



GC CORPORATION R&D RELATED ABSTRACTS

THE SCIENCE BEHIND OUR PRODUCTS

The IADR 86th General Session & Exhibition

Toronto, Ontario, Canada

(July 2-5, 2008)

CONTENTS

<u>PRODUCT CATEGORY</u>	<u>PAGE</u>
■ Glass Ionomer Restoratives -----	P. 3
■ Glass Ionomer Cements -----	P.11
■ Resin Cements -----	P.13
■ Composite Resins & Bonding Agents -----	P.17
■ Denture Products -----	P.31
■ Impression Materials -----	P.32
■ Orthodontic Products -----	P.33
■ Hygiene / Preventive -----	P.34
■ Laboratory Products -----	P.49
■ Implant -----	P.51
■ CAD/CAM -----	P.52

ABSTRACT NO.# 453

Fuji II LC

0453***Long-term dentin remineralization from Ca-PO₄-releasing, whisker-reinforced polymeric composites***

S.H. DICKENS, and G.M. FLAIM, American Dental Association Foundation, Gaithersburg, MD, USA

Resin-based cements containing calcium-phosphates have been shown in-vivo and in-vitro to remineralize mineral-deficient dentin. More recently, stronger whisker-reinforced composites have been developed for Atraumatic Restorative Treatment of carious teeth. These composites release calcium, phosphate, and fluoride ions in amounts that produce supersaturation with respect to hydroxy/fluoroapatite.

OBJECTIVE: To report the 8wk remineralization of artificially demineralized dentin from 5 experimental composites, a positive (GIC-Fuji-LCII), and a negative control (TPH-Dentsply); to compare the results to the 4wk data, and explore the hypothesis that the remineralization is related to the ion release these composites produced in saline solution.

METHODS: Cavities (3mm-width, 6mm-length, 1mm-depth) were drilled into occlusal dentin of extracted caries-free human molars. The teeth except the cavity were varnish-coated and exposed to demineralizing solution (pH=4.3, 48h). Each cavity was restored with one of the materials. The tooth was sliced into 180 μ m sections, contact microradiographs were taken and digital image analysis was performed to determine the 'mineral-loss-before'. Each section was sandwiched between parafilm and a plastic cover exposing only the restoration edge, and incubated in 25mL artificial saliva for 4wk. Contact microradiographs were retaken, and the mineral loss after treatment was determined. This procedure was repeated after 8wk incubation. The %-remineralization was calculated from [(1-'mineral-loss-after'/'mineral-loss-before') x 100].

RESULTS: The mean %-remineralization \pm s.d. (n \geq 3) after 8wk are: B1: 37 \pm 16; B3: 41 \pm 7; B4: 37 \pm 7; B6: 47 \pm 13; U3: 42 \pm 11; GIC: 42 \pm 3; TPH: 19 \pm 3. Analyzing for incubation time and treatment, 2-way ANOVA indicated a significant effect of time on the %-remineralization with increases over 4wk data of 6% (TPH) to 15% (B6). All experimental groups and GIC had significantly higher remineralization than TPH (p<0.05).

CONCLUSION: The experimental composites and GIC have a high time-related potential to remineralize artificially demineralized human dentin. However, the measured remineralization cannot be predicted from saline ion concentrations. Support: ADAF; NIST; NIDCR-Grant-DE13298.

Seq #75 - Antibacterial/Caries-inhibiting Effects, Biomaterials, and Bioengineering
2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0487

Fuji IX GP EXTRA, G-COAT PLUS,
Fuji COAT LC, Fuji Varnish**0487*****Influence of coating materials on conventional glass-ionomer cement***

K. KATO, H. YARIMIZU, H. NAKASEKO, and T. SAKUMA, GC CORPORATION, Tokyo, Japan

Objectives: Conventional glass-ionomer cements(GIC) are widely used for restoration. However, they sometimes fail in wear or crack at the surface by long term fatigue. We investigated the influence of the various coating materials for the conventional restorative GIC, Fuji IXGP EXTRA(F9E) on its properties.

Methods: The flexural strength test was carried out referring to ISO/9917-2:1998. The surfaces of specimens were prepared using 600-grit SiC paper 10minutes after start of cement mixing. One group of F9E was not coated. Other groups were applied with G-COAT PLUS, Fuji COAT LC and Fuji Varnish according to manufacturer's instruction. The data was analyzed by t-test compared with Uncoated(**:p<0.01).

The tensile bond strength of several coating materials to F9E was carried out according to ISO/TS11405:2003. F9E disk (diameter: 15mm, thickness:2mm) surfaces were prepared using 600-grit SiC papers. Bonding area was prescribed(diameter:3mm) with plastic tape. Coating materials were applied according to the directions. Acrylic blocks as tensile appliances were bonded onto the cured coats with self-cure acrylic resin(Unifast II,GC). The specimens were soaked in distilled water at 37°C for 23hours before tensile test. The data was analyzed by t-test compared with G-COAT PLUS(**:p<0.01).

Results: F9E coated with G-COAT PLUS showed the highest flexural strength. Tensile bond strength of G-COAT PLUS is significantly higher than other products. The results are attributed to adhesive monomer exclusively contained in G-COAT PLUS which enables to create the chemical bond to no-resin materials.

Conclusion: G-COAT PLUS has the highest bond strength to F9E among the examined coating materials, and the effect to improve the mechanical property of substrate restorative GIC. The application of G-COAT PLUS onto F9E is reliable and clinically recommendable. Coating material

Coating material	Uncoated	G-COAT PLUS	Fuji COAT LC	Fuji Varnish
Flexural strength of coated F9E (MPa)	16.8(3.3)	32.2(2.0)**	18.8(1.3)	18.6(3.0)
Tensile bond strength to F9E (MPa)	-	5.8(1.7)	1.7(0.8)**	1.8(0.7)**

():S.D.

Seq #77 - Adhesion, Resin Coating, Fluoride-Releasing Materials

2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1771

Fuji II LC CAPSULE, Fuji IX GP CAPSULE

1771***Clinical Evaluation of Tooth-colored Materials in Small Class I Lesions***

S. POOLTHONG, V. PATANAPIRADEJ, R. SAKOOLNAMARKA, S. SRISAWASDI, and C. OONSOMBAT, Chulalongkorn University, Bangkok, Thailand

Tooth-colored adhesive materials have been increasingly used after the introduction of minimal intervention concept.

Objective: The present study aimed to evaluate clinical performances of tooth-colored adhesive materials restored in small class I lesions.

Method: The materials were Fuji II LC capsule (FII), Fuji IX capsule (FIX), Filtek Supreme/Clearfil Photo Bond (S/C), Filtek Supreme/Prime&Bond NT (S/P). All materials were randomly restored on 122 class I lesions of posterior teeth under rubber dam. The restorations were restored by 2 operators following the manufacturers' instructions. They were evaluated by 2 evaluators at base line and 18 months. The assessments were based on modified Ryge's criteria. The criteria were color match (CM), retention (RT), marginal discoloration (MD), marginal adaptation (MA), secondary caries (SC), anatomic form (AF) and surface texture (ST).

Result: The results (% alpha grade) are summarized in the table.

%a	CM	RT	MD	MA	SC	AF	ST
FII	68.4	100.0	57.9	42.1	100.0	100.0	68.4
FIX	0.0	100.0	70.0	20.0	100.0	100.0	30.0
S/C	90.5	100.0	61.9	42.9	100.0	100.0	95.2
S/P	80.0	100.0	73.3	26.7	100.0	100.0	93.9

Conclusion: Within 18 months, glass-ionomer restorations exhibited comparable performances to composite except for their color match and surface texture. %a

Supported by Thai Research Fund/MRG4780130.

Seq #185 - Clinical Evaluation of Resin Composite and ART Restorations

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1776

Fuji IX

1776***Survival of Glass Ionomer Atraumatic Restorations (ART): 10-year Results***

R.L. ZANATA, T.C. FAGUNDES, M.C.C.A. FREITAS, G.S. CARDIA, J.R.P. LAURIS, and M.F.L. NAVARRO, Bauru School of Dentistry - University of Sao Paulo, Brazil

This work reports on a longitudinal evaluation of a high-strength glass ionomer cement (Fuji IX/GC) employed in a modified atraumatic restorative approach (ART).

Objectives: this study evaluated the clinical behavior of glass ionomer (GI) restorations after a 10-year period, and verified the enamel/ionomer interface by scanning electron microscopy (SEM).

Methods: in 1997, 417 GI restorations were placed in 43 pregnant patients with high treatment needs (mean number of decayed teeth 9.8). Minimal cavity preparations were performed using excavators to remove soft carious dentin; the openings of small lesions were widened using high speed burs; the restorative material was used following the manufacturer's instructions. Evaluations at baseline and after 1, 2 and 10 years were performed by two calibrated examiners using the criteria proposed by Frencken for ART restorations.

Results: the inter-examiner agreement was high ($\kappa = 0.9$). After one year, 383 restorations were evaluated in 39 patients with a success rate of 95%. After 2 years, 302 restorations were evaluated in 34 patients and the estimated cumulative success rate (Kaplan-Meier curve) was 90.6%. After 10 years, 154 restorations were evaluated in 15 patients with a cumulative success of 53.6%. The clinical performance of GI in small preparations (Class I, III and V) was compared (chi square) with its performance in preparations with larger loss of tooth structure (II, IV and reconstructions), which revealed superior behavior for the former (cumulative success rate 61% x 39%, respectively). This tendency had already been observed at the 2-year recall ($p = .07$) and was evident at the 10-year recall ($p = .011$). SEM analysis showed a continuous and smooth interface between GI and enamel.

Conclusion: The GI provided a satisfactory clinical performance after 10 years, with an unexpected good result for large restorations.

This study was supported by FAPESP – grant 2007/04276-0.

Seq #185 - Clinical Evaluation of Resin Composite and ART Restorations
2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

1806***Hardening of GI-Based Restoratives with LED curing***

E. MOBARAK1, I. ELSAYAD1, M. IBRAHIM1, and W. EL-BADRAWY2, 1University of Cairo, Egypt, 2University of Toronto, Canada

Objective: To evaluate degree of hardening of GI-based restorative materials using two second-generation LED and one QTH light curing units (LCUs).

Methods: Four restorative materials: Z-250 (composite, 3M-ESPE), Beautifil (giomer, Shofu), Dyract-AP (poly-acid-modified composite, Dentsply) and Fuji-II-LC (RMGI, GC Corp) with shade A3.5 were tested. Three LCUs: Astralis 3 (QTH, Ivoclar-vivadent), Blue phase (LED, Ivoclar-Vivadent) and Radies (LED, SDI) were used. Fifteen disc specimens 3.5 mm in diameter and 2 mm thick were prepared using specially-constructed moulds from each material. Specimens were irradiated from top surface only to a similar energy density equivalent to 14 J/CM. Microhardness measurements were then performed using a Vickers indenter. For each specimen three indentations were made for top surface and three for bottom following 15 min of dark storage. Measurements were repeated at 24h and 7days of dark storage. Mean VHNs and SD of top and bottom surfaces of all specimens were calculated. Relative hardness numbers (RH), that is mean hardness of bottom surfaces divided by mean hardness of top surfaces, were also calculated for each test group. Data were statistically-analyzed with MANOVA.

Results: At 15 min Z-250 had VHNs that were 50% higher than those of the other restoratives. Top surfaces of Z-250, Beautifil and Dyract-AP were significantly harder than bottom ($P<0.05$) with all LCUs and at all time intervals. However, for Fuji II LC, mean VHNs of bottom surfaces were significantly higher than those of top ($P<0.05$). Blue phase LCU was the only LCU that resulted in RH values above the critical 80% level with all tested materials at all time intervals. At 7-days Fuji-II-LC was the only GI-based restorative that exceeded the 80% RH with all LCUs.

Conclusions: One LED LCU (Blue phase) resulted in RH values which were consistently within the desired level of 80% + with all tested restoratives.

Seq #188 - Polymerization of Resin-based Materials

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 2866

Fuji II LC, Fuji IX

2866***Fluoride release and re-uptake of dental materials with fluoride varnish/gel***

S.Y. KIM, Ajou University School of medicine, Suwon, South Korea, J.-B. KIM, Pusan National University, South Korea, S.J. RA, Pusan University, and J.S. KIM, Dankook University, Cheon-An, South Korea
Fluoride release and re-uptake of dental materials with fluoride varnish/gel

Objectives: This study aimed to compare the amounts of fluoride released by esthetic restorative materials into deionized water and to assess the differences in fluoride re-uptake among esthetic restorative materials, following a treatment of APF-gel and fluoride-varnish.

Methods: The each amounts of fluoride release from four materials including a flowable resin (GC), a compomer (3M ESPE) and two glass-ionomers (Fuji II-LC and Fuji IX GP Fast, GC) was measured using an ion-selective electrode and analyzer(37 , 45d). Composite-resin (Z350, 3M ESPE) was used as a control. After fluoride was released completely, the specimens were treated with the fluoride-gel (APF 1.23%, ANB Inc.) and fluoride-varnish (Fluor protector, Ivoclar Vivadent). The amounts of fluoride release was measured continuatively(37 , 28d) and the surface roughness was observed under scanning electron microscope.

Results: The amounts of released fluoride was under 1ppm in flow resin, 1-2ppm in compomer and 2-8ppm in glass ionomers for 38days. All materials showed negligible levels of release after 45days. After exposure to fluoride varnish/gel, all materials were recharged and continued releasing fluoride. The fluoride was released 0.6-0.2ppm in fluoride-varnish and 0.6-2.6ppm in APF-gel within the first day after application (ANOVA, Dunnett's t-test, $p < 0.05$). The surface of specimens exposed to fluoride-varnish were smoother than others.

Conclusion: We conclude that glass ionomers can act as rechargeable slow fluoride release systems and fluoride-varnish applications with glass ionomers could be recommended as a preventive tool especially in caries active children.

Seq #259 - Keynote Address and Materials for Remineralization and Desensitization
9:00 AM-10:30 AM, Saturday, July 5, 2008 Metro Toronto Convention Centre Room 801A

ABSTRACT NO.# 3134

Fuji IX GP FAST,
GRADIA DIRECT Flo, G-BOND**3134*****Bond Strength of Repaired Filling Materials Using Different Repair Procedures***

F. SALAMA, UNMC College of Dentistry, Omaha, NE, USA

Objectives: An adequate repair procedure depends on high bond strength between the existing material and the new material. Matrices of adhesive restorative materials and repair procedures may both influence bond strength of repaired adhesive materials. The purpose of this study was to evaluate the effect of surface treatments and repair material on the repair bond strength of a glass ionomer (Fuji IX GP FAST), a compomer (Compoglass F), and a flowable composite (GRADIA® DIRECT Flo).

Methods: Twenty four disk specimens were prepared from each material according to the manufacturer's instructions. Specimens of each material were randomly assigned into 3 subgroups of 8 each. Eight specimens of each material with no surface treatment were used as control. Eight specimens of each material (Treatment one) were coated by a self-etching adhesive (GC G-BOND) while eight specimens of each material (Treatment two) were roughened with a finishing diamond bur for 10 seconds followed by application of a self-etching adhesive (GC G-BOND). All specimens (subgroups) were mounted in an assembly apparatus and a flowable composite (Filtek™ Flow) was applied to the opening in a split Teflon mold. Shear bond strengths (SBS) for repairs were evaluated after 48 h (crosshead speed = 0.5 mm/min) and were compared by two-way ANOVA. Planned pairwise comparisons were made and p-values were adjusted using the Tukey method.

Results: There were significant treatment, material, and interaction effects ($p < 0.01$). For the glass ionomer and compomer; Treatment two showed significantly higher SBS than either no treatment or Treatment one which were not statistically significantly different from each other. For the flowable composite, there was a statistically significant difference in SBS between all treatments.

Conclusions: It was concluded that surface treatment with a diamond bur and applying self-etching adhesive produces the highest repair strength.

Seq #291 - Surface Treatment

1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0410

Fuji VII

0410***Comparative Evaluation of Microleakage of Three Fluoride Releasing Sealants***

E.M.G. SUBRAMANIAN, M.S. MUTHU, and N. SIVAKUMAR, Meenakshi Ammal Dental College & Hospital, Chennai, India

Objective: To compare the marginal sealing ability of three commercially available fluoride releasing sealants based on depth of dye penetration using Stereomicroscope.

Methods: Sixty non-carious human molars and premolars were selected and divided into three equal groups (seven molars and thirteen premolars) for every sealant. The sealants used were (i) Glass ionomer cement (Fuji VII, GC), (ii) Clinpro (3M, ESPE) and (iii) Helioseal-F (Ivoclar, Vivadent).

All the sealants were applied on to their respective samples as per the manufacturer's instructions. Teeth were then subjected to thermocycling of 200 cycles and immersed in 2% fuschin dye for 24 hours. After cleaning and sectioning buccolingually, teeth were assessed under stereomicroscope.

Results:

1. There was no microleakage in any of the samples of glass ionomer cement group.
2. Mean depth of dye penetration for Clinpro group and Helioseal-F group were 0.098mm and 0.245mm respectively and the difference was statistically significant.
3. There was no statistically significant difference in dye penetration between premolars and molars within any of the sealant groups.

Conclusion: Microleakage was not found with glass ionomer cements. Routine placement of bonding agents can be recommended for all resin based sealant applications for better results.

Seq #72 - Class V, Gap Formation

2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 995

Fuji I, Fuji Plus

0995***Incorporation of Recaldent into glass ionomer cement luting agents***

R. WONG, J. PALAMARA, P.R. WILSON, M.F. BURROW, and E. REYNOLDS, University of Melbourne, Melbourne VIC, Australia Objectives:

The aim of this study is to investigate the concentration of Recaldent™ required to reduce the compressive strength of 3 commercially available glass ionomer luting cements (GIC) to an extent that it may function as temporary luting agents.

Materials & Methods: Recaldent™ powder was manually incorporated into two conventional glass ionomer cements Ketac™ Cem Easy Mix® [KC] (3M ESPE AG Dental Products, D-82229 Seefeld, Germany) and GC Fuji I® [FI] plus a resin modified GIC, GC Fuji Plus® [FP](GC Int. Corp., Japan) on a w/w % ratio. Powder and liquid ratios of the glass ionomer cements were weighed based on manufacturer's recommendations. Increasing concentrations of Recaldent™ were utilised until the mean compressive strength was below 35 MPa. The other physical properties investigated were setting time and film thickness. Testing methods of ISO 9917:2003 were utilised. Five tests were carried out for each test group. Statistical analysis was carried out using Minitab® 14.1 software programme.

Results:

Increasing concentrations of Recaldent™ tended to reduce the compressive strength of all three glass ionomer cements. To obtain mean compressive strength values below 35 MPa, the incorporation of >20.0 w/w % Recaldent™ was required for KC (31.3 ± 6.4 MPa), ≥ 16.0 w/w % for FI (30.4 ± 4.3 MPa) and ≥ 14.0 w/w % for FP (30.0 ± 4.4 MPa). Setting time was delayed beyond the ISO requirement of 8 minutes at ≥ 12.0 w/w % Recaldent™ for both KC and FI and ≥ 8.0 w/w % for FP. Film thickness was below 25 μm for ≤ 1.0 % for KC, $\leq 12.0\%$ for FI and ≤ 8.0 % for FP.

Conclusions:

Mean compressive strengths of the three glass ionomer luting cements can be reduced to below 35 MPa by the incorporation of Recaldent™. The setting time and film thickness at these concentrations however does not comply with ISO requirements.

Seq #108 - Resin Cement Mechanical Properties, Glass Ionomers

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1775

Fuji VIII

1775***Clinical evaluation of multiple-surface ART restorations: 6-year follow-up***

M.F.L. NAVARRO¹, T.C. FAGUNDES¹, C.A.R. CARVALHO¹, T.J.E. BARATA², D.F.G. CEFALY¹, and J.R.P. LAURIS¹, ¹Bauru School of Dentistry, University of São Paulo, Brazil, ²University of North of Paraná, Brazil

Objective: To evaluate the performance of multiple-surface restorations made with two different glass ionomer cements (GICs) using the Atraumatic Restorative Treatment (ART) in permanent teeth.

Methods: A total of 60 restorations, 36 Class I involving two or more tooth surfaces and 24 Class II were placed in schoolchildren (9-16 years of age) by two dentists using standard ART procedures. The restorations were randomly divided into two groups in a parallel-group study design. Thirty cavities were filled with high strength GIC (Ketac Molar-3M ESPE, code K) and the other 30 cavities with resin-modified GIC (Fuji VIII-GC Corp., code F). Two calibrated independent examiners carried out the evaluation according to ART criteria. The inter examiner kappa was 0.92. A difference was considered statistically significant if $p < 0.05$.

Results: In the 6-year follow-up, 22 patients (47.8%) and 43 restorations (71.7%) were evaluated. The success rates of the restorations were 43.5% and 60.0% for K and F, respectively. Failures registered were: 9 restorations replaced by other restorations (6K, 3F), 7 restorations with marginal defect > 0.5 mm (repair is needed; 4K, 3F), 3 restorations partly or completely missing (2K, 1F), 1 restoration with wear > 0.5 mm (repair is needed; 1F,) and 1 tooth missing due to secondary caries (1K). There was no statistically significant difference between GICs, cavity types or operators. There was a statistically significant difference between baseline and 6-year results for both groups ($p=0.001$ and $p=0.013$, for Ketac Molar and Fuji VIII, respectively). Although the real reasons for replacement of restorations were unknown, secondary caries was observed in only one ART restoration.

Conclusions: Both GICs performed similarly and ART approach provided approximately 50% of survival rate for multiple-surface restorations over a 6-year period. This study was supported by CNPq – grant 485476/2007-0.

Seq #185 - Clinical Evaluation of Resin Composite and ART Restorations

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0384

G-CEM

0384***Shear Bond Strength of Self-Adhesive Resin Cements to Dentin***

A. KIREMITCI, Hacettepe University, School of Dentistry, Ankara, Turkey, and P. ALTINCI, Private Practice, Ankara, Turkey

Objective: The aim of this study was to assess the bonding performance of two new self-adhesive resin cements and one conventional resin cement when used for the luting of indirect composite restorations using a shear bond strength test set-up.

Methods: Thirty buccal dentin specimens were prepared from human molar teeth and divided into three groups (n=10). Thirty light polymerized nanohybrid composite resin discs of 4x2 mm (Premise, Kerr) were prepared to simulate laboratory processed composite resin restorations. In group I composite discs cemented to dentin using conventional resin-based cement with its proprietary adhesive system as a control (Variolink II, Vivadent). In group II and III two self adhesive resin cements RelyX Unicem (3M ESPE) and G Cem (GC) were used for cementing respectively. After storage in distilled water the shear bond strength test was done. The data were subjected to ANOVA and Bonferroni paired comparisons.

Results: Statistically significant differences were found between the bond strength values of cement systems ($p < 0.05$). The shear bond strength values were 11.6 ± 2.2 MPa, 8.77 ± 2.3 MPa and 6 ± 2 MPa for G-Cem, RelyX Unicem and Variolink II respectively.

Conclusion: For the cementation of indirect composite restorations the use of a simplified application procedure does not decrease bonding effectiveness to dentin as statistically higher values were determined with self adhesive resin cements.

Seq #70 - Cements

2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

0982***Effect of Photocuring vs. Autocuring on Properties of Resin Cements***

A.M. BINMAHFOOZ, and D. NATHANSON, Boston University, MA, USA

Objective: To evaluate the effect of photocuring vs. chemical (auto) curing on mechanical properties of contemporary self-etching (SE) resin cements.

Methods: Seven SE resin cements were tested: A. Embrace (Pulpdent); B. Monocem (shofu); C. BisCem (Bisco); D. G-cem (GC); E. Multilink Sprint (Ivoclar); F. Multilink Automix (Ivoclar); G. RelyX Unicem (3M ESPE). Flexural strength (FS) and Elastic modulus (EM) were determined on bar-shaped specimens (2 x 2 x 25 mm). Compressive strength (CS) was measured on cylindrical specimens (6 x 4mm). Specimens were formed by placing the mixed cements into Teflon molds. Ten specimens in each group were photopolymerized using a Triad curing unit (Dentsply) for one minute. Another 10 specimens/group were tested after chemical auto-curing for 5 minutes. Specimens were placed in distilled water inside an incubator (37°C) for 24h. Testing was performed in an Instron Testing machine (0.5 mm/min). Data was analyzed using ANOVA and multiple comparison.

Results: Mean CS, FS, EM and (SD) are shown below:

Test	Cement	A	B	C	D	E	F	G
CS (MPa)	Photo	236.3 (44)	267 (22)	204 (15)	211 (17)	198.5 (11)	300 (22)	204 (14)
	Auto	214 (21)	225 (35)	205.5 (24)	200 (15)	188.8 (8)	309 (17)	184.6 (11)
FS (MPa)	Photo	88.4 (13.4)	75 (13.7)	91 (16)	77 (12)	99 (18)	116.9 (6)	80.6 (11.6)
	Auto	42 (10)	53 (16.5)	71 (13)	59 (9.3)	75 (19)	100.8 (8)	62.6 (8.2)
EM (GPa)	Photo	2.7 (0.5)	2 (0.4)	6.8 (0.6)	7.7 (1.2)	6.3 (0.4)	6.3 (0.3)	6.9 (0.8)
	Auto	0.9 (0.3)	1.1 (0.4)	5.4 (0.9)	5.5 (0.5)	3.6 (1.3)	5.4 (0.3)	0.8 (0.4)

Conclusion: ANOVA revealed that both cement type and curing method had a significant effect (P=0.000) on all properties tested. Photocuring proved higher mechanical properties than autocuring (P=0.000).

Seq #108 - Resin Cement Mechanical Properties, Glass Ionomers

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0423

G-CEM Automix

0423***Bond stability of automix self-adhesive resin cement, GAM-100, on ceramics***

N. MATSUMOTO, H. TOKUI, H. YARIMIZU, H. NAKASEKO, T. SAKUMA, and S. AKAHANE, GC Corporation, Tokyo, Japan

Objectives: Recently, the high-strength ceramics such as zirconia or alumina are used for many clinical cases. However, there are few cements with high bond stability on the high-strength ceramics. This study evaluated tensile bond strength(TBS) of the trial material, GAM-100(GC), and other two paste-type self-adhesive resin cements to yttria-stabilized zirconia(Aadva Zr-Block: YSZ, GC) and glass-infiltrated alumina(In-ceram ALUMINA: In-AI, VITA).

Methods: TBS test was carried out according to ISO/TS11405. YSZ and In-AI were embedded in acrylic resin. Flat-abraded YSZ and In-AI surfaces were prepared using wet 600-grit silicon carbide paper(#600SiC). Bonding area was prescribed(3mm in diameter) with a plastic tape. The cements were handled following manufacturers' instructions. A stainless steel rod was cemented(self-curing mode) to each substrate. The specimens were stored at 37°C-100%RH for 1hour and soaked in 37°C distilled water for 23hours. For 0-thermocycle specimens(n=5), TBS was measured(1mm/min) after the storage. The other specimens(n=5) were thermocycled(5000, 5/55°C) and followed by the measurement.

Results: In the table, asterisk(*) indicates significant difference(T-test, **: p<0.01) compared with GAM-100 in the same column. GAM-100 showed equivalent TBS to YSZ and In-AI to other cements in 0-thermocycle tests. However, GAM-100 maintained high TBS to YSZ and In-AI even after 5000-thermocycles while the values of other cements significantly dropped.

Cement	Manufacturer	TBS[MPa]			
		YSZ		In-AI	
		0-cycle	5000-cycles	0-cycle	5000-cycles
GAM-100	GC	38.4(12.9)	40.5(9.1)	50.0(10.1)	47.3(10.6)
productA	companyA	33.5(7.7)	2.4(2.9)**	41.3(10.4)	1.5(0.3)**
productB	companyB	37.2(7.7)	0.2(0.2)**	45.5(8.8)	0.3(0.1)**

()S.D.

Conclusion: GAM-100 demonstrates the stable bonding property to the smooth ceramic surface abraded with #600SiC that hardly produces the mechanical interlock. It seems that GAM-100 has chemical interaction to YSZ and In-AI, which enables to maintain the bonding stability after 5000-thermocycles.

Seq #73 - Cement Bond to Ceramics, Orthodontic Cements, Post and Crown Cementation
2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 2306

LINKMAX

2306***Effect of Silica-coating on the Bond Strength to Zirconium***

K. HIKITA¹, T. MAIDA¹, Y. IKEDA¹, T. KAWAKAMI¹, K. ENDO², and H. OHNO², ¹Health Sciences University of Hokkaido, Sapporo, Japan, ²Health Sciences University of Hokkaido, Ishikari-Tobetsu, Japan

Objectives: The purpose of this study was to examine the effect of two silica-coating methods on the shear bond strength to zirconium with an adhesive resin cement.

Methods: This study used zirconia ceramic disks (yttria-stabilized zirconia) with a 15 mm diameter and 10 mm thickness and stainless steel rods with a 5 mm diameter and 3 mm thickness. The ceramic samples were embedded in epoxy resin and the surface of the ceramic material was wet-ground sequentially to 600 grit using SiC and paper. All samples were ultrasonically cleaned in water for five minutes. The surface of the zirconia ceramic disks was treated in one of four different ways ; (a) ground to 600 grit, (b): (a) + air-abraded with 150 µm alumina at 2.8 bar pressure at a distance 10 mm for 10 seconds, (c) : (a) + (b) + tribochemically silica-coated using the Rocatec system (3M ESPE), (d) : (a) + (b) + silica-coated using the Silano-Pen (Bredent). After ultrasonically cleaning in water for five minutes, zirconia ceramic disks and stainless steel rods were bonded with Linkmax (GC), GC ceramic primer (GC) and Metal primer (GC). All specimens were stored in 37 °C water for 24 before shear bond strength test (n=6). The bonded specimens were subjected to shear testing using a Universal testing machine with a notched shear blade and a crosshead speed of 0.5 mm/min. Load at failure was recorded in Newtons and converted into shear bond strength in MPa. Data were analyzed by one-way ANOVA and Turkey-Kramer post-hoc test at p<0.05.

Results: Shear bond results were : (a); 7.7(4.5)a, (b); 20.5(1.4)b, (c); 32.9(2.8)c, (d); 40.5(5.8)d.

There were significant differences among four groups.

Conclusion: These results suggest that the application of silica-coting to zirconia ceramic appears to be effective for bonding between zirconia ceramic and an adhesive resin cement.

Seq #218 - Ceramics

3:30 PM-4:45 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0032

G-BOND

0032***Loading Effect on μ TBS of All-In-One Adhesives – Indirect Bonding***

G.J. DORSMAN¹, X. DING¹, N. BRESLIN¹, B. OZCOPUR², C. YESILYURT³, and S. BELL^{1,2},
¹Danville Materials, Inc, Santa Ana, CA, USA, ²University of Selcuk, Konya, Turkey, ³Karadeniz
 Technical University, Trabzon, Turkey

Objectives: The purpose of this in vitro study was to use microtensile bond strengths (μ TBS) and cyclic mechanical loading to compare a recently developed unfilled one-component adhesive containing organophosphate and hydrophobic monomers to commercial all-in-one adhesives by using indirect bonding of MultiCore to dentin with or without an intermediate material, Prelude Dual/Self Cure Link (Danville Materials).

Methods: Dentin surfaces of sound human third molars were exposed using #600 SiC paper, treated with four all-in-one adhesives: Danville Experimental (Danville Materials); G Bond (GC); TriS Bond (Kuraray); AdheseOne (Vivadent) and a total etch adhesive Prelude (Danville). Dual-curable resin (Multicore; Vivadent) build ups were created with or without use of 'Prelude Link', forming two groups. Two subgroups were created from each group and the first subgroup was subjected to mechanical fatigue loading (5x10⁴; 50N at 0.2 Hz). After storage at 37°C for 1 week, μ TBS test was performed, data was calculated as MPa and statistically analyzed using Multivariate Analysis of Variance. Multiple comparisons were done using t-test.

Results: Pre-test failures were observed and no data could be obtained from the groups without Link except when using Prelude Total Etch; μ TBS with/without loading was (Mean \pm SD;MPa): 37.37 \pm 4.58/45.81 \pm 2.40. μ TBS of tested materials with Link and with/without loading were as follows (Mean \pm SD;MPa): Danville Experimental: 11.58 \pm 1.26/18.72 \pm 2.95; GBond: 20.24 \pm 2.14/23.44 \pm 1.95; TriS Bond: 22.56 \pm 3.12/26.14 \pm 2.35; AdheseOne: 8.79 \pm 3.04/18.76 \pm 4.62.

Conclusion: Prelude Link significantly increased μ TBS of all-in-one adhesives to dentin (p=0.000). Mechanical loading significantly decreased μ TBS of the tested materials (p=0.000). G Bond and TriS Bond showed significantly higher bond strength values than Danville Experimental and AdheseOne(p<0.01).

Seq #10 - Strength of Restorative Materials

2:15 PM-3:45 PM, Wednesday, July 2, 2008 Metro Toronto Convention Centre Room 801B

ABSTRACT NO.# 0033

G-BOND

0033***Loading Effect on μ TBS of All-In-One Adhesives – Direct BondingG.***

J. DORSMAN¹, X. DING¹, B. OZCOPUR², C. YESILYURT³, G. BULUT³, and S. BELL^{1,2}, ¹Danville Materials, Inc, Santa Ana, CA, USA, ²University of Selcuk, Konya, Turkey, ³Karadeniz Technical University, Trabzon, Turkey

Objectives: The purpose of this in vitro study is to use microtensile bond strength (μ TBS) test to compare an experimental unfilled single-component adhesive containing a proprietary organophosphate and hydrophobic monomers (Danville Materials) to commercial products by using each in direct bonding of AP-X to dentin with and without mechanical loading on each system.

Methods: Dentin surfaces of sound human third molars were exposed using #600 SiC paper, treated with four all-in-one adhesives: Danville Experimental (Danville Materials); G Bond (GC); TriS Bond (Kuraray); AdheseOne (Vivadent) and a total etch adhesive, Prelude (Danville). Composite resin (AP-X, Kuraray) build ups were created. The samples were divided into two subgroups and the first subgroups only were subjected to mechanical fatigue loading (5×10^4 ; 50N at 0.2 Hz). After storage at 37°C for 1 week, μ TBS test was performed, data was calculated as MPa and statistically analyzed using Multivariate Analysis of Variance. Multiple comparisons were done using t-test.

Results: μ TBS of tested materials with/without loading were as follows (Mean \pm SD;MPa): Danville Experimental: 11.92 \pm 2.52/22.72 \pm 3.92; GBond: 22.91 \pm 1.89/33.22 \pm 5.55; TriS Bond: 19.46 \pm 3.87/27.65 \pm 4.28; AdheseOne: 16.67 \pm 2.15/19.8 \pm 3.86; Prelude Total Etch: 31.21 \pm 2.54/40.92 \pm 3.51.

Conclusion: Mechanical loading significantly decreased μ TBS of the tested materials ($p=0.000$). Prelude Total Etch showed the highest bond strength values when compared to the all-in-one adhesives ($p<0.01$). G Bond and TriS Bond showed significantly higher bond strength values than Danville Experimental and AdheseOne ($p<0.01$).

Seq #10 - Strength of Restorative Materials

2:15 PM-3:45 PM, Wednesday, July 2, 2008 Metro Toronto Convention Centre Room 801B

ABSTRACT NO.# 0123

G-BOND

0123***Shear Bond Evaluation of Current Self-Etching Adhesive Systems***

M. FALEMBAN, and D. NATHANSON, Boston University, MA, USA

Introduction New generation all-in-one self-etching (SE) adhesives are promoted for dentin and enamel bonding, but reports about their performance vary.

Objectives: This study evaluates the shear bond strength (SBS) of several current SE adhesive systems.

Methods: Seven SE adhesive systems were tested in this in-vitro study: A. Bond Force (Tokuyama); B. G-Bond (GC); C. Adper L Pop (3M-ESPE); D. Xeno IV (Dentsply); E. Clearfil Tri-S Bond (Kuraray); F. Easy Bond (3M-ESPE) and G. Clearfil SE Bond (Kuraray) as control. Human extracted permanent teeth were mounted into acrylic resin cylinders and sectioned to reveal either dentin or enamel. Each group was treated according to the manufacturers' instructions. Composite (Z-250, 3M-ESPE) was used in conjunction with all adhesives. The composite was placed over the tooth surface using special molds and holding clamps (Ultradent). All specimens were photopolymerized with the same light curing unit (Astralis 10 – Ivoclar). All specimens were tested in shear mode after 24 hours in water. Data was analyzed for significant differences using two way ANOVA.

Results: Mean SBS (MPa) and SD are shown in the table below:

Material	A	B	C	D	E	F	G
Enamel	31.9(4.6)	29.7(5.4)	24.8(3.5)	27.5(2.3)	30.4(3.7)	28.1(3.9)	27.9(5.4)
Dentin	32.0(3.7)	28.4(2.4)	24.3(4.4)	28.3(3.6)	32.6(6.8)	27.3(3.7)	26.9(2.8)

Conclusion: ANOVA revealed a significant difference in SBS to enamel and dentin between all materials. Post-Hoc multiple comparison test concluded that Bond Force and Clearfil Tri-S Bond generated significantly higher SBS than other groups tested, but not significantly different from each other. This study demonstrates the capability of new generation SE adhesives to yield mean SBS and variance comparable to conventional adhesives.

Seq #30 - Bond Strength Evaluation

9:00 AM-10:30 AM, Thursday, July 3, 2008 Metro Toronto Convention Centre Room 801B

ABSTRACT NO.# 0412

G-BOND

0412***Efficacy of nine commercial one step dentin adhesives***

K. ITOH, Y. KATO, C. TANI, M. KUSUNOKI, and H. HISAMITSU, Showa University, Tokyo, Japan

Objectives: To simplify the clinical handling of the dentin bonding procedures, one step dentin adhesives have been developed though the efficacy of these systems has not been consistently clarified. The aim of this study was to investigate the effect of nine commercial one step bonding system by measuring the contraction gap width of the resin composite in a dentin cavity.

Materials and methods: Nine commercial one step bonding systems, (Absolute, Absolute 2, Bond Force, Fluoro Bond Shake One, G-Bond, i-Bond, One-up Bond F plus, Prompt L-pop and S3 bond) were used. A cylindrical cavity, 3 mm in diameter and 1.5 mm deep, was prepared in the dentin of extracted human tooth. The one step adhesives were applied in the cavity according to the manufacturers' instructions and a commercial resin composite (Palfique Estelite, Tokuyama, Japan) was filled. Ten minutes after the irradiation of composite, the marginal adaptation of resin composite was inspected under a light microscope and possible contraction gap width was measured. Ten specimens were prepared for each system and the gap value was statistically analyzed by Fisher's PSLD ($p < 0.05$). For the positive control, the dentin cavity was conditioned with 0.5 mol EDTA and primed with 35% glyceryl mono-methacrylate solution. Then a commercial dentin bonding agent (Clearfil Photo Bond, Kuraray, Japan) was applied prior to the resin composite filling.

Results: Complete marginal adaptation of composite was observed only in the control group. The gap values of tested dentin bonding systems were statically classified into two groups. Three one step bonding systems (Prompt L-pop, Absolute and Fluoro Bond Shake One) exhibited significantly inferior marginal adaptation compared to that of other seven groups.

Conclusion: The efficacy of commercial step less dentin bonding systems tested in this study was incomplete and required some improvement because the contraction gap formation was not prevented completely.

Seq #72 - Class V, Gap Formation

2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1478

G-BOND

1478***Microleakage and Microtensile Bond Strength of Loaded Composite MOD Restorations***

T. BRAVIS, R.M. FOXTON, P. PILECKI, R.F. WILSON, M. FENLON, and T.F. WATSON, King's College London, United Kingdom

Objectives: To investigate the effect of mechanical loading on the microleakage and microtensile bond strength of MOD direct composite restorations bonded with either a self-etch or total-etch adhesive.

Methods: Class II MOD cavities were prepared into dentine in 28 extracted molar teeth. 14 teeth were bonded with a self-etch adhesive (G Bond, GC Corporation) and 14 with a total-etch adhesive (Optibond Solo Plus, Kerr) then restored with resin composite (Gradia, GC Corporation). For each adhesive, 7 teeth were loaded and 7 unloaded (controls). Mechanical loading was achieved with an axial force of 80 N at 2.5 cycles/second for 250,000 cycles. All the teeth were then stored in 0.25% Rhodamine solution for 24 hours and sectioned in a bucco-lingual direction at the proximal boxes to examine microleakage using a tandem scanning confocal microscope. The restorations were further sliced mesiodistally to obtain two 1.0 mm-thick slabs, which were sectioned into 1.0 mm² beams for the μ TBS test. Analysis of variance was performed to assess the effect of loading on the microleakage and bond strength of the two adhesives.

Results: There were no differences in microleakage between the two adhesives when unloaded. However, after loading, the self-etch bonded restorations exhibited greater microleakage (90%) compared to total-etch bonded restorations (70%, $p < 0.001$). When unloaded, the mean μ TBS of the self-etch bonded restorations was lower at 23.7 MPa than total-etch bonded restorations at 37.5 MPa, but not statistically significant ($p = 0.146$). Loading affected the μ TBS of the total-etch adhesive, which reduced to 20.2 MPa ($p < 0.001$), whereas it had no effect on the μ TBS (22.8 MPa, $p = 0.153$) of the self-etch adhesive.

Conclusions: Although restorations bonded with the self-etch adhesive exhibited greater microleakage after loading, their μ TBS did not reduce. On the other hand, the μ TBS of the restorations bonded with the total-etch adhesive reduced after loading.

Seq #142 - Interface

9:00 AM-10:30 AM, Friday, July 4, 2008 Metro Toronto Convention Centre Room 801B

ABSTRACT NO.# 1487

G-BOND

1487***Enamel Margin Integrity Using One-bottle All-in-one Adhesives after Thermo-mechanical Stressing***

U. BLUNCK¹, G.M. LÖSCHE¹, P. ZASLANSKY², and T. ATTIN³, ¹Charité-Universitaetsmedizin Berlin, Germany, ²Max Planck Institute of Colloids and Interfaces, Potsdam-Golm, Germany, ³University of Zurich, Switzerland

Objective: To evaluate the continuity of the enamel margins of Class-I cavities restored by using contemporary one-bottle all-in-one adhesives, stressed by thermocycling and mechanical loading.

Methods: 96 extracted human molars were prepared for standardized Class-I-restorations (approximately 3 mm deep, 6 mm wide in mesio-distal direction, and 4 mm wide in buccal-oral direction). 12 adhesive systems: OptiBond FL (OPT), Clearfil SE Bond (CSE) and Adper Prompt L-Pop (PLP) as a control and nine one-bottle all-in-one adhesives AdheSe One (AHO), Adper Easy Bond (EB), Bond Force (BF), G-Bond (GB), iBond Self Etch (IB), One Coat 7.0 (OC), OptiBond All-in-one (OPA), Tri-S-Bond (TSB), Xeno V (XV), were used. All teeth were restored using Filtek Z 250, which was placed in three (one horizontal, two oblique) increments. Enamel margins were evaluated following 21 days of water storage, after thermocycling (2000 cycles: 5 to 55 °C), and after mechanical loading of 150,000 cycles of 50 N. After each step, replicas were produced and quantitative SEM margin analysis was performed (200x) to determine gap formation, irregularities and the continuity of enamel margins.

Results: Median values (% "continuous margin") for the different adhesive systems were OPT (98.6/96.2), CSE (95.4/90.9), BF (81.7/68.1), GB (81.1/65.0), OPA (83.0/68.1), OC (64.1/41.3), TSB (59.3/42.2), EB (57.1/42.6), IB (38.4/27.6), PLP (36.6/21.5), XV (45.0/30.0), AHO (17.7/5.4) after thermocycling and after mechanical loading, respectively. The statistical evaluation (Kruskal-Wallis-Test with Bonferroni adjustment, $p < 0.05$) revealed the following ranking: OPT = CSE > BF = GB = OPA > OC = TSB = EB = IB = PLP = XV = AHO.

Conclusion: All one-bottle all-in-one adhesives exhibited statistically significant lower margin qualities in enamel compared to the etch & rinse system OPF and the two-step self-etching system CSE. The results obtained for GB, OPA and BF however, were better than for the other all-in-one adhesives.

Seq #143 - Keynote Address and Marginal Adaptation

9:00 AM-10:30 AM, Friday, July 4, 2008 Metro Toronto Convention Centre Room 801A

ABSTRACT NO.# 1737

G-BOND

1737***Mechanical Assistance to Dentin Bonding***

G.B. GREITZER, None, Tarrytown, NY, USA, and J. KANCA, III, Private Practice, Middlebury, CT, USA

Objectives: Questions have been voiced concerning the long term stability of dentin bonding. One suggestion is to place "pot-holes" into dentin to create mechanical retention. The purpose of this study was to determine if the incorporation of pot-holes increases retention of composite bonded to dentin.

Methods: 36 human molars were ground exposing dentin then sagittally sectioned to create 72 dentin specimens. Each specimen was imbedded into 1 inch diameter methylmethacrylate cylinders, ground flat, then aged in water at 37o C for 2 months prior to testing. Upon removal from water test specimens were polished with 320 grit silicon-carbide paper and randomly separated into 6 groups. Using a ½ round (.61mm) carbide bur "pot-holes" were prepared into one section of each dentin specimen. Specific adhesives were applied to each group as per manufacturer's instructions.

Adhesives selected for testing

Adper Prompt™
 Prelude™
 Clearfil SE™
 Simplicity™
 G-Bond™
 Surpass™

Two 2.38mm diameter X 2 mm high composite posts, Z-100™ (3 M ESPE), were placed on each specimen and polymerized using a 750mW/cm2 FlashLite 1401™ LED (Discus Dental) for 40 seconds. One post incorporated the pot-hole and one was placed on flat dentin. Specimens were stored in water at 37o C for 180 days. Using a Universal Testing Machine notched blade apparatus with a crosshead speed of 1mm per minute specimens were stressed to fracture. Results were analyzed by t- test.

Results:

Averaged (std dev) were as follows:

Pot-holes Flat

Adper Prompt 17.4MPa(3.2) Adper Prompt 21.6MPa(5.8)

Clearfil SE 33.6MPa(8.2) Clearfil SE 42.7MPa(12.8)

G-Bond 31.5MPa(6.3) G-Bond 36.8MPa(4.4)

Prelude 23.7MPa(7.3) Prelude 31.7MPa(6.1)

Simplicity 34.2MPa(3.4) Simplicity 45.6MPa(6.9)

Surpass 36.1MPa(2.2) Surpass 54.2MPa(8.9)

All Adhesives 27.25MPa All Adhesives 33.77MPa

Conclusion: Those samples incorporating "potholes" showed a marked decrease in shear bond strength compared to those placed on flat dentin surfaces.

Seq #183 - Composite/Endo/Others

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1779

G-BOND

1779***RCT of a HEMA-free all-in-one adhesive in non-carious cervical lesions***

K.L. VAN LANDUYT¹, S. FIEUWS¹, M. PEUMANS¹, J. DE MUNCK¹, M.V. CARDOSO¹, R.B. ERMIS², P. LAMBRECHTS³, and B. VAN MEERBEEK¹, ¹Catholic University of Leuven, Belgium, ²Suleyman Demirel University, Faculty of Dentistry, Isparta, Turkey, ³Leuven BIOMAT Research Cluster, Catholic University of Leuven, Belgium

Objectives: One-step self-etch adhesives are the most recent generation of adhesives introduced onto the market. The objective of this randomized controlled clinical trial was to test the hypothesis that a one-step self-etch adhesive performs equally well as a conventional three-step etch&rinse adhesive (gold standard).

Methods: Two-hundred and sixty-seven non-carious cervical lesions in fifty-two patients were restored with Gradia Direct Anterior (GC, Tokyo, Japan). These composite restorations were either bonded with the HEMA-free 'all-in-one' adhesive G-Bond (GC, Tokyo, Japan) or with the three-step etch&rinse adhesive Optibond FL (Kerr, CA, USA). The restorations so far have been evaluated after 6 and 12 months clinical service regarding retention, marginal adaptation, microleakage, caries occurrence and sensitivity. Retention loss, severe marginal defects and/or discoloration that needed intervention (repair or replacement) and occurrence of caries were considered as clinical failures. A Logistic regression analysis with generalized estimating equations (GEE) was applied to factor in the clustered data (multiple lesions per patient).

Results: The recall rate at 1 year was 98%. The statistical analysis revealed a relatively low patient factor, indicating that supplementary information could be obtained from the additional restorations per patient. The retention rate for G-Bond was 98.5% compared to 99.3% for Optibond FL due to loss of two and one restoration, respectively. There were no significant differences between both adhesives regarding the evaluated parameters except for the higher occurrence of incisal marginal defects with G-Bond. These defects, however, were small and clinically irrelevant.

Conclusions: Regarding short-term performance, it was concluded that the simplified one-step adhesive G-Bond and the three-step Optibond FL are clinically equally successful, even though both were characterized by progressive degradation of marginal adaptation and G-Bond exhibited more small enamel marginal defects.

This study was supported by the Toshio Nakao Chair. The author was granted a PhD-fellowship of the Research Foundation–Flanders.

Seq #186 - Clinical Performance of Dental Adhesives

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1782

G-BOND

1782***One-year clinical comparison of two all-in-one adhesives in non-carious lesions***

M. BURROW, University of Melbourne, Victoria, Australia, and M. TYAS, University of Melbourne, Melbourne VIC, Australia

Objectives: The aim of this study was to evaluate the retention and marginal staining over 1y of restorations bonded with Clearfil S3 and Clearfil ST resin composite (Kuraray Medical, Japan) or G-Bond and Gradia Direct Anterior resin composite (GC Corp, Japan) all-in-one adhesive systems placed in non-carious cervical lesions.

Materials and Methods: Sixty restorations (7 molars, 28 premolars, 25 anteriors) were placed in 11 subjects, mean age 62.5 years. Approval was obtained from the Human Ethics Committee of the University of Melbourne. Restorations were bonded and placed according to the manufacturers' instructions. No enamel etching was performed on margins prior to restoration placement. Patients were recalled at 6 m and 1y; all restorations were evaluated for presence and marginal staining. Photographic records were obtained prior to restoration, immediately after and at recall.

Results: All patients could be recalled. All restorations were present at both recall periods. A 100% retention rate was obtained. Slight marginal staining was observed on four restorations for S3 and three restorations for G-Bond. **Discussion:** This is one of the few trials that have compared all-in-one adhesive systems to restore non-carious cervical lesions. The two systems are somewhat different in their chemistry, particularly in that G-Bond does not contain HEMA and is a 4-methacryloxyethyl trimellitic acid (4-MET) based system compared with the functional monomer of S3 which is 10-MPD. The degree of marginal staining was no different between the materials. Staining was most commonly observed at the distal margin where the resin composite was thinnest. It is possible the resin had lifted off during polymerization, as well as being more difficult to finish restorations in this location.

Conclusion: The early results of this evaluation are showing good outcomes for both materials in NCCL.

Seq #186 - Clinical Performance of Dental Adhesives

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1783

G-BOND

1783***Two-year Clinical Evaluation of G-Bond Dentine Bonding Agent***

M. TYAS, University of Melbourne, Melbourne VIC, Australia, and M. BURROW, University of Melbourne, Victoria, Australia

Two-year Clinical Evaluation of G-Bond in Non-cariou Cervical Lesions. MJ Tyas,* MF Burrow, School of Dental Science, University of Melbourne, Australia

Introduction: The aim was to evaluate the clinical performance of G-Bond (GC Corporation, Japan) dentine bonding agent, over 2 y in unprepared non-cariou cervical lesions (NCCL).

Materials and Methods: Ethics Committee approval was obtained, and 47 restorations were placed (30 anteriors, 13 premolars, 4 molars) in 10 patients aged 45-75 y (mean 62 y), using Gradia resin composite (GC) and G-Bond dentine bonding agent, according to the manufacturer's instructions. Patients were recalled at 6 mo, 1 y and 2 y, and photographs taken for assessment of colour match and marginal discoloration.

Results: All patients were available for recall at 6 mo and 1 y, and all restorations were present. One restoration had minor marginal discoloration at 1y. At 2y, one patient (4 restorations) failed to return, and one tooth had been extracted. All the remaining 42 restorations were present; four had slight and clinically insignificant marginal discoloration.

Discussion: G-Bond is a HEMA-free, 'mild-etch' all-in-one bonding agent, i.e., etching, priming and bonding are achieved simultaneously. The functional ionomer 4-MET and a phosphate ester achieve bonding by hybridization. The absence of HEMA precludes possible hypersensitivity. Pre-etching the uncut enamel with phosphoric acid overcomes the sub-optimal etching which occurs with 'mild-etch' dentine bonding agents, which is confirmed by the absence of enamel marginal staining. The mild staining at the dentine margin could indicate bond degradation, but may also be a consequence of the difficulty of isolation of the area during restoration. A key requirement when using G-Bond is to dry the adhesive aggressively in order to evaporate the acetone solvent and thus prevent phase separation.

Conclusion: G-Bond shows good clinical performance in NCCL after 2 y. (Supported by GC Corp, Japan.)

Seq #186 - Clinical Performance of Dental Adhesives

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1054

SOLARE

1054***Effects of Irradiation Period on Toothbrush Wear of Restorative Materials***

H. MINAMI¹, H. KURASHIGE¹, K. FUJII¹, S. SUZUKI², and T. TANAKA¹, ¹Kagoshima University, Graduate School of Medical and Dental Sciences, Japan, ²University of Alabama, Birmingham, USA

Objectives: This study evaluated the effect of irradiation period on wear behavior of various materials after toothbrushing.

Methods: A cavity (2.5 x 4.0 mm, 2.0mm in depth) was prepared in a porcelain denture tooth. The cavities were air-abraded, primed with a mixture of bonding agent (Clearfil New Bond, Kuraray) and silane coupler (Clearfil Porcelain Bond Activator, Kuraray), and filled with restorative materials including an indirect composite (Solidex, Shofu), a direct composite (Solare, GC), and a polyacid-modified glass ionomer (Dyract Extra, Dentsply DeTrey). Each material was packed with two increments, and each increment was polymerized according to the manufacturers' instructions. Solidex was polymerized in a photo-polymerizing unit (α -Light II, Morita) for 90seconds, Solare and Dyract were photo-polymerized using a light-curing unit (G-Light, GC) for 20 seconds and 10 seconds, respectively. Specimens polymerized under doubled irradiation period were also fabricated for each composite (n=5). Specimens were stored in 37°C water for 24 hours, and then polished with a 600-grit Si-C paper and 1- μ m alumina suspension. Specimens were subjected to 25 minutes of toothbrushing with a 1.47 N load using a powered toothbrush (Oral-B AdvancePower, Braun) with an oscillating-rotating brush head (Oral-B FlexiSoft, Braun). The mean surface roughness (Ra) was measured using a profilometer (Surfcom 130A, Tokyo Seimitsu). The data were statistically analyzed by 3-way ANOVA and Bonferroni's test ($\alpha=0.05$).

Results: There were no significant differences between Ra values of normal and doubled irradiation period for all the composites before toothbrushing. Ra of normal irradiation period after toothbrushing (Solidex: 0.965 \pm 0.109 μ m, Solare: 0.648 \pm 0.122 μ m, Dyract: 0.739 \pm 0.134 μ m) were significantly decreased to those of doubled irradiation period (Solidex: 0.494 \pm 0.149 μ m, Solare: 0.407 \pm 0.068 μ m, Dyract: 0.542 \pm 0.062 μ m).

Conclusion: Doubled irradiation period significantly decreased the surface roughness after toothbrushing for all the materials tested.

Seq #112 - Wear and Biomechanics of Materials

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1056

GRADIA DIRECT

1056***Wear Resistance of Resin-based Restorative Composites***

T. NIHEI¹, K.-H. KUNZELMANN², A. DABANOGLU², K. OHASHI¹, R. MORI¹, R. HICKEL², and T. TERANAKA¹, ¹Kanagawa Dental College, Yokosuka, Japan, ²Ludwig Maximilians University, Munich, Germany

Objectives: Evaluating the wear resistance of commercially available restorative resin composites after water immersion.

Methods: Seven photo-cured commercial resin composites, Gradia Direct (GD: GC Co.), Solare (SO: GC Co.), Clearfil AP-X (AP: Kuraray Medical Co.), Clearfil Majesty (CM: Kuraray Medical Co.), Beatifil II (BE: Shofu Co.), Estelite Σ (ES: Tokuyama Dental Co.), and Filtec Surpreme XT (FS: ESPE 3M) were filled into cylindrical metal sample-holder and light cured for 180 seconds. Finished and prepared ten specimens per group were subjected to the three-body-wear tests with the ACTA machine (Willytec GmbH, Germany) for 200,000 cycles after 1-day room temperature, and 180-day 37 °C water storages. The collected data (wear loss in μm) were analyzed statistically using the one-way ANOVA and Tukey's multiple comparison test as the post-hoc test.

Results: The wear values of GD (22 μm) was significantly lower when compared with other composites after 180-day water immersion ($p < 0.05$). The AP and CM composites were measured over 50 μm wear loss after water storage.

Conclusion: GD showed the superior wear resistance. The reasons might be the components of well dispersed microfilled hybrid fillers and aliphatic DMA may play important roles in the high wear resistance. This study was supported by grant (#19592215 and 19390487) from the Ministry of Education, Science, Sports and Culture of Japan.

Seq #112 - Wear and Biomechanics of Materials

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

1059***Wear Comparison of Indirect Restoratives Using Two Profiling Systems***

W.W. BARKMEIER, M.A. LATTA, and T.M. WILWERDING, Creighton University, Omaha, NE, USA

Investigators have used various systems to assess wear generated by wear simulators.

Objective: The purpose of this study was to examine and compare wear measurements using two different profiling systems.

Methods: Ten specimens each were fabricated for localized and generalized wear simulation using three indirect resin restorative materials: 1) Gradia(G), 2) Radica(R) and 3) Sinfony(S). The specimens were subjected to 400,000 cycles in a Leinfelder-Suzuki wear simulator (maximum load of 80N) using a stainless steel ball bearing stylus to generate localized wear(LW) and a flat stainless steel stylus for generalized wear(GW) in a water slurry of PMMA beads. Wear was determined using a contact profilometer(CP), MTS 3D Profiler with Capture and AnSur 3D software, and a non-contact profilometer(NCP), Proscan 2000 with Proscan and ProForm software. ANOVA, Tukey's post hoc test and Pearson's correlation were used for analysis of the wear measurements.

Results:

Table 1: Localized Wear

Material	Maximum Depth (μm)		Volume Loss (mm^3)	
	MTS	Proscan 2000	MTS	Proscan 2000
Radica	121.4 \pm 16.1	141.3 \pm 17.7	0.051 \pm 0.010	0.072 \pm 0.010*
Gradia	125.1 \pm 14.2	138.3 \pm 14.1	0.058 \pm 0.007	0.070 \pm 0.009
Sinfony	141.3 \pm 17.8	157.1 \pm 17.5	0.078 \pm 0.020	0.091 \pm 0.019

Groups connected by vertical line are not different at the 5% significance level.

*MTS and Proscan 2000 values different at 5% significance level.

Table 2: Generalized Wear

Material	Mean Depth (μm)		Volume Loss (mm^3)	
	MTS	Proscan 2000	MTS	Proscan 2000
Radica	22.6 \pm 7.7	28.8 \pm 8.9	0.324 \pm 0.120	0.477 \pm 0.150
Gradia	26.0 \pm 4.6	41.5 \pm 5.7 *	0.379 \pm 0.090	0.682 \pm 0.083 *
Sinfony	56.7 \pm 8.2	62.8 \pm 10.4	0.806 \pm 0.125	1.005 \pm 0.161 *

Groups connected by vertical line are not different at the 5% significance level.

*MTS and Proscan 2000 values different at 5% significance level.

Measurements of wear depth and volume loss for both localized and generalized wear simulation were greater for the NCP when compared to the CP. Both profiling systems ranked GW wear in the same order and LW values were in the same order as GW for the CP system. Significant differences ($p < 0.05$) between CP and NCP measurements were found for LW volume loss of R, GW mean depth of G, and GW volume loss of G and S. Pearson's correlation (r) of the CP and NCP values were as follows: LW–maximum depth 0.961, LW–volume loss 0.792, GW–mean depth 0.850 and GW–volume loss 0.847.

Conclusions: The wear measurements of localized and generalized wear simulation of three indirect resin restoratives were greater with a non-contact profilometer when compared to a contact profilometer. The rank order of generalized wear for three indirect restoratives was the same with both measurement systems. Supported in-part by Dentsply/Prosthetics.

Seq #112 - Wear and Biomechanics of Materials

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

0478***Early bond strengths of dual-cured core composite resin by self-curing***

K. HIRANO, Y. KOSAKA, A. ARITA, T. KUMAGAI, and T. SAKUMA, GC Corporation, Tokyo, Japan

Objectives: For root canal restoration, dual-cured type composite resin and bonding agent are generally used, because it is difficult to reach the light irradiation on deep area. Meanwhile, clinically, contouring for core preparation may occur a few minutes after the core-buildup. In those clinical cases, it is important that having proper bond strength of no-light irradiation area in early timing. The purpose of this study was to evaluate early shear bond strength of dual-cured core composite resins using bonding agent to dentin by self-curing mode.

Methods: Three dual-cured core composite resins [UniFilCore (UC, GC), Trial core composite resin UCA-106 (GC) and Clearfil DC Core Automix (DC, Kuraray Medical inc.)] were examined. Bovine teeth were polished with wet silicon carbide paper (#600), in order to expose the dentin surface. Bonding system for each product was applied to exposed dentin surfaces according to the manufacturers' instructions without light-curing and each core composite resin was placed on the bonding surface. These bonded specimens immersed in water at 37-degrees Centigrade for 5min, 10min and 24 hours and then were subjected to shear bond strength (SBS) testing with a crosshead speed of 1 mm/min. Statistical analysis was performed using t-test (p-value<0.01).

Results: Mean values of the shear bond strength (SBS) including standard deviations after each time immersed in water at 37-degrees Centigrade were shown as follows; (tests per material; n=5).

	SBS to dentin (MPa)			
	Self-curing			Light-curing
	5min	10min	24hrs	24hrs
UC	5.18(1.27)	7.70(1.59)	10.99(4.41)	21.88(2.33)
UCA-106	3.28(0.39)	6.43(2.19)	11.35(4.22)	21.71(2.23)
DC	N.D.	1.32(0.20)	1.75(0.37)	21.45(2.66)

The shear bond strength by self-curing after 10min and 24hrs for UCA-106 and UC was significantly higher than those for DC ($p < 0.01$).

Conclusion: The Self-curing SBS were lower than Light-curing SBS for three materials. UCA-106 and UC had significantly higher SBS compared to DC.

Seq #77 - Adhesion, Resin Coating, Fluoride-Releasing Materials

2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0929

ACRON MC

0929***Effect of Injection molding on Flexural Properties of Denture resins***

M.M. EL-SHEIKH, Tanta University Faculty of dentistry Egypt, Egypt

Using injection systems for processing denture resins may improve mechanical properties.

Objectives: This study evaluate the effect of injection molding technique on the flexural strength (FS) and modulus (FM) of 6 denture resin 2 Type 1, Class1 (Lucitone 199, LT; Fricke HI, FH), 1 Type 1, class2 (SR Ivocap, IV), 1 type 5 (Acron MC, AC) and 2 fluid resin type 2, class2 (Palapress Vario, PV; Fricke HI Poure, FP).

Methods: Specimens strip 64x10x3.3 were prepared from each material. Flexural properties were determined in 3-point bending after storage in water at 37°C for 50 h using testing machine at a crosshead speed of 5mm/min.

Results: Mean and standared deviation of flexural strength (MPa, n=6) and flexural modulus (Gpa, n=6) are listed.

	AC	LT	FH	IV		PV	FP
FS-CM	84.6 (5.3)	71.7 (1.5)	70.8 (3.3)	na	FS-PO	67.5 (5.0)	58.9 (2.0)
FS-IJ	89.0 (2.8)	71.4 (3.6)	74.5 (2.5)	73.5 (2.1)	FS-IJ	73.4 (5.8)	65.0 (2.4)
FM-CM	2.10 (0.07)	1.72 (0.05)	1.70 (0.06)	na	FM-PO	1.89 (0.10)	1.75 (0.06)
FM-IJ	2.27 (0.07)	1.78 (0.15)	1.96 (0.05)	1.80(0.06)	FM-IJ	2.04 (0.08)	1.90 (0.06)

Flexural data were analyzed by 2-way analysis of variance. Tukey-Kramer intervals at the 0.05 significance level for comparison of flexural strength and modulus among 6 resin and between 2 processing techniques were 6.1 and 2.1 MPa and 0.12 and 0.04 Gpa. Injection techniques increased FS for AC, FH, PV, and FP, and increased FM for AC, LT, FH, PV and FP. Microwave resin AC (both techniques) had the highest flexural properties of the resin tested.

Conclusion: Processing of denture resins by injection molding techniques improved flexural properties.

Seq #104 - Removable Prosthodontics

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 3192

Newly developed elastomeric
impression material "ACM-1"**3192*****Physical Properties of Newly Developed Elastomeric Impression Material***

S. FUKUSHIMA, M. TSUNOOKA, H. KAMOHARA, T. SAKUMA, and S. AKAHANE, GC CORPORATION, Tokyo, Japan

Objective: In gingival area, good flowability into the detail on a wet surface and high tear strength for marginal area are necessary for obtaining the accurate impression. The purpose of this study was to determine the tear strength and the flowability into the detail on a wet surface for newly developed elastomeric impression material "AGM-1" and other silicone impression materials.

Methods: AGM-1 (AGE, AGL: Extra Light Body, Light Body: GC), Aquasil Ultra (AX, AL: XLV, LV: Dentsply), ImprintII (IMII: Light Body: 3M ESPE), Imprint3 (IM3: Light Body: 3M ESPE), Flexitime (FT: Correct Flow: Heraeus Kulzer), AFFINIS PRECIOUS (AP: Light Body: coltene) and Genie (GX, GL: X-Light, Light: Sultan) were evaluated for the tear strength. The specimens were prepared according to "unnicked angle tear strength (ISO34)". Each impression material was mixed into the mold and remained for manufacturers' setting time in water at 35°C. After that, the specimens were immediately removed and loaded in tension until failure using an Autograph at 500 mm/min. Results were analyzed one-way ANOVA and Turkey test ($p < 0.05$). Flowability into the detail on a wet surface was evaluated by using the mold consisted of agar with slit.

Results: The values of the tear strength were (standard deviation in brackets): AGE: 6.8N/mm (1.3N/mm), AGL: 7.9N/mm (1.0N/mm), AX: 5.3N/mm (1.6N/mm), AL: 5.6N/mm (1.5N/mm), IMII: 4.4N/mm (1.0N/mm), IM3: 4.9N/mm (1.5N/mm), FT: 4.9N/mm (0.2N/mm), AP: 4.9N/mm (0.9N/mm), GX: 4.8N/mm (1.1N/mm), GL: 5.8N/mm (0.6N/mm), Significant differences were found between materials ($n=3$, $p < 0.05$). The tear strength of AGL was significantly higher than those of other materials. Further, "AGM-1" had higher flowability into the detail on a wet surface than other materials.

Conclusions: "AGM-1" has high tear strength and flowability into the detail on a wet surface those are the optimal features for an accurate impression.

Seq #297 - Impression and Bite Registration Materials

1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

0441***Effect of temperature on fluoride release from orthodontic adhesives***

G. MAHMOUD, P. GORDON, Z. YAN, and J.F. MCCABE, Newcastle University, Newcastle upon Tyne, United Kingdom

Objectives: To investigate the effect of recharging temperature on the level of fluoride release from a number of fluoride releasing adhesives.

Methods: Three fluoride releasing orthodontic adhesives; Conventional glass ionomer (Ketac Cem μ ®), resin modified glass ionomer (Fuji Ortho LC) and compomer (Dyract® Cem Plus) were tested and a composite resin (Transbond™) was used as a control. Two groups of 5 disc specimens of each material were prepared and stored in deionised water at 37°C. The discs in group A and B were soaked daily for 21 days in a 250ppm F⁻ solution at 37°C and 55°C respectively. The daily fluoride release from specimens for 28 days was measured using an ion selective electrode (ISE). Results were statistically analyzed using ANOVA and t-test at (p< 0.05).

Results: The cumulative amounts of daily fluoride released ($\mu\text{g}/\text{cm}^2$) from each material during the 21 days recharging period are given in the table below.

Recharging temperature	Fuji Ortho	Ketac Cem	Dyract	Transbond
	Mean	Mean	Mean	Mean
	SD	SD	SD	SD
37° C	158.92	189.41	53.48	1.46
	10.07	24.73	2.6	0.74
55° C	188.47*	228.71*	85.88*	2.1
	9.99	17.2	8.49	0.67

* Indicates a significant difference between values in the two temperature groups.

Through out the study, the control material showed a negligible rechargeability at all times. During daily recharging period, the three fluoride releasing materials showed a sustained fluoride release. When recharging was stopped, the level of fluoride release dropped dramatically to a low level. All three materials showed significantly higher levels of fluoride release with the increase in recharging temperature from 37° C to 55° C. At both recharging temperatures, there were significant differences in the cumulative amount of fluoride released from the 3 materials.

Conclusions: Increasing the recharging temperature significantly increased the amount of fluoride released from fluoride releasing adhesives.

Seq #74 - New Cements and Bonding to Tooth Structure

2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

0607***Effects of Education on Plaque Acid and Mutans Streptococci***

K.A. PLONKA¹, W.K. SEOW¹, A. BARNETT², L.J. WALSH¹, M. PUKALLUS³, and T. HOLCOMBE³,
¹University of Queensland, Brisbane, Queensland, Australia, ²Queensland University of
 Technology, Brisbane, Queensland, Australia, ³Queensland Health, Southside Health Service
 District, Brisbane, Queensland, Australia

Targeting education to expectant and new mothers is anticipated to aid caries prevention in children through reducing maternal mutans streptococci (MS) levels and transmission by improving oral hygiene.

Objectives: The aim of this study was to determine whether oral health education leads to reduction in mothers' plaque acid and MS levels.

Methods: Identical 30 minute verbal dental education sessions were administered to two case groups; pregnant mothers (n = 54) and new mothers (n = 64), in groups (size 4-20 mothers). The control group of pregnant mothers pre-registering for birthing suite (n= 310) received no dental education.

Plaque and salivary samples and plaque scores were obtained from 428 mothers at initial contact at either an antenatal clinic or community child health clinics. Plaque samples were taken from the interproximal region of the mandibular first molar and second premolar and assessed for acids levels using Plaque-Check (GC International, Japan). MS levels were assessed using CRT-Bacteria (Ivoclar-Vivadent, Liechtenstein). A second sample was obtained from pregnant mothers within 1-30 days of the child's birth. For new mothers, a second plaque sample was obtained when their child reached 6 months of age (n=64).

Results: The proportion of subjects with post-education reduction in MS levels and reduction in plaque acid levels was similar in all groups (P=0.48, P=1.0). However, both antenatal and new parent education groups had smaller percentages of participants who showed increases in MS levels compared to the control groups (26% and 20% respectively vs 31%).

A statistically significant correlation was found between plaque acid levels and plaque scores (Correlation= 0.40), P<0.0001). No statistical significance was noted in the correlation between MS levels and plaque scores nor between MS and plaque acid scores.

Conclusion: A one-time education session for expectant and new mothers was associated with a slight, but not statistically significant reduction in the MS levels. A strong correlation was shown between plaque acid levels and plaque scores.

The research was funded by Queensland Health, Southside Health Service District, Logan-Beaudesert Area, Oral Health Program. The support of GC Asia Dental Pte Ltd, Curaden Swiss, Colgate-Palmolive Pty Ltd is gratefully acknowledged.

Seq #85 - Dentin Caries/Clinical Studies

2:00 PM-3:15 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

1117***Association of salivary mutans streptococci with DMFT index in elderly***

T. OGAWA, K. IKEBE, K.-I. MATSUDA, Y. MAEDA, S. IMAZATO, and S. EBISU, Osaka University, Japan

Objectives: Salivary mutans streptococci level has been reported to be associated with the prevalence of caries in children or young adults. However, microbiological etiology of caries in elderly people has not yet been fully clarified.

The purpose of this study was to examine the association of the salivary mutans streptococci (*S. mutans* and *S. sobrinus*) levels with decayed, missing, filled teeth (DMFT) index in a sample of independent-living elderly.

Materials & Methods: The study sample consisted of independently-living, cognitively healthy 240 elderly people (115 men and 125 women) aged 60-80 years. The number of natural teeth, including those with restorations, and their decayed lesion were determined without any additional cleaning. Stimulated whole saliva was collected by mastication method for 2 minutes. Salivary levels of *S. mutans* and *S. sobrinus* were estimated using the real time PCR (Saliva-check LAB PCR, GC Corp., Tokyo, Japan).

Differences in DMFT index were evaluated using the one way ANOVA, followed by multiple comparisons and the stepwise multiple linear regression analysis. P-values less than 0.05 were considered to be statistically significant.

Results: Mean number of residual teeth and DMFT index were 25.0 (SD=5.4) and 15.3 (5.7), respectively. DMFT was significantly higher in subjects harboring 105 CFU/mL and more of *S. mutans* (34.6% of total subjects) and in subjects harboring 104 CFU/mL and more of *S. sobrinus* (18.8%).

The stepwise multiple linear regression analysis showed that DMFT index was independently associated with salivary *S. mutans* level (partial Beta=0.13, P<0.05) and with *S. sobrinus* level (partial Beta=0.18, P<0.01) after controlling for age, gender or salivary flow rate.

Conclusions: These results indicate that the salivary levels of *S. mutans* and *S. sobrinus* are significantly and independently associated with DMFT index in the elderly.

This study was supported in part by a Grant-in-aid for Scientific Research (19390496) from the Japan Society for the Promotion of Science.

Seq #116 - QOL and Epidemiology in the Elderly
3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 2129

Saliva-Check LAB PCR
periodontopathic Bacteria test set**2129*****Detection of Periodontopathic Bacteria and their Co-relation with Periodontal Symptoms***

K. TAKAYAMA¹, H. MASUDA¹, T. SAKUMA¹, A. YOSHIDA², and T. TAKEHARA², 1GC Corporation, Tokyo, Japan, 2Kyushu Dental College, Kitakyushu, Japan

Objectives: Periodontopathic bacteria in the mouth are potential biological indexes for stage periodontal conditions. The aims of this study are to established a real-time PCR based detecting method to monitor microbial implicated in periodontal diseases and to correlate the result with conventional clinical indexes.

Methods: 13 subjects were recruited for this study. Gum conditions were examined clinically by doctors in attendance and the results ((Bleeding on Probing (BOP) and Pocket Depth (PD)) were recorded. After the examination, Gingival Crevicular Fluid (GCF) samples (98) were collected with paper point and subjected to real-time PCR for levels of *P. gingivalis* (Pg), *A. actinomycetemcomitans* (Aa), *T. denticola* (Td), *T. forsythensis* (Tf), *P. intermedia* (Pi) respectively. The correlation of the real-time PCR generated results with three groups (group 1: BOP negative with shallow pocket (PD<4mm), n=12, group 2: BOP negative with deep pocket (PD>4mm), n=64, group 3: BOP positive with deep pocket, n=22) was analyzed. Statistical evaluation was conducted by using Steel-Dwass method.

Results: Positive detection of Pg, Aa, Td, Tf, Pi were 70, 0, 71, 73, 52 respectively. Infection of the red complex (Pg, Td and Tf) was detected in 91 of the samples. The positive detection ratio of red complex, Td and Tf from the group 3 samples was significantly higher than that of the group 1 samples, respectively ($p<0.05$). The detection ratio of Td from the group 2 samples was significantly higher than that of the group 1 samples ($p<0.05$). The detection ratio of Tf from group 3 samples was significantly higher than that of the group 1 samples ($p<0.05$).

Conclusion:

A real-time PCR detecting system for GCF samples was established. The results indicated that co-infection of the red complex, infection of Td and infection of Tf are associated with advanced stages of periodontal disease respectively.

Seq #208 - Microbial, Genetic, and Proteomic Markers for Periodontitis

2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 2549

Saliva-Check BUFFER

2549***An Assessment Addressing Oral Treatment Protocols for Vietnamese with ALL***

C.A. RABUKA¹, N.T. THAO², P.T. OANH³, S. NG¹, A. TSANG⁴, T.C. KHUONG², and C. ZED¹,
¹University of British Columbia, Vancouver, Canada, ²Ho Chi Minh Cancer Hospital, Vietnam, ³Ho Chi Minh City Hematology Hospital, Vietnam, ⁴Maple Clinic, Ho Chi Minh City, Vietnam

Purpose: Conducting a comprehensive paediatric oral health assessment is challenging. Therefore, the need for oral care protocols in immunocompromised patients is essential. The purpose of this study is to determine whether there is an increase in oral soft tissue and dental morbidity due to treatment side effects and resulting decreased saliva quality in Vietnamese children undergoing treatment for Acute Lymphocytic Leukemia (ALL)

Material and Methods: The study is being conducted at the Ho Chi Minh City (HCMC) Cancer Hospital and HCMC Hematology Hospital. Subjects will be randomly selected from both institutions. Our patient population will be comprised of children, from ages 3 to 18 years, that have been diagnosed with Acute Lymphocytic Leukemia from southern Vietnam. A WHO-based Oral Assessment Form and Simplified Oral Hygiene Index will be used to assess each patient prior to the chemical intervention. The form will include the patient's demographic information and chemotherapeutic protocol as well as objectively assess DMFT. Salivary quality will also be examined using Saliva-Check Buffer Tests (GC Asia). Blood counts will be recorded, and the use of a central line will be noted.

Results: 15 children were examined in a 2-month trial period using an older assessment form based on the modified Eiler's Oral Assessment Guide and a Faces Scale for Pain. Preliminary results revealed generalized poor oral conditions in children receiving chemotherapy in Southern Vietnam, with little or no oral protocols set up.

Conclusion: Unfortunately, the patients seen in these hospitals did not receive worldwide accepted protocols as described by the AAPD. Based on the results from this preliminary trial study, Vietnamese children with ALL require a definitive standard protocol that supports their oral health treatment. The previous study used outdated protocols and therefore the results were deemed inadequate. A new survey has now begun and is approximately 10% completed.

Seq #232 - Oral Health Sciences Research/quality-of-life Measures/Epidemiology
 3:30 PM-4:45 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 3343

Tooth Mousse / MI PASTE, Saliva-Check
Buffer, Plaque Indicator Kit**3343 Effect of CPP-ACP on Oral Health of Cerebral Palsy Children**

Z. AYTEPE, E.B. TUNA, D. ONER OZDAS, and E. YAMAC, University of Istanbul, Faculty of Dentistry, Turkey

Objective: The aim of this study was to evaluate the effect of Casein Phosphopeptide-Amorphous Calcium Phosphate (CPP-ACP) on buffering capacity of saliva and plaque pH in individuals with cerebral palsy (CP).

Methods: 15 children with CP were included, (mean age: 5.6±2) who lived in a government institution in Istanbul, Turkey. Before using CPP-ACP complex, buffering capacities of saliva and plaque were checked in first measurement and accepted as control group. Then, CPP-ACP complex (GC Tooth Mousse, Recaldent™, GC Corp., Tokyo, Japan) applied to the children two times a day regularly by caretakers. Saliva and plaque samples were collected with using plastic strips and tubes. Dental plaque pH and buffering capacity of saliva were measured by using Saliva-Check Buffer (GC Corp., Tokyo, Japan) and Plaque Indicator Kit (GC Dental Corp., Japan). Measurements were repeated on 1st, 2nd, 3rd, 4th, 6th and 8th weeks. All scores were assessed according to manufacturer's instructions. All the data was analyzed statistically by Dunn's multiple comparison, Friedman and Mc Nemar's tests.

Results: For plaque pH, although there were no significant differences between the initial and the 1st, 2nd and 3rd weeks' scores ($p > 0,05$); statistically significant differences were seen between initial and 4th, 6th and 8th weeks' scores ($p = 0,039, p = 0,042, p = 0,018$). For buffering capacity of saliva, a significant difference was seen between the initial and the 1st, 2nd, 3th, 4th, 6th and 8th weeks' scores ($p = 0,0001$). The 1st and 2nd weeks' saliva buffer scores significantly lower than 6th and 8th weeks' scores ($p = 0,003, p = 0,001$). No significant differences were found in other time points ($p = 0,0001$).

Conclusions: From the result of this study, it was suggested that CPP-ACP complex is effective on saliva buffering capacity and plaque pH; therefore it may be a good choice as CP individuals generally need high oral hygiene attention.

Seq #305 - Caries and Other Oral Health Issues in Children,
1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0112

Tooth Mousse / MI PASTE

0112***A Clinical Trial Measuring White Spot Lesion Progression and Regression***

M.V. MORGAN, D. BAILEY, G. ADAMS, C. TSAO, A. HYSLOP, K. ESCOBAR, D. MANTON, and E. REYNOLDS, University of Melbourne, Australia

Objectives: A clinical trial to investigate the progression/regression of white spot lesions (WSL) in post-orthodontic adolescent subjects utilizing ICDAS II criteria for assessment of lesion severity and activity.

Methods: Eligible subjects exhibiting at least 2 WSL on buccal surfaces of anterior teeth were recruited within seven days of orthodontic bracket removal. In the 45 subjects (age 12-18 years) recruited, 408 WSL (mean 9 WSL per subject) were recorded. Subjects were randomised to either intervention group (Tooth Mousse™) or control group (placebo cream). Subjects were instructed to apply study product at home twice daily for 12 weeks. Clinical assessments were undertaken by three calibrated examiners at baseline, 4, 8 and 12 weeks. After prophylaxis and inspection of both wet and air-dried surfaces, WSL were scored for lesion severity and activity using ICDAS II criteria. To assess efficacy, a transition matrix incorporating both ICDAS II severity and activity criteria was used to assess transitions between baseline and follow-up examination scores. Transitions were coded as progressing (positive score), regressing (negative score) or stable (score zero). Impossible or implausible transitions were excluded from the calculation.

The transition scores were analysed using a proportional odds ordinal logistic regression model and robust variance estimates to account for clustering of lesions within subjects.

Results: Lesion severity was scored as Code 1 in 7.8%, Code 2 in 89.7% and Code 3 in 2.5% of WSL. 86.3% of WSL were classified as active. For codes 2 and 3, 31% more of these lesions had regressed with Tooth Mousse™ than with the placebo control at 12 weeks (OR=2.3, P=0.04). Differences in the regression rates between the two treatments were not statistically significant at 4 and 8 weeks.

Conclusions: ICDAS II criteria and transition scoring provided a useful method to demonstrate that significantly more post-orthodontic WSL regressed with Tooth Mousse™ compared to a placebo control.

Study Sponsor: CRC for Oral Health Science/GC Corporation, Japan

Seq #28 - Demineralization - Remineralization

9:00 AM-10:30 AM, Thursday, July 3, 2008 Metro Toronto Convention Centre Room 713B

ABSTRACT NO.# 1032

Tooth Mousse / MI PASTE

1032***Fluoride and Calcium-Phosphate Effects on Fracture Toughness of Bleached Dentin***

M. CIPOLLA, E.A. RYAN, and L.E. TAM, University of Toronto, Canada

Objectives: It was the aim of this study to determine whether or not the decrease in fracture toughness (K1C), observed after carbamide peroxide bleaching, could be either prevented or restored with pre- or post-bleaching treatments using an amorphous calcium phosphate or a fluoride gel in vitro.

Methods: Compact test specimens, approximately 4.6X4.5X1.6 mm, composed of dentin cut from the coronal aspect of recently extracted human molars, were used (n=10/group). Tooth bleach (10% carbamide peroxide, Opalescence, Ultradent Dental Products) was applied directly to the dentin (6hr/day) in a custom-made bleach tray to simulate an overnight conventional (2-weeks) or prolonged (8-weeks) bleaching regimen. The specimen-containing bleach trays were immersed in artificial saliva and stored in a 37oC humid environment during the bleach treatments. The prevention or recovery groups received, respectively, additional daily topical pre-bleach or post-bleach treatments of either amorphous calcium phosphate (MI paste, GC America) or fluoride gel (Prevident Booster, Colgate Oral Pharmaceuticals) for 30-minutes. A placebo gel acted as a control material for each group. The dentin specimens were stored in 37oC artificial saliva when not undergoing treatment. 24hrs after the last bleaching session, a tensile load was applied (1cm/min) until specimen fracture. K1C values were calculated and analyzed using ANOVA and Tukey's test (p<0.05).

Results: The highest mean K1C results were generally associated with the unbleached (placebo) groups. Preliminary results indicated that the daily amorphous calcium phosphate and fluoride gel treatments did not significantly affect the fracture toughness results.

Conclusions: The in-vitro fracture toughness of dentin was generally reduced by the direct application of a carbamide peroxide bleach. There was insufficient evidence to suggest that a daily amorphous calcium phosphate or fluoride gel treatment could prevent this reduction in K1C. Materials were provided by Ultradent Dental Products, GC America and Colgate Oral Pharmaceuticals.

Seq #110 - Clinical and Experimental Evaluation of Bleaching

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 2499

Tooth Mousse / MI PASTE, MI PASTE Plus

2499***Progression of erosion following use of calcium and phosphorus compounds***

C.P. TURSSI, F.A. MAEDA, D.C.F. MESSIAS, F.C. REHDER NETO, D. GALAFASSI, and M.C. SERRA, Universidade de São Paulo - School of Dentistry of Ribeirão Preto, Brazil

Objective: To assess whether pastes containing casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) and calcium sodium phosphosilicate (CSP) control erosion progression.

Methods: Enamel slabs of bovine teeth with preformed incipient erosion-like lesions were randomly assigned to five treatment groups (n=5): A) CPP-ACP (MI Paste, GC America); B) CPP-ACP+F (MI Paste Plus, GC America); C) CSP (Oravive); D) regular fluoridated dentifrice (Sensodyne Cool Gel, GSK); E) control (unexposed to any product). Paste treatments (1:3 slurry in deionized water or undiluted product in the case of the CPP-ACP formulae) were performed for 90s and followed by a 2-h period in artificial saliva (pH=6.8). Then, an alternating erosion-remineralization cycle consisting of immersion of specimens in 0.3% citric acid solution (pH=3.2, 90s) and artificial saliva for 4h was used. Paste treatments and erosion-remineralization cycle were repeated five times. Specimens were analyzed by surface microhardness (Knoop, 25g, 10s).

Results: Mean (sd) values were: A) 213.2 (42.4); B) 234.3 (12.9); C) 234.1 (26.8); D) 246.5 (38.1); E) 172.3 (24.2), with [B=C=D]>E and A=E (p<0.05, ANOVA/Tukey).

Conclusion: Treatment of eroded enamel with CPP-ACP+F and CSP reduced progression of erosion compared with the untreated control, but in a manner indistinguishable from that of the regular fluoridated toothpaste.

Seq #230 - Saliva/Erosion

3:30 PM-4:45 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

2500***The role of Tooth Mousse in reducing erosive tooth wear***

S. RANJITKAR1, J.M. RODRIGUEZ2, D.W. BARTLETT2, J.A. KAIDONIS1, G.C. TOWNSEND1, and L.C. RICHARDS1, 1The University of Adelaide, Australia, 2King's College London Dental Institute, United Kingdom

In addition to its role as a remineralizing agent in preventing dental caries, recent evidence has shown that Tooth Mousse (TM, GC Corporation, Japan) can reduce dental erosion.

Objective: Our aim in this study was to determine whether TM could reduce erosive tooth wear involving toothbrush abrasion.

Methods: Flat, polished enamel and dentine specimens (n=72) were subjected to 10 wear regimes, with each regime involving immersion in 0.3% citric acid (pH 3.2) for 10 min followed by toothbrush abrasion in a slurry of fluoride-free toothpaste and artificial saliva (1:3 ratio by weight) under a load of 200gm for 200 cycles. The specimens were immersed in artificial saliva for 2hrs between wear episodes. In experimental group 1 (n = 12 each for enamel and dentine), TM was applied at the beginning of each wear episode for 5min whereas Tooth Mousse without the remineralizing agent (TM-) was applied in experimental group 2 (n=12 each for enamel and dentine). No TM or TM- was applied in the control group (n = 12 each for enamel and dentine).

Results: A linear mixed model showed that intervention involving TM and TM- had a significant effect on both enamel and dentine wear ($p < 0.01$). The mean wear depth for enamel in experimental group 1 (mean \pm SE, $1.26 \pm 0.33\mu\text{m}$) was significantly less than that in the control group ($3.48 \pm 0.43\mu\text{m}$) ($p < 0.001$), but not significantly different from that of experimental group 2 ($2.41 \pm 0.50\mu\text{m}$) ($p > 0.05$). The mean dentine wear in experimental group 1 ($2.16 \pm 0.89\mu\text{m}$) was significantly less than those in experimental group 2 ($5.75 \pm 0.98\mu\text{m}$) ($p < 0.01$) and control group ($10.29 \pm 1.64\mu\text{m}$) ($p < 0.001$).

Conclusion: Our findings that TM can reduce erosive tooth wear, probably by remineralizing and lubricating eroded tooth surfaces, have clinical implications in the management of tooth wear.

Seq #230 - Saliva/Erosion

3:30 PM-4:45 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E
Back to the Cariology Research Program

3267***Remineralization of Eroded Teeth Using CPP-ACP Paste***

A. HUANG, and D. TANTBIROJN, University of Minnesota, Minneapolis, USA

Objectives: Soft drinks can cause dental erosion. Previous studies have shown that casein phosphopeptide amorphous calcium phosphate (CPP-ACP) has been effective in the remineralization of carious lesion. This in vitro study examined whether CPP-ACP paste can reharder enamel after slight erosion by Coke®, and how different artificial saliva solutions affect the enamel hardness.

Methods: Bovine teeth (n=15) were immersed in Coke® for 8 minutes and then placed under artificial saliva solutions pumped at 0.4mL/min. A total of 5 teeth (each tooth consisted of treatment and control halves) were subjected to different artificial saliva solutions: saliva like solution (SLS) with 1 ppm fluoride (F), SLS without F, and Biotene® mouthwash. CPP-ACP Paste was applied in the treatment group for 3 minutes at 0, 8, 24, and 36 hours. Knoop microhardness (KHN) was measured at baseline, after Coke® immersion, and after 24 and 48 hours contact with artificial saliva solution.

Results: Enamel hardness significantly decreased after 8 minutes immersion in Coke® and significantly changes with each treatment (ANOVA and SNK; p<0.05). The table shows that specimens treated with CPP-ACP paste were significantly harder than those untreated after 48 hours under an artificial saliva solution drip. However, the effect of 1 ppm fluoride in SLS was not significant. Biotene® mouthwash significantly softened the enamel surface.

Table. Difference in KHN (Mean±SD) after 48 hours remineralization. Superscripts denote mean values that are not significantly different (two-way ANOVA, p=0.05).

	SLS with F	SLS without F	Biotene
CPP-ACP paste	41.7±30.5a	42.2±15.5a	-116.1±17.6c
No paste	14.6±21.0b	4.4±14.7b	-154.7±13.0d

Conclusion: This study suggests that the application of CPP-ACP Paste along with saliva-like solution significantly hardened the enamel softened by Coke®. Biotene® mouthwash softened enamel surface after prolonged contact.

Supported by MDRCBB, the UMSOD summer research fellowship program and the William H. Crawford award.

Seq #302 - Demineralization-Remineralization Studies

1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 3274

Tooth Mousse / MI PASTE

3274***Remineralization of Artificial Caries by CPP-ACP Paste***

U. THEERAPIBOON, R. PUANAIYAKA, and C. MANEENUT, Chulalongkorn University, Bangkok, Thailand

Objectives: This study evaluated the effectiveness of casein phosphopeptide-amorphous calcium phosphate paste (CPP-ACP paste) on remineralization in smooth surface artificial caries of both permanent and deciduous teeth after 3-minute CPP-ACP paste application.

Methods: Forty human teeth 20 extracted premolar and 20 exfoliated primary molars with sound buccal surfaces underwent soft tissue debridement, then bucco-lingual longitudinally sectioned into two parts. In addition, an acid resistant varnish was coated on enamel surface leaving buccal window exposed. Following artificial caries creation, each specimen was randomly divided into experiment and control groups of permanent as well as deciduous teeth, respectively. Only experiment groups were applied with CPP-ACP paste (Tooth Mousse, GC Corp., Japan) for 3 minutes, twice a day. Finally all of the specimens were treated in pH-cycled for 4 weeks. Consequently, the thin section was performed and evaluated lesion area under polarized light microscope.

Results: The paired-t test was selected to compare lesion area difference between pre- and post-treatment in both experiment and control groups. It demonstrated significantly lesion area reduction ($P < 0.00$) in experiment groups. (both permanent and deciduous teeth)

Conclusion: According to these results CPP-ACP paste is effective on remineralization of artificial caries on smooth surface of human tooth (both permanent and deciduous teeth)

This research was supported by Graduate School Chulalongkorn University, Bangkok Thailand

Seq #302 - Demineralization-Remineralization Studies

1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 3280

Tooth Mousse / MI PASTE

3280***Remineralization of the artificial caries lesion using CPP-ACP and Fluoride***

K.-B. KIM, H.-S. SHIN, S.-M. KIM, N.-K. CHOI, and K.-H. YANG, Chonnam National University, Gwang-ju, South Korea

Objective: The aim of this study was to examine efficacy of the commercially available 1% CPP-ACP cream (Tooth mousse, GC Co., Tokyo, Japan) and/or 0.05% NaF solution on the remineralization of artificial caries-like lesion in the bovine teeth enamel.

Methods: Sixty bovine teeth were embedded in orthodontic resin and flattened for surface hardness test. The enamel surface in 3 mm diameter was exposed with nail varnish. Specimens were stored in demineralizing solution and divided 5 groups; Group 1 (No treatment), 2 (0.05% NaF solution 1 min), 3 (Tooth mousse 3 min), 4 (After 0.05% NaF solution, Tooth mousse treatment), and 5 (After Tooth mousse treatment, soaking in 0.05 % NaF solution during 1 min). After treatment by groups, all specimens was stored in artificial saliva for 30 min, and rinsed with distilled water. After the process described as above was performed during 10 days without pH cycling, surface hardness (Vickers Hardness Number, VHN) was tested and analyzed by paired t-test and one-way ANOVA test with SPSS 14.0.

Results: In intragroup comparison between surface hardness of pre-treatment and post-treatment, group 3, 4, 5 showed statistically significant increase ($P < 0.05$). In intergroup comparison among surface hardness increase of all groups, difference of group 5 between pre and post-treatment (15.80 ± 12.21) was the highest, and followed by group 4 (14.27 ± 11.73), 3 (4.05 ± 5.18), 2 (1.15 ± 6.83), 1 (0.78 ± 6.21). Both groups of combination treatment with 0.05% NaF and Tooth mousse, showed statistically significant increase of surface hardness than groups of treatment alone ($P < 0.05$).

Conclusions: Tooth mousse can be a good alternative strategy for localized application of fluoride, and the combination use with fluoride might have the additional anticariogenic effect, regardless of application sequence.

Seq #302 - Demineralization-Remineralization Studies

1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 0099

GIC with CPP-ACP

0099***Glass-ionomer Cements - Current and Future Performance***

Sponsored by: Cariology Research, Dental Materials, Dental Materials Journal

Description: The ability of glass-ionomers and resin-modified glass-ionomers to remineralise early caries lesions has been well established in laboratory studies. Technological innovations in recent years have provided dental professionals with a host of new tools to heal and restore carious lesions. Recent advances in these materials have allowed the introduction of techniques to ensure maximal preservation of dental tissues.

This symposium includes the following topics:

- (1) The existing and recent literature on the clinical performance of resin-modified glass-ionomers, in terms of retention rates, marginal integrity and discolouration, will be examined and compared to other adhesive restorative materials wherever possible. It is intended that a review of their clinical performance will encourage discussion regarding the potential benefits, or otherwise, of their use.
- (2) The 'Atraumatic Restorative Treatment' (ART) technique approach will be described, including the development of ART sealants and ART restorations using different types of glass-ionomers (GICs), in a time-lag perspective (1986-2008). Restoration survival rate for both dentitions, wear patterns, antimicrobial action and future perspectives will be analysed.
- (3) The current understanding will be reviewed on the interactions between GIC and dentine, including the concept of 'internal remineralisation', as well as its interactions with the oral environment.
- (4) Current clinical evidence will be reviewed that does not consistently demonstrate that GICs prevent the progression of caries. Previous work will be discussed on the potential of amorphous calcium phosphates with casein phosphopeptide (CPP-ACP) to remineralise early enamel lesions. Laboratory tests will be presented on incorporating CPP-ACP into a high fluoride releasing GIC with enhanced potential for the GIC to reduce early enamel lesion progression. These topics together will provide a comprehensive review and discussion of the current status and future research directions of fluoride release.

Sponsored by Elsevier Science.

Chairpersons: M. TYAS and D.C. WATTS

0099

Clinical Evaluations of Resin-modified Glass-ionomers

S. SIDHU, Queen Mary's School of Medicine and Dentistry, London, United Kingdom

Glass-ionomer and the Atraumatic Restorative Treatment (ART) Approach

J. FRENCKEN, Radboud University Nijmegen Medical Center, Malden, Netherlands

Interactions between Glass-ionomer and Immediate Environment

H.C. NGO, University of Adelaide, Athelstone, SA, Australia

Modifying Glass-ionomer Cement to Enhance Its Remineralizing Potential

M. BURROW, University of Melbourne, Victoria, Australia

ABSTRACT NO.# 2797

Platinum Nanoparticles

2797***The Inhibitory Effect of Platinum Nanoparticles on Oxidative Cytotoxicity***

S. NAGAO¹, T. SATO¹, S. KATO¹, L. CHEN¹, and Y. MIYAMOTO², 1GC Corporation, Tokyo, Japan, 2University of Tokyo, Chiba, Japan

OBJECTIVES: Reactive oxygen species (ROS) is associated with many inflammatory diseases. ROS cause tissue damage by a variety of mechanisms; DNA or protein damage, lipid peroxidation, oxidation of important enzymes, stimulation of pro-inflammatory cytokines. IL-8, one of important chemokines, is induced by ROS in several cells. In this study, we investigated the effect of Platinum nanoparticles, a novel antioxidant agent, on H₂O₂ stimulated IL-8 production in oral epithelial cell line KB.

METHODS: Cell cultures with 0, 10, 100µM Platinum nanoparticles (manufactured by APt Co., LTD., Tokyo, JAPAN) were challenged with 500µM H₂O₂ respectively. After 24 hours incubation at 37°C in 5% CO₂, cells were subjected to cytotoxicity test (WST assay) and IL-8 assay (ELISA). Statistical significance of differences between groups was analyzed by one-way analyses of variance (ANOVA) and followed by Tukey's test.

RESULTS: H₂O₂ induced the dose-dependent cytotoxicity to KB cells. After 500µM H₂O₂ treatment, cell viability was 58.7% compared with control. Although the basal level IL-8 was 320pg/mL, it reached 2610pg/mL after H₂O₂ treatment. These ROS effects were significantly reduced by Platinum nanoparticles (p<0.01). Especially, the H₂O₂ induced cytotoxicity and IL-8 production was completely neutralized by 100µM Platinum nanoparticles.

CONCLUSIONS: Platinum nanoparticles inhibited IL-8 production in oral epithelial cells stimulated by H₂O₂. Platinum nanoparticles are expected as a novel anti-inflammatory agent.

Seq #247 - Therapeutics and Oral Infectious Diseases

3:30 PM-4:45 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 3348

TWINBREASOR

3348***Clinical Evaluation of Novel VSCs Detector for Mouth Air Analyses***

H. II, B. CALENIC, M. HERAI, T. MURATA, and K. YAEGAKI, Nippon Dental University, Chiyoda-ku, Tokyo, Japan

Objectives: Oral malodor represents an important and delicate problem for many individuals. Volatile sulfur compounds (VSCs) found in the human mouth air are responsible for oral malodor. Therefore, portable devices that can accurately evaluate VSCs are highly required in dental practice. There are several detectors on the market, however, these devices were found to lack accuracy and reproducibility in comparison with a gas chromatography (GC) modified specially for detecting VSCs in mouth air. The purpose of this study is to assess the accuracy of the novel VSCs detectors with utilizing semiconductor sulfide sensor, a separation column and a sample loop for measuring VSCs, i.e. methyl mercaptan and hydrogen sulfide, respectively.

Methods: Prior to clinical tests a number of laboratory trials were performed in order to ascertain the prototypes' selectivity for compounds that can be normally found in human mouth air and also to assess the sensors performances at different hydrogen sulfide concentrations. For the clinical study we compared the detectors with a GC (GC 8APFp, Shimadzu, Japan) modified for detecting oral VSCs.

Result: Ethanol, Methanol and Acetone did not interfere with VSC measurements by the semiconductor sensor at the concentrations in human mouth air or in dental practice environment. For hydrogen sulfide measurements the data obtained from the tested prototypes were correlated with the data acquired from the GC (R-Square=0.9684, SD=0.06662, N=308, P<0.0001, in hydrogen sulfide and R-Square=0.95871, SD=0.04876, N=275, P<0.0001, in methyl mercaptan measurements). At low hydrogen sulfide concentrations such as threshold level, the machines showed constant and accurate results, although other devices are lacking accuracy.

Conclusion: Our clinical and laboratory tests demonstrate that the novel VSCs detectors have a reliable specificity to VSCs in human mouth air, also showed both extremely high reproducibility and strong correlations with VSC levels measured by GC.

Seq #306 - Malodor, Dentifrice, Rinses

1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1839

T-ALLOY H

1839***Removal of Cast Surface of Titanium by Chemical Treatment***

Y. SATO1, M. KOIKE2, E. MURAISHI1, T. HOSOI1, and T. OKABE2, 1Tsurumi University, Yokohama, Japan, 2Baylor College of Dentistry, Dallas, TX, USA

Objectives: The detrimental hardened surface layer of cast titanium is routinely removed by the sandblasting and chemical treatment. The present study investigated the effect of the surface treatment exposure time on the amounts removed from the cast surface.

Methods: Eighty castings (5mmx10mmx10mm) of commercially pure titanium (CP3, ASTM grade 3; T-ALLOY H, GC Corp., Japan) were made using two different types of investment material; a magnesia-based investment (Selevest CB, Selec, Japan) and a phosphate-bonded investment (T-INVEST, GC Corp.). Two surfaces (10mmx10mm) of each specimen were sandblasted with 50 μ m Al₂O₃ particles for 30 seconds. After sandblasting, the specimens (n=5) were chemically treated with a HNO₃/HF solution (Chemipolish, Shofu, Japan) at room temperature for 1, 2, 3, 4, 5, 10 or 15 minutes. The reduction of the thickness at 20 randomly chosen sites after the sandblasting and also chemical treatment was determined using a micrometer. The data were analyzed by ANOVA/Tukey's test ($\alpha=0.05$).

Results: The amounts [mean (SD): μ m] removed are as follows (means with identical letters in same investment are not significantly different) ($p>0.05$):

	sandblast	1-min	2-min	3-min	4-min	5-min	10-min	15-min
Selevest CB	10.9(6.3)a	16.5(12.3)a	20.3(8.9)ab	21.1(10.3)ab	28.9(16.4)ab	37.2(23.1)ab	54.2(23.0)bc	62.3(22.9)c
T-INVEST	33.2(12.7)a	38.5(13.5)a	42.8(14.0)a	42.5(17.5)a	44.3(17.0)a	51.9(28.7)a	62.1(24.6)a	67.1(21.3)a

After the sandblasting, the amounts removed from specimens made with T-INVEST were significantly larger than those made with Selevest CB ($p<0.05$). After chemical treatment, the amounts removed increased with the time, and the total amounts removed in the Selevest CB specimens were significantly larger when the treatment exceeded 3-min ($p<0.05$).

Conclusion: The amounts removed by two cleaning processes depended on the investment materials used. Cleaning procedures of the castings should be adjusted based on the investment used. Partially supported by NIH-NIDCR grant DE011787.

Seq #190 - Cast Titanium and Wrought Alloys of Titanium, including Ni-Ti
2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 3103

T-ALLOY H

3103***Casting accuracy of titanium frameworks for implant-fixed partial dentures***

C. OHKUBO, N. OKAMOTO, M. KOBAYASHI, H. SHIMPO, Y. ISHIKAWA, D. KURIHARA, Y. KOKUBO, and T. HOSOI, Tsurumi University, Yokohama, Japan

Objective: Titanium frameworks are frequently used for implant fixed partial dentures (FPD) on the concept of one-metal rehabilitation. This study evaluated the casting accuracy of titanium frameworks for implant-FPD with a fully formed hybrid composite (Ti-FPD).

Methods: Forty-seven implant-fixed superstructures were fitted to 40 patients between February 2005 and December 2007. The frameworks were cast with commercially pure (CP) titanium grade III (T-alloy H, GC) using a GC Autocast system. After priming a bonding agent (Metal primer II, GC), a hybrid prosthetic composite (Estenia, Shofu) was fully applied to a titanium framework. Before cementing the Ti-FPDs, marginal and internal fits were recorded intraorally to record the gap between the titanium framework and abutment using white and black silicone impression materials (Fit Checker and Bite Checker, respectively, GC) according to the previous study (Euro J Prosthodont Res Dent 14: 85-89, 2006). The marginal and axial wall film thickness was measured microscopically (Profile Projector V-16E, Nikon) at 50x magnification. As controls, Ag-Au-Pd alloy and Type IV gold alloy frameworks of FPD were measured. Data were statistically analyzed by ANOVA/Tukey's test ($\alpha=0.05$).

Results: There was no statistical difference of the mean marginal and axial wall gaps among the cast titanium (marginal 52 μ m, axial 87 μ m), Ag-Au-Pd alloy (marginal 68 μ m, axial 88 μ m), and Type IV gold alloy (marginal 71 μ m, axial 95 μ m) ($p>0.05$). No clinical problems resulting from using titanium for implant FPDs were observed.

Conclusions: The casting accuracy of titanium frameworks was clinically accepted. No clinical disadvantages of cast titanium frameworks were evident during short-term observations.

Seq #289 - Fixed Prosthodontics and Esthetics

1:45 PM-3:00 PM, Saturday, July 5, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1253

GENESI0

1253***Stress analysis of zirconia abutment***

Y. NOGUCHI, S. AOYAGI, N. FUJII, and M. TAKAYAMA, GC Corporation, Tokyo, Japan

Objectives: The purpose of this study was to conduct the stress analysis of the zirconia abutment compared with the titanium abutment.

Methods: The GENESI0 (GC) was applied as an implant system in this study.

The abutment, the implant body and the abutment screw were modelled with 3D CAD (SolidWorks) in order to compare the results of real mechanical test with those of FEM (finite element method / COSMOS Works Designer) analysis.

On 3D CAD, the implant body was fixed in a condition of osseointegration and the abutment was tightened by an abutment screw with recommended torque.

The modelled data were analyzed with two kinds of tests by FEM.

Test1: A compression-loading test (25° to the implant axis)

Test2: A repetition durability test (5,000,000 times, 25kgf, 25° to the implant axis)

The materials of the abutment were postulated as titanium and zirconium for FEM analysis.

The real mechanical test with the same condition as Test1 and 2 was conducted and compared with the results of FEM analysis.

Results:

Test1:

In the real mechanical test, breaking load of the zirconia abutment resulted in 51.1kgf.

Contrastingly, the titanium abutment was bent with the almost same load (One-way ANOVA, $p > 0.05$).

	FEM analysis	Real mechanical test
Zirconia	51.0	51.1 (1.8) Breaking
Titanium	56.1	52.6 (3.1) Bending

Test2: Neither abutment was broken by FEM analysis. The same result was provided by the real mechanical test. In addition, the results of FEM analysis were equal with those of real mechanical test (One-way ANOVA, $p > 0.05$).

Conclusion: The zirconia abutment had the approximately same mechanical strength with the titanium abutment and it could be applied clinically with the same design as the titanium abutment.

Seq #123 - Simulation and Drugs Study

3:30 PM-4:45 PM, Thursday, July 3, 2008 Metro Toronto Convention Centre Exhibit Hall D-E

ABSTRACT NO.# 1830

GN-I

1830***Machinability Evaluation of a Ti-Ag Alloy Using a Dental CAD/CAM***

R. INAGAKI¹, M. YODA¹, M. KIKUCHI², K. KIMURA¹, and O. OKUNO², ¹Tohoku University, Graduate School of Dentistry, Sendai, Miyagi, Japan, ²Tohoku University, Sendai, Miyagi, Japan

Objectives: In recent years, many dental CAD/CAM systems have been commonly used to fabricate dental prostheses. The durability of tungsten carbide burs is influenced by the machinability of metal. The purpose of the present study was to evaluate the machinability of a Ti-Ag alloy by measuring the durability of the tungsten carbide burs. The durability of the bur was measured after fabricating a framework using a Ti-Ag alloy and commercial pure titanium by a dental CAD/CAM system.

Methods: Experimental Ti-20mass% Ag alloy (Ti-Ag) blocks were made using a dental titanium-casting machine, subsequently, the blocks were machined to fabricate the framework using a dental CAD/CAM system (GN-I, GC, Japan). Pure titanium (CP-Ti, JIS grade II) blocks were also machined as a control. Fifteen identically sized blocks were prepared from each metal. Each bur was used to machine three blocks. The cutting edges of the burs were observed by SEM after every use. The attrition parts of the cutting edges of the SEM image were traced. The durability was evaluated by measuring the area of the attrited part of the cutting edges. The data (n=5 for each condition) were compared to the data for Ti-Ag and CP-Ti using Student's t-test ($\alpha=0.05$).

Results: The attrition area of the cutting edges increased with the number of uses, and that of the Ti-Ag alloy was about 68% less than that of CP-Ti after the first use. However, there was no significant difference. After the second use, the area of the Ti-Ag alloy was about 65% less than CP-Ti, and about 55% after the third use. There were significant differences ($p<0.05$).

Conclusion: It was concluded that, in terms of tool life, the machinability of the Ti-20%Ag alloy was superior to that of pure titanium.

Seq #190 - Cast Titanium and Wrought Alloys of Titanium, including Ni-Ti
2:00 PM-3:15 PM, Friday, July 4, 2008 Metro Toronto Convention Centre Exhibit Hall D-E