, and Redbull. Surface microhardness was measured using a Vickers hardness measuring instrument at baseline (prior to solutions storage), after 1 week, 1 month and 6 months. Data were statistically analyzed by using two-way repeated ANOVA and followed by Bonferroni's multiple comparison test ( $\alpha = 0.05$ ). Results: Statistical analysis revealed that all storage solutions significantly decreased microhardness values of polyacid-modified resin composite, microhybrid composite and nanofilled composites at the different storage time ( $p < 0.05$ ) except for distilled at 1 week. All materials tested had various softening characteristics depending on the types of storage solutions. Burn sports drinks significantly reduced surface hardness of Filtek Supreme and Compoglass at the end of the 6 months ( $p < 0.05$ ). Sports drinks significantly reduced microhardness for all materials, compared with the distilled water ( $p < 0.05$ ). Conclusion: The storage solutions tested and immersion time were significant factors on the reduction of surface microhardness of restorative materials. Distilled water storage had less effect on microhardness over time compared with the other solutions.

#### PP 126

Category: Operative dentistry

DIRECT PULP CAPPING WITH A SELF-ETCHING ADHESIVE: A PRELIMINARY CLINICAL FOLLOW UP STUDY

Nevin COBANOGU<sup>1</sup>, Ayşe KOCABASOGLU<sup>1</sup>, Ali Rıza CETİN<sup>1</sup>, Füsün OZER<sup>2</sup>

<sup>1</sup> Operative Dentistry, Selcuk University, Konya, Turkey

<sup>2</sup> Restorative Dentistry, Pennsylvania University, Pennsylvania, PA, USA

Objective: The aim of this study was to evaluate the treatment outcomes of direct pulp capping with an antibacterial monomer (MDPB) containing self-etching adhesive 24 months after treatment. Materials and Methods: All 75 adult patients who received direct pulp capping with self-etching adhesive (Clearfil Protect Bond) after completely removal of deep decayed dentin were recalled after 24 months. The teeth were restored permanently with a composite restorative material (Clearfil Majesty Posterior) after pulp capping. Of the 23 patients (30.6%) who responded, 30 restorations were examined clinically and radiographically. The age of the patients varied from 18 to 55. The criteria used, clinically favorable or failure, were based on the following clinical exams: pulp vitality, sensitivity to percussion, negative response to cold test and periapical alterations. Results: A successful outcome was

recorded for 27 teeth (90%) with sustained pulp vitality without apical radiolucency. No positive cases were found in the assessment of tooth sensitivity. Failure was verified in only 3 teeth (10%). These teeth presented short-term pulp complications resulted in canal treatment due to pulp inflammation. Conclusion: In the limitations of this study, it can be concluded that antibacterial monomer MDPB-containing adhesive Clearfil Protect Bond is a promising agent for direct pulp capping in decayed teeth. However, long-term clinical studies are required with more clinical cases. Clinical Relevance: Protect Bond can be used without conventional pulp protection for direct pulp capping.

#### PP 127

Category: Operative dentistry

#### MICRORAMAN SPECTROSCOPY ANALYSIS OF CARIOUS DENTINAL TISSUE

Ahmed ALMAHDY<sup>1</sup>, Frederic FESTY<sup>1</sup>, Timothy WATSON<sup>1</sup>, Avijit BANERJEE<sup>2</sup>

<sup>1</sup> Biomaterials, Biomimetic and Biophotonics Research Group, Dental Institute, King's College London, London, UK

<sup>2</sup> Restorative Dentistry, Dental Institute, King's College London, London, UK

Objectives: The aim of this study was to evaluate and correlate objectively the chemical components of infected and affected carious dentine with their microhardness and autofluorescence (AF) characteristics. Materials and Methods: 8 extracted human carious teeth were scanned using a Renishaw inVia Raman microscope (StreamLine™ Plus scanning technique; 785 nm laser, 600 lines/mm grating, 2 secs exposure). Cluster analysis, performed using a specially designed program, detected four clusters representing phosphate (P-O) peak at 960 cm<sup>-1</sup> (hydroxyapatite), amide peak at 1450 cm<sup>-1</sup> (protein content), broad porphyrin fluorescence (bacterial byproducts) and protein breakdown fluorescence. Knoop microhardness (KHN) and blue-green AF signal were obtained for the same samples. Using ImageJ software (Wayne Rasband, NIH, USA), the mean microRaman peak intensities in each cluster and the AF signals were calculated for the equivalent KHN areas in each cluster. Results: Results identified a positive relation between phosphate and collagen peak intensities and the microhardness ( $R^2=0.5$ ). Additionally, both types of the microRaman fluorescence had decreased as the Knoop hardness number increased. The two fluorescence clusters were related to the blue-green AF ( $R^2=0.6$ ). Conclusions: The use of microRaman spectroscopy provides an objective evaluation of the different carious dentine layers. Clinical relevance: The microRaman spectroscopy can be used to evaluate in vitro the remaining infected dentine following different excavation modalities. This is important to help find the optimum caries

excavation method which reduces the risk of unnecessary removal of the affected dentine during cavity preparation.

#### PP 128

Category: Operative dentistry

#### EFFECT OF CAVITY DEPTH ON THE MICROLEAKAGE OF INDIRECT COMPOSITE INLAYS

Hande SAR SANCAKLI<sup>1</sup>, Hasmet ULUKAPI<sup>2</sup>

<sup>1</sup> Department of Operative Dentistry, Istanbul University, Faculty of Dentistry, Istanbul, Turkey

<sup>2</sup> Department of Operative Dentistry, Faculty of Dentistry, Istanbul, Turkey

Objective: To evaluate the effect of light curing type on microleakage of indirect composite inlays with different cavity depths cemented with self-etching resin cements. Materials-methods Standardized Class I inlay cavity preparations with 2 mm or 4 mm depths were performed on seventy non-carious teeth and further divided into five subgroups depending on curing units used: Panavia F(PF, Kuraray) and quartz-tungsten-halogen lamp (QTH;VIP, Bisco), Esthetic Cement(EC,Kuraray) and QTH, PF and light-emitting diode (LED;Demetron,Kerr), EC and LED, PF with autocuring (control group). Fabricated indirect composite inlays (Tescera ATL,Bisco) were luted according to the manufacturer's instructions and light-cured. The specimens were thermocycled 1,000 times and immersed in 0.5% basic-fuchsin solution for 24 h, then washed and cross-sectioned serially, and evaluated under 20× stereomicroscope to assess dye penetration digitally (Olympus, Imaging solutions;CELLA) Kruskal Wallis tests were used for statistical analyzes. Results: Inlays luted with either PF or EC cured by QTH unit showed the least microleakage when the cavity depth was 2 mm ( $p>0.005$ ), while inlays with 4 mm depths luted by EC and LED unit exhibited the highest microleakage. Composite inlays with a depth of maximum 4 mm exhibited lower microleakage when luted with PF or EC and cured by QTH rather than LED curing device. Conclusion: Microleakage is lower when QTH unit was used for both P and EC. Cavity depth also plays an effective role on microleakage. Clinical relevance: Regardless of light-curing type, cavity depth has an effective role to achieve minimal microleakage when using self etching luting cements

#### PP 129

Category: Operative dentistry

#### EFFECTS OF FIBER REINFORCEMENT AND POLYMERIZATION TECHNIQUES ON THE FRACTURE RESISTANCE OF ORMOCER MATERIALS

Muhammed KARATAS<sup>1</sup>, Cagatay BARUTCIGIL<sup>1</sup>, Nurcan OZAKAR ILDAY<sup>1</sup>, Merve ISCAN YAPAR<sup>1</sup>

<sup>1</sup> Department of Restorative Dentistry, Atatürk University, Erzurum, Turkey

**Aim:** The purpose of this study was to investigate the effects of fiber reinforcement and polymerization techniques on the compressive strengths of ormocer materials. **Materials and Method:** 84 composite rectangular specimens (9 mm long, 3 mm wide and 4 mm high) prepared in three groups according to the polymerization methods: Group I: Ormocer specimens without fiber (a) and with fiber (b) prepared and polymerized using direct polymerization. Group II: Ormocer specimens without (a) and with fiber (b) prepared and polymerized using indirect polymerization and additionally heat cured in an inlay oven. Group III: Ormocer specimens without (a) and with fiber (b) polymerized through indirect polymerization with a combination of pressure, light and heat using a light cup and heat cup. Then specimens were stored in distilled water at 37°C for 24 h in order to complete the cure. Compressive loading of the specimens was performed with a universal testing machine at a cross-head speed of 0.5 mm/min until failure. Data were subjected to ANOVA and Duncan test ( $p < 0.05$ ). **Results:** Effects of fiber reinforcement revealed a statistically significant difference between groups III (a) and III (b) ( $p < .05$ ), though none between the other groups. ( $p > .05$ ) Comparison of direct and indirect polymerization techniques revealed no statistically significant difference between composite specimens reinforced with fibers or composite specimens without fiber. ( $p > .05$ ) **Conclusion:** Polymerization techniques had no effect on compressive strength, while fiber reinforcement only affected the group in which polymerization was performed using light, heat and pressure.

#### PP 130

Category: Operative dentistry

MICROTENSILE BOND STRENGTHS OF CLASS V RESTORATIONS WITH DIFFERENT ADHESIVES AFTER CONVENTIONAL AND LASER PREPARATION  
Burcu DIKICI<sup>1</sup>, Haktan YURDAGÜVEN<sup>1</sup>, Mübin SOYMAN<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Dentistry, Yeditepe University, Istanbul, Turkey

**Objectives:** The aim of this study was to compare the microtensile bond strengths of Class V cavities prepared by laser treatment or conventional method and restored with different adhesive systems and composite resins.

**Materials and Methods:** 64 premolar were divided into two groups. Group I 32 cavities in 4 mm width, 3 mm high and 2 mm depth which were prepared by Er:YAG laser (enamel 250 mj-25 Hz, dentin 180 mj-20 Hz) and in group II same cavities were prepared by conventional methods (diamond bur, carbide bur). Each groups were divided in four subgroups and four different composite materials (Clearfil Majesty Posterior, Silorane, Amaris and Filtek Z250) were applied with its adhesive system (Clearfil SE bond, Silorane, Futurabond, Adper SE bond). The specimens were termocycled in distilled water for 1000 cycles. The microtensile test was performed in a universal testing machine at a crosshead speed of 1 mm/min. Data were analyzed using one-way ANOVA and post hoc multiple comparison TUKEY tests. **Results:** Results are; in laser group Silorane/Silorane 21,81 ±6,92 Futurabond/Amaris 20,77 ±5,26, Clearfil Se Bond/Clearfil Majesty Posterior 24,14 ±5,40, Adper Se Plus/ Filtek Z250 27,71 ±7,0; in conventional group Silorane/Silorane 21,09 ±3,72 Futurabond/Amaris 19,01 ±3,8 Clearfil Se Bond/Clearfil Majesty Posterior 28,78 ±5,98 Adper Se Plus/ Filtek Z250 29,03 ±9,16. **Conclusion:** Er:YAG laser does not increase the microtensile bond strength to dentin when compared to conventional methods. **Clinical Relevance:** Er:YAG laser does not affect the microtensile bond strength to dentin as expected.

#### PP 131

Category: Operative dentistry

THE EFFECT OF DESENSITIZING-TOOTHPASTES ON THE BOND STRENGTH OF DIFFERENT RESTORATIVES ON CORONAL/ROOT DENTIN  
Kıvanç YAMANEL<sup>1</sup>, Neslihan ARHUN<sup>1</sup>

<sup>1</sup> Conservative Dentistry, Baskent University Faculty of Dentistry, Ankara, Turkey

**Objectives:** The aim was to evaluate the effects of two desensitizing tooth-pastes on the shear bond strength (SBS) of resin composite and glass ionomer (GI) to coronal/root dentin. **Materials & Methods:** 108 human molars' distal or mesial sides were ground flat. The samples were randomly divided into 3-major groups (N=36) to be brushed with: GroupA: Sensodyne Rapid Relief; GroupB: Colgate Sensitive Prorelief; GroupC: Colgate Total 12. Brushing was performed with tooth brushing simulator 2 times/day for 10 days with 10 stroke/brushing. They were further divided into three sub-groups(n=12) to receive the following adhesion protocols to coronal/root dentin. Group1: Clearfil SE Bond(SE)+Filtek Z250; Group2: Adper Single Bond2(ASB)+Filtek Z250; Group3:RIVA(GI).

They were kept in distilled water for 24 hours. SBS test was performed with Instron Machine (cross head speed: 0.5 mm/sec). The data were evaluated statistically. Results: The desensitizing tooth-pastes decreased SBS values in both coronal and root dentin for SE but not for ASB; GI demonstrated statistically significant inferior SBS. Conclusion: Two desensitizing tooth-pastes used in the study had different effects on the adhesion to dentin. Clinical Relevance: Toothbrushing with desensitizing tooth-pastes may affect the adhesion of resin composites and glass ionomers to dentin.

### PP 132

Category: Operative dentistry

#### COLOR CHANGE OF FIVE RESIN COMPOSITES EXPOSED TO 10% HYDROGEN PEROXIDE AND CARBAMIDE PEROXIDE

Sevcan KURTULMUS-YILMAZ<sup>1</sup>, Esra CENGİZ<sup>2</sup>, Ece YUKSEL<sup>3</sup>, Sule Tugba OZAK<sup>3</sup>, Nuran ULUSOY<sup>2</sup>

<sup>1</sup> Prosthodontics, Near East University, Mersin, Turkey

<sup>2</sup> Restorative Dentistry, Near East University, Mersin, Turkey

<sup>3</sup> Prosthodontics, Ankara University, Ankara, Turkey

Objectives: This study was conducted to determine the effect of hydrogen peroxide (HP) and carbamide peroxide (CP) on color change of different resin composites. Materials and Methods: A round metallic matrix was used to fabricate composite specimens of each brand (Reflexions, Grandio, Gradia Direct, Clearfil Majesty Esthetic and Ceram-X Mono). Each composite group (n=20) was equally divided into 2 subgroups as CP and HP. Baseline CIE L\*a\*b\* color coordinates of specimens were measured on neutral grey background with a spectrophotometer (Easyshade Compact, Vita). 10% HP (Opalescence Treswhite, Ultradent) and 10% CP (Opalescence PF, Ultradent) were applied according to manufacturers' instructions and color measurements were repeated at the end of 10 days. CIE L\*a\*b\* coordinates were analyzed with paired t-test and color differences ( $\Delta E$ ) were analyzed with one-way ANOVA. Results: The results of this investigation showed that bleaching agents changed the color of resin composites. HP and CP increased the a\* coordinate and decreased the b\* coordinate of resin composites whereas L\* coordinate was not effected statistically (P<0.05). All  $\Delta E$  values were >3.5. The highest  $\Delta E$  values were observed in Ceram-X Mono (P<0.05). There was no significant difference between  $\Delta E$  values after HP and CP application within each composite group. Conclusions: Both CP and HP application caused a clinically unacceptable color difference in all resin composites by

changing a\* and b\* color coordinates. Clinical Relevance: Patients should be advised that home bleaching agents may cause color change in resin composites that would demand replacement of restorations.

### PP 133

Category: Operative dentistry

#### THE EFFECT OF HOME BLEACHING AGENTS ON THE SURFACE ROUGHNESS OF FIVE DIFFERENT RESIN COMPOSITES

Esra CENGİZ<sup>1</sup>, Nuran ULUSOY<sup>1</sup>, Sevcan KURTULMUS-YILMAZ<sup>2</sup>, Sule Tugba OZAK<sup>3</sup>, Ece YUKSEL<sup>3</sup>, Hikmet SOLAK<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Near East University, Mersin, Turkey

<sup>2</sup> Prosthodontics, Near East University, Mersin, Turkey

<sup>3</sup> Prosthodontics, Ankara University, Ankara, Turkey

Objectives: The aim of this study was to investigate the effects of hydrogen peroxide (HP) and carbamide peroxide (CP) on surface roughness of resin composites. Materials and Methods: Thirty specimens of five resin composites were fabricated using a round matrix (1 mm thick, 10 mm in diameter). Each composite group was equally divided to 3 subgroups as control, CP and HP. Baseline surface roughness (Ra) value of each specimen was measured with a profilometer (Mahr Perthometer M2). 10% HP (Opalescence Treswhite, Ultradent) and 10% CP (Opalescence PF, Ultradent) were applied according to manufacturers' instructions and Ra measurements were repeated at the end of 10 days. Data were analyzed with Kruskal-Wallis and Mann-Whitney U tests. Results: Ra values of composite groups exposed to bleaching agents were statistically higher than control group (P<0.05). There was no significant difference between Ra values after HP and CP application within each composite group. Ceram-X Mono revealed the lowest Ra values (P<0.05) however no statistically significant difference was found among the other composites. Conclusions: Home bleaching agents increased the surface roughness of all composites. CP and HP were not superior to each other in terms of surface roughness. It may be suggested that ceramic content of Ceram-X Mono was effective on the Ra values. Clinical Relevance: Home bleaching agents should not be used without a clinician's supervision. Since the rough surfaces promote plaque adhesion and staining, composite restorations should be controlled and patients should be informed that restorations may need polishing or replacing after bleaching treatment.

## Manufacturers and microstructures of resin composites

Resin Composites	Manufacturer	Microstructure
Reflexions	Bisco, IL, USA	Nano-hybrid
Grandio	Voco, Cuxhaven, Germany	Nano-hybrid
Gradia Direct	GC, Tokyo, Japan	Micro-hybrid
Clearfil Majesty Esthetic	Kuraray, Osaka, Japan	Nano-filled
Ceram-X Mono	Dentsply, Konstanz, Germany	Nano-filled

**PP 134**

Category: Operative dentistry

## THE EFFECT OF DIFFERENT TYPE OF LIGHTING ON SHADE SELECTION: A COMPARATIVE STUDY

Murat TIRYAKI<sup>1</sup>, Meltem MERT EREN<sup>1</sup>, Burcu ŞENOL<sup>1</sup>, Fatma KORAY<sup>1</sup><sup>1</sup> Operative Dentistry, Istanbul University, Istanbul, Turkey

**Objectives:** Shade matching performance of dental health professional is very important for the aesthetic performance of a tooth restoration. The aim of this study is to evaluate the similarity of the ocular shade selection of the tooth colour by different types of lights to the spectrophotometric measurements and to find out the most suitable light source for colour selection. **Material and methods:** The colour of 151 upper incisors were matched by three clinicians using shade guide (VITA 3D-Master) in natural daylight, light of Demetron light correcting device (Kerr) and the halogen dental unit light. The colour of each tooth was measured by another clinician using spectrophotometer (VITA Easy shade). Obtained data were compared with each other statistically using NCSS, Mc Nemar tests.

**Results:** Selected shade scores of tooth colour in natural daylight and by the light of Demetron were similar to the results of the spectrophotometric measurement ( $p > 0,05$ ). Considering the three dimension of the colour, performance in selection of hue by halogen unit light and light of Demetron and selection of value in all lighting conditions exhibited similarity to the measurement of spectrophotometer ( $p > 0,05$ ).

**Conclusion:** The performance in tooth colour selection is influenced by the lighting of the clinic.

**Clinical Relevance:** It is recommended that dental professionals match the colour of the teeth in natural daylight instead of halogen dental unit light. The light of Demetron device is an alternative to natural daylight.

**PP 135**

Category: Operative dentistry

## ANTIBACTERIAL EFFECT OF SURFACE PRETREATMENT TECHNIQUES AGAINST STREPTOCOCCUS MUTANS

Hande Sar SANCAKLI<sup>1</sup>, Seyda Siso HERGUNER<sup>2</sup>, Yasemin BENDERLI GOKCE<sup>1</sup>, Zerrin SUMER<sup>3</sup><sup>1</sup> Department of Operative Dentistry, Istanbul University, Faculty of Dentistry, Istanbul, Turkey<sup>2</sup> Department of Operative Dentistry, Cumhuriyet University, Faculty of Dentistry, Sivas, Turkey<sup>3</sup> Department of Microbiology, Cumhuriyet University, School of Medicine, Sivas, Turkey

**Objective:** The aim of this study was to evaluate the antibacterial surface pretreatment methods against *S. mutans* within the infected dentin surface using a tooth cavity model. **Material-methods:** 72 cavities were prepared on occlusal dentin of caries-free third molars. After sterilization, teeth were inoculated with *Streptococcus mutans* for 48 h. One cavity of each tooth was used to evaluate the infection. After inoculation, infected cavity surfaces were treated with 1:Er:YAG Laser (1 W;5×5s, Smart 2940D Plus, Deka Laser) 2:KTP Laser (1 W;60s, SMARTLITE D, Deka Laser) 3:Ozone (80s; HealOzone, Kavvo) 4:Chlorhexidine(0.2% chlorhexidine digluconate, 40s CHX) 5:Er:YAG-Ozone-CHX combination 6:KTP-Ozone-CHX 7:Er:YAG-Ozone combination, 8:KTP-Ozone combination 9:Clearfil Protect Bond(20s,PB); control (n=8). Standardized amounts of dentin chips were obtained from the cavity walls, and the number of bacteria recovered was counted. Kruskal-Wallis test was used for statistical analyzes. **Results:** CHX treatment and Protect Bond application exhibited the most effective antibacterial activity among the groups evaluated ( $p < 0.05$ ). Er: YAG laser irradiation and its combinations with other antibacterial surface pretreatment applications also resulted in low bacterial recovery where as KTP laser irradiation and ozone application alone could maintain antibacterial effect as high as the other pretreatment techniques and antibacterial adhesive system used in the study. **Conclusion:** Laser irradiation and their combination with chlorhexidine and ozone treatments exert antibacterial effect against *S. mutans* also beside high antibacterial effect of chlorhexidine and antibacterial dentin bonding application. **Clinical relevance:** Chlorhexidine or antibacterial monomer MDPB are able to inactivate *S. mutans* more effectively than complicated and alternative pretreatment techniques such as laser irradiation and ozone applications.

**PP 136**

Category: Operative dentistry

**EFFECT OF THE BACKGROUND ON COLOR MEASUREMENTS**

Osman Tolga HARORLI<sup>1</sup>, Çağatay BARUTCİGİL<sup>1</sup>, Muhammed KARATAŞ<sup>1</sup>, Nurcan Özakar İLDAY<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Atatürk University, Erzurum, Turkey

Objectives: Instrumental color measurements of dental materials could potentially be influenced by the properties of the background that is used. The aim of this study was to evaluate which background is more relevant for the purpose of dental color measurements. Material methods: The color parameters of Filtek™ Z250 Universal Restorative Shade Guide tabs (3M ESPE) , which were based on the Vitapan® Classical Shade Guide, were measured according to the CIE L\*a\*b\* color scale, using four different backgrounds (white, black, green, and mirror) with a spectrophotometer (ShadePilot, Degudent®; Hanau,Germany). Measurements were conducted from the crowns of the shade guide taps and repeated for three times . Calculated Lab values of shade tabs were compared with the Vitapan® Classical Shade Guide L\*a\*b\* values that were defined in the spectrophotometer. Shades computed on different backgrounds by the spectrophotometer were also recorded. Statistical analyses were performed using the Wilcoxon signed-rank test. Results: As shown in table, 63,6% of the measurements were not in accordance with the original shade tabs. Additionally, when all CIE L\*a\*b\* values were analyzed, green and black backgrounds did not affect the CIE L\* values (p>0, 05). CIE a\* values did not statistically changed when mirror was used as a background (p>0, 05). None of the tested backgrounds were successful in determining CIE b\* values. Conclusion: None of the tested backgrounds are ideal for the purpose of dental color measurements; different backgrounds could potentially affect the shade measurements. Clinical relevance: The background could potentially affect shade matching.

Shade detections on different backgrounds

	Original shades
	A1 A2 A3 A4 B1 B2 B3 C2 C3 C4 D3
Backgrounds	Detected shades by the spectrophotometer
White (L: 96,3 a:-0,9 b:3,9)	A1 B2 A3 B3 A1 B2 B3 A3 B3 A4 A2
Black (L:4,1 a:1,8 b:2,6)	C1 B1 B2 C3 B1 C1 D4 C2 C3 C4 D2
Green (L:51,9 a:31,9 b:12,8)	B1 C1 D3 D4 B1 B1 A3 C2 C3 C4 D2
Mirror (L:1,7 a:2,9 b:-1,6)	A1 B2 A3 B3 A1 B2 B3 B3 B3 B4 B2

**PP 137**

Category: Operative dentistry

**MICROLEAKAGE AT ENAMEL AND DENTIN MARGINS WITH A LOW-SHRINKAGE FLOWABLE RESIN.**

Francesco Andrea COERO BORGA<sup>1</sup>, Alberto IUSO<sup>1</sup>, Alberto GAMBINO<sup>1</sup>, Damiano PASQUALINI<sup>2</sup>, Elio BERUTTI<sup>2</sup>, Nicola SCOTTI<sup>1</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> Endodontics, University of Turin, Turin, Italy

Objectives: The aim was to assess the marginal sealing quality of different low-shrinkage flowable and nano-hybrid composite. Materials and Methods: Forty-eight teeth were prepared with four fifth class cavities on mesial, distal, lingual and vestibular surface, measuring 2×2×2 mm (±0,2) and following the CEJ. Adhesion was achieved through a three-step total-etch system (OPTIBOND FL, Kerr). The cavities were then filled with three different composites: nano-hybrid composite (Venus Diamond, Heraeus Kulzer), flowable composite (Venus Diamond Flow, Heraeus Kulzer), SDR (Dentsply) and cured for 40s. Samples were divided into two groups: group 1 was immersed in a 1:10 methylene blue solution for 30 minutes at 25°C; group 2 was thermocycled (6000 cycles at 5°C-55°C), immersed in artificial saliva for 12 months and then treated as group 1. All samples were rinsed up and sectioned to estimate dye penetration with a scale of values ranging from 0 to 3. Results were statistically analyzed with Kruskal-Wallis Test (p <0,05) Results: Mean microleakage scores and SD of testes samples are expressed in table 1. CONCLUSIONS: Flowable composites showed a significant lower seal capability on enamel than the two other materials tested both before (p< 0,003) and after (p<0,54) artificial aging. Nanohybrid composite showed a statistically significant lower seal on dentin than flowable ones and SDR, but only after aging (p<0,38). Clinical Significance: Flowable resins performed better in sealing dentine margins.

Group	Material	infiltration Mean	
		Enamel	Dentine
1	Nano-hybrid composite (Venus Diamond, Heraeus Kulz)	1,256a ( $\pm 0,736$ )	1,566a ( $\pm 0,594$ )
1	Flowable composite (Venus Diamond Flow, Heraeus Ku)	1,838b ( $\pm 1,027$ )	1,555a ( $\pm 0,983$ )
1	SDR (Dentsply, USA)	1,006a ( $\pm 0,639$ )	1,428a ( $\pm 0,487$ )
2	Nano-hybrid composite (Venus Diamond, Heraeus Kulz)	1,438a ( $\pm 0,805$ )	1,944b ( $\pm 0,759$ )
2	Flowable composite (Venus Diamond Flow, Heraeus Ku)	1,932b ( $\pm 1,195$ )	1,544a ( $\pm 0,849$ )
2	SDR (Dentsply, USA)	1,228a ( $\pm 0,533$ )	1,414a ( $\pm 0,496$ )

Different superscript letters indicate statistical difference

### PP 138

Category: Operative dentistry

#### BOND STRENGTHS OF LASER-IRRADIATED AND BUR-CUT DENTIN

Gulsah E. AKIN<sup>1</sup>, Seyda HERGUNER-SISO<sup>1</sup>, Mutlu OZCAN<sup>2</sup>, Ozden OZEL-BEKTAS<sup>1</sup>, Hakan AKIN<sup>3</sup>

<sup>1</sup> Conservative Dentistry, Faculty of Dentistry, Cumhuriyet University, Sivas, Turkey

<sup>2</sup> Center for Dental and Oral Medicine, Clinic for Fixed and Removable Prosthodontics and Dental Materials Science, Faculty of Dentistry, Spain

<sup>3</sup> Prosthodontics, Faculty of Dentistry, Cumhuriyet University, Sivas, Turkey

**Objectives:** The objectives of this study were to evaluate the microtensile bond strength of one-step self-etch adhesive systems to Er:YAG laser-irradiated and bur-cut dentin after aging. **Methods:** Seventy-two third molars were selected and randomly divided according to cavity preparation method (Er:YAG laser and bur-cut). One-step self-etch adhesive systems (Clearfil S3 Bond, AdheSE One and Adper Easy One) were used. Following the adhesive procedure, the specimens were subdivided according to aging conditions (24 h in water control (C), 6 months water storage (WS) and 10.000 thermocycles). The micro-tensile bond strength ( $\mu$ TBS) was determined in a universal testing machine. Two-way ANOVA and post hoc Tamhane's T2 comparisons tests ( $\alpha=0.05$ ) were performed on all data. **Results:** There was no statistical difference in  $\mu$ TBS between Er:YAG laser-irradiated and bur-cut dentin ( $p>0.05$ ). Similarly, no significant difference was found in  $\mu$ TBS between C, WS and TC specimens ( $p>0.05$ ). Moreover, Clearfil S3 Bond presented the highest  $\mu$ TBS to dentin in both laser-

irradiated and bur-cut cavity preparation methods. **Conclusions:** Within the limitations of this study, adhesion of the Er:YAG laser-irradiated dentin was similar with the bur-cut dentin. Water storage and thermocycling was found ineffective on  $\mu$ TBS of the one-step self-etch adhesive systems. Clearfil S3 Bond presented the highest  $\mu$ TBS to dentin, irrespective of the cavity preparation method employed. **Significance:** Both bur-cut and Er:YAG laser-irradiated dentin was not affected by the aging methods used to simulate degradation of the adhesive interface and Er:YAG laser treatment may be used as an alternative cavity preparation method.

### PP 139

Category: Operative dentistry

#### RELIABILITY OF COLOR MEASUREMENTS DEVICES FOR IN VITRO STUDIES

Cagatay BARUTCIGIL<sup>1</sup>, Osman Tolga HARORLI<sup>1</sup>, Burak YILMAZ<sup>2</sup>, Funda BAYINDIR<sup>2</sup>

<sup>1</sup> Department of Restorative Dentistry, Ataturk University Faculty of Dentistry, Erzurum, Turkey

<sup>2</sup> Department of Prosthodontics, Ataturk University Faculty of Dentistry, Erzurum, Turkey

**Objectives:** This study evaluated the measurement reliability of a dental colorimeter and spectrophotometer regarding the color parameters of different shades of resin composite used in in vitro. **Materials and Methods:** Five different shades (B3, A2, UD, D3, and C2) of microhybrid resin composite samples (3M ESPE Filtek Z250) were included within this study. Ten specimens (6 mm diameter, 2 mm thickness) were prepared for each shade. After polymerization, the specimens were immersed in distilled water at 37°C for 24 hours. After 24 hours, all specimens were numbered from 1 to 10 for each shade, and color parameters were measured with a dental colorimeter (ShadeEye NCC). In the same sample order, the measurements were then repeated with a spectrophotometer (ShadePilot, Degudent) according to the CIE L\*a\*b\* color system. **Results:** The average values of L\*, a\*, and b\* of ten samples from each shade were calculated separately. The upper bound value, mean value, and lower bound value of each parameter is shown in the Table for each shade. In colorimetric measurements, the highest differences were shown in the A2 shade for L\* and b\*, as well as in the UD shade for a\*. Additionally, the A2 shade had the highest peak value when the spectrophotometer was used for all color parameters. **Conclusion:** Within the limitations of this study, we demonstrated that the spectrophotometer and dental colorimeter might show good repeatability

for in vitro color measurements of resin composites. Clinical Relevance: Color measurements of resin com-

posite may be reliably performed with colorimeter and spectrophotometer.

Results of Colorimetric and Spectrophotometric measurements.

	Colorimeter			Spectrophotometer		
	L	a	b	L	a	b
B3	74,90/73,64/72,73	-0,83/-1,03/-1,17	23,87/22,70/21,60	76,43/76,07/75,67	0,20/-0,06/-0,27	27,47/26,91/26,17
A2	75,67/73,75/71,00	-1,20/-1,28/-1,40	17,83/16,19/13,70	77,30/76,29/74,60	-0,40/-0,90/-1,30	21,50/20,16/18,20
UD	78,53/77,66/77,17	-0,25/-0,51/-0,80	19,33/18,06/17,30	77,40/77,03/76,80	0,50/0,40/0,30	20,80/20,46/20,10
D3	72,70/71,17/69,80	0,53/0,39/0,23	16,60/15,76/14,80	74,50/73,88/73,40	1,30/1,03/0,70	20,50/19,80/19,10
C2	71,00/69,03/67,43	-0,83/-1,07/-1,20	19,93/18,49/16,67	72,70/71,88/71,40	0,10/-0,06/-0,40	23,60/22,80/21,50

Upper, Mean and Lower values were represented respectively.

**PP 140**

Category: Operative dentistry

REHABILITATION OF EXTRACTED ANTERIOR TOOTH SPACES USING FIBER-REINFORCED COMPOSITE WITH AND WITHOUT NATURAL TOOTH PONTIC

Oktay YAZICIOGLU<sup>1</sup>, Safa TUNCER<sup>1</sup>, Murat TIRYAKI<sup>1</sup>  
<sup>1</sup> Operative Dentistry, University of Istanbul Faculty of Dentistry, Istanbul, Turkey

Introduction: Traumatic damage to anterior teeth is a common form of injury, particularly in children and adolescents. This damage causes to fracture or loss of the teeth. Older adults are lost their teeth due to advanced periodontal disease. Fiber-reinforced composite materials offer an alternative treatment for the replacement of missing teeth. These case reports present the management of single anterior teeth loss with two different treatment approaches. Clinical management: Case 1: A 29-year-old male patient presented with a loss of maxillary lateral incisor, and an uncomplicated crown fracture of maxillary central teeth. The fracture central incisor was restored with composite resin. The missing lateral incisor tooth were treated and fixed with glass fiber reinforced composites as a bridge. Case 2: A 49-year-old male patient loss of right maxillary central teeth for periodontal reasons. After the preparation of the loos area and pontic tooth were treated and fixed with glass fiber reinforced composites as a bridge. RESULTS: In case one 3 month and in case two 2 years follow-up showed good stability, aesthetics and periodontal health. CONCLUSIONS: Fiber reinforced composites may successfully used to provisionally restore esthetics and function to anterior incisors. CLINICAL SIGNIFICANCE: Using of fiber reinforced composites and adhesive techniques can provide minimally invasive and cost-effective treatment

options for the chairside replacement of missing anterior tooth with and without natural tooth pontic.

**PP 141**

Category: Operative dentistry

THE EFFECT OF FISSURE SEALANTS APPLICATION ON MICROLEAKAGE OF NANO-HYBRID COMPOSITE RESIN

Fikret YILMAZ<sup>1</sup>, Eda GÜLER<sup>1</sup>, Melek GÜREL<sup>2</sup>, Tuğba ÖZKAN<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Ondokuzmayıs University, Faculty of Dentistry, Samsun, Turkey

<sup>2</sup> Endodontics, Ondokuzmayıs University, Faculty of Dentistry, Samsun, Turkey

Objectives: This study evaluated the effect of fissure sealants application on microleakage of nano-hybrid composite resin restoration. Methods: Twenty-eight extracted human third molars were used. Fifty-six Class V cavities (5×2×2 mm) were prepared on vestibular and lingual surfaces. Futurabond M was used according to manufacturers' recommendations. Grandio- Shade A inserted into cavities. The specimens were divided into 4 groups with seven teeth each. The fissure sealants; Fissurit FX at Group I, Helioseal F at Group II, and Prime-Dent Fissure sealant at Group III was applied around the restoration margins. Group IV was control group. All teeth were thermocycling regime (500×, 5–55°C). After staining with basic fucsin, the teeth were sectioned for evaluation of microleakage. Staining degree fissure sealant was analyzed by stereomicroscope at 30× magnification and evaluated by two researchers. Statistical analysis was performed with Kruskal-Wallis and Mann-Whitney U test. Results: According to the results of present study, Control group showed significantly more microleakage as compared to sealant applied groups (p<0.05). There was

no statistically significant difference between Group 1 and Group 3 ( $p>0.05$ ) and these groups demonstrated the lowest microleakage. **Conclusion:** For decreasing the microleakage rate, use of the fissure sealants can be recommended for enamel treated with composite resin restoration margins **Clinical relevance:** Increasing of sealing ability of composite resin restorations' with fissure sealants may improve the clinical performance and extend the composite durability.

#### PP 142

Category: Operative dentistry

##### EFFECT OF TUBE POTENTIAL AND DIGITAL RADIOGRAPHY RECEPTORS ON DETECTION OF PROXIMAL CARIES

Hikmet SOLAK<sup>1</sup>, Kaan ORHAN<sup>2</sup>, Faruk ER<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Near East University Dentistry Faculty, Mersin, Turkey

<sup>2</sup> Oral, Jaw and Teeth Radiology, Near East University Dentistry Faculty, Mersin, Turkey

**Objective** Early detection of caries is crucial to prevent caries progression and to choose adequate treatment modality. The aim of the present study was to assess the efficiency of digital radiography systems for proximal caries detection **Design** Thirty extracted human teeth with natural caries were radiographed with Planmeca CCD receptor, VistaScan Perio and Digora SPP systems. The or absence of caries was scored according to a five-point scale by three observers. True caries depth was determined by histological examination. The diagnostic accuracy of each radiographic system was assessed by means of a receiver operating characteristic (ROC) curve analysis. **Results** No significant difference was found according to exposure time ( $p>0.05$ ). Although, the statistical analysis of Az scores exhibited no significant difference for the imaging modalities ( $p>0.05$ ). CCD and Digora SPP had higher accuracy than VistaScan. There was no statistically significant difference between inter-observer agreements ( $p>0.05$ ). **Conclusions** and **Clinical Relevance** The performance of digital receptors was similar to each other. The digital systems can be recommended with lowest kV tube potential setting for caries detection because of less radiation.

#### PP 143

Category: Operative dentistry

##### ANTIBACTERIAL ACTIVITY OF DENTAL COMPOSITE CONTAINING TRITERPENOID

Soohyeon KIM<sup>1</sup>, Jisoo KIM<sup>1</sup>, Sung-Ho PARK<sup>2</sup>, Su-Jung SHIN<sup>1</sup>, Jeong-Won Park PARK<sup>1</sup>

<sup>1</sup> Department of Conservative Dentistry, Yonsei University, Gangnam Severance Hospital, Seoul, Korea

<sup>2</sup> Department of Conservative Dentistry, Yonsei University, Seoul, Korea

**Objectives** The objective of this study was to evaluate the antibacterial effect of the composite resins which containing two different triterpenoids - Oleanolic acid (OA) and Ursolic acid (UA) – in vitro. **Materials and Methods** UA and OA were dissolved in acetone, and composite (Filtek Z350, 3M/ESPE, St Paul, MN, USA) was admixed to make homogenous mixture. Three different concentration was evaluated; 0.01, 0.02, 0.04 wt% for OA and 0.025, 0.005, 0.01 wt% for UA. Composite resin mixed only with acetone served as negative control. Composite resin disks ( $n=10$ , 5 mm diameter $\times$ 2 mm height) were fabricated for each group. Sterilized resin disks were submerged in artificial saliva for 2 hours for formation of biofilm, transferred to Streptococcus mutans(ATCC 25175) suspension and incubated for 5 days. Afterwards, the specimens were rinsed with saline and sonicated for 10 minutes. Disrupted biofilm cultures were diluted serially and plated for viable cell counting. Linear mixed model was used for data analyses. **Results** Both acids showed antibacterial effect when they are mixed with the composite. CFU were decreased by 20~60% in UA and 15~45% in OA a different concentrations. UA showed higher antibacterial effect in lower concentrations than OA. **Conclusions** UA and OA incorporated in composite resin exhibited antibacterial effect against S. mutans in low concentrations. **Clinical Relevance** Following the result of this experiment, UA and OA in a composite resin might lead to clinical benefit of decreased plaque accumulation and secondary caries.

#### PP 144

Category: Operative dentistry

##### COMPARATIVE IN-VITRO STUDY OF THE FINISHING AND POLISHING EFFICIENCY OF PROXIMAL STRIPS

Juan Ricardo MAYORAL MOLINA<sup>1</sup>, Maria Carlos REAL DIAS<sup>1</sup>, Miguel ROIG CAYÓN<sup>1</sup>, Lluís GINER TÀRRIDA<sup>2</sup>

<sup>1</sup> Restorative Dentistry, International University of Catalonia, Barcelona, Spain

<sup>2</sup> Research and Biomaterials, International University of Catalonia, Barcelona, Spain

**Objectives:** To compare the finishing and polishing efficiency of different proximal strips, on enamel proximal surface restored with resin composites. **Materi-**

als and Methods: Forty eight extracted upper molars were mounted in dent-form models using self-cured acrylic-resin. Standardized Class II cavities (6×6mm) were made using 80–40 µm diamond burs. Sectional matrix (Palodent, Dentsply) and interdental wedges were used. All samples were restored using Tetric Evo-Ceram resin-composite, Syntac adhesive system and light cured by LED curing-unit (Bluephase, Ivoclar-Vivadent) following manufacturers indications. Samples were randomly divided in three experimental groups: G1=(ProxoStrips,Intensiv,Switzerland), G2=(Edenta,Switzerland), G3=(Komet,Germany). Polishing-finishing manual procedures for 10–20 outlines were made by same operator. SEM analysis at 150× magnification was made for all finishing and polishing strips after every 10–20 outlines. SEM images were processed using ImageJ software (NIH,USA) to quantify remaining diamonds, debris, and spots percentages after use. Polyvinyl-siloxane impressions and gold-coated epoxy replicas of restored groups were prepared for 20× SEM examination. Data were statistically analyzed using a repeated measures analysis of variance (ANOVA) at  $p < 0.05$ . Results: Significant differences ( $p < 0.05$ ) were found between groups (G3=37,79%, G2=52,67%, G3=75,37%) on remaining diamonds, debris (G3=21,94%, G2=24,50%, G3=15,65%). There were no significant differences between groups ( $p > 0.05$ ) on remaining spots percentages. Conclusions: All groups were effective in finishing and polishing, however G3 showed higher diamond loss, higher percentage of debris accumulation and spots compared with G1 and G2. SEM qualitative analysis of restorations revealed that G1 tend to create more homogeneous finishing-polishing surface. Clinical Relevance: Finishing and polishing of restorations are essential steps in restorative dentistry.

#### PP 145

Category: Operative dentistry

#### EFFECT OF SURFACE TREATMENT METHODS ON THE SHEAR BOND STRENGTH OF REPAIRED RESIN COMPOSITES

Batu Can YAMAN<sup>1</sup>, Cigdem SÖZEN<sup>1</sup>, Yasemin BENDERLI GÖKÇE<sup>1</sup>

<sup>1</sup>Operative Dentistry, Istanbul University Faculty of Dentistry, Istanbul, Turkey

Objective: This study was to evaluate the effect of three different surface conditioning methods on the repair bond strength of the different type resin composite. Material and Method: Nanohybrid composites Ceram X Duo(Dentsply, Konstanz,Germany), AELITE Aesthetic(Bisco,Schaumburg,IL,USA) and a microhybrid composite AELITE All Purpose(Bisco, Schaumburg,IL, USA) were selected. Fifty-four composite resin blocks were prepared (5 mm×5 mm×

10 mm) and randomly assigned into nine groups for process. All samples were submitted thermocyclus.(5–55° C,1 min. dwell time- 5000 cyclus) Surfaces of samples were abraded with three different treating systems(diamond bur, laser, air abrasion) in the following manner:Group1: CeramX Duo/Diamond Bur-CRX/DB, Group2:CeramX Duo/Laser-CRX/L,Group3:CeramXDuo/AirAbrasion-CRX/AA,Group4:AELITEAesthetic/Diamond Bur-AELITE A/DB,Group5:AELITE Aesthetic/Laser-AELITE A/L,Group6:AELITE Aesthetic/AirAbrasion-AELITE A/AA,Group7:AELITE All Purpose/Diamond Bur-AELITE AP/DB,Group8:AELITE All Purpose/Laser- AELITE AP/L,Group9:AELITE All Purpose/Air Abrasion- AELITE AP/AA. Following the surface treatments, composite specimens were repaired with composite materials by using a total etch adhesive(Single Bond,3M ESPE,St.Paul,MN, USA) and light cured. Bond strengths were measured at a crosshead speed of 0.5 mm/minute in an Instron universal test system. Bond strengths were expressed in MPa. Data were analyzed with ANOVA and Tukey's HSD. Result: Mean bond strength values(MPa) of groups were: Group1:8.00, Group2:6.17, Group3:3.65, Group4:8.33, Group5:7.04, Group6:6.21, Group7:11.82, Group8:9.24, Group9:8.64. Statistically differences were found between the air abrasion groups and diamond bur only except Group1 vs. Group4. In the laser groups were not determined statistic difference. Conclusion: Even though fact that statistically differences were not found between the repaired composites types, microhybrid composite was showed better than other repaired composites. Between the surface treatment systems, air abrasion groups showed the lowest results and diamond bur exhibited best result.

#### PP 146

Category: Operative dentistry

#### MICRO-TENSILE BOND STRENGTH OF TWO DIFFERENT ADHESIVES TO DENTIN CONTAMINATED WITH NATURAL SALIVA

Muhammet YALÇIN<sup>1</sup>, Neslihan ŞİMŞEK<sup>2</sup>, Ali KELEŞ<sup>2</sup>, Fuat AHMEDOĞLU<sup>2</sup>, Ayşe KOCABAŞOĞLU<sup>3</sup>, İbrahim UMAR<sup>1</sup>

<sup>1</sup>Department of Conservative Dentistry, School of Dentistry, University of Inonu, Malatya, Turkey

<sup>2</sup> Department of Endodonti, School of Dentistry, University of Inonu, Malatya, Turkey

<sup>3</sup>Department of Conservative Dentistry, School of Dentistry, University of Selçuk, Konya, Turkey

Objectives: The purpose of this study was to evaluate the effect of saliva contamination on microtensile bond strength of two self-etch dentine bonding systems. Materials and Meth-

ods: Clearfil SE Bond (SEB) and Clearfil S3Bond (S3B) adhesive systems were used in this study. Twelve extracted caries-free human molar teeth were randomly divided into three sub-groups for (SEB) and (S3B). For (SEB)-I was the control group (adhesive applied to noncontaminated dentine surface), (SEB)-II was the contamination group (adhesive applied, followed by saliva contamination then rinsed, air dried and reprimed and rebonded) and (SEB)-III was the double contamination group (adhesive applied, followed by saliva contamination, rinsed, air dried and then adhesive reapplied, this procedure was repeated). For (S3B)-I was the control group same as (SEB)-I, (S3B)-II was the contamination group same as (SEB)-II and S3B-III was the double contamination group same as (SEB)-III. Followed by the bonding procedure, a 5 mm composite resin block with TPH Spectrum was built on the substrate. The data was calculated as MPa and analyzed using one-way ANOVA and Tukey test ( $P < 0,05$ ). Results: The results indicated that S3B-3 showed highest bond strength when compared to the others sub-group of S3B ( $P < 0,05$ ). No statistically significant difference was found between sub-group of SEB ( $P > 0,05$ ). Conclusion: if decontamination procedure is done well, saliva contamination did not affect the dentin microtensile bond strength of the self-etching adhesives. Clinical Relevance: Should be considered or used rubber-dam while filling because of salivary contamination may affect the strength of binding.

#### PP 147

Category: Operative dentistry

#### EVALUATION OF MICROHARDNESS OF TWO DIFFERENT COMPOSITE MATERIALS POLYMERISED UNDER LIGHT, HEAT, PRESSURE AFTER THERMOCYCLING

Nese BALIBEY<sup>1</sup>, Mustafa ERSOY<sup>1</sup>, Mubin SOYMAN<sup>1</sup>

<sup>1</sup>Operative Dentistry, Yeditepe University, Istanbul, Turkey

Objectives: The aim of this in vitro study is to determine the differences between the microhardness of two different composite materials (Tescera, Filtek Z250) after they have been polymerised in Tescera ATL processing unit and with halogen light source after 2000 thermocycles. Material and Methods: Composite materials were embedded in 3 mm deep and 8 mm wide acrylic scaffolds. Three groups of 16 samples each were formed. The first two groups (Tescera Bisco, Filtek Z250 3M ESPE) were polymerised in Tescera ATL processing unit under light, heat and pressure. 3rd group (Filtek Z250) was polymerized by halogen light source. The third group was only polymerized by halogen light source. All the polymerised specimens were kept in distilled water for 24 hours in room temperature. All the samples were ground with 600, 800, 1200 grit silicon carbide papers under

running water. After polishing, Vickers microhardness values were measured. All samples were then thermally cycled for 2000 cycles between 5°C and 55°C. After thermocycling Vickers microhardness were determined again. Results: The highest microhardness values before and after thermocycling were obtained in Tescera composite group and the lowest microhardness was for Filtek Z250 polymerised by halogen light source. Conclusions: The microhardness of restorations polymerised in Tescera ATL processing unit (indirect polymerization) was higher than the microhardness of restorations polymerised by halogen light.

#### PP 148

Category: Operative dentistry

#### IN VITRO EVALUATION OF SHEAR BOND STRENGTHS OF DIFFERENT FLOWABLE RESINS

Fatma CEBE<sup>1</sup>, Mehmet Ata CEBE<sup>2</sup>, Emine SIRIN KARAARSLAN<sup>2</sup>, Necdet ADANIR<sup>3</sup>, Bora OZTURK<sup>1</sup>

<sup>1</sup> Department of Restorative Dentistry, Selcuk University Faculty of Dentistry, Konya, Turkey

<sup>2</sup> Department of Restorative Dentistry, Gaziantep University Faculty of Dentistry, Gaziantep, Turkey

<sup>3</sup> Department of Endodontics, Gaziantep University Faculty of Dentistry, Gaziantep, Turkey

Objectives: The aim of this in vitro study was to compare the shear bond strength (SBS) of four flowable composite resins to dentin. Materials and Methods: Sixty extracted molar human teeth were randomly divided into four groups (15 teeth per group). To test the SBS of Filtek Flow, (3M ESPE), Vertise Flow (Kerr), Dyract Flow (Dentsply), Tetric Flow, (Ivoclar) were applied to the dentin surfaces of teeth. Clearfil SE Bond (Kuraray Medical) adhesive resin material was used in all flowable composite resins except Vertise Flow. Each composite material was cured using light emitting diode (LED) light for 20 seconds. Specimens were subjected to SBS testing using universal testing machine. The results were calculated in mega pascals (MPa) and analyzed using ANOVA and Tukey HSD test. Results: The SBS values were as follows (mean ± SD in MPa): 9.78±3.84 (Vertise Flow), 7.9±3.24 (Dyract Flow), 7±3.91 (Filtek Flow), 6.15±2.8 (Tetric Flow). Vertise Flow composite resin had the highest SBS values and Tetric Flow composite resin had the lowest SBS values. Statistically significant differences were found among the groups in terms of SBS ( $P < 0.05$ ). Conclusions: Vertise Flow composite resin yielded a significantly higher SBS value compared with the other flowable resins. Clinical Relevance: In this in vitro study, Vertise Flow composite resin showed a significantly higher SBS value compared with the other flowable resins without using acid etching and dentin bonding material.

**PP 149**

Category: Operative dentistry

**MICROTENSILE BOND STRENGTH OF RESIN CEMENT-ADHESIVE SYSTEMS IN DIFFERENT DENTIN DEPTHS**Nazlı SIRINSUKAN<sup>1</sup>, Ali Kağan GÖKÇE<sup>1</sup>, Burcu DIKICI<sup>1</sup>, Yasemin BENDERLI GÖKÇE<sup>1</sup><sup>1</sup> Operative Dentistry, Dentistry

**Objectives:** The purpose of this study was to evaluate the microtensile bond strength between a dual cure resin cement with different adhesive systems and a self-adhesive resin cement in different dentin depth. **Materials and Methods:** Occlusal enamel of 18 extracted carries-free human third molar were removed by 180 and 600 grit SiC. Teeth were randomly divided into 3 groups according to the resin cement- adhesive systems. (Adhese-Variolink II, Syntac- Variolink II, Unicem). Composite onlays (Filtek Z250, 3MESPE) were luted with these resin cement-adhesive systems. After the specimens were stored in distilled water for 1 day, the microtensile test was performed in a universal testing machine (Instron). Microtensile bond strengths were determined at three dentin depth levels with a remaining dentin thickness of more than 3 mm, between 2 and 3 mm, and less than 2 mm. Data were analyzed using one-way ANOVA ( $p < 0.05$ ) and post hoc Tukey HSD tests ( $p < 0.01$ ). **Results:** Results are, for Adhese-Variolink II, Syntac-Variolink II, Unicem groups, in deep dentin  $27,97 \pm 4,68$ ,  $19,26 \pm 5,20$ ,  $22,23 \pm 3,85$ , in mild dentin  $27,48 \pm 8,15$ ,  $30,01 \pm 6,75$ ,  $28,82 \pm 5,98$ , in superficial dentin  $30,22 \pm 8,09$ ,  $28,89 \pm 5,26$ ,  $25,60 \pm 5,89$  respectively. **Conclusion:** Luting with Adhese-Variolink II showed higher bond strength values in all dentin depths. Using Syntac-Variolink II and Unicem in deep dentin cavities showed lower bond strength values. **Clinical Relevance:** In superficial and mild dentin, all the materials have clinically accepted results. In deep cavities less technical sensitive and reliable adhesive system such as self-adhesive bonding systems should be preferred for luting indirect restoration.

**PP 150**

Category: Operative dentistry

**INFLUENCE OF ACIDIC SPORTS DRINKS ON THE COLOR STABILITY OF RESIN COMPOSITES**Ugur ERDEMİR<sup>1</sup>, Esra YILDIZ<sup>1</sup>, Meltem MERT EREN<sup>1</sup><sup>1</sup> Operative Dentistry, University of Istanbul, Faculty of Dentistry, Istanbul, Turkey

**Objectives:** The aim of this in vitro study was to evaluate the effect of three sports drinks; Powerade, Redbull and Burn on the color stability of two nanofilled and two microhybrid resin composites after a period of 1 month and 6 months. **Methods:** Color stability of nanofilled (Clearfil Majesty Posterior and Filtek Supreme XT) and microhybrid (Clearfil APX and Filtek Z250) was evaluated after storage in Powerade, Redbull, Burn and distilled water (control) for two minutes daily over 1 month and 6 months test period. Color measurement was done using a spectrophotometer based on the CIE L\*a\*b\* color scale after each treatment. Mean values of the different groups were compared using Kruskal-Wallis Test and multiple comparisons of the mean values were done using Mann-Whitney U test with 0.05 as significance level. **Results:** The color change exhibited by all composite groups was significantly different for all storage solutions, at both time periods ( $p < 0.05$ ). Independent of the composites tested, Burn resulted in the highest level of  $\Delta E$  values, while the lowest  $\Delta E$  was found for specimens stored in distilled water. Amongst the resin composites tested Clearfil Majesty Posterior group demonstrated significantly less color change at 6 months than the other materials tested ( $p < 0.05$ ). **Conclusions:** All tested resin composites showed color change over a period of 1 month and 6 months. The highest color change values were obtained for the Clearfil APX specimens that were immersed in the Sports drinks for 1 month and 6 months.

**PP 151**

Category: Operative dentistry

**EFFECT OF DIFFERENT SURFACE TREATMENTS ON THE REPAIR BOND STRENGTH OF AGED COMPOSITE**Diğdem EREN<sup>1</sup>, Özden ÖZEL BEKTAŞ<sup>1</sup>, Şeyda HERGÜNER SİSO<sup>1</sup>, Emine GÜLŞAH GÖKTOLGA AKIN<sup>1</sup><sup>1</sup> Restorative Dentistry, Faculty of Dentistry, Cumhuriyet University, Sivas, Turkey

**Abstract Objective:** The aim of this study was to compare the effect of four different surface treatments on the repair bond strength of aged composite resin by employing the microshear test. **Materials and Method:** Forty-eight micro-matrix composite blocks were prepared. All samples were stored in distilled water at 37°C for 24 hours, then thermo cycled for 1000 cycles between ( $5 \pm 2$ ) and ( $55 \pm 2$ )°C with a dwell time of 30 s and a transfer time of 5 s. The samples were randomly divided into four groups and were subjected to the following treatments (n=12): Group 1 - phosphoric acid; Group 2 - diamond bur + phosphoric acid; Group 3 - diamond bur; Group 4 - Er:YAG Laser. After the aging procedure, fresh microhybrid resin composite was bonded to the treated surfaces with an etch and rinse adhesive resin. The repair bond strength of each sample

was determined using a microshear bond strength test. All data were analyzed using the Kruskal Wallis test. Results: There were no significant differences among samples in the four groups. Conclusion: Based on the results of this study, each of the four surface treatment methods produced sufficient repair bond strength.

### PP 152

Category: Operative dentistry

#### CBCT VERSUS THREE DIGITAL IMAGE RECEPTORS ON DETECTION OF PROXIMAL CARIES

Faruk ER<sup>1</sup>, Kaan ORHAN<sup>2</sup>, Hikmet SOLAK<sup>1</sup>, Atakan KALENDER<sup>1</sup>

<sup>1</sup> Restorative Dentistry, Near East University Dentistry Faculty, Mersin, Turkey

<sup>2</sup> Oral, Teeth And Jaw Radiology, Near East Dentistry Faculty, Mersin, Turkey

Objective: Early detection of proximal caries is crucial to prevent caries progression and to choose adequate treatment modality. The aim of the present study was to assess and compare the visibility of proximal caries at three different tube potential settings using two SPPs, and a charge-coupled device and a CBCT. Materials and methods: Thirty extracted human teeth with natural proximal caries were radiographed with three different imaging modalities and Newtom CBCT scanner. Three observers scored the resultant images for the presence of caries. The definitive diagnosis was determined by stereomicroscopic assessment. The diagnostic accuracy for each imaging modality was expressed as the area under the receiver operating characteristic curves (Az). Results: Higher accuracy was found for Digora compared to VistaScan and CCD images at all tube potentials. Accuracy was significantly different only at all tube setting in favor of Digora ( $p < 0.05$ ). CBCT and Digora were almost same on detection of caries ( $p < 0.05$ ). Conclusions and Clinical Relevance: The performance of CBCT images was similar to that with SPP images. A SPP system can be recommended for dental clinics particularly with the lowest tube potential for the diagnosis of caries.

### PP 153

Category: Operative dentistry

#### THE INVESTIGATION OF SURFACE ROUGHNESS AND ION EXCHANGE OF TEETH AFTER BLEACHING AGENTS WERE APPLIED

Presentation Type: Poster (Display Only)

Muhammet YALCIN<sup>1</sup>, Burak DAYI<sup>1</sup>, Ibrahim UMAR<sup>1</sup>, Reyhan GOZLEK<sup>1</sup>, Nimet UNLU<sup>2</sup>

<sup>1</sup>Department of Restorative Dentistry, Faculty of Dentistry, Inonu University, Malatya, Turkey

<sup>2</sup>Department of Restorative Dentistry, Faculty of Dentistry, Selcuk University, Konya, Turkey

Objectives: The aim of this study was investigated the effects of four different bleaching agents on surfaces chemical composition and roughness of bovine enamel. Materials and Methods: A total of 40 bovine incisors randomly were divided into four experimental groups. G1-White & Brite %30 Carbamide Peroxide, G2-Opalescence Boost %38 Hydrogen Peroxide, G3-Onda Oxygel %38 Hydrogen Peroxide and G4-Whiteness HP %35 Hydrogen Peroxide. Then the coronary portion of the teeth were sectioned at the cemento-enamel junction(CEJ). The effects on the contents of elements were measured using Energy-dispersive X-Ray Microanalysis (EDX)system (n=2) before and after application. In addition, the effects of bleaching agents on surface roughness(Ra) were performed by Computerize Roughness Tester (n=8). The mean of the roughness values was calculated and data was analyzed by one-way ANOVA and Pos Hoc Tukey HSD tests. Wilcoxon Signed Ranks Test was used for statistical analysis of EDX mean values. Result. EDX data showed no significant chemical changes in bovine enamel surface for the tested groups ( $p > 0.05$ ).According to the surface roughness test results, FGM exhibited increased surface roughness values( $P < 0.05$ ),whereas there was not significant different from the other bleaching agents ( $P > 0.05$ ). Conclusions: Bleaching agents with varying concentrations of CP and/or HP don't constitute a significant change in terms of ion distribution however, can affect the surface roughness negatively. Clinical Relevance: Roughness and ion loss on the surface of teeth is caused by bleaching agents. Clinical modifications or new materials should be developed to overcome these problems

### PP 154

Category: Operative dentistry

#### THE EFFECT OF SALIVA CONTAMINATION ON MICROLEAKAGE OF AN ETCH-RINSE DENTIN ADHESIVE

Safa TUNCER<sup>1</sup>, Mustafa DEMIRCI<sup>1</sup>, Neslihan TEKÇE<sup>1</sup>, Ömer UYSAL<sup>2</sup>

<sup>1</sup> Department of Operative Dentistry, Istanbul University Faculty of Dentistry, Istanbul, Turkey

<sup>2</sup> Medical Statistics and Informatics, Bezmialem University School of Medicine, Istanbul, Turkey

Objective: To evaluate the influences of saliva contaminations on microleakage of one-bottle etch and rinse adhesive at different stages during the bonding procedure. Material and

**Method:** Class V cavity preparations at the cemento-enamel junction were made on the buccal surfaces of 21 freshly extracted human molars. The teeth were randomly allocated three groups. Group1(Control): without saliva contamination, dental adhesive applied according to manufacturer's instruction. Group2: The cavity surfaces of teeth were contaminated after etching. Saliva was dried with oil-free gently air and then adhesive was applied and cured according to manufacturer's instruction. Group3: Cavity surface were etched and then the adhesive was applied according to manufacturer's instruction. Then, saliva was left undisturbed then dried with oil-free gently air. The adhesive was then applied and cured according to manufacturer's instruction. The specimens were restored with nanohybrid composite. After thermocycling and immersing in methylene blue, the teeth were sectioned three buccolingual sections, evaluated under a stereomicroscope and scored(0–4). The results are expressed as means  $\pm$  standard deviation (SD). Data were analyzed using Kruskal-Wallis and Dunn tests. Results: Group 2 ( $2.52 \pm 1.07$ ) and Group3 ( $2.42 \pm 1.63$ ) were significantly exhibited more gingival microleakage than control group( $0.95 \pm 1.11$ ) ( $p < 0.05$ ). The mean occlusal microleakage for group 2 ( $1.14 \pm 0.96$ ) were significantly higher than control group ( $0.42 \pm 0.5$ ) ( $p < 0.05$ ). Microleakage in the gingival margins was significantly higher than occlusal margins for the groups 2 and 3 ( $p < 0.05$ ). Conclusion: Leakage was significantly increased by contamination before and after adhesive application. Therefore, isolation during restoration procedure can be a important a factor in success.

#### PP 155

Category: Operative dentistry

#### EFFECT OF DIFFERENT CARIES REMOVAL TECHNIQUES ON THE BOND STRENGTH OF ADHESIVES TO CARIES-AFFECTED DENTIN

Esma YILDIZ<sup>1</sup>, Emine ŞIRIN KARAARSLAN<sup>1</sup>, M. Ata CEBE<sup>1</sup>, Zeynep YEĞİN<sup>2</sup>, Gül TOSUN<sup>2</sup>

<sup>1</sup>Department of Pediatric Dentistry, Gaziantep University Faculty of Dentistry, Gaziantep, Turkey

<sup>2</sup>Department of Pediatric Dentistry, Selcuk University Faculty of Dentistry, Konya, Turkey

**Objective:** The aim of this study is to evaluate the effect of three different caries removal techniques on micro tensile bond strength of adhesive materials to caries-affected human dentin. **Materials and Methods:** Thirty primary and thirty permanent molar teeth were used. According to caries removal techniques, the teeth were randomly divided into three groups; I: conventional steel burs, II: Er:YAG laser (Fidelis Plus 3, Fotona) III: chemo-mechanical method (Carisolv gel, Medi-Team). Each group was divided into two subgroups according to bonding agents: G-Bond (GC Corporation) and Adper

Single Bond 2 (3M Dental Products). Teeth were restored with composite resin (Adper Single bond 2/Filtek Z 250 or G Bond/Gradia Direct). **Results:** The highest bond strength was observed in the total etch-laser group (mean  $\pm$  SD in MPa:  $22.77 \pm 5.40$ ) in the permanent teeth but there were no differences between bur groups ( $p > 0.05$ ). The lowest values were observed in the total etch-chemo mechanical group in the permanent teeth (mean  $\pm$ SD in MPa:  $11.78 \pm 4.98$ ). There were no difference between bur and chemo mechanical groups in the primary teeth for both bonding agents ( $p > 0.05$ ) but values of laser groups was significantly lower than the other primary teeth groups ( $P < 0.05$ ). **Conclusion:** Laser-total etch and bur techniques in permanent teeth, bur and chemo mechanical techniques in primary teeth were found more successful. **Clinical relevance:** Similar results were found for bur groups in both dentition, however laser technique in primary teeth, chemo mechanical technique in permanent teeth were poorest in providing bonding for both etching systems.

#### PP 156

Category: Operative dentistry

#### EFFECT OF BLEACHING AGENTS ON SURFACE CHARACTERIZATION OF MINERAL TRIOXIDE AGGREGATE

Tahsin YILDIRIM<sup>1</sup>, Tugba SERIN KALAY<sup>1</sup>, Huseyin IPEK<sup>2</sup>

<sup>1</sup> Operative Dentistry, Health Sciences

<sup>2</sup> Operative Dentistry, Karadeniz Technical University, Trabzon, Turkey

**Objectives** The placement of a coronal plug before intracoronary bleaching treatment is recommended for preventing cervical resorption. Mineral Trioxide Aggregate (MTA) has been recommended for cervical barrier. The aim of this study was to evaluate the surface changes of MTA after bleaching agents application for intracoronary bleaching. **MATERIALS AND METHODS** Forty cylindrical holes – diameter and depth as 4 mm- were prepared. MTA was mixed and packed into the cylindrical holes. Samples were divided to four groups. Three groups(n=10) were subjected to bleaching procedure; carbamide peroxide(CP), hydrogen peroxide(HP) and sodium perborate(SP). Control(C) group didn't receive any application. The microhardness and surface roughness of specimens were measured and compared with control group. Structural changes of MTA were evaluated using scanning electron microscope (SEM) and energy-dispersive x-ray microanalysis(EDX) systems. **RESULTS** Comparison of the mean change in hardness and roughness between the groups was done with Kruskal-Wallis test, and intergroup comparison was performed with Mann-Whitney U test with Bonferroni adjustment ( $p < 0.05$ ). The difference between groups was statistically significant ( $P < .0001$ ).

(Results were shown in Table 1) EDX system showed that bleaching agents affected the elemental distribution. This structural change was maximum in HP group and minimum in SP group. **CONCLUSIONS** Bleaching agents affected elemental distribution, surface roughness and surface microhardness of MTA. The use of SP as a intracoronal bleaching agent showed minimum effect on MTA surface.

Table 1. Comparisons between groups and Intergroup

Groups	Microhardness (VHN)			Surface Roughness (Ra)		
	Mean	SD	p value	Mean	SD	p value
Control	69,671 a	6,610		0,392 A	0,055	
SP	63,147 a	4,978	P<.0001	0,470 B	0,080	P<.0001
CP	54,796 b	4,433		0,669 C	0,219	
HP	47,203 c	2,739		0,691 C	0,188	

Different letters indicate significantly differences

### PP 157

Category: Operative dentistry

#### USE OF MINERAL TRIOXIDE AGGREGATE OR CALCIUM HYDROXIDE IN THE TREATMENT OF DIRECT PULP CAPPING

Tahsin YILDIRIM<sup>1</sup>, Gunes BULUT EYUBOGLU<sup>1</sup>, Tugba SERIN KALAY<sup>1</sup>, Cemile KEDICI ALP<sup>1</sup>, Cemal YESILYURT<sup>1</sup>

<sup>1</sup>Operative Dentistry, Enstitute of Health Science, Samsun, Turkey

**Objectives:** Direct pulp capping has been applied for more than 200 years. The aim of this study was to determine the clinical long-term success of direct pulp capping, by using MTA (ProRoot MTA; Dentsply-Maillefer, Ballaigues, Switzerland) or a Ca(OH)<sub>2</sub> paste. **Materials and Methods:** Ethical permission was gained. 80 patients of the teeth were used in this study without any symptoms of pulpitis. If the pulp was exposed while the caries was removing, the teeth were applied direct pulp capping. Following isolation and caries removal, when the perforation occurred, a sterile cotton pellet embedded salin was placed over the exposed pulp tissue to prevent the bleeding. After bleeding was controlled, the exposed pulp dressed with either MTA (40 patients) or Ca(OH)<sub>2</sub> (40 patients). In MTA group, final restorations were performed after one visit in MTA group. In Ca(OH)<sub>2</sub> group, final restorations were performed immediately after Ca(OH)<sub>2</sub> was inserted. At recall appointments, patients were evaluated as clinically and radiographically at 6 months, 1 year and 2 years. **Results:** In Ca(OH)<sub>2</sub> group; 12 of 40 teeth were symptomatic after 2 years and root canal treatment were applied to the teeth. Success rate

was 70% in the teeth treated with calcium hydroxide. In MTA group; 8 of 40 teeth were symptomatic after 2 years follow up. 32 teeth didn't show any clinical and radiographically symptom. Success rate was 80%. **Conclusions:** MTA material can be used in the treatment of the exposed pulp as the capping material.

### PP 158

Category: Operative dentistry

#### THE EFFECT OF DIFFERENT DENTAL LIGHT CURING UNITS ON HUMAN DENTAL PULP STEM CELLS

Muhammet YALÇIN<sup>1</sup>, Halime KENAR<sup>2</sup>, Burak DAYI<sup>1</sup>, Reyhan GÖZLEK<sup>1</sup>, Erdal KARAÖZ<sup>3</sup>

<sup>1</sup> Department of Conservative Dentistry, School of Dentistry, University of Inonu, Malatya, Turkey

<sup>2</sup> Head of Tissue Engineering and Real Time PCR Lab., University of KOCAELİ, Kocaeli, Turkey

<sup>3</sup> Manager, Head of Animal Stem Cell /Onkogram/ Endometrium- Embryo Co-Culture Lab., University of KOCAELİ, Kocaeli, Turkey

**Objectives:** To evaluate the effect of different dental light curing units on cellular senescence and proliferation rate of human pulp mesenchymal stem cells. **Materials and methods:** Human dental pulp mesenchymal stem cells (hDP-MSCs) were seeded at a density of  $1 \times 10^4$  cells/cm<sup>2</sup> into a 96 well plate. Cells were allowed to attach for 24 h and Halogen curing units, Light-Emitting-Diode and Plasma arc (MOD1(10 sec.,% 100 light intensity) MOD2(6 sec. (2(%50) +2(% 80) +2(% 100 light intensity), MOD3(6 sec. (3(%50) +3(% 100 light intensity)) units were applied on the cells from 1.2 cm distance (8 mm air +4 mm growth medium). Media of the wells was refreshed after irradiation and cells cultured at 37°C in a 5% CO<sub>2</sub> incubator for 48 h. Cell growth was determined using the WST cell proliferation assay. The same samples were fixed and evaluated for cellular senescence, the irreversible growth arrest of cells, by staining for SA-β-galactosidase activity. Mann-Whitney U test was used for senescence data evaluation and One-way Anova and Tukey HSD tests were used for proliferation data evaluation. **Results:** Cell proliferation rate was significantly higher under MOD3 conditions than under Halogen and MOD1. MOD2 conditions caused cellular senescence more than the others. **Conclusions:** Light curing units can affect hDP-MSCs' proliferation rate and their proliferative capabilities, so they should be selected accordingly. **Clinical relevance:** When the light curing units are used for polymerization of adhesive systems in direct and indirect pulp capping they may have effects on senescence and proliferation rate of dental stem cells.

**PP 159**

Category: Operative dentistry

**COMPARISON OF TRANSLUCENCY PARAMETER AND DEGREE OF MONOMER CONVERSION ON TWO DIFFERENT COMPOSITE RESINS**Fatma CEBE<sup>1</sup>, Mehmet Ata CEBE<sup>2</sup>, Emine SIRIN KARAARSLAN<sup>2</sup>, Nevin COBANOGLU<sup>1</sup>, Semih OZSEVIK<sup>2</sup>, Bora OZTURK<sup>1</sup><sup>1</sup> Restorative Dentistry, Selcuk University Faculty of Dentistry, Konya, Turkey<sup>2</sup> Restorative Dentistry, Gaziantep University Faculty of Dentistry, Gaziantep, Turkey

**Objectives:** The aim of this in vitro study was to compare the translucency parameter (TP) and the degree of monomer conversion (DC) on two different composite materials. **Materials and Methods:** Duo Ceram X E1 (Dentsply) and Synergy Enamel (Coltene Whaledent) composite resins were used to prepare the composite discs. In A Teflon mold (10 mm in diameter, 2 mm in height), composite discs were polymerized with Fomed monitex (blue Lex Gt-1200) light curing device (n=10). Specimens were stored in light proof boxes for 24 hours after polymerization. Color measurement was performed using a spectrophotometer (Vita, Easy Shade) in black and white background color. The CIE L\*a\*b values and light permeabilities of specimens were calculated. For the determining the DC, in another teflon mold (5 mm in diameter, 2 mm in height), 10 resin discs were prepared with the same composite resins (n=5). Fourier Transformation Infrared Spectroscopy (FTIR) was used to determine the level of light polymerization of the resin materials immediately after polymerization. DC was calculated as a percentage of experimentally polymerized versus maximally polymerized composite. The results were statistically analyzed with Mann-Whitney U Test. A Spearman's correlation coefficient test was used to correlate between TP and DC. **Results:** According to TP measurement, there were significant differences between groups (P<0.05). According to DC, there were no significant differences between groups (p=0.76). The correlation was not found between TP and DC. **Conclusions:** We must consider TP because it showed differences between groups. **Clinical Relevance:** In this in vitro study, the correlation was not found between TP and DC.

**PP 160**

Category: Operative dentistry

**ENAMEL SEALING ABILITY OF A NEW SELF-ADHESIVE RESIN COMPOSITE.**Mariano PEDANO DE PIERO<sup>1</sup>, Bruno BARACCO CABAÑES<sup>1</sup>, Laura CEBALLOS GARCÍA<sup>1</sup><sup>1</sup> Stomatology, Health Sciences Faculty, Rey Juan Carlos University, Móstoles, Madrid, Spain

**Objectives:** To compare the enamel sealing in Class I cavities of a self-adhesive resin composite with two restorative systems composed by a total-etch adhesive either with a flowable or conventional nanofilled composite, after a thermal aging treatment. To analyze, under Scanning Electron Microscopy (SEM), the interface generated by these products. **Materials and Methods:** Conservative occlusal Class I cavities were performed in 63 non-carious extracted molars and divided into three groups (n=21). Teeth of each group were restored with one of the following restorative systems: 1) Vértise Flow; 2) Optibond Solo Plus + Filtek Supreme XT Flow; 3) Optibond Solo Plus + Filtek Supreme XT. All materials were used according to manufacturers' instructions. Twenty teeth of each group were thermo-cycled (10000×, 5–55°C), immersed in 0.5% basic fuchsin (24 h) and sectioned in V-L axis to determine the dye penetration according to a qualitative scale. One dye-free tooth of each group was sectioned and observed under SEM. Data were analyzed by Kruskal-Wallis and U-Mann Whitney non parametric tests (p<0.05). **Results:** Statistically significant differences were detected between the restorative systems: Vértise Flow showed a lower sealing capacity in comparison with the other materials. SEM images showed generalized gaps between enamel margins and Vértise Flow. **Conclusions:** Vértise Flow did not confer an adequate sealing at the enamel margins after a thermal aging procedure. **Clinical Relevance:** The inability of Vértise Flow to achieve a competent sealing at the enamel may lead to marginal leakage and restoration failure.

**PP 161**

Category: Operative dentistry

**MARGINAL ADAPTATION AND MICROLEAKAGE OF LOW-SHRINKAGE COMPOSITES IN CLASS V CAVITIES**  
Ozge KAM<sup>1</sup>, R. Banu ERMIS<sup>1</sup><sup>1</sup> Conservative Dentistry, Suleyman Demirel University, Isparta, Turkey

**Objectives:** To evaluate marginal adaptation of Class V cavities restored with low-shrinkage composites by scanning electron microscopy (SEM), and to determine microleakage of the restorations using dye penetration method. **Materials and Methods:** Standardized Class V cavities (4 mm wide, 3 mm long, 1.5 mm depth) with gingival margins located in dentin were prepared in 90 third molars and randomly assigned to nine groups (n=10). The cavities were restored with nine different resin composite materials (Ceram-X Duo, Dentsply;

Grandio, Voco; Premise, Kerr; Tetric Evo Ceram, Ivoclar/Vivadent; Clearfil Majesty Posterior, Kuraray; Reflexions XLS, Bisco; Filtek Silorane, 3M ESPE; Filtek Z250, 3M ESPE; Aelite LS Posterior, Bisco). All but Filtek Silorane used with one three-step etch-and-rinse adhesive (Adper Scotch-bond Multipurpose, 3M ESPE). All restored teeth were subjected to thermocycling and mechanical loading (5.000 and 60.000 cycles, respectively). SEM analysis of restorations' margins were performed on the epoxy replicas of the teeth. Dye penetration degree of the cross-sectional samples were evaluated using stereomicroscope. Results: Statistical analysis (Kruskal Wallis, Mann-Whitney U) revealed significant differences ( $p < 0.05$ ) among the groups for the results of quantitative margin analysis and for the microleakage scores at occlusal margins. At gingival margins, the microleakage scores were similar in all groups ( $p > 0.05$ ). The gingival microleakage was greater than the occlusal microleakage ( $p < 0.05$ ). Conclusion and Clinical Relevance: None of the tested low-shrinkage composites achieved a perfect marginal integrity in margins of Class V cavities. Sealing ability of the materials to dentin, is still inferior compared to enamel margins.

## PP 162

Category: Operative dentistry

### BOND STRENGTH AND CEMENT-TOOTH INTERFACIAL CHARACTERISATION OF SELF-ADHESIVE COMPOSITE CEMENTS

U. Burak TEMEL<sup>1</sup>, R. Banu ERMIS<sup>1</sup>, Jan DE MUNCK<sup>2</sup>, Bart VAN MEERBEEK<sup>2</sup>

<sup>1</sup> Conservative Dentistry, Suleyman Demirel University, Isparta, Turkey

<sup>2</sup> Conservative Dentistry, Katholieke Universiteit Leuven, Leuven, Belgium

Objectives: (1) To determine the micro-tensile bond strength ( $\mu$ TBS) of four self-adhesive composite cements to unetched/etched enamel and dentin, and (2) to characterize the cements' interaction with tooth tissue using SEM. Materials and Methods: Four self-adhesive composite cements (Clearfil SA, Kuraray; RelyX Unicem, 3M ESPE; SmartCem2, Dentsply; G-Cem, GC), and three multi-step composite cements, two used following an etch-and-rinse approach (RelyX ARC, 3M ESPE; Variolink II 'E&R', Ivoclar-Vivadent) and one used following a self-etch approach (Variolink II 'SE', Ivoclar-Vivadent) were examined. Results: Table:  $\mu$ TBS in MPa Pre-testing failures were included as 0 MPa; different superscript letters indicate significant difference by ANOVA and Scheffé test ( $p < 0.05$ ). SEM revealed very similar interaction to 180-grit SiC-abraded enamel and dentin, exhibiting very superficial interaction at enamel, and the formation of a shallow hybrid layer at dentin

without resin tags in the tubules. When the self-adhesive composite cements were applied to dentin free of a smear layer, regular and long resin tags were formed. Conclusion and Clinical Relevance: The tested self-adhesive cements bonded equally well to enamel and dentin. Selective etching of enamel improved their bonding effectiveness to enamel, which however remained inferior to that of both etch&rinse cements.

### $\mu$ TBS in MPa

Composite cement	ETCHED ENAMEL		DENTIN
	UNETCHED ENAMEL	ETCHED ENAMEL	
Clearfil SA	14.6±4.4a,b,c (2/36)	26.5±7.2e,f (0/33)	12.3±3.3a,b (1/49)
RelyX Unicem	18.9±4.6c,d (2/40)	30.9±3.9f,g (0/35)	13.7±4.5a,b,c (2/46)
SmartCem2	13.7±1.7a,b,c (0/31)	23.0±2.5d,e (0/36)	8.8±2.9a (1/33)
G-Cem	15.4±1.3b,c (0/29)	26.8±3.0e,f (0/29)	11.9±2.5a,b (1/40)
RelyX ARC	-	39.5±11.5h (2/30)	33.8±9.9g,h (1/44)
Variolink II 'E&R'	-	52.4±5.0i (0/30)	10.1±9.9a,b (17/36)
Variolink II 'SE'	-	-	11.0±4.8a,b (32/44)

## PP 163

Category: Operative dentistry

### POST-GEL SHRINKAGE OF LIGHT-POLYMERIZED POSTERIOR RESIN COMPOSITES: A STRAIN-GAUGE ANALYSIS

Serdar ARIKAN<sup>1</sup>, Burak SADIK<sup>2</sup>

<sup>1</sup> Restorative Dentistry, Faculty of Dentistry, Ordu University, Ordu, Turkey

<sup>2</sup> Endodontics, Faculty of Dentistry, Ordu University, Ordu, Turkey

Aim: The purpose of this study was to compare the polymerization shrinkage strains of light-cured composites. Methodology: Four light-polymerized posterior composite resins (Voco Admira, Vivadent Tetric Ceram, Filtek P60 and Degussa-Hüls Definite,) were used in this study. A linear strain-gauge was placed at the bottom of 5 disc-shaped specimens prepared from each of the test materials in a mold. Strain-gauge signals were digitalized by a data acquisition system and were displayed in a computer by corresponding software for a total of 90 seconds and using 60-second light-polymerization with 400 mW/cm<sup>2</sup> light intensity. Statistical analysis was performed by Kruskal Wallis test at  $p < 0.05$  to

determine the difference between post-gel strain levels between groups. Result: The lowest shrinkage strain was recorded for Filtek P60 followed by Admira, Tetric Ceram, and Definite. However, the differences were statistically insignificant ( $p < 0.05$ ). Conclusion: Posterior composites exhibit similar levels of post-gel shrinkage strains. The ultimate fate of posterior composites should not be predicted using contraction values alone.

#### PP 164

Category: Operative dentistry

THE EFFECT OF ACID ETCHING AND REBONDING ON MICROLEAKAGE OF A HEMA FREE ADHESIVE Neslihan TEKÇE<sup>1</sup>, Mustafa DEMIRCI<sup>1</sup>, Safa TUNCER<sup>1</sup>, Dina ERDILEK<sup>1</sup>, Ömer UYSAL<sup>2</sup>

<sup>1</sup> Department of Operative Dentistry, Istanbul University Faculty of Dentistry, Istanbul, Turkey

<sup>2</sup> Medical Statistics and Informatics, Bezmialem University School of Medicine, Istanbul, Turkey

Objectives: The aim of study was to evaluate the effect of acid etching and rebonding on microleakage of a HEMA free adhesive. Materials and Methods: Twenty one sound human third molars extracted for clinical reasons were selected for this study. Class V cavities were prepared at the cemento-enamel junction. The teeth were randomly allocated to three groups (each group was containing 7 cavities). Group1: HEMA free all-in-one adhesive (G-Bond PLUS) was applied according to manufacturer's instruction and cavities were filled with a nanohybrid resin composites and ; Group2: Enamel margins was etched with 36% phosphoric acid gel before adhesive application and filling of cavities; Group3: after adhesive application, filling of cavities and polishing the surface, adjacent margins was received a rebonding agent (Fortify Plus) according to manufacturers' instruction. The specimens were stored in distilled water at 37°C for 24 h. After thermocycling and immersing in methylene blue, the teeth were sectioned three bucco-lingual sections and evaluated under a stereomicroscope. Data were analyzed using Kruskal-Wallis test. Dunn test was used for multiple comparisons Results: There were no statistically significant differences between groups. However, microleakage scores of gingival margins in group 2 and 3 were lower than group 1. In group 3, microleakage on gingival margins was significantly lower than enamel margins ( $p < 0.003$ ). Conclusion: Acid etching or rebonding did not reduce microleakage significantly. However, rebonding reduced the microleakage at the gingival margins compared with microleakage at the enamel margins. Clinical relevance: Rebonding of gingival margins in class V cavities may promote marginal sealing.

#### PP 165

Category: Operative dentistry

DOES APPLICATION OF FLOWABLE COMPOSITE AS LINING AGENT INFLUENCE THE MARGINAL LEAKAGE AT CLASS-V CAVITY?

Mustafa AYDINBELGE<sup>1</sup>, Sezer DEMIRBOGA<sup>2</sup>, Selin KOSAR<sup>3</sup>

<sup>1</sup> Pediatric Dentistry, Erciyes University Faculty of Dentistry, Kayseri, Turkey

<sup>2</sup> Restorative Dentistry, Erciyes University Faculty of Dentistry, Kayseri, Turkey

<sup>3</sup> Undergraduate, Erciyes University Faculty of Dentistry, Kayseri, Turkey

Objectives: The aim of this study was to determine the influence of flowable composite lining on marginal microleakage in Class V composite restorations with 3 different bonding agents. Materials and Methods: Standard Class V cavities were prepared at eighty four extracted human premolar teeth. The teeth were randomly assigned into three main groups. Group1 Clearfil SE Bond (Kuraray Medical Inc., Tokyo, Japan), Group 2 Solobond M (Voco, Cuxhaven, Germany); Group 3 All Bond 2 (Bisco Inc., IL, USA). Restoration were completed with two different technique a: Aelite flo LV (Bisco Inc.) lining material and resin composite (Gradia, Voco), b: resin composite restorations without a lining material and used as a control. The samples were placed in 1% methylene blue. All samples then were sectioned longitudinally and evaluated for microleakage at the occlusal and gingival margins under a stereomicroscope at 20× magnification. Mann-Whitney U- and Kruskal-Wallis tests were used for data analyses ( $p < 0.05$ ). Results: Gingival margins showed higher microleakage scores than coronal margins ( $p = 0.007$ ). There were no significant differences found among the different bonding agents and between the using flowable and control. Conclusion: Although the gingival margins showed higher microleakage than the coronal margins, application of flowable composite as a lining materials was not affected the microleakage of resin composite. Clinical Relevance: The use of flowable resin composite as a lining material did not provide a reduction in microleakage at class V cavities.

#### PP 166

Category: Operative dentistry

SHEAR BOND STRENGTH OF AN EXPERIMENTAL CERAMIC REPAIR SYSTEM TO CERAMIC

Manuel P. DUARTE<sup>1</sup>, Jaime PORTUGAL<sup>1</sup>, Filipa CHASQUEIRA<sup>1</sup>, Henrique LUIS<sup>1</sup>, Luis P. LOPES<sup>1</sup>, Sofia A. OLIVEIRA<sup>1</sup>

<sup>1</sup> Biomaterials, FMDUL, Lisbon, Portugal

The objective of the present study was to determine the shear bond strength to zirconium oxide ceramic of two ceramic repair systems (one experimental and one commercial) and to determine the influence of the surface preparation methods (Sandblast and Bur) on the shear bond strength of each repair system. M&M: Zirkozahn disk (9 mm diameter, 4 mm height) were divided into sandblasted (110 µm alumina particles for 10 sec, 2,5 bar), and abraded with a green stone-like bur. The specimens in the four groups (n=10) were shear bond strength tested. Data (Mean MPa) were analyzed with two-way ANOVA and independent T tests were performed to evaluate differences between materials within each surface treatment and to evaluate the differences between group of the manufacturer's indications, i.e. CRS with the Bur and CR with the sandblast. 3 samples per group were performed to analyze the interface under a Scanning Electron Microscope. Results: There was an interaction between Material and Surface treatment (p<0,05). A significant difference was detected between groups that were sandblasted (p<0,05), (CR sandblasted=12,69± 6,07 MPa, CRS sandblasted=4,44± -2,32 MPa) but the bur groups were not statistically different (p>0,05) (CR Bur=9,2±-5,31 MPa, CRS Bur=8,8±-3,55 MPa) also the manufacturer's instruction groups were not statistically different (p>0,05). Conclusions: According to the results of this in vitro study, abrasion treatment of the ceramic surface for repairing should be performed according to the manufacturer's instructions of the repair system. Work performed at UICOB, I&D unit n°4062 of FCT.

#### PP 167

Category: Operative dentistry

#### CLINICAL EVALUATION OF RESIN BASED COMPOSITES IN POSTERIOR RESTORATIONS: 3-YEAR RESULTS

Cigdem CELIK<sup>1</sup>, Neslihan ARHUN<sup>1</sup>, Kivanc YAMANEL<sup>1</sup>

<sup>1</sup> Dept. of Conservative Dentistry, Baskent University Faculty of Dentistry, Ankara, Turkey

Objectives: The aim was to evaluate the clinical performance of a nanohybrid and a low shrinkage posterior composite in class I and II restorations after three years. Materials and Methods: A total of 82 Class I and Class II restorations which were restored with Grandio and Quixfil using their self etch adhesives

(Futura Bond and Xeno III) in 31 patients (10 male; 21 female). They were clinically evaluated 1 week after placement (baseline), 6 months, one, two and three years using modified USPHS criteria by two operators. At the 3-year call, 62 Class I and Class II cavities were evaluated in 23 patients (7 male, 16 female). Statistical analysis was completed using Pearson Chi-square and Fisher's Exact Test (p<0.05). Results: After two years, no significant differences have been found with respect to color match, marginal adaptation, secondary caries and surface texture. 2-year recall data demonstrated that Grandio restorations showed a significant deterioration of the surface properties demonstrating 26% bravo scores which are still clinically acceptable. Similarly, after 3 years there was statistically significant surface texture deterioration in Grandio group. Conclusion: It was concluded that nanofill (Grandio) and posterior composite (Quixfil) demonstrated acceptable clinical performance after 3 years.

#### PP 168

Category: Operative dentistry

#### TWO-YEAR CLINICAL PERFORMANCE OF ADHESIVE RESTORATIONS IN XEROSTOMIC HEAD- AND NECK-IRRADIATED CANCER PATIENTS

Verstraeten VIRGINIE<sup>1</sup>, Keulemans FILIP<sup>1</sup>, Hommez GEERT<sup>1</sup>, De Moor ROELAND<sup>1</sup>

<sup>1</sup> Operative Dentistry and Endodontology, Ghent University - Dental School, Ghent, Belgium

Objectives: To evaluate clinical performance of adhesive fillings in root caries cavities in xerostomic head- and neck-irradiated cancer patients Materials and Methods: 40 high-carries-risk, post-radiation, xerostomic adults with ≥3 cervical carious lesions in the same arch received a FujiCap II (FC), Fuji II LC encapsulated (FLC) and Herculite XRV (HX) restoration. The daily use of a neutral 1% sodium fluoride gel (trays) was recommended. After 6, 12, 18 and 24 months, the restorations were examined for adaptation and anatomical form (A&AF) and recurrent caries (RC). Fluoride compliance was recorded at each recall appointment as the percentage of recommended use during that interval [compliance of ≤50% = NFUs, >50% = FUs]. Results: 36 patients were screened at 6 months; 34 patients at 12 and 18 months, 33 patients at 24 months. In NFUs significantly less RC was found for FC versus HX at 6, 12 and 18 months (p<0.05) - no differences in A&AF were found at all observation times. In FUs significantly more failures in A&AF (p<0.05) were observed for FC

versus HX after 6 months; FC versus HX, FC versus FLC after 12 months; FC versus HX, and FLC versus HX after 18 and 24 months - but no significant differences in RC between the materials at all observation times. Conclusions: Glassionomers provide better caries inhibition in this group of patients when there is a low fluoride compliance. Clinical relevance: Conventional glassionomers are the preferred restorative materials in root caries cavities in xerostomic head- and neck-irradiated patients.

#### PP 169

Category: Operative dentistry

#### THE EFFECT OF KTP LASER BLEACHING AND FOUR CONVENTIONAL BLEACHING PROCEDURES ON ENAMEL MICROHARDNESS

Rimbaut AN<sup>1</sup>, Vanderstricht KATRIEN<sup>1</sup>, De Bruyne MIEKE<sup>1</sup>, Keulemans FILIP<sup>1</sup>, De Moor ROELAND<sup>1</sup>

<sup>1</sup> Operative Dentistry and Endodontology, Ghent University - Dental School, Ghent, Belgium

Objectives: To evaluate in vitro the effects of KTP laser bleaching versus different conventional vital bleaching techniques on bovine enamel microhardness. Materials and Methods: Sixty bovine enamel samples were distributed among six groups (A-I) of 10 samples. Half of each surface remained unbleached; the other halves were bleached with (A) Opalescence 35%, (B) Opalescence 20%, (C) KTP laser / Smartbleach 1 W - 30 sec, (D) KTP laser / Smartbleach 3 W - 10 sec, (E) Nite White 22%, (F) Nite White 16% [ A-B: Ultradent Products, South Jordan, USA; C-D: KTP laser and Smartbleach, High Tech Laser - SBI, Herzele, Belgium; E-F: Discus Dental, Culver City, USA] The Knoop microhardness (KHN) was determined (1) after removal from the skull (baseline), after immersion in artificial saline during 14 days (2) (confirmation of baseline values), immediately after bleaching (3), post-bleaching after 10 days (4) and after 6 weeks (5); and statistically compared to baseline values using Wilcoxon-tests ( $p < 0.05$ ). Results: Bleaching led to a statistically significant decrease of KHN in Groups A3-B3-E3-F3 (non-laser bleached), compared to Groups C3-D3. The post-bleach values demonstrated an increase in microhardness, demonstrating a recovery of the enamel microhardness. Conclusions: KTP laser bleaching with the Smartbleach system resulted in an unaltered enamel surface. In the non-laser bleached groups a statistically significant decrease in enamel microhardness was observed immediately after bleaching, followed by a recovery of the enamel microhardness as a function of time.

Clinical relevance: KTP laser bleaching is a safe power bleaching method.

#### PP 170

Category: Operative dentistry

#### EFFECT OF ALTERNATIVE MODES OF APPLICATION ON THE MICROLEAKAGE OF ONE-STEP SELF-ETCH ADHESIVES

Mustafa ÜLKER<sup>1</sup>, Hayriye Esra ÜLKER<sup>1</sup>, Said KARABEKIROĞLU<sup>1</sup>, Murat Selim BOTSALI<sup>2</sup>, Ali Riza CETİN<sup>1</sup>

<sup>1</sup> Operative Dentistry, Selcuk University, Faculty of Dentistry, Konya, Turkey

<sup>2</sup> Pedodontics, Selcuk University, Faculty of Dentistry, Konya, Turkey

Purpose: This in vitro study evaluated the efficacy of two modes of application (double application or placement of a hydrophobic resin coating) for the reduction of microleakage in three one-step self-etch adhesives (AdheSE One VivaPen, Ivoclar Vivadent; Xeno V, Dentsply; OptiBond All-In-One, Kerr). Materials and methods: Class V cavities with the occlusal margin in enamel and the gingival margin in dentin were prepared on both buccal and lingual surfaces of 108 human molar teeth. Cavities were divided into nine groups according to the adhesives and application modes ( $n=24$ ). Adhesives were applied: 1) according to the manufacturers' directions, 2) using a double application method, and 3) before placement of a hydrophobic resin, according to the manufacturers' directions. The cavities were restored with a composite resin. After thermocycling (500 cycles at 5°C/55°C) and immersion in 0.5% basic fuchsin, the teeth were sectioned and evaluated for microleakage using a stereomicroscope (20×). Enamel and dentin margins were scored separately. The data were analyzed using Kruskal-Wallis, Bonferroni corrected Mann-Whitney U and Wilcoxon Signed Rank tests. Results: The application of a hydrophobic resin over the cured Xeno V adhesive decreased the amount of microleakage at the enamel margins ( $P=0.005$ ). Both application modes decreased the amount of microleakage at the dentin margins with the AdheSE One VivaPen adhesive ( $P<0.001$ ). No significant difference between application modes was found with the OptiBond All-In-One adhesive. Conclusion: Alternative modes of application did not adversely affect the sealing ability of one-step self-etch adhesives. Alternative modes of application may contribute to low microleakage values, depending on the type of adhesive.

**PP 171**

Category: Operative dentistry

THE INFLUENCE OF PROPHYLACTIC PASTE AND BLEACHING ON THE MICROHARDNESS OF DIFFERENT COMPOSITES

Yonca KORKMAZ<sup>1</sup>, Ceren Ozge BICER<sup>2</sup>, Nuray ATTAR<sup>2</sup>

<sup>1</sup> Department of Restorative Dentistry, Baskent University, Ankara, Turkey

<sup>2</sup> Restorative Dentistry, Hacettepe University, Ankara, Turkey

**Objectives:** In vitro study aimed to evaluate the microhardness of different types of composites after application of prophylactic Paste and bleaching. **METHODS AND MATERIALS:** The composites evaluated were Filtek Supreme XT Flow (3M ESPE), Grandio SO (VOCO) and Filtek Ultimate XT (3M ESPE). A total of 120 specimens were fabricated for in a plexiglass mold covered with a Mylar strip. After polymerization, all specimens were finished and polished with Sof-Lex Disc system (3M ESPE) and divided into three treatment groups: Group1 : No treatment (control) Group 2: Application of Proxy Fine Prophylactic paste (PP) (Vivadent), Group 3: Bleaching with Polo Office (SDI) (B), Group 4: PP+B. The microhardness measurements were performed using a digital microhardness tester (load 500 g; dwell time 15 seconds). The data were analyzed using the one-way ANOVA test at a significance level of 0.05. Multiple comparison was performed with the Tukey test. **RESULTS:** For GrandioSO, Group 4 exhibited statistically significant lower microhardness values than Group1 ( $p < 0.05$ ) but there were no difference between Groups 1,2 and 3 ( $p > 0.05$ ). In terms of Filtek Ultimate XT, Group 1 and 2 showed statistically significant higher microhardness values than Group 3 and 4 ( $p < 0.05$ ). In Filtek Supreme XT Flow there were statistically significant difference for all 4 groups ( $p > 0.05$ ). **CONCLUSION:** Application of Prophylactic Paste and bleaching procedure may negatively affect the microhardness of composites depending on the type. **CLINICAL RELEVANCE:** Application of Prophylactic Paste and bleaching may not be used on composite restorations.

**PP 172**

Category: Operative dentistry

THE EFFECTS OF DIFFERENT POLISHING SYSTEMS ON THE SURFACE ROUGHNESS OF ESTHETIC COMPOSITES

Nuray ATTAR<sup>1</sup>, Ceren Ozge BICER<sup>2</sup>, Tugba TOZ<sup>3</sup>, Yonca KORKMAZ<sup>4</sup>

<sup>1</sup> Department of Restorative Dentistry, Hacettepe University, Ankara, Turkey

<sup>2</sup> Restorative Dentistry, Hacettepe University, Ankara, Turkey

<sup>3</sup> Private Practice, Confident, Ankara, Turkey

<sup>4</sup> Visiting Faculty, University of Texas Dental Branch at Houston, Houston, TX, USA

**Objects:** This in vitro study evaluated the surface roughness of esthetic composites finished and polished with two different one-step polishing systems and a conventional multi-step disc system. **METHODS AND MATERIALS:** The composites evaluated were Filtek Ultimate XT (3M ESPE), Amaris (V6co) and Esthet•X® HD (Dentsply). A total of 120 specimens were fabricated in a plexiglass mold covered with a Mylar strip. After polymerization, ten specimens per group received no polishing treatment and served as the control for both tests. For each composite group ( $n=30$ ), the specimens were randomly divided into three polishing systems: Enhance (Dentsply), OptraPol (Vivadent) and Sof-Lex (3M). All polishing systems were applied according to the manufacturers' instructions after being ground wet with 1200 grid silicon carbide paper. The surface roughness values were determined using a profilometer. The data were analyzed using the one-way ANOVA test at a significance level of 0.05. Multiple comparison was performed with the Tukey test. **RESULTS:** The smoothest surfaces were achieved under Mylar strips in all composite groups ( $p < 0.05$ ) except for Esthet•X® HD. For Filtek Ultimate XT Sof-Lex exhibited statistically lower surface roughness values compared to other polishing systems ( $p < 0.05$ ) however in two other composite groups there were no statistically difference between polishing systems ( $p > 0.05$ ). **CONCLUSION :** One-step polishing systems may exhibit comparable results with multi-step for polishing esthetic composites depending on the brand. **Clinical Relevance:** One-step polishing systems may be preferred for polishing esthetic composites.

**PP 173**

Category: Operative dentistry

EFFECT OF PHOSPHORIC ACID FORMULATION ON INTERFACIAL NANOLEAKAGE EXPRESSION OF INTRARADICULAR ADHESIVE INTERFACES.

Marco SCANSETTI<sup>1</sup>, Annalisa MAZZONI<sup>2</sup>, Lorenzo BRESCHI<sup>3</sup>, Nicola SCOTTI<sup>1</sup>, Elio BERUTT<sup>4</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> SAU&FAL, University of Bologna, Bologna, Italy

<sup>3</sup> Medical Science, University of Trieste, Trieste, Italy

<sup>4</sup> Endodontics, University of Turin, Turin, Italy

The aim of this study was to assay the interfacial nanoleakage expression within adhesive interfaces

created by etch-and-rinse adhesive systems. The null hypothesis tested was that the etching formulation has no influence on interfacial nanoleakage expression of fiber posts luted with a three-step or two-step etch-and-rinse . Eighteen single-root human extracted teeth were endodontically treated and a 10 mm postspace was prepared. Specimens were divided into 3groups according to the etching procedure: A) 36% H3PO4 gel for 30s; B) 32% H3PO4 semigel for 30s; C) 36% H3PO4 (Sigma Aldrich) water solution for 30 s. Specimens were divided into 2subgroups and randomly assigned to one of the tested adhesive system: 1) All Bond 3 ; 2) XP Bond + Self Cure Activator . Fiber posts were luted with a dual-cure resin-based cement . Teeth were cut in 1 mm-thick slices and immersed in silver nitrate solution in 50 wt% ammoniacal silver nitrate (AgNO3) for 24 h, immersed in photo-developing solution, fixed on glass slides, flattened with SiC paper under running water, stained with 0.5% acid fuchsine for 15 min, and observed under light microscope . Images of the adhesive interfaces were obtained (1000×) and the degree of interfacial nanoleakage was scored on a scale of 0–4 by two observers. Differences among specimens were analyzed using chi-square tests (p< 0.05). Mean nanoleakage scores are reported in Table1.

Group	Nanoleakage		
	Score 0-4	N of images (total of images)	% relative nanoleakage score
<b>H<sub>3</sub>PO<sub>4</sub> gel acid + All Bond 3</b>	0	1(28)	3.6
	1	8(28)	28.6
	2	3(28)	10.7
	3	9(28)	32.1
	4	7(28)	25.0
<b>H<sub>3</sub>PO<sub>4</sub> gel acid + XP Bond</b>	0	0(28)	0.0
	1	0(28)	0.0
	2	7(28)	25.0
	3	11(28)	39.3
	4	10(28)	35.7
<b>H<sub>3</sub>PO<sub>4</sub> semi-gel acid + All bond 3</b>	0	0(26)	0.0
	1	6(26)	23.1
	2	14(26)	53.8
	3	6(26)	23.1
	4	0(26)	0.0
<b>H<sub>3</sub>PO<sub>4</sub> semi-gel acid + XP Bond</b>	0	0(24)	0.0
	1	0(24)	0.0
	2	4(24)	16.7
	3	17(24)	70.8
	4	3(24)	12.5

Group	Nanoleakage		
	Score 0-4	N of images (total of images)	% relative nanoleakage score
<b>H<sub>3</sub>PO<sub>4</sub> liquid acid + All Bond 3</b>	0	1(26)	3.8
	1	4(26)	15.4
	2	5(26)	19.3
	3	7(26)	26.9
	4	9(26)	34.6
<b>H<sub>3</sub>PO<sub>4</sub> liquid acid + XP Bond</b>	0	0(25)	0.0
	1	1(25)	4.0
	2	10(25)	40.0
	3	11(25)	44.0
	4	3(25)	12.0

The null hypothesis was accepted since no influence was found on interfacial nanoleakage in relation to the use of different etching formulation before application of an etch-and-rinse adhesives

**PP 174**

Category: Operative dentistry

INFLUENCE OF SILANE TREATMENT ON MICROTENSILE BOND STRENGTH BETWEEN FIBER POSTS-SELF ADHESIVE RESIN CEMENTS. Çağlar YAŞA<sup>1</sup>, Haktan YURDAGÜVEN<sup>1</sup>, Mübin SOYMAN<sup>1</sup>  
<sup>1</sup> Restorative Dentistry, Yeditepe University Faculty of Dentistry, Istanbul, Turkey

Objectives: The aim of this study was to evaluate the influence of silane treatment on microtensile bond strength between two fiber posts and two self adhesive resin cements and to compare bonding efficacy with a conventional dual-cure resin cement. Materials and Methods A total of 40 posts, 20FRC Postec Plus (FPP) and 20GC Fiber Post (GCFP), were used and each post system was divided into 5 groups according to two self-adhesive resin cements (Speed Cem, Ivoclar-Vivadent ; G-Cem; GC Co), silane treatment and one conventional dual cure resin cement VariolinkII (Ivoclar-Vivadent). Group1a ; FPP-SpeedCem, Group1b ; FPP-G-Cem, Group2a; GCFP-SpeedCem, Group2b ; GCFP-G-Cem, Group3a;FPP - SpeedCem silane treatment (ST), Group3b;FPP-G-CEM ST, Group4a; GC FP-SpeedCem ST, Group4b;GC FP-G-Cem ST, Group5a; FPP-VariolinkII, Group5b;GCFP-VariolinkII. The posts were cemented in a cylinder 10 mm in length and 20 mm in height following the manufacturer’s instructions. After storage in distilled water at 37 C for 24 hours, the specimens were sectioned into 1×1 mm sticks . The

microtensile test was performed in a universal testing machine (Instron) at a crosshead speed of 1 mm/min. Data were analyzed Kruskal Wallis and Mann Whitney U tests at  $p < 0.05$ . Results: mean  $\pm$  sd(MPa): G1a;11.29  $\pm$  5.03, G1b;12.35  $\pm$  3.43, G2a;14.06  $\pm$  3.73, G2b;15.04  $\pm$  3.65, G3a;13.84  $\pm$  4.39, G3b;20.63  $\pm$  9.09, G4a;19.22  $\pm$  5.32, G4b;19.92  $\pm$  4.79, G5a; 20.08  $\pm$  5.89, G5b; 17.90  $\pm$  5.22. Conclusion: MPa between silane treated fiber posts and self-adhesive resin cement showed higher bond strength values than to untreated fiber posts. Clinical relevance: Silane treatment on fiber posts may enhance bonding of self adhesive cements to fiber posts.

#### PP 175

Category: Operative dentistry

#### SURFACE QUALITY OF CLASS V RESTORATIONS IN-VIVO: BASE-LINE AND 1-YEAR RESULTS

Martin JUNG<sup>1</sup>, Kai HORNING<sup>2</sup>, Joachim KLIMEK<sup>1</sup>

<sup>1</sup> Faculty of Dentistry, Liebig-University, Giessen, Germany

<sup>2</sup> Private Practice, Dentist

Objectives: To assess surface quality of class V restorations made of three resin composites after initial polishing and after one year of clinical use. Materials and Methods: 72 restorations were placed in 24 patients; each patient had three class V lesions that were restored either with a flowable (Filtek Supreme XT Flowable), a nanoparticle (Filtek Supreme XT) and a microhybrid composite (Filtek Z 250; all by 3M Espe). Surfaces were finished by a tungsten carbide bur (H48LQ.314.012; Brasseler) and polished using flexible discs (Sof Lex medium, fine and extra-fine, 3M Espe). Replicas (Blue Star, Girschbach Dental) were made of the restorations initially (base-line) and after one year. Quantitative surface analysis was done by laser-stylus profilometry; Ra (average roughness) was calculated. Surfaces were evaluated qualitatively by SEM (XL 20, Philips). Results: After one year, overall Ra for all composites was greater compared to base-line (Ra= 1.14  $\mu$ m vs. 1.05  $\mu$ m); the difference was not significant ( $p=0.206$ ). There were no interactions between composite materials and effect of clinical use ( $p=0.720$ ). At base-line, differences between Filtek Supreme and Filtek Z were significant ( $p=0,046$ ). After one year, there were no significant differences among the composites ( $p=0.563$ ). Conclusions: one year clinical service caused a moderate, not significant raise of surface roughness of class V composite restorations. This effect was similar for the three types of composite used. Clinical Relevance: Surface roughness of class V restorations was not significantly affected by the type of composite (flowable, nanoparticle or microhybrid) after one year in-vivo.

Ra  $\pm$  SD in  $\mu$ m (baseline) 1.03  $\pm$  0.28 0.99  $\pm$  0.23 1.11  $\pm$  0.35  
Ra  $\pm$  SD in  $\mu$ m (after one year) 1.14  $\pm$  0.29 1.10  $\pm$  0.27 1.17

#### PP 176

Category: Operative dentistry

#### THE EFFECT OF FLEXIBLE POLISHING DISCS ON THE SURFACE QUALITY OF A NANOPARTICLE COMPOSITE

Martin JUNG<sup>1</sup>, Ali DURAN<sup>1</sup>, Joachim KLIMEK<sup>1</sup>

<sup>1</sup> Faculty of Dentistry, Justus-Liebig-University, Giessen, Germany

Objectives: To evaluate the efficiency of flexible Al<sub>2</sub>O<sub>3</sub>-coated discs for finishing and polishing a nanoparticle composite under various application conditions. Materials and Methods: 200 specimens were made of the composite Filtek Supreme XT (3M Espe); eight specimens were left untreated (polyester matrix group). Six brands of discs were used in four consecutive steps from coarse to super-fine for polishing the composite specimens with and without water cooling and at rotational speeds of 5000 and 10000 rpm. Sample size was n=8 specimens per disc system and application mode. Quantitative surface evaluation was performed by laser-based profilometry; average roughness (Ra) was calculated. Surfaces were evaluated qualitatively by SEM (XL 20, Philips). Results: The smoothest surfaces were obtained by the polyester matrix group (Ra= 0.17  $\mu$ m). All disc systems caused roughening of the surfaces. There was a highly significant effect of the disc system ( $p=0.003$ ), water cooling mode ( $p < 0.001$ ) and rotational speed ( $p=0.037$ ) on composite surface roughness. There were significant interactions between the disc systems and the effect of water cooling ( $p < 0.001$ ). Smoothest surfaces were achieved by Flexi-Snap discs under dry conditions (Ra=0,311  $\mu$ m). In general, application of the discs under dry conditions and at 10000 rpm yielded lower surface roughness. Formation of a smear layer was observed preferably if discs were used under dry conditions. Conclusions and Clinical Relevance: In order to achieve an optimal polishing effect, Al<sub>2</sub>O<sub>3</sub>-coated flexible discs should be applied under dry conditions and at a moderately high rotational speed.

#### PP 177

Category: Operative dentistry

#### EFFECTS OF BLEACHING AGENTS, NEUTRAL FLUORIDE GELS, SURFACE SEALANTS ON THE ENAMEL SURFACE ROUGHNESS

Burak GÜMÜŞTAŞ<sup>1</sup>, Özge GÜRBÜZ<sup>1</sup>, Özgür GÖZLÜKLÜ<sup>1</sup>, Begüm GÜRAY EFES<sup>1</sup>

<sup>1</sup> İstanbul University, Faculty of Dentistry, İstanbul, Turkey

**Objectives:** The aim of this in vitro study was to evaluate the surface roughness of enamel after different bleaching agents procedure and to determine the effect of fluoride and bonding agent application on the roughness of bleached enamel. **MATERIAL AND METHODS:** Forty-nine dental slice (5×5 mm) polished enamel surfaces were randomly assigned to 7 groups (n=7). All the slices were stored in sterilized saliva at 37°C. In group 1 slices were kept untreated (control group). The surfaces of the slices were treated with 30% carbamide peroxide (3M White & Brite) (group 2-3-4), or 38% hydrogen peroxide (Ultradent Opalescence Boost) (group 5-6-7) for 20 minutes according to the manufacturers instructions. Group 2 and group 5 were only bleached. Neutral fluoride (Denti-Care Denti-Pro Gel 2% Neutral Sodium Fluoride) was applied to the bleached surface of the groups 3 and 6. The bleached surfaces of the groups 4 and 7 were covered with bonding agent (Kuraray Protect Bond). Surface roughness of the specimens were analyzed with a profilometer (Taylor Hobson, UK). Data were subjected to analysis of Tukey test ( $p>0.05$ ). **RESULTS:** There were no statistically significant differences between the surface roughness of untreated control specimens and the specimens treated with the bleaching materials, fluoride gel and dental bonding agent ( $p>0.05$ ).

#### PP 178

Category: Operative dentistry

**EFFECT OF DENTAL EXPERIENCE ON THE ASSESSMENT OF LOCALIZATION AND DEPTH OF APPROXIMAL LESIONS**

UGUR ERDEMİR<sup>1</sup>, ISIL SERBES<sup>1</sup>, KIVANC DULGER<sup>1</sup>, SERCİN AYDIN<sup>1</sup>, ESRA YILDIZ<sup>1</sup>

<sup>1</sup> Operative Dentistry, Institute of Health Sciences, İstanbul University, İstanbul, Turkey

**Objectives:** The aim of this study was to investigate the effect of dental experience on assessment of localization and depth of approximal lesions in panoramic and conventional periapical radiographs. **Methods:** A total of 126 approximal lesions on radiologic images that were obtained by both panoramic (n=47) and conventional periapical radiographs (n=79) were examined by 12 calibrated observers separately. The observers are dental students training in 3rd, 4th, 5th grades and postgraduate program evaluated the localization of the

lesions according to the marginal bone level and scored the lesions with respective to the radiographic depth. The kappa values and consistency ratios (CR) were calculated for inter and intra-observer agreement on localization of the lesions both in panoramic and periapical radiographs. **Results:** For localization of the lesions according to the marginal bone level in panoramic radiographs kappa values for inter-observer agreement varied between 0.257 and 0.599; while varying between 0.467 and 0.665 in periapical radiographs. The CR was higher when the lesion was localized above marginal bone level in both panoramic and periapical radiographs. Regarding the caries scores, consistency ratios of inter-observer agreement for 6 observers varied from 50% to 83% with periapical radiographs and from 10% to 86% with panoramic radiographs. The CR of intra-observer agreement for postgraduate students were 73% with panoramic radiographs and 71.7% with periapical radiographs. **Conclusion:** One can conclude from the results of this study that dental experience dramatically effects the observer performance in the assessment of the localization and depth of approximal lesions.

#### PP 179

Category: Preventive dentistry

**COMPARING SOME CHARACTERISTICS OF SALIVA IN SMOKING AND NONSMOKING YOUNG PEOPLE**

Gamze YILDIRIM<sup>1</sup>, Ayşegül DEMİRBAŞ KAYA<sup>1</sup>, Mustafa ATEŞ<sup>2</sup>

<sup>1</sup> Restorative Dentistry, Ege University School of Dentistry, İzmir, Turkey

<sup>2</sup> Biology, Ege University Faculty of Science, İzmir, Turkey

**Objective:** The objective of this study is to research the relation between smoking and the flow rate of the saliva also the amount of mutans streptococci and lactobacilli among dental faculty students. **Material and Methods :** Two groups of 25 individuals are formed. Group A: who have never smoked before. Group B: smokes at least 3 years and has divided into two as Group B1 and B2. Group B1: smokes 10 or less cigarettes per day. Group B2: smokes more than 10 cigarettes per day. The DMFT index of the individuals are decided. The average DMFT values of the individuals are close to each other. The stimulated saliva samples of the study groups are taken. First the flow rate, then the mutans streptococci and lactobacilli amounts of the stimulated salivas are calculated. In statistical analysis of the obtained data, Kruskal Wallis and Mann-Whitney tests are used ( $p<0.05$ ). **Results:**

Smoking among dental faculty students, has no statistical significant relation with flow rate of the saliva, mutans streptococci and lactobacilli values. Conclusion: It has been concluded that smoking does not have a statistical significant effect on the flow rate of the saliva, mutans streptococci and lactobacilli values for the individuals, processing regular and aware oral hygiene care. Clinical Relevance: In the case of regular oral hygiene habit, smoking has no effect in formation of cavities. But the case for a longer time period smoking should be researched.

#### PP 180

Category: Preventive dentistry

#### EFFECT OF RADIOTHERAPY ON CALCIUM LOSS ON ENAMEL SURFACE

Aysegul KAYA<sup>1</sup>, Huseyin TEZEL<sup>1</sup>, Elif YASA<sup>1</sup>, Ozlem SOGUT<sup>2</sup>, Ibrahim OLACAK<sup>3</sup>

<sup>1</sup> Restorative Dentistry, Ege University, Izmir, Turkey

<sup>2</sup> Pharmaceutical Technology, Ege University, Izmir, Turkey

<sup>3</sup> Radiooncology, Ege University, Izmir, Turkey

Radiation induced caries is a major complication in the treatment of patients suffering from head and neck cancer. The objective of this study was to evaluate the correlation between calcium loss of human enamel and radiation for different given doses. Thirty three premolars extracted for orthodontic purposes were sectioned buccolingually and longitudinally, so that four specimens were obtained from each tooth. The specimens were randomly assigned to one of the four groups. Three parts of prepared teeth were exposed to radiation for different levels of radiation: 20 Gray (2 Gy/day, 5 days/week), 50 Gy, 70 Gy. The specimens in the fourth group were used as a control group. The specimens were treated with an artificial caries solution (pH 4) for 16 days; the solution was replaced on days 4, 8, 12 and 16. Calcium concentrations were determined by an atomic absorption spectrophotometer. At the end of day 16, calcium ions released per square millimeter were calculated cumulatively as follows: 20 Gy group: 16.63±1.84 µg/mL; 50 Gy group: 18.13±1.72 µg/mL; 70 Gy group: 22.81±2.43 µg/mL and control group: 16.24±1.61 µg/mL. The loss of calcium was statistically significant when the 20 Gy irradiation group compared to the 50 Gy and the 70 Gy irradiation groups (p<0.5). It is observed that calcium loss from the enamel surface is related to radiation dose. The highest calcium loss was observed in 70 Gy irradiation group. Calcium loss in enamel tissue becomes signifi-

cant as long as the received radiation dose increases to a certain level.

#### PP 181

Category: Preventive dentistry

#### ROOT CARIES IN INSTITUTIONALIZED ELDERLY IN THE OPORTO DISTRICT

Sandra GAVINHA<sup>1</sup>, Maria Conceição MANSO<sup>2</sup>, Patrícia MANARTE-MONTEIRO<sup>1</sup>, Liliana COSTA<sup>1</sup>, Paulo MELO<sup>3</sup>

<sup>1</sup> Department of Dental Medical Sciences, Faculty of Health Sciences, University Fernando Pessoa, Porto, Portugal

<sup>2</sup> Faculty of Health Sciences, University Fernando Pessoa, Porto & REQUIMTE-UP of Porto, Portugal

<sup>3</sup> Faculty of Dental Medicine, University of Porto, Porto, Portugal

**Objectives** The purpose of this study was to assess root caries (RC) prevalence and socio-behavioral factors influence on RC index in a population of institutionalized elderly of the Oporto District. **Materials and Methods** Observational, cross-sectional study with 372 individuals (≥60 years; 78.8 (±9.1) years, 69.9% women, 257 dentate) residents in 22 homes of the Oporto District, randomly selected (clusters). The root caries index (RCI) was used to assess caries and several socio-behavioral factors that may influence that index. **Descriptive/inferential analysis** (α=0.05) and multivariable logistic regression (backward stepwise method, p=0.05/0.10 for factors' inclusion/exclusion) was carried out using SPSS®vs.17.0 (complex samples add in). **Results** The root caries prevalence was 78.6% [95%CI: 74.4%-82.8%]. Mean root caries was 3.4(±3.6)/elderly. A 43.8% of RCI was calculated (240 (64.5% of the elderly had exposed roots); gender, age and last visit to the dentist was not associated with RCI. Those not brushing presented significant higher RCI (p<0.05), though RCI on the removable prostheses users did not differ. Age, gender, use of removable prostheses and brushing habits were included in a multivariate logistic model, were brushing ≥1/day [p=0.002; OR (95%CI)= 2.8 (1.4-5.4)] and use of removable metal prostheses [p=0.030; OR (95%CI)=5.3 (1.2-24.3)] remained independently associated with RCI≥20%. **Conclusions** RC observed in institutionalized elderly may be a reflex of the lack of information and of dental medical surveillance along their life. **Clinical Relevance** RC is a raising clinical problem as the elderly population has also increasing, but is a controllable pathology with suitable prevention and managing strategies toward these age groups.

**PP 182**

Category: Preventive dentistry

**COMBINED EFFECTS OF ER:YAG LASER AND SOME PREVENTIVE TREATMENTS ON DEMINERALIZED ENAMEL**Emine KARA<sup>1</sup>, Nimet ÜNLÜ<sup>2</sup>, Gürsel KANSUN<sup>3</sup><sup>1</sup> Restorative Dentistry, Van Oral and Dental Health Center, Van, Turkey<sup>2</sup> Restorative Dentistry, Selcuk University, Faculty of Dentistry, Konya, Turkey<sup>3</sup> Geological Engineering, Selcuk University, Faculty of Engineering and Architecture, Konya, Turkey

**Objectives:** This in vitro study evaluated the inhibition of demineralization in enamel sections produced by Er:YAG laser, Fluoride (APF), Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) and combined applications with Er:YAG laser of APF and CPP-ACP treatments under polarized light microscopy (PLM). **Materials and Methods:** One hundred twelve human third molar teeth enamel slabs were randomly divided into seven groups (n=16): (1) Control (positive); (2) Control (negative); (3) Er:YAG laser; (4) Fluoride (APF); (5) Er:YAG laser+APF; (6) CPP-ACP; (7) Er:YAG laser+(CPP-ACP). The enamel surfaces were covered with varnish except for an exposed window on the external surfaces of the enamel samples and placed in a pH-cycling model to create subsurface enamel lesions (approximately 120 microns in depth) for 14 days, except for negative control. The treatments were applied to the demineralized enamel slabs. The surface analysis of enamel samples was performed by quantitatively measuring the caries lesion depth and percentage under a polarized light microscopy (PLM). The obtained data were statistically analyzed by using One-Way ANOVA and Two Sample T tests. **Results:** According to the results of PLM assessment, the depth( $\mu\text{m}$ ) and percentage in the caries lesion areas treated by Er:YAG laser+APF and Er:YAG laser +(CPP-ACP) groups were lower than the other groups( $p < 0.05$ ). **Conclusions:** As a result of this laboratory study, Er:YAG laser can effective in preventing enamel demineralization and promote the demineralization of demineralized enamel surfaces. Further studies on the preventive effects of laser irradiation and combined preventive treatments are recommended. **Clinical Relevance:** Er:YAG lasers can be an alternative tool for preventing enamel demineralization.

**PP 183**

Category: Preventive dentistry

**MIGRAINE & ORAL HEALTH: IS THERE A RELATIONSHIP?**Cem PEŞKERSOY<sup>1</sup>, Ayşegül KAYA<sup>1</sup>, Şule PEKER<sup>2</sup>, Aycan ÜNALP<sup>3</sup>, Necmi GÖKAY<sup>4</sup><sup>1</sup> Restorative Dentistry, Ege University Faculty of Dentistry, Izmir, Turkey<sup>2</sup> Neurology, Izmir Ataturk Training and Research Hospital, Izmir, Turkey<sup>3</sup> Pediatric Neurology, Dr. Behcet Uz Child Disease and Pediatric Surgery Training and Research Hospital, Izmir, Turkey<sup>4</sup> Restorative Dentistry, Ege University Faculty of Dentistry, Izmir, Turkey

**Introduction:** Migraine headache is one of the primary disabling clinical and physiological problem afflicting millions of individuals. Common side effects of migraine include nausea, vomiting, GERD (gastroesophageal reflux), irritation and fatigue affect the oral health. **Objectives:** The aim of this study was to explore the relationship between oral hygiene, dental status and chronic migraine syndrome in a controlled clinical study. **Material and Methods:** One hundred participants included and divided into two groups; Group:1, patients examined by a neurologist and diagnosed as migraine, n =50) and Group:2 (healthy individuals, n=50). The mean age was  $39.7 \pm 9.7$  years ( $p=0.141$ ) and sexual diversity were close (M/F:19/31 vs. 24/26,  $p=0.419$ ). MIDAS (Migraine Disability Assessment) form and pretreatment questionnaires and World Health Organization oral health assessment form were administrated by dental professionals. Statistical analysis were performed with chi-square, ANOVA and t-test by SPSS17. **Results:** Female patients seems do experience migraine attacks more than male patients do (62%). The frequency of GERD is 48% in migraine patients and 20% in control group ( $p=0.001$ ). Oral hygiene status were similar in both groups ( $p=0.358$ ). Tooth wear and abrasion seems more frequent amongst patients with migraine (72%,  $p=0.028$ ). OHI-S scores (mean 3.63 vs. 2.99,  $p=0.011$ ) and gingival plaque index scores(mean 1.6 vs.1.2,  $p=0.001$ ) showed statistically significant differences in both groups. **Conclusion:** The relationship between chronic migraine pain and the oral health cannot underestimate. The existence of GERD in addition to migraine can lead to higher dental problems. **Clinical Relevance:** Clinicians need to manage migraine and dental problems concomitantly, which will result in improved treatment outcomes.

**PP 184**

Category: Preventive dentistry

**THE INFLUENCE OF AN INFANT DENTAL CARE PROGRAM (PADI) ON THE CARIES INDEX (DMFT)**

Eva ROSEL<sup>1</sup>, Javier MONTERO<sup>2</sup>, Manuel BRAVO<sup>1</sup>

<sup>1</sup> Department of Preventive and Community Dentistry, School of Dentistry, University of Granada, Granada, Spain

<sup>2</sup> Department of Dentistry, Department School of Medicine, University of Salamanca, Salamanca, Spain

**Objectives:** In 2001, the Infant Dental Care Program (PADI) was set up in Andalusia (a southern region in Spain) which covers the population of 6 to 15 years of age, and which has a mixed provision, public and private-arranged, the latter with a payment system by capitation. The aim of this study is to analyze the effect of this program on DMFT index in 6-12-yr children. **Material and Methods:** In East-Andalusia, in 2007, 1905 6-12-yr children corresponding to 20 primary schools were randomly selected. A clinical examination of the study children (following the WHO guidelines) and a questionnaire survey of their parents were conducted at baseline. The design is a transversal study (quasi-experimental). The data was exploited statistically with the SPSS and SUDAAN software. **Results:** 425 children had never been to the dentist last year (control group), 411 had gone to a private dentist who did not belong to the program (private group) and 1069 had visited a dentist who belonged to the program (PADI group). DMFT means observed (among the three groups: control, private and PADI) were around 0,2 at age 6–7, around 0.3 to 0.4 at age 8–9 and around 0.8 at age 10–12, very low rates. There were no significant differences among the three groups. **Conclusions:** This study shows that the Infant Oral Care Program (PADI) was not effective to reduce the caries index (DMFT). **Clinical Relevance:** Spanish population have such low levels of dental caries that this program is not able to reduce caries rates.

#### PP 185

Category: Preventive dentistry

#### EFFECTS OF A NOVEL REMINERALIZING PRODUCT ON ENAMEL MICROHARDENESS AFTER EXPOSURE TO THE BLEACHING AGENTS

Andrea GUIDA<sup>1</sup>, Elena MARCHETTI<sup>1</sup>, Stefano ERAMO<sup>1</sup>

<sup>1</sup> Restorative, University of Perugia, Perugia, Italy

**Objectives:** Aim of this study is to give a contribute on the contrasting data of literature concerning the effects on enamel microhardness of home bleaching based on carbamide peroxide gel and the properties of a remineralizing Remin Pro(Voco GmbH, Cuxhaven Germany) , **Materials and Methods:** Enamel of one hundred maxillary canines and incisors were exposed to the action of five commercially available carbamide peroxide bleaching gel for seven hour a day for ten days. The samples were divided into two groups(A e B):the microhardness was

determined before and after exposure using a Vikers durometer with a load of 200 g/15".The microhardness was determined on group B also after exposure to the remineralizing based on fluoride, hydroxyapatite and xylitol, for thirty minutes for a week. **Results :** Statistical analysis of the results showed that the bleaching gels significantly decreased the microhardness of the enamel, and this effect was greater in the case of higher concentration of carbamide peroxide .The use of remineralizing, increase the enamel microhardness. **Conclusions:** The different results of the literature compared with this study may be due to the application of excessive loads during vikers measurements, The use of remineralizing is an important prerequisite. **Clinical Relevance:** The use of bleaching agents should always be accompanied with the use of a remineralizing.

#### PP 186

Category: Preventive dentistry

#### TOOTH WEAR IN TURKISH ADULT PATIENTS

Sevgi ŞENER<sup>1</sup>, Said KARABEKIROĞLU<sup>2</sup>, Güldane BOZDAĞ<sup>1</sup>, Nimet ÜNLÜ<sup>2</sup>

<sup>1</sup> Oral Diagnosis, Selcuk University, Faculty of Dentistry, Konya, Turkey

<sup>2</sup> Restorative Dentistry, Selcuk University, Faculty of Dentistry, Konya, Turkey

**Objectives:** The aim of this study was to determine the prevalence of tooth wear (TW) in a sample of subjects attending a university dental clinic in Turkey and to investigate the relationship to age, gender, socioeconomic status, tooth brushing, medical history, parafunction and dietary habits. **MATERIALS AND METHODS:** The group of study had 560 patients (333 women and 227 men), structured on the following subgroups of age: 13–30 years, 31–40, 41–50, 51–65 and more than 65 years old. Each patient had a clinical exam and a questionnaire for age, gender, tooth brushing, medical history, the diet, parafunctional habits and socioeconomic data, spotlighting the etiology of tooth wear. We recorded the prevalence and severity of tooth wear. TW was measured clinically by Smith and Knight index. Data were analyzed using Spearman Correlation and Chi Square tests. **RESULTS:** 560 subjects were examined of whom 64% had some degree of TW with the majority, (34%) exhibiting mild, 23% with moderate and 8% with severe TW. TW (...%) is more frequent at the feminine gender. There were associations found between TW and age ( $p < 0.01$ ), dietary ( $p = 0.043$ ), parafunction (bruksizm)( $p = 0.02$ ), medical history ( $p = 0.018$ ) and medicament usage ( $p = 0.048$ ). **CONCLUSIONS:** TW in this Middle of Anatolian population group appears to be common. Data supports an association between

TW and age, parafunction, dietary, medical history and medicament usage. **CLINICAL RELEVANCE:** Tooth wear is significantly associated with age, gender, dietary habits, medical history, parafunction habits. **Key Words:** Tooth wear, prevalence, etiologic factors, Smith and Knight index

### PP 187

Category: Preventive dentistry

#### IN-VIVO COMPARISON OF EFFICIENCY OF DIFFERENT DIAGNOSTIC TECHNIQUES FOR OCCLUSAL CARIES DETECTION

Emine KARA<sup>1</sup>, Sami KARA<sup>2</sup>, Nimet ÜNLÜ<sup>3</sup>

<sup>1</sup> Restorative Dentistry, Van Oral and Dental Health Center, Van, Turkey

<sup>2</sup> Dentomaxillafacial Radiology, Yuzuncu Yil University Faculty of Dentistry, Van, Turkey

<sup>3</sup> Restorative Dentistry, Selcuk University Faculty of Dentistry, Konya, Turkey

**Objective:** The purpose of this in vivo study was to evaluate the efficiencies of the different methods (visual examination, bite-wing radiography and laser fluorescence (DIAGNOdent®)) for occlusal caries detection. **Materials and Methods:** Permanent teeth (100) were selected and divided in five groups (n=20) according to Ekstrand's visual examination criteria by two examiners independently. The lesions were evaluated by visual examination, radiographic examination and laser fluorescence (DIAGNOdent®). After evaluations, the teeth were opened and the clinical lesions depth was determined. **Statistical analysis** of the data was performed using Mann-Whitney-U and Kruskal Wallis tests. **Results:** When the visual examination, bite-wing radiographic scores and laser fluorescence (DIAGNOdent®) scores are compared, there were no statistically significant difference between three diagnostic methods ( $p>0.05$ ). For all techniques, a correlation between laser fluorescence values and the visual and radiographic assessment and with the extent of the lesion was shown. Enamel and outer third of the dentine caries lesions were not detected by bite-wing radiography alone ( $p<0.05$ ). In this study higher DIAGNOdent® scores were obtained than DIAGNOdent® pen instruction's scores. **Conclusion:** According to these results, laser fluorescence method (DIAGNOdent®) shows helpful diagnostic performance to traditional methods but more in-vivo studies are still in need. None of the tested methods are reliable alone in diagnosis of initial occlusal caries, so these techniques should be used together for increasing the rate of

proper diagnosis. **Clinical Relevance:** Laser fluorescence may be a useful adjunct to traditional methods and the diagnostic performance of this device seems to be good for occlusal caries detection.

### PP 188

Category: Preventive dentistry

#### INFLUENCE OF A PERSONALIZED TREATMENT ON PATIENT'S COMPLIANCE AND CARIES RISK PROFILE: PROSPECTIVE CLINICAL STUDY

Erika BRACHET CONTUL<sup>1</sup>, Damiano PASQUALINI<sup>2</sup>, Lorenzo TAMAGNONE<sup>2</sup>, Nicola SCOTTI<sup>2</sup>, Elio BERUTTI<sup>3</sup>

<sup>1</sup> Preventive, University of Turin, Turin, Italy

<sup>2</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>3</sup> Endodontics, University of Turin, Turin, Italy

**Objectives** The aim of the study was to evaluate the efficacy of a personalized caries preventive treatment in a high-risk population for socio-economic factors. **MATERIALS AND METHODS** An observational prospective cohort clinical study was designed. 155 healthy adults were enrolled in the test group and 135 in the control group. Both groups were homogeneous for sex, age, socio-economic and physio-pathologic factors. Clinical data (DMFT, plaque index, SM and LB count, salivary flow, buffer capacity) and behavioral data (oral hygiene, compliance, dietary habits) were collected. Patients' caries risk profile was designed by Cariogram software and personalized treatment was planned. Subjects in the test group received professional mechanical tooth cleaning, individualized behavioral treatment through the assignment of health-oriented objectives and NAF mouth rinse (0.05% for 40 days) in case of high sugar-intake scores. Control group received only professional mechanical tooth cleaning and oral hygiene instructions. Baseline data were compared to 6 months and 1 year follow-up. Descriptive and inferential analysis are summarized in table 1 by means and (95% CI). **RESULTS** Results are collected in table 1. Patients received a total of 337 objectives. Dietary objectives were satisfied in 62,96%, while oral hygiene objectives were satisfied in 44,06% of the subjects. However the test group showed a significant improvement ( $p=0.01$ ) of the caries risk profile, increasing by 28% the "chance to avoid caries". **CONCLUSIONS** Based on the behavioral factor, the personalized preventive treatment appears to be effective. **CLINICAL RELEVANCE** Individualized preventive treatment may improve patient's compliance, also in a high-risk population for socio-economic factors, with non-invasive and cost-effective interventions.

## Results

		BASELINE	T6 MONTHS	T12 MONTHS
Carbohydrate Content	Test Group	1,50 (1,35-1,65)	1,24 (1,10-1,38)	1,02 (0,86-1,18)
Carbohydrate Content	Control Group	1,66 (1,47-1,85)	1,60 (1,42-1,78)	1,45 (1,16-1,74)
Carbohydrate Frequency	Test Group	1,33 (1,14-1,52)	1,03 (0,88-1,18)	0,98 (0,81-1,15)
Carbohydrate Frequency	Control Group	1,32 (1,11-1,53)	1,42 (1,22-1,62)	1,29 (1,01-1,57)
Plaque Index	Test Group	1,36 (1,23-1,49)	0,94 (0,81-1,07)	0,61 (0,51-0,71)
Plaque Index	Control Group	1,49 (1,33-1,65)	1,38 (1,20-1,56)	1,16 (0,90-1,42)
Chance to avoid caries	Test Group	50,74 (46,12-55,36)	66,44 (62,12-70,76)	78,04 (73,94-82,14)
Chance to avoid caries	Control Group	48,06 (42,88-53,24)	50,68 (45,65-55,71)	42,11 (35,66-48,56)

Table 1: Means and (95% CI)

## PP 189

Category: Preventive dentistry

## CLINICAL COMPARATIVE STUDY: VARIATION OF INDIVIDUAL CARIES RISK PROFILE BY ANTIMICROBIAL TREATMENT.

MARTINA Carollo<sup>1</sup>, DAMIANO Pasqualini<sup>2</sup>, LORENZO Tamagnone<sup>2</sup>, NICOLA Scotti<sup>2</sup>, ELIO Berutti<sup>3</sup><sup>1</sup> Preventive, University of Turin, Turin, Italy<sup>2</sup> Operative Dentistry, University of Turin, Turin, Italy<sup>3</sup> Endodontics, University of Turin, Turin, Italy

**Objectives** The aim of the study was to evaluate the efficacy of a personalized preventive treatment in a population at high caries risk for socio-economic factors, compared to a standard treatment, through the analysis of microbiological parameters. **MATERIALS AND METHODS** An observational prospective cohort clinical study was designed. 290 subjects from two homogeneous groups for sex, age, socioeconomic factors. (155 patients in the test, 135 in control group) 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 in the test group received professional mechanical tooth cleaning, dietary and oral hygiene instructions. Patients with SM count high scores performed at 40 days 0.12% chlorhexidine mouth rinse (2 per day). Patients with LB received at 40 days 0.05% NaF mouth rinse (2 per day). Patients in the control group received professional mechanical tooth cleaning and oral hygiene instructions. Baseline clinical

and microbiological data were compared to 6 months and 1 year follow-up. Patient's caries risk profile was designed with the Cariogram software. Descriptive and inferential statistics are presented in table 1 by means and 95% C.I. **RESULTS** Result are shown in table n. 1 **CONCLUSIONS** Based on the microbiological parameters the personalized preventive treatment was effective, increasing by 28% "the chance to avoid" new caries in the future. **CLINICAL REVALENCE** Chlorhexidine may be effective in caries prevention. It is possible to positively influence the individual risk-profile with non-invasive and cost-effective interventions.

		Baseline	T6 months	T12 months
Lactobacillus	Test	1,86 (1,69-2,03)	1,26 (1,09-1,43)	0,68 (0,55-0,81)
Lactobacillus	Control	1,62 (1,43-1,81)	1,39 (1,21-1,57)	1,18 (0,92-1,44)
Streptococcus Mutans	Test	1,59 (1,41-1,77)	1,09 (0,93-1,25)	0,79 (0,65-0,93)
Streptococcus Mutans	Control	1,75 (1,57-1,93)	1,75 (1,55-1,95)	1,56 (1,26-1,86)
Plaque Index	Test	1,36 (1,23-1,49)	0,94 (0,81-1,07)	0,61 (0,51-0,71)
Plaque Index	Control	1,49 (1,33-1,65)	1,38 (1,20-1,56)	1,16 (0,90-1,42)
Chance to avoid caries	Test	50,74% (46,12-55,36)	66,44% (62,12-70,76)	78,04% (73,94-82,14)
Chance to avoid caries	Control	48,06% (42,88-53,24)	50,68% (45,65-55,71)	42,11% (35,66-48,56)

## PP 190

Category: Preventive dentistry

## EVALUATION OF DEMINERALIZATION AND REMINERALIZATION OF ROOT SURFACE INCIPIENT LESIONS IN VITRO

Oyku DURMUŞOĞLU<sup>1</sup>, Dilek TAGTEKIN<sup>2</sup>, Funda YANIKOĞLU<sup>2</sup>, Margarita FONTANA<sup>3</sup>, GK STOOKEY<sup>4</sup><sup>1</sup> Private Practice, İstanbul, Turkey<sup>2</sup> Operative Dentistry, Marmara University Dental Faculty, İstanbul, Turkey<sup>3</sup> Oral Health Operative Dentistry, Michigan University Dental Faculty, Ann Arbor, MI, USA<sup>4</sup> Emerging Technologies Center, Indiana University, Bloomington, IN, USA

This study aimed to quantify root surface incipient lesions and demineralization of these lesions. Samples (4×2×3 mm) (n:64) were selected from extracted human teeth. Before demineralization by in vitro microbial caries model, samples' halves (baseline) were covered with varnish. They were evaluated by QLF (Quantitative Light-induced Fluorescence), Ultrasound, DIAGNodent, CLSM (Confocal Laser Scanning

Microscope). For demineralization, samples were chosen for three groups (n:21, each group). At the first group, samples were kept in artificial saliva with 0 ppm fluoride. The second group, 1100 ppm fluoride was applied ( $2\times 1$ ). At the third group besides 1100 ppm fluoride ( $2\times 1$ ), Bifluoride 12 fluoride varnish was applied (each week). CLSM differentiated demineralization and baseline. However it couldn't differentiate demineralization and any remineralization groups. QLF differentiated the differences between demineralization and baseline, demineralization and remineralization group with 1100 ppm F, remineralization group with both 1100 ppm F and Bifluoride 12. DIAGNOdent also measured the differences between baseline and demineralization. However it couldn't measure the difference between demineralization and any remineralization groups. There wasn't any difference between baseline, demineralization and remineralization groups with Ultrasound measurements. It's determined that, remineralization of root surface incipient lesions could be well detected and quantified by the QLF system used in this in vitro study corresponding to promising result for clinical usage. Additionally Bifluoride 12 varnish enhanced remineralization with 1100 ppm fluoride toothpaste.

#### PP 191

Category: Preventive dentistry

DIFFERENT ECC PATTERNS FROM TURKEY:  
4-CENTERED EPIDEMIOLOGIC STUDY FOR 1  
TO 3 YEARS OLD CHILDREN

Mehmet DALLI<sup>1</sup>, Ç. Türksel DÜLGERGİL<sup>2</sup>, M. Mustafa HAMİDİ<sup>2</sup>, A. Talha MUTLUAY<sup>2</sup>, Damla DOĞAN<sup>2</sup>, Zeki AKKUŞ<sup>3</sup>

<sup>1</sup> Operative Dentistry, Faculty of Dentistry, University of Dicle, Diyarbakır, Turkey

<sup>2</sup> Operative Dentistry, Faculty of Dentistry, University of Kırıkkale, Kırıkkale, Turkey

<sup>3</sup> Biostatistics, Faculty of Medicine, University of Dicle, Diyarbakır, Turkey

Objectives: Early childhood caries (ECC) is a major health concern that continues to negatively affect the oral health of infants and children, especially living in less deprived communities. As a general rule, caries declining has recently been observed in many European countries. However, with its changing nature caries shows varied levels at various time intervals even in the same community. These variations may have a negative effect on a systematic caries prevention program which could be targeted to same age group for overall country. In the light of this topic, we aimed in this 4-centered study, to assess the prevalence of dental caries in a large group of preschool children from different city-centers of Turkey. Materials and Methods : Before and during a new preventive

program targeting to 1–3 years old children in 4-city-centers, Turkey; two-trained dentists in each city-centers, performed all oral examinations at family-physicians centers (FPCs). Three, at least 2, FPCs were selected according to various socio-economic conditions. Results: Of the 1191 children from 4-city centers, the dft values and caries prevalence were  $1,43\pm 0,204$ ,  $3,66\pm 3,438$ ,  $0,70\pm 0,117$ ,  $0,56\pm 0,081$  and 33,0%, 78,4%, 18,1% and 16,7% for Karaman, Kütahya, Mardin and Kırıkkale, respectively. The differences between cities were statistically significant, especially for Kütahya to Karaman, Kırıkkale and Mardin ( $2=245,52$   $P<0.001$ ). Conclusion: Due to limited resources and huge number of oral health problems in developing and/or less developed countries, preventive programs should be targeted to specific-age groups having different caries patterns in different regions.

#### PP 192

Category: Preventive dentistry

A NOVEL DEVICE FOR OCCLUSAL CARIES  
DETECTION

Ali Murat AKTAN<sup>1</sup>, Mehmet Ata CEBE<sup>2</sup>, Mehmet Ertugrul CIFTCI<sup>1</sup>, Emine SIRIN KARAARSLAN<sup>1</sup>

<sup>1</sup> Department of Oral Diagnosis and Radiology, Gaziantep University Faculty of Dentistry, Gaziantep, Turkey

<sup>2</sup> Department of Restorative Dentistry, Gaziantep University Faculty of Dentistry, Gaziantep, Turkey

Objectives: The aim of this in-vitro study was to compare the performance of the laser based (DIAGNOdent) and the LED based caries detectors (Midwest Caries I.D.) in the detection of occlusal caries in permanent molars. Materials and Methods: The study consisted of 129 visually sound or non-cavitated pits or fissures in 82 extracted permanent human molar teeth. The fissures were examined for caries by two trained examiners using the laser and LED based devices. The teeth were then sectioned at the specified test sites and histologically evaluated using stereomicroscope as a gold standard. Intra-examiner reliability of the caries detector examination was assessed using Cohen's Kappa statistics. The sensitivity, specificity, accuracy, and receiver operating characteristic (ROC) in diagnosing occlusal caries using the two devices were calculated according to appropriate cut-off scores. Results: Cohen's Kappa showed substantial agreement for the laser based (0.63) and almost perfect agreement for LED based (0.89) caries detectors. The specificity of the laser based device was 0.97 and its sensitivity was 0.65. The specificity of the LED based device was 0.56 and its sensitivity was 0.78. Conclusion: Taking the limitations of the current study into consideration, DIAGNOdent pen showed more accurate diagnose of the occlusal caries free teeth than Midwest Caries I.D. In addition, Although Midwest

Caries I.D. indicated more accurate diagnose of the occlusal caries than DIAGNODent pen. Clinical Relevance: The results of the present study showed substantial and acceptable values for clinical utilization for both devices.

### PP 193

Category: Preventive dentistry

#### THE EFFECT OF A NEW DRYING AGENT ON SHEAR BOND STRENGTH OF A FISSURE SEALANT

Fatma Bahar MERAKLI<sup>1</sup>, Emre KORKUT<sup>1</sup>, Gül TOSUN<sup>1</sup>, Yağmur ŞENER<sup>1</sup>

<sup>1</sup> Pediatric Dentistry, Selcuk University, Konya, Turkey

**Objectives:** Pit and fissure sealants are widely used as a non-operative preventive method in public dental health. Long-term retention of pit and fissure sealants is essential for their success. The purpose of this study was to evaluate the shear bond strength of a fissure sealant to enamel. **Material method:** Thirty extracted human third molars were sectioned mesio-distally to obtain two flat and sound enamel surfaces. Sixty specimens were randomly assigned into three groups. The groups were prepared to receive the following treatments. (Group 1) Phosphoric acid + Ultraseal XT plus (Ultradent , USA), (Group 2) Phosphoric acid + Prima Dry + Ultraseal XT plus (Ultradent , USA), (Group 3) Phosphoric acid + Adper Single Bond 2 (3M Espe, USA) + Ultraseal XT plus (Ultradent , USA). A cylindrical mould was placed over the enamel surface, and materials were applied according to the instructions. A universal testing machine was used to test shear bond strength of materials with a crosshead speed of 1 mm per second. Kruskal–Wallis and Mann–Whitney U-tests were performed for the statistical analysis. **Results:** The bond strength of group 1 and group 3 were statistically higher than group 2 ( $p < 0.005$ ). there were no statistically difference between group 1 and 3 ( $p = 0.005$ ). **Conclusion:** Pretreatment with drying agent did not increase the effectiveness of conventional acid etching of enamel.

### PP 194

Category: Preventive dentistry

#### COLOR STABILITY OF AN INFILTRANT RESIN MATERIAL: AN IN VITRO STUDY

Yağmur ŞENER<sup>1</sup>, Emre KORKUT<sup>1</sup>, Murat Selim BOTSALI<sup>1</sup>, Gül TOSUN<sup>1</sup>

<sup>1</sup> Pediatric Dentistry, Selcuk University, Konya, Turkey

**Objectives** Micro-invasive caries treatment with resin infiltration is an innovative approach to arrest progression of caries lesion. This present study was aimed to

determine the color stability of infiltrated resin into the caries lesion. **Materials and methods** Forty artificial white spot lesions were created out of human incisors following a demineralization protocol and lesions were treated with an infiltrant resin material (Icon, DMG, USA). Specimens were divided in two groups. First group served as a control and was stored in distilled water at room temperature. Other group was underwent thermo-cycling and exposed to sunset yellow food colorant. The first color measurements were made before the specimens placed into food colorant and the other measurements were made after one month using a small area colorimeter (Easy shade, Vita, USA). The color differences ( $\Delta E$ ) were calculated by using the data obtained. The data were analyzed by using repeated measures of ANOVA followed by Tukey's test. **Results** The statistical analysis showed no significant differences between control and experimental group in color stability ( $p = 0.337$ ). **Conclusion** Satisfactory color stability after in vitro exposure to food colorants was observed for the resin infiltration material.

### PP 195

Category: Student's session

#### EFFECT OF POLYMERISATION AND AGING ON THE INCREMENTAL BOND-STRENGTH OF ORMOCER-BASED DENTAL MATERIALS

Daniel AWAD<sup>1</sup>, Nicoleta ILIE<sup>1</sup>

<sup>1</sup> Conservative Dentistry, LMU Munich, Munich, Germany

**Objective:** To evaluate an experimental ormocer-based composite with dimethacrylat-diluent free matrix. **Materials and methods:** An experimental-ormocer (V37877; VOCO) and two commercial, ormocer-based materials (CeramXDuo/Dentsply;Admira/Voco) were applied in a cavity (2×6mm) of an acrylic cylinder and cured (20 sec;1,200 mW/cm<sup>2</sup>; Bluephase/Ivoclar-Vivadent) at different distances (1, 3 or 6 mm). A second layer (2×3mm) was applied 30 sec after the first increment was cured and polymerised for 20s. For each material 120 specimens-40 for each distance- were prepared and stored for 24 h at 37°C in distilled water. Half of the specimens were additionally aged (5,000 cycles, 5°C/55°C, 28 days, 37°C in distilled water). The incremental-shear-bond-strength, ISBS, was measured (0.5 mm/min, MCE 2000ST;Quicktest Prüfpartner GmbH;Langenfeld;Germany). The degree of cure, DC, was determined in real-time for 2 minutes after photo-initiation (FTIR-ATR-spectrometer, Nexus;Thermo Nicolet;Madison;USA) on 50 µm composite films (n=5). DC-data were analyzed using one-way ANOVA. An Independent-Sample-T test

evaluates differences between 24 h stored and aged samples ( $\alpha=0.05$ ). Results: Aging exhibited a significant effect on ISBS in mostly all groups, except the experimental-ormocer. Conclusions: The experimental ormocer showed the best stability to aging and significant lower DC compared to the commercial ormocer-based materials. Clinical relevance: Ormocers with dimethacrylat-diluent free matrix are promising materials for dental restorations.

## PP 196

Category: Student's session

### EFFECTS OF ARTIFICIAL AGING ON SURFACE ROUGHNESS OF RESIN COMPOSITES

Emanuele BERGANTIN<sup>1</sup>, Giorgio CHIANDUSSI<sup>2</sup>, Davide PAOLINO<sup>2</sup>, Giulio MARCHESI<sup>3</sup>, Lorenzo BRESCHI<sup>3</sup>, Elio BERUTTI<sup>4</sup>, Nicola SCOTTI<sup>1</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> Mechanical Engineering, Politechnical, Turin, Italy

<sup>3</sup> Medical Science, University of Trieste, Trieste, Italy

<sup>4</sup> Endodontics, University of Turin, Turin, Italy

**Objectives** The aim of this in vitro study was to determine the effect of aging on surface roughness of resin composites with different fillers. The null hypothesis tested was that there is no difference in surface roughness in relation to the composite filler before and after artificial aging. **Materials and methods** Pressed round 2 mm-thick disks of each tested composite were prepared (n=6). Group 1: Venus Diamond (Heraeus Kulzer, Germany); Group 2: Opallis (FGM, Brasil); Group 3: Estelite (Tokuyama, Japan); Group 4: Filtek Supreme XTE (3M ESPE, USA); Group 5: Tetric Evoceram (Ivoclar Vivadent, Liechtenstein). The surface roughness (Ra) of all samples was measured using a RT-70 profilometer (ALPA-SM, Italy) with a 5  $\mu$ m diamond stylus. Measurements were performed after 24 h storage in artificial saliva and repeated after 12 months storage and thermocycling (6000 cycles at 5°C-55°C). The statistical analysis was performed with a Two-Way ANOVA and post-hoc Dunn's tests ( $p<0,05$ ). **Results** The mean roughness before and after aging of each group is reported in Table 1. The aging treatment statistically increased the roughness of all groups. **Conclusions** The null hypothesis was partially rejected since, no differences were found between the tested composites before the aging, while nano-filled and micro-filled composites showed a statistically higher roughness after aging and thermocycling. Conversely the descriptive analysis showed that the surface of micro-hybrid composites is less influenced

by aging. Clinical relevance Micro-hybrid composites seem to better maintain surface characteristics after aging and thermocycling.

### Different superscript letters indicate statistical difference

Material	Filler	Mean roughness not aged ( $\pm$ SD)	Mean roughness after aging ( $\pm$ SD)	Mean roughness increase (%)
Venus Diamond	Nano-hybrid	0.276 ( $\pm$ 0.121)a	0.437 ( $\pm$ 0.163)b	60.4
Opallis	Micro-filled	0.212 ( $\pm$ 0.062)a	0.262 ( $\pm$ 0.085)a	23.7
Estelite Sigma Quick	Nano-hybrid	0.297 ( $\pm$ 0.132)a	0.407 ( $\pm$ 0.159)b	47.0
Filtek Supreme XTE	Nano-filled	0.250 ( $\pm$ 0.141)a	0.460 ( $\pm$ 0.201)b	89.4
Tetric Evoceram	Nano-hybrid	0.308 ( $\pm$ 0.133)a	0.519 ( $\pm$ 0.185)c	70.1

## PP 197

Category: Student's session

### INFLUENCE OF OPERATOR SKILLNESS ON ADHESIVE SYSTEMS OUTCOME: A RANDOMIZED CLINICAL TRIAL

Alberto FORNIGLIA<sup>1</sup>, Alberto GAMBINO<sup>1</sup>, Damiano PASQUALINI<sup>2</sup>, Elio BERUTTI<sup>2</sup>, Nicola SCOTTI<sup>1</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> Endodontics, University of Turin, Turin, Italy

**Objectives:** The aim of this in vivo study was to evaluate the influence of operator skillness in adhesive application. The null hypothesis is that total-etch and self-etch adhesives performances are not related to operator experience. **Methods:** Fifty patients with 112 cervical lesions were included in the study. They were divided into two groups according to the operator (Experienced vs. Student) who performed the adhesive steps and divided into two subgroup according to the adhesive system employed: total-etch three-step (Optibond FL, Kerr, USA) or self-etch one-step (G-Bond, GC, Japan). Follow-up was made after 18 month evaluating several parameters and assigning a value of Alpha, Bravo, Charlie conforming to the method of valuation Ryge/USPHS: restoration retention, marginal integrity, marginal ditching, postoperative sensitivity, secondary caries and vitality. Data obtained during follow-up were statistically analyzed with chi-square test ( $p<0,05$ ). **Results:** Results did not showed a

statistically significant difference between experienced and inexperienced operators in employing both multi-step and one-step adhesive systems. Conclusions: The null hypothesis was accepted since experienced and inexperienced operators obtained comparable results in restoring cervical lesions. Total-Etch systems provided better clinical outcomes and, if used in accordance with the manufacturer's instructions, did not show variability related to the operator. Clinical Relevance: Both total-etch and self-etch adhesive systems performances are not influenced by operator skillness after 18 month.

### PP 198

Category: Student's session

PINLEDGE RETENTION AS MININVASIVE PROCEDURE TO INCREASE FRACTURE RESISTANCE OF ENDODONTICALLY TREATED TEETH.

Guido GREGORI<sup>1</sup>, Cristina ERULI<sup>1</sup>, Nicola SCOTTI<sup>1</sup>, Damiano PASQUALINI<sup>2</sup>, Elio BERUTTI<sup>2</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> Endodontics, University of Turin, Turin, Italy

Objectives: The aim of this in vitro study was to determine the effect of the fiber post and/or pinledge retention and/or cuspal coverage on the fracture resistance of endodontically treated maxillary premolars. Methods: Forty intact single-rooted maxillary premolars were selected and endodontically treated. Half specimens were prepared with an MOD cavity, half with a 2 mm cuspal reduction preparation and divided in four groups (n=10): “inlay with fiber post” (G1), “inlay with pinledge retention” (G2), “overlay with fiber post” (G3), “overlay with pinledge retention” (G4). All specimens were thermocycled (6000 cycles at 5°-55°C), exposed to a 20 N cyclic loading, and then submitted to static fracture resistance test until fracture occurred. Fracture loads were statistically evaluated with Two-Way ANOVA and Dunn post-hoc tests ( $p < 0,05$ ). Results: A statistically significant difference in fracture resistance was found between Group 1 and the other groups ( $p < 0.001$ ). Conclusions: Similar fracture resistance was detected in maxillary premolars endodontically treated with MOD cavity preparations, restored with either direct resin composite with fiber post or complete cuspal coverage. The pinledge direct restoration showed lower fracture resistance values. Clinical significance: Inlay direct restorations with pinledge intracanal retentions do not provide sufficient fracture resistance to endodontically treated premolars.

Table 1: Mean and SD fracture resistance values

	Fracture Resistance (Newton)	SD
Fiber Post (+); Cuspal Coverage (-)	808.36	±75.91
Fiber Post (+); Cuspal Coverage (+)	829.03	±203.79
Pinledge (+); Cuspal Coverage (-)	342.31	±160.32
Pinledge (+); Cuspal Coverage (+)	894.35	±214.92

### PP 199

Category: Student's session

CORRELATION BETWEEN 38% HYDROGEN PEROXIDE APPLICATION TIME AND BONDING EFFICIENCY: AN IN VITRO STUDY

Marco CUPPARI<sup>1</sup>, Emanuele COLAIANNI<sup>1</sup>, Valter BATTAGLIA<sup>1</sup>, Damiano PASQUALINI<sup>2</sup>, Elio BERUTTI<sup>2</sup>, Nicola SCOTTI<sup>1</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> Endodontics, University of Turin, Turin, Italy

Objectives: The aim of this in vitro study was to evaluate the correlation between application time of 38% hydrogen peroxide and bond strength. The null hypothesis is that bleaching agent's application time does not influence the bonding procedures. Materials and Methods: Thirty-two intact extract molar teeth were selected and divided in 2 groups depending on the 38% hydrogen peroxide application time (respectively 30 and 60 minutes). Each group was then divided in 2 subgroups to evaluate the bond strength at 7 and 14 days after bleaching. After bleaching procedure occlusal enamel was removed with a microtome in order to expose dentin surface and teeth were prepared for micro-shear bond test. Bond strength was evaluated on 3 different dentin spots after the application of total-etch adhesive (Optibond FL, Kerr, USA) which was cured for 40 sec. Results were statistically analyzed with two-way ANOVA and Dunn post-hoc tests ( $p < 0,05$ ). Results: Means and standard deviations of bond strength (expressed in MPa) of the different groups are expressed in table 1. Conclusions: The null hypothesis tested was not rejected since bleaching agent's application time did not influenced the bond strength. However the bonding procedures performed after 14 days after bleaching showed statistically higher bond strength than 7 days groups. Clinical significance: Bleaching procedures influence bond strength not in relation to peroxide application time but in relation to waiting period before performing adhesive procedures.

## Mean bond strength values (expressed in MPa) of each group

	Bleaching application time	Days expected for bond strength test	BOND STRENGTH (MPa)
GROUP 1	30 minutes	7	15,673 ( $\pm 5.91$ )
GROUP 2	60 minutes	7	16,632 ( $\pm 3.79$ )
GROUP 3	30 minutes	14	18,518* ( $\pm 6.32$ )
GROUP 4	60 minutes	14	22,361* ( $\pm 2.92$ )

**PP 200**

Category: Student's session

ULTRASONIC TIPS AND SELF-ADHESIVE CEMENTS: AN OPTIMAL COMBINATION FOR FIBER POST CEMENTATION?

Francesco LERDA<sup>1</sup>, Nicola SCOTTI<sup>1</sup>, Lorenzo BRESCHI<sup>3</sup>, Damiano PASQUALINI<sup>2</sup>, Elio BERUTTI<sup>2</sup>

<sup>1</sup> Operative Dentistry, University of Turin, Turin, Italy

<sup>2</sup> Endodontics, University of Turin, Turin, Italy

<sup>3</sup> Medical Science, University of Trieste, Trieste, Italy

**Objectives** The aim of this in vitro study was to evaluate the effect of different post space preparation techniques on the bond strength of fiber posts luted with different self-adhesive cements. The null hypothesis tested was that the post space preparation mode has no effect on the push-out bond strength of fiber posts luted with self-adhesive cements. **MATERIALS & METHODS** Twenty single-root human extracted teeth were endodontically treated and randomly divided in 2 groups according to the post space preparation procedure: 1) ultrasonic tip (Start-X 2, Dentsply, Switzerland), 2) calibrated bur (Torpan #90, Dentsply, Switzerland). Each group was then divided in 2 subgroups according to the luting cement employed: A) ClearFil SA Cement (Kuraray, Japan); B) RelyX Unicem 2 (3M ESPE, USA). Fiber posts (RelyX, 3M ESPE) were luted in accordance with manufactures' instructions. Teeth were cut in 1 mm-thick slices and pushed until failure with an Instron Machine. Results were statistically analyzed with Two-Way ANOVA and Tukey test. Statistical significance was set at  $p=0.05$ . **RESULTS:** Means and SD of push-out bond strength (expressed in MPa) are expressed in Table 1. **CONCLUSIONS** The null hypothesis tested was rejected since post space calibrated burs showed higher push-out bond strength compared to ultrasonic tips. No differences were observed between the 2 self-adhesive cements tested. **CLINICAL RELEVANCE** The use of a calibrated bur for post space preparation improves the bond strength of fiber posts luted with self-adhesive cements to radicular dentin compared to ultrasonic tips.

PREPARATION DEVICE	SELF-ADHESIVE CEMENT	Bond Strength (MPa $\pm$ SD)
Ultrasonic Tip	ClearFil SA Cement	4.6 ( $\pm 2.8$ )a
Ultrasonic Tip	RelyX Unicem 2	4.9 ( $\pm 3.4$ )a
Calibrated Bur	ClearFil SA Cement	7.8 ( $\pm 3.4$ )b
Calibrated Bur	RelyX Unicem 2	7.0 ( $\pm 2.4$ )b

Different superscript letters indicate statistical difference

**PP 201**

Category: Student's session

THE SENSITIVITY AND SPECIFICITY OF PROXIMAL CARIES LESION DETECTION BY VARIOUS DIAGNOSTIC METHODS

Serap MÜEZZINOĞLU<sup>1</sup>, Gül ORHAN<sup>1</sup>, Tamer ERDEM<sup>1</sup>, Begüm GÜRAY EFES<sup>1</sup>, Can DÖRTER<sup>1</sup>

<sup>1</sup> Faculty of Dentistry, Istanbul University, Istanbul, Turkey

**Objectives:** The aim of this in vitro study was to compare the sensitivity and specificity of proximal caries lesion detection by visual-tactile, radiographic examination and DIAGNodent-pen. **Materials and Methods:** The study was performed using 23 extracted premolar and 25 extracted molar teeth with healthy appearance and no cavitation or/and proximal caries lesion. Teeth were clinically examined with visual-tactile methods using a mirror and explorer by two dental students. Dried teeth visually examined under operating light and recorded as caries (+) or caries (-). After using DIAGNodent-pen and radiographic methods, teeth were sectioned in mesio-distal direction and examined visually under a standard operating light to determine the gold standard. **Results:** The sensitivity of visual-tactile examination in detection proximal caries lesion in premolar teeth was %47, the specificity was %74. The sensitivity of radiographic examination in detection proximal caries lesion in premolar teeth was %37, the specificity was %93. The sensitivity of DIAGNodent-pen examination in detection proximal caries lesion in premolar teeth was %21, the specificity was %100. The sensitivity of visual-tactile examination in detection proximal caries lesion in molar teeth was %75, the specificity was %78. The sensitivity of radiographic examination in detection proximal caries lesion in molar teeth was %25, the specificity was %81. The sensitivity of DIAGNodent-pen examination in detection proximal caries lesion in molar teeth was %30, the specificity was %94. **Conclusions:** Hence we conclude that, DIAGNodent-pen showed higher specificity, while the highest sensitivity was reached with visual-tactile examination in detection proximal caries lesions.