# INTERNATIONAL JOURNAL OF PAEDIATRIC DENTISTRY

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Editor-in-Chief
Göran Dahllöf

Abstracts of the 22nd Congress of the
International Association of Paediatric Dentistry
Munich, Germany, 17–20 June 2009

Volume 19 – Suppl. 1
June 2009

WILEY-BLACKWELL

The official journal of
The International Association of Paediatric Dentistry
The British Society of Paediatric Dentistry

INTERNATIONAL JOURNAL OF
PAEDIATRIC DENTISTRY

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Oral Session O15 – Dental Materials

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INTERNATIONAL JOURNAL OF PAEDIATRIC DENTISTRY

# Oral Session O15/Dental Materials

## O15–108

### Clinical assessment of two adhesive systems on sealant retention in newly-erupted teeth

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**Introduction:** This clinical study compared the effects of two bonding agents on the retention of sealants placed on mesial and distopalatal grooves of newly-erupted teeth.

**Patients and methods:** This 12-month clinical study scored 126 mesial and distopalatal sealants of newly-erupted permanent first maxillary molar, using of a split-mouth design, half receiving sealant alone and half bonding agent plus sealant. Two bonding agent groups (Single-Bond and SE Bond) were analyzed for treatment effect. Clinical examinations were performed at 3, 6 and 12 months and the retention was studied in terms of success and failure and then was analyzed using Wilcoxon, Mann Whitney and Chi-square tests.

**Results:** In the group receiving sealant alone, distopalatal showed a higher failure rate than mesial grooves ($P < 0.05$). Since the teeth were newly erupted, the distopalatal areas were in contact with the gingival sulcus. Higher failure rates in this difficult clinical situation are most likely due to moisture contamination. Moreover, use of both bonding agents significantly improves the success of distopalatal sealant even more than that of the mesial groove sealant ($P < 0.001$). For the distopalatal area, the result of SE Bond was better than that of Single Bond, although the difference was significant only at 6 months interval examinations ($P < 0.05$). However, in mesial area, the result of Single Bond was better ($P < 0.05$).

**Conclusion:** These results support the use of these two bonding agents in fissure sealants under both isolated and contaminated conditions. Further, SE Bond seems to be less sensitive to moisture contamination.

## O15–109

### Chlorhexidine release from calcium phosphate cements

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**Introduction:** Alternatives to formocresol for pulp therapy are required. Calcium Phosphate Cements (CPCs) form hydroxyapatite (HA) or brushite (DPCD) as a final product, and are used as bone substitutes. These cements release drugs via drug diffusion. They have the potential to be used for pulpotomies. Initial studies indicate they could be modified to release chlorhexidine (CHX). The aim of this study was to investigate the release profile of chlorhexidine from DPCD's and the effect of partial replacement of citric acid in the standard formulation with polyacrylic acid (Fuji IX).

**Materials and methods:** Beta-TCP and MCPC were mixed to give DCPC in which Citric acid and Fuji IX (F IX) were added and mixed in 2.5:1 ratio. UV Spectroscopy was used to record the amount of CHX released over time.

**Results:** After 7 days, the cement containing 5% CHX and 25% F IX released 18.6% CHX compared to 3.9% release for the cement containing 50% F IX. After 7 days the cement containing 10% CHX and 25% F IX 27.3% released CHX compared to 21.3% release for the cement containing 50% F IX. The presence of Fuji IX substantially slowed down the drug release rate of CHX beyond 24 h.

**Conclusion:** By varying levels of Fuji IX in the CPC cement CHX release was prolonged. This could result in the antibacterial action being maintained for a longer period of time.

## O15–110

### Sealing ability and fissure penetration level of a nano-filled resin-based sealants

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**Introduction:** The aim of this randomized controlled, *in vitro* study was to evaluate the sealing ability and fissure penetration following different application techniques of a nano-filled resin-based fissure sealant.

**Materials and methods:** 60 extracted human molars were randomly allocated into two equal groups representing the filling level, border filling, or over filling (according to the filling level either to the border or over filling). A light cured, nano filled resin fissure sealant (Filtek Z350) was placed on occlusal surface following cleaning by prophylaxis and acid etching. Then, they were stored for one week in artificial saliva, painted with two layers of impermeable varnish: their apices were sealed with wax, and the teeth were immersed in 1% methylene blue for 48 h. The teeth were sectioned to achieve three cuts. A total of 351 sections were scored for microleakage.

**Results:** No statistically significant differences between different groups and the sealing ability of the fissure sealant were detected ($P = 0.15$).

**Conclusion:** Over filled fissures caused higher levels of microleakage (16.4%) but statistically it was not significant. There is no significant association between fissure penetration level and microleakage.

## O15–111

### Quality and longevity of posterior restorations in permanent teeth of adolescents

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**Introduction:** Tooth-colored materials are used increasingly instead of amalgam for posterior restorations. This study aims to compare the quality and longevity of class I and II restorations in composite resin (CR), compomer (CO), and amalgam (AM) in the young permanent dentition. The study has a prospective, nonrandomized design and comprises consecutively performed, routine treatments.

**Patients and methods:** Between August 2002 and December 2005 1743 class I and 1020 class II restorations were made in permanent teeth of 1893 patients aged 5–20 years (mean = 13.6 years) by 33 dentists. Informed consents from all patients/parents were

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obtained. The material included 1817 CR, 388 CO and 558 AM restorations. The quality of the restorations was assessed at recalls up to 4 years. Chi-square statistics was used for analyses of differences among type of restorations and restorative materials.
**Results:** By January 2009 61 class I (3.5%) and 13 class II restorations (1.3%) were repaired or replaced because of primary caries ($P < 0.01$), and 81 class I (4.6%) and 75 class II restorations (7.4%) because of failure of restorations ($P < 0.01$). The failed class I restorations were distributed at CR-5.3%, CO-2.8% and AM-3.2% ($P > 0.05$). The failed class II restorations were distributed at CR-10.0%, CO-4.9% and AM-3.5% ($P < 0.01$).
**Conclusion:** Re-treatments of posterior restorations due to primary caries and failure of restorations in the young permanent dentition vary with the type of the restoration and the type of the restorative material with the highest occurrence of failures for class II composite resin restorations.

## O15–112

## Clinical evaluation of GC Fuji IX GP-Fast restorations after 24 months

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**Introduction:** Glass-Ionomers have become an integral part of the restorative materials in paedodontics. Aim of this study was to evaluate clinical behaviour of GC Fuji IX GP-Fast on primary and permanent teeth over 24 months.
**Materials and methods:** 66 restorations were placed in 40 children (17 boys, mean age 9.25) attending the Paedodontics Department, Carol Davila University, Bucharest. 58 restorations were placed on molars (41 permanent, 17 temporary). 52 restorations were placed in stress bearing areas: 38 occlusal, 10 class II, 4 extended cavities. Cavity design followed minimal intervention technique. Restorations were evaluated using Modified Ryge USPHS Criteria for: Wear/Anatomical Form (W/AF), Marginal Integrity (MI), Cavo-surface Marginal Discoloration (CMD), Recurrent Caries (RC), Surface Texture (ST), Maintenance of Interproximal Contact (MIC), Postoperative Sensitivity (POS), scores range 1 (optimal) to 3 (unacceptable).
**Results:** 13.33% optimal restorations, 82.13% acceptable, 4.54% unacceptable. Score distribution for class I and II restorations: a) *Permanent molars;* W/AF 1 (23.7%), 2 (76.3%); MI 1(39.5%), 2 (60.5%); CMD 1 (63.2%), 2 (36.8%); RC 1 (100%); ST 1 (23.7%), 2 (71%), 3 (5.3%); MIC 1 (100%); POS 1 (100%). b) *Temporary molars*: W/AF 2 (100%), MI 1 (5%), 2 (80%), 3 (15%); CMD 1 (20%), 2 (80%); RC 1 (100%); ST 1 (5%), 2 (90%), 3 (5%); MIC 1 (28.6%), 2 (28.6%), 3 (42.9%); POS 1 (100%).
**Conclusions:** After 24 months most of the restorations were optimal/clinically acceptable. There were no failed restorations on permanent molars. Fuji IX showed promising results for restorative treatment of primary and permanent molars. Research partly supported by GC Israel.

## O15–113

## Enamel shear-bond strength of glass carbomer after heating with three polymerization units

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**Introduction:** Glass Carbomer represents a new material derived from GIC. Advantages of Glass Carbomer are high wear resistance, biocompatibility - no acid, high F release, and fluorapatite particles incorporated. Setting reaction of the material is accelerated by heating with a high energy polymerization unit. The aim of this study was to establish shear bond strength of the Glass Carbomer material heated with three polymerization units.
**Materials and methods:** Material comprised 50 teeth divided in 5 groups of 10 specimens. (3 Glass Carbomer and 2 GIC- conditioned and unconditioned). Teeth were embedded in epoxy resin, enamel surface flattened and cylinders of the Glass Carbomer (Glass Carbomer Products) and GIC (control group) were fabricated according to the respective manufacturers instructions. Samples of Glass Carbomer material were heated using LED polymerization units Elipar Freelight (1000 mW/cm$^2$) (3M Espe), Bluephase (1200 mW/cm$^2$) (Vivadent) and Bluephase 16i (1600 mW/cm$^2$) (Vivadent). GIC samples were chemically cured. Shear-bond testing was performed in Universal testing machine (LRX, Lloyd Instruments) with 1kN load cell and 1 mm/min crosshead speed. Statistical analysis was performed using ANOVA and Tukey HSD test.
**Results:** Glass Carbomer showed significantly higher shear bond strength (13,7 MPa) compared to GIC (6, 7 MPa) ($P < 0.05$). No statistically significant differences in the shear bond strength of Glass Carbomer material regarding the use of different polymerization units were observed.
**Conclusion:** Enamel shear bond strength of Glass Carbomer material is comparable or higher than conventional GIC. Regarding this property Glass Carbomer material can be clinically used with high confidence. Further evaluation of other characteristics of this material should be performed on larger samples.

## O15–114

## Enamel remineralization potential of two dentifrices based on CPP–ACP and Novamin® (Calcium-sodium-phosphosilicate)

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**Introduction:** The potential for remineralization of damaged tooth surfaces, especially in young immature permanent teeth, is highly appreciable. Since the standard procedures for protection of these teeth as fissure sealing and topical fluoride application are not completely efficient, the purpose of our study was to investigate the enamel remineralization potential of two toothpastes, one of which was based on CPP–ACP and the other one on Novamin® (calium-sodium-phosphoslicate).
**Materials and methods:** Fifteen human immature permanent molar teeth, divided in three groups, were subjected to three consecutive demineralization cycles. These cycles were followed by remineralization of the two experimental groups with CPP–ACP and Novamin® (calcium-sodium-phosphosilicate) containing toothpastes respectively (the third group was used as a control). The teeth were divided by half longitudinally and the first half from each tooth was analyzed by SEM (secondary electron mode), while the other one by SEM (backscattered electron mode) and EDAX.
**Results:** Extensive demineralization was noted in the control group, while the groups treated with the dentifrices demonstrated various degrees of remineralization represented by formation of different types of deposits on the enamel surface. The EDAX analysis proved the increased presence of Ca, P, Si and Zn in the enamel of the experimental groups, compared to the control one.

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**Conclusions:** CPP–ACP and especially Novamin® (calcium-sodium-phosphosilicate) containing dentifrices exhibit enamel remineralization potential, which might be important in finding a substitute to pit and fissure sealing.

## O15–115

## Microhardness and surface roughness of glass ionomer cements after APF and $TiF_4$ application

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**Introduction:** Little has been reported on the effects of different topical fluoride agents on newly developed glass ionomer cements (GIC). The present study investigated the effects of 1 and 4 min application of 1.23% acidulated phosphate fluoride (APF) and 1 min application of 1% titanium tetrafluoride (TiF4) on the mechanical properties of Fuji IX Extra (GIC), Fuji II LC (resin-based GIC) and Ketac N100 (nano-ionomer).

**Materials and methods:** Fifteen disc-shaped specimens of each material were prepared according to the manufacturers' instructions. Each specimen was stored in 2 mL of artificial saliva at 37°C for 8 weeks. Subsequently, specimens of each material were divided randomly into three subgroups. Following the applications, specimens were stored in artificial saliva for another 8 weeks. Microhardness and surface roughness values were evaluated by using Vicker's hardness test, surface profilometry and SEM for all time interventions. Two-way ANOVA test was performed for statistical analysis.

**Results:** In both Fuji II LC and Fuji IX Extra groups, APF application time had no statistically significant effect on microhardness. However 1-min TiF4 application had statistically higher values compared to 4-min APF application. There were no significant differences in microhardness of Ketac N100 after different fluoride applications. In both Fuji II LC and Fuji IX Extra groups, there was no difference in roughness among different applications. However, in Ketac N100 group, 4-min APF application provided the highest roughness values.

**Conclusion:** Nano-ionomers may present different mechanical properties after APF and TiF4 applications in comparison to GIC and resin-based GIC.

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