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COMPILATION OF SCIENTIFIC ABSTRACTS

AUGUST 2011

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COMPANY PROFILE

More than 85 years of Kuraray

Kuraray Co. Ltd., established in 1926 in Kurashiki, Japan, was originally involved in the industrial production of fibers out of viscose. Today, thanks to Kuraray's technological strength and comprehensive experience, the company successfully covers the sectors polymer chemistry, chemical synthesis, and chemical engineering developing and producing a broad range of high-quality and innovative products.

In 1973, Kuraray entered the business field of dental materials with the objective to respond to requirements of dental practice precisely and carefully – with products which convince users by their reliability and high quality.

Inventor of the bonding system

In 1978, Kuraray introduced the first bonding system to the market: CLEARFIL™ BOND SYSTEM-F, the start of the age of adhesive dentistry. At the same time, the company developed the total-etch technique for enamel and dentin.

Today, Kuraray continues to steadily produce innovative quality products which meet the requirements of a profession that also develops constantly. Its products that make history – such as PANAVIA™ F2.0, CLEARFIL™ PROTECT BOND, CLEARFIL™ SE BOND, CLEARFIL™ AP-X and ESTENIA™ C&B – are proof of Kuraray's capability to develop solutions for practice from the results of their pioneering research.

Our dedication

As science and society continue to develop, new questions and challenges also arise for dental materials. Thus, Kuraray has set itself the goal of meeting demands and requirements of dentistry to the very best of its ability, now and in the future.

With this compilation of abstracts presented at IADR, the 89th General Session of the International Association of Dental Research in San Diego, California and 45th Meeting of CED/IADR in Budapest, Kuraray is delighted to present the most recent and informative scientific information on our clinically tested and evaluated products.

Dedicated to develop and produce high quality products, the external verification of the products' quality is vital for us. Hence, Kuraray expresses its gratitude to the universities for including Kuraray's products in their research.

Please feel invited to contact us in case of questions –
We are happy to provide even more information.

ADHESIVES

CLEARFIL™ SE BOND
CLEARFIL™ S³ BOND
CLEARFIL™ PROTECT BOND

CLEARFIL™ SE BOND (CED/IADR)

359 Potential smear interference with self-etch hybridization studied by TEM

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Objectives: To evaluate whether hybridization of enamel/dentin by self-etch adhesives may be affected by smear.

Methods: Two 2-step self-etch adhesives, the recently marketed Optibond XTR (O-XTR; Kerr) and Clearfil SE Bond (C-SE; Kuraray), were bonded strictly according to the manufacturer's instructions to either (1) bur-cut (100-ìm grit) enamel/dentin, (2) 600-grit SiC-paper ground enamel/dentin, or (3) smear-free un-cut enamel and fractured dentin (non-carious human third molars). The 3-step etch-and-rinse adhesive Optibond FL (O-FL, Kerr) served as control. After 1-day storage in water (37°C), non-demineralized/demineralized 70-90 nm sections were prepared following common TEM-specimen processing, and eventually examined by TEM (JEM-1200EX II, Jeol).

Results: At enamel, a tight bond based on only superficial interaction was observed for both O-XTR and C-SE. Especially at uncut enamel, hydroxyapatite rods appeared hardly dissolved (in contrast to phosphoric-acid etched enamel in case of O-FL). At dentin, the hybrid layer varied from maximum 1 µm in thickness for C-SE to about 1.5 µm for O-XTR (again in contrast to the 3-5 µm hybrid layer produced by O-FL). For O-XTR, the hybrid layer appeared nearly completely demineralized, with only at the bottom part some hydroxyapatite remaining. For C-SE, residual hydroxyapatite could be found within the whole hybrid layer. Especially at bur-cut dentin, the hybrid layer of C-SE, somewhat in contrast to that of O-XTR, appeared to contain more minerals, most likely representing resin-encapsulated smear remnants.

Conclusion:

The obtained tight interface at both enamel and dentin indicates that both the two-step self-etch adhesives O-XTR and C-SE effectively bonded to tooth tissue. O-XTR etched slightly deeper, which should be attributed to it lower pH of 1.6 (vs. 1.9 for C-SE), and following the AD-concept of Yoshida et al. (2004) maybe also because of the more decalcification than adhesion effect of its functional monomer GPDM (vs. 10-MDP in C-SE).

CLEARFIL™ SE BOND (CED/IADR)

377 Quantitative microleakage evaluation of repaired resin-based restorations with different treatments

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Objectives: The successful addition of new restorative materials to an existing restoration may be the most conservative course of treatment. Repairing resin based restorations with resin materials remains a viable clinical alternative to replacement. The aim of the study was to evaluate the effect of different adhesive systems and surface treatments on the integrity of resin-resin and resin-tooth interface after partial removal of preexisting resin composites using quantitative image analysis for microleakage testing protocol.

Methods: 80 defect-free human molar teeth were restored with two different types of resin composites (Filtek Z250 and GrandioSo) occlusally. The teeth were thermocycled (1000X) between 5oC and 55oC with a dwell time of 30 seconds. Mesial and distal 1/3 parts of the restorations were removed out leaving only middle part. One side of the cavity was finished with course diamond bur and the other part is sandblasted (50 µm AlO3). The samples of each composite group were randomly divided into 4 groups (n=10/group) to receive the following adhesive systems: Group1: Single Bond2 (3M); Group2: AllBond3 (Bisco); Group3: Clearfil SE (Kuraray); Group4: Beauty Bond (Shofu). All the cavities were restored with resin composite (Filtek Z250). The specimens were re-thermocycled (1000X), sealed with nail varnish, stained with 0,5% basic fuchsin for 24h, sectioned mesiodistally and photographed digitally. The extent of dye penetration was measured by image analysis software (ImageJ) for both course-finished and sandblasted surfaces at resin-tooth and resin-resin interface. The data were analyzed statistically.

Results: Beauty Bond exhibited the most microleakage at every site. Surface finishing with sandblasting showed less microleakage when compared to bur finishing at every site for all the adhesive types except Beauty Bond. The type of initial repaired restorative material did not affect the microleakage.

Conclusion:
All-in-one adhesives may not be the choice for composite resin repair in terms of microleakage prevention.

CLEARFIL™ SE BOND

1816 Relationship Between Functional Monomer and Acid-base Resistant Zone

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Objectives: To investigate the effects of two functional monomers on dentin caries inhibition potential of two-step self-etching adhesive systems on dentin.

Methods: Clearfil SE Bond and similar experimental formulations different only in the functional monomer were used. Four combinations of primer and bonding agents were evaluated: (1) Clearfil SE Bond which contains MDP in both primer and bonding (M-M); (2) Clearfil SE Bond primer and Phenyl-P in bonding (M-P); (3) Phenyl-P in primer and Clearfil SE Bond bonding (P-M); (4) Phenyl-P in primer and bonding (P-P). Ground dentin surfaces of human sound molars were treated with one of the systems; the bonded interface was exposed to an artificial demineralizing solution (pH=4.5) for 90min, and then 5% NaOCl for 20min. After 24h storage, specimens were prepared for TEM-analysis.

Results: An acid-base resistant zone (ABRZ) was found with all adhesive systems containing MDP either in primer or in bond; however, ultramorphology and HAp crystallite arrangement in the ABRZ were different among groups. In M-M and M-P, a complex layer consisting of HAp, collagen fibrils and resin monomer was observed. While P-M and P-P lacked such layer, P-M showed a layer of dense HAp, completely separated from HL. In P-P erosion was observed between hybrid layer and dentin.

Conclusion:
The chemical bonding ability of functional monomer in self-etching system influenced the formation and quality of ABRZ.

CLEARFIL™ SE BOND after 30 day storage

2449 Immediate and delayed microshear bond strength of self-etching-adhesives to dentin

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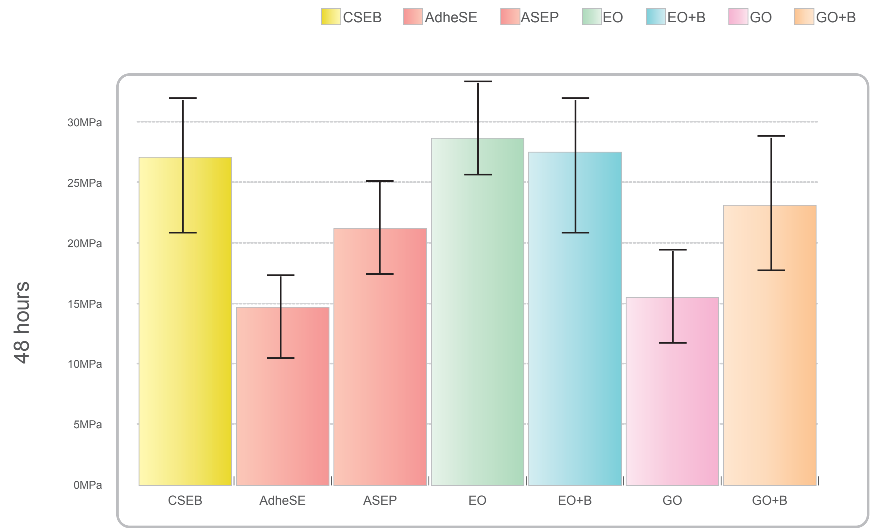
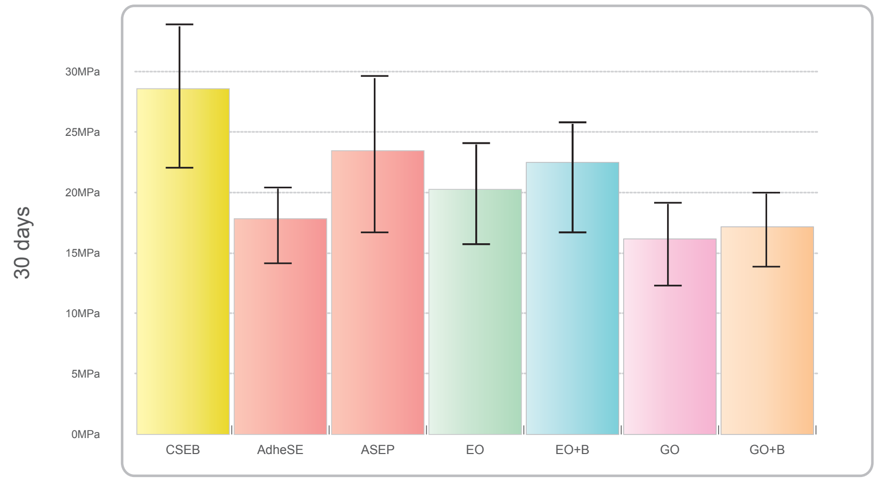
Objectives: To compare the microshear bond strength (μSBS) of self-etching adhesives after 48h and 30-day-storage in distilled water at 37oC and to evaluate the effect of the application of a hydrophobic resin layer on all-in-one adhesives.

Methods: Flat dentin surfaces of 56 bovine incisors were randomly divided in 14 groups (n=12) according to the adhesive system [Clearfil SE Bond (CSEB), AdheSE, Adper SE Plus (ASEP), Easy One (EO) and Go! (GO)] and storage period (48h and 30 days). In another two groups a layer of hydrophobic resin was applied on all-in-one adhesives (GO+B and EO+B). Tygon tubes were placed on the dentin surface treated with the adhesives tested, filled with composite resin and photoactivated for 20s. The tubes were removed to expose the composite resin cylinders (cross-sectional area of 0.38 mm2). After 48h and 30-day-storage (distilled water, 37oC), μSBS was determined (0.5 mm/min). The results were statistically analyzed by ANOVA and Tukey's test (α=5%).

Results: After 48h EO, EO+B, CSEB and GO+B showed the higher bond strength values. The application of a hydrophobic layer did not influence EO and increased GO bond strength values. After 30 days CSEB, ASEP and EO+B showed higher bond strength values. When comparing groups of all-in-one adhesives with and without a hydrophobic layer, the bond strength values showed no significant difference.





Conclusion:

The application of a hydrophobic resin layer increased bond strength values only at 48h. With respect to the degradation of strength over time, only EO showed a statistically significant decrease of bond strength after 30 days.

Chlorhexidine & CLEARFIL™ SE BOND 2-Year Durability Test

2930 Chlorhexide pretreated caries-affected dentin bond durability under simulated intrapulpal pressure

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Objectives: To evaluate the influence of 2% and 5% chlorhexidine (CHX) pretreatment on bond durability of a self-etching adhesive to normal (ND) and caries-affected (AD) dentin after 2-years aging in artificial saliva and under simulated intra-pulpal pressure (IPP).

Methods: One-hundred twenty freshly extracted carious teeth were ground to expose normal and caries-affected dentin. Differentiation between both substrates was carried out using microhardness and dye method. Specimens were distributed into three equal groups (n=40) according to whether the dentin substrates were pretreated with 2% or 5% CHX or with water (control). Clearfil SE Bond (Kuraray) was applied to both substrates and composite cylinders (0.9.mm diameter 0.7mm height) were formed. Pretreatment and bonding were done while the specimens were subjected to 15mmHg IPP. After curing, specimens were aged in artificial saliva at 37C and under IPP at 20mmHg until being tested after 24h or 2 years. Microshear bond strength (n=20/group) was evaluated. Failure modes were determined using stereomicroscope at 40X magnification. Data were statistically analyzed using three-way ANOVA and Bonferroni tests ($p<0.05$). Additional specimens (n=5/group) were prepared to evaluate interfacial silver precipitation.

Results: For the 24h groups, there were no significant differences among the ND groups and AD groups. For ND aged specimens, the 5% CHX group had the highest value followed by the 2% and control groups; whereas the difference was statistically insignificant. For AD aged specimens, the 5% CHX group revealed statistically higher bond values compared to the 2% CHX and control groups. Fracture modes were predominately adhesive and mixed. Different Interfacial silver depositions were recorded.

Conclusion:
2% or 5% CHX pretreatment has no adverse affect on the 24h bonding to ND and AD. 5% CHX was able to diminish the loss in bonding to AD after 2-years aging in artificial saliva and under stimulated IPP.

CLEARFIL™ SE BOND

1078 Effect of cholesterol esterase on durability of resin-dentin bond

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Background: Cholesterol esterases have been shown to degrade the monomer components of composite resins. Objective: To evaluate the effect of cholesterol esterase on microtensile bond strengths of etch-and-rinse and self-etch adhesives to dentin after 12 months of aging in artificial saliva.

Methods: Flat dentin surfaces prepared from forty-eight extracted caries-free human third molars were divided into two groups for bonding with a 3-step etch-and-rinse (Scotchbond Multipurpose, SCMP) or a 2-step self-etch (Clearfil SE Bond, CSE) adhesive. The adhesives were applied to dentin following manufacturer's instructions and light-cured after solvent evaporation. Composite build-up (Z250, 3M ESPE) was performed with five 1-mm increments. The bonded teeth were sectioned into 0.9 x 0.9mm beams and assigned to one of the three storage conditions: (i) artificial saliva (24 hours); (ii) artificial saliva (12 months) and (iii) artificial saliva containing cholesterol esterase (12 months). Microtensile bond strengths were evaluated and analyzed by 2-way ANOVA and SNK multiple comparison tests.

Results: Significant differences were observed for the two factors "adhesive" ($p=0.001$) and "storage condition" ($p<0.05$). Interaction between these two factors was not significant ($p>0.05$). After 12 months of storage in artificial saliva, significant reduction in bond strength was observed in SCMP. The addition of cholesterol esterase to artificial saliva had no effect on the long-term bond strength of both adhesives to dentin.

Conclusion:
Durability of resin-dentin bond was not affected by cholesterol esterase. This study is supported by HKU grants 10207821.14207.08004.324.01.

Class-V In-Vitro Marginal Integrity Study of CLEARFIL™ SE BOND

1570 3-year Water-storage Class-V Dentin Margin Integrity of Adhesives

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Objective: To compare the continuity of margins of Class-V restorations bonded with adhesives, at 3 weeks and after 3-year water-storage and thermocycling.

Methods: 88 extracted human central incisors were prepared for standardized Class-V-restorations (4mm incisal-apical (50% in dentin), 3mm mesio-distal, and 1.5mm deep) and restored with Filtek Z250 (n=8). The etch&rinse-one-bottle-adhesives Adper Scotchbond 1XT (SB1), Cosmedent Complete light-curing (CCLC) and Cosmedent Complete dark-curing (CCDC); an all-in-one-adhesive with mixing Adper Prompt L-Pop (PLP), and the all-in-one-adhesives without mixing Bond Force (BFZ), Xeno V (XV), and OptiBond All-in-one (Oaio) were tested. The adhesives OptiBond FL (OPT) and Clearfil-SE-Bond (CSE) were used as controls. All adhesives were used according to manufacturer instructions and each filling was placed in two increments, starting at the cervical margins. Bond Force was additionally used with Estelite Sigma restorative to compare 20 s applications with and without agitation of the adhesive (BFwa and BFno respectively). Margins were evaluated at two time-points: after 21 days water-storage following a thermocycling session (2000 cycles: 5 to 55°C), and after 3-years water-storage, including thermocycling after 1 year and also prior to the second evaluation. Replicas were produced and quantitative SEM margin analysis was performed (200x) using standardized criteria.

Results: Median values (% "continuous margin") for the different adhesives in dentin were: OPT:100.0/97.2, CSE:100.0/98.2, Oaio:98.6/97.7, PLP:92.3/77.3, BFZ:99.3/87.5, SB1: 97.7/64.3, XV:100.0/60.7, CCLC:99.3/50.1, CCDC:96.9/34.7, BFwa:98.3/81.9, BFno:96.3/42.4. Statistical evaluation (Kruskal-Wallis-Test with Bonferroni-adjustment, $p<0.05$) revealed no significant differences between the adhesives at 21 days, except for PLP (PLP=BFno). Statistically significant results after 3 years show that OPT=CSE=Oaio>BFZ=PLP; BFZ>SB1>XV=CDLC. CDLC was better than CDDC and BFwa was better than BFno with no significant difference between BFZ and BFwa.

Conclusion:

In the used experimental design only long-term water-storage shows significant effects on marginal adaptation depending on the adhesive, the curing mode (light-curing>dark-curing) and the application technique (with agitation>no agitation).

CLEARFIL™ S³ BOND (Tri-S BOND) Composite Repair

3160 Strength Analysis of Rebonded Composite using Seventh Generation Bonding Agents

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Objective: This in vitro study evaluated the effectiveness of different seventh generation bonding agents (BA) in combination with different surface treatment techniques in repairing damaged composite restorations.

Methods: Cylindrical composite blocks (FiltekTM 3M™ ESPE™) were fabricated in 5mm diameter molds and light-cured (ESPE) 60s. The blocks were mounted in acrylic and aged 48h in 37˚C distilled water. Samples were divided into the following groups according to type of surface treatments:

- I-No Treatment
- II-Bur roughened under water cooling, using a coarse diamond bur and a high speed handpiece
- III-Air Abrasion (3M™ ESPE™ CoJet™) with 30 micron alumina-silica coated particles for 15 s at 90˚ to composite surface

Each treatment group was repaired using seven different BAs (n=11)

A-Excite (Ivoclar Vivadent)–5th generation BA (control)
B-G-Bond (GC America)
C-Bond Force (Tokuyama)
D-Adper Easy Bond (3M ESPE)
E-OptiBond All in One (Kerr)
F-iBOND Self Etch (Heraeus Kulzer's)
G-Clearfil S3 Bond (Kuraray America)

After the surface treatment, the samples were rebonded by adding a 2 mm diameter composite cylinder using an Ultradent jig. Each BA was applied according to manufacturer's instructions. Rebonded composite was light-cured 60s and aged 24h in 37˚C distilled water. Shear bond strength was tested with a universal testing machine (Instron 4202 crosshead speed: 1.0 mm/min) and results were analyzed.

Results: A 2-way ANOVA showed a significant interaction between treatment groups and surface treatments. A Tukey HSD test showed that Clearfil S3 Bond was superior in samples with untreated surfaces ($p < 0.05$). There was no significant difference between the BAs tested with bur or air abrasion surface treatments.

Conclusion:

Fifth generation Excite and all tested seventh generation bonding agents performed equally well in rebonding roughened composite surfaces. Clearfil S3 Bond performed superior to other bonding agents when the composite surface was left untreated.

Class-V Clinical CLEARFIL™ S³ BOND (Tri-S BOND) and G-Bond

1144 Five-year Clinical Evaluation of Two All-in-one Systems

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Objective: This randomized controlled clinical trial evaluated 5-year clinical performance of resin composite restorations in non-carious cervical lesions restored with two all-in-one systems.

Methods: One hundred and eight non-carious cervical lesions in 23 patients (12 men and 11 women) with a mean age of 61.8 years (range 30-79) were involved for the study. Enamel bevel was placed and dentin walls were lightly ground, and restored with S3 Bond (S3: Kuraray Medical, Tokyo, Japan) or G-Bond (GB: GC, Tokyo, Japan) in conjunction with a hybrid resin composite (Clearfil AP-X, Kuraray). Each patient received both restorative groups randomly. All restorations (53 restorations for S3 and 55 restorations for GB) were placed by one dentist. The restorations were blindly evaluated at baseline, 6 months and every year up to 5 years using modified USPHS criteria by two examiners. The data were statistically analyzed using the Cochran Q test and Fisher's exact test.

Results: All patients were examined after 5 years but 5 restorations were not evaluated. One restoration of each material was lost during 5 years and 3 teeth were extracted because of severe periodontal disease. No secondary caries was detected on any restorations. The only clinical problem observed related to enamel marginal integrity. Small steps were detected at the margins of many restorations, regardless of the adhesive system. The incidence of marginal staining increased with time. Slight marginal stains occurred adjacent to about 40% and 50% of the restorations for S3 and GB, respectively. There was no significant difference in the clinical performance between S3 and GB for each variable.

Conclusion:

Under the protocol used in this study, CLEARFIL™ S3 BOND (Tri-S BOND) and GB have demonstrated an acceptable clinical performance up to 5 years. This study was supported by JSPS Grant-in Aid for Scientific Research (C) 20592230.

Leakage bur vs laser treatment for CLEARFIL™ S³ BOND (Tri-S BOND)

3209 Microleakage of adhesives in Er:YAG laser and bur prepared cavities

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Objectives: The purpose of this study was to assess the microleakage of three different adhesive systems in Er:YAG laser and bur prepared cavities.

Methods: Class V cavities prepared on buccal surfaces of 80 extracted third molars with Er:YAG laser(Fidelis Plus III,Fotona) or diamond bur were randomly assigned to 8 groups (n=10): Group1:Er:YAG laser+Clearfil S3 Bond(Kuraray Co Ltd); Group2:Er:YAG laser+Adper SE Plus(3M Espe); Group3:Er:YAG laser+laser etch(120mj/10Hz)+Adper Singlebond2(3MEspe); Group4:Er:YAG laser+acid etch +Adper Singlebond2; Group5:Er:YAG laser+Adper Singlebond2(no etching); Group6:Bur+acid etch+Adper Singlebond2; Group7: Bur+ Clearfil S3 Bond; Group8: Bur+Adper SE Plus. Cavities were prepared by Er:YAG laser (enamel 300mj/30Hz, dentin 200mj/15 Hz) or diamond bur in a high-speed handpiece. Adhesives were applied to the teeth according to the manufacturers' instructions;the teeth restored with Filtek Z250(3M Espe) were stored in distilled water at 37°C for 24h and thermocycled (5°C-55°C)500 times.The specimens immersed in a 0.5% aqueous solution of methylene blue for 24h were embedded in acrylic resin and sectioned longitudinally.The teeth/restoration interfaces were assessed for dye penetration by light stereomicroscopex35 and image analysis program.The data was analyzed by Kruskal Wallis and Mann Whitney U tests.

Results: Groups 3-6 demonstrated the lowest,Group 8 showed the highest occlusal microleakage scores. Groups 6 and 5 exhibited the lowest and highest gingival scores,respectively. Groups 3,5 showed significantly higher($p<0.05$) gingival scores than occlusal scores.

Significancies in occlusal scores were found between

Groups 1-3 ($p<0.05$), Groups 1-6 ($p<0.05$),
Groups 2-8 ($p<0.05$), Groups 3-5 ($p<0.05$),
Groups 3-7 ($p<0.05$), Groups 3-8 ($p<0.01$),
Groups 4-8 ($p<0.05$), Groups 5-6 ($p<0.05$),
Groups 6-7 ($p<0.05$), Groups 6-8 ($p<0.01$).

Significant differences in gingival scores were determined between

Groups 1-3 ($p<0.05$),Groups 1-5 ($p<0.01$),
Groups 2-5 ($p<0.05$), Groups 3-4 ($p<0.05$),
Groups 3-6 ($p<0.01$), Groups 3-7 ($p<0.01$),
Groups 4-5 ($p<0.01$), Groups 5-6 ($p<0.01$),
Groups 5-7 ($p<0.01$).

Conclusion:

AdperSE plus has demontrated significantly less microleakage in Er:YAG laser prepared cavities than bur prepared cavities. CLEARFIL™ S3 BOND (Tri-S BOND) showed no significancies in microleakage on bur or laser prepared dentin. Cavity preparation methods and etching types had no significant effects on occlusal leakage for Adper Singlebond2. Supported by Istanbul University BAP/2445.

CLEARFIL™ PROTECT BOND and Chlorhexidine Antibacterial Activity on Dentin

745 2% chlorhexidine and MDPB antibacterial effect in caries affected dentin

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Objectives: The aim this study was to evaluate the long term (60 minutes) antibacterial effect of antibacterial monomer (Clearfil SE Protect Primer with MDPB) and 2% chlorhexidine digluconate (CHX) on Streptococcus mutans in demineralized dentin surface.

Methods: Blocks of demineralized dentin was produced in vitro using an acid gel model and contaminated with S mutans (n=6). The dentin blocks were divided into 20 groups according to type of adhesive systems (Clearfil SE Bond (SE), Clearfil SE Protect (CP) and Adper Single Bond 2 (SB), surface cleaning with CHX (with and without) and bacterial time exposition (15, 30, 60 min) and negative (no treatment+contamination) and positive controls for CHX (CHX+contamination). After 48 h, incubated anaerobically at 37C, the number of viable bacteria was assessed by counting the colonies formed (CFU) for all groups. Data from bactericidal activities were analyzed by Friedman test, ANOVA-R and t test (LSD) at a significance level of 0.05.

Results: There was no statistically significantly difference between SE/15 min and SB/30 min with no chlorhexidine cleaning and negative and positive control for CHX, showing any antibacterial effect against S mutans. Regardless dentin cleaning surface with CHX and time of CHX contacting, the self-etching adhesives systems (SE and CP) showed a lower number of CFU than SB. However, when comparing SE and CP it can be noticed that regardless using CHX until 30 min of contacting, CP showed higher antibacterial effect.

Conclusion:
The dentin surface treatment with chlorhexidine did not show decreasing number of bacteria; however, MDPB primer contributed to the antibacterial effect of adhesive systems against cariogenic bacteria.

COMPOSITES

CLEARFIL MAJESTY™ Flow
CLEARFIL MAJESTY™ Esthetic
CLEARFIL MAJESTY™ Posterior

Radiopacity CLEARFIL MAJESTY™ Flow and Esthetic

387 Comparison of the radiopacities of different composites and corresponding flowables

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Objectives: The purpose of this study was to investigate the radioopacities of 10 composites and corresponding flowables.

Methods: The composites and corresponding flowables of Voco (Grandio Composite & Flow), FCM (Opallis Composite & Flow), Voco (Amaris Composite Q2&Flow), Kuraray (Clearfil Majesty Composite & Flow), Ivoclar/Vivadent (Tetric Evo Ceram Composite & Flow), Tokuyama (Estelite " Composite & Flow), Dentsplay (Esthetix Composite & X Flow), 3M ESPE (SupremeXT Composite &Flow), Bisco (Aelite Composite & Flow) and Ivoclar/Vivadent (Tetric N Ceram Composite & N Flow) were used. Samples were prepared using stainless steel molds of 5x2 mm. Densities of samples were calculated using aluminium (Al) stepwedge with 99% purity and containing 8 steps, increasing 1 mm in each step. Three radiographs were taken for each group. Density measurements were taken from the radiograph at 5 different points for each sample. Data were analysed using Tukey HSD tests.

Results: Among the composites, the highest composite opacity value was obtained with Tetric Evo Ceram and Tetric N ceram with 7,63 mm Al and 7.53 mm Al stepwedge values respectively. Tetric Evo Ceram and Tetric N Ceram showed no statistically significant difference with each other ($p>0.05$) whereas both groups were statistically different than the other groups.($p<0.05$). Among the flowables, Tetric Flow and Clearfil Majesty Flow yielded the highest values with 6.1 mm Al stepwedge value. Among the flowable composites, both Tetric Flow and Clearfil Majesty Flow showed no statistically significant difference with each other, as well as with Tetric Flow and Clearfil Majesty Flow ($p>0.05$). Both flowable composites showed statistically significant difference with other materials tested ($p<0.05$).

Conclusion:

Dental materials are expected to possess adequate radioopacity to be readily distinguished from dental tissues. The practitioner must be able to select the appropriate material depending on the case.

Hardness of enamel and dentin and CLEARFIL MAJESTY™ Posterior and Flow

1112 Microhardness topography of human tooth

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Objectives: Differing mechanical properties (e.g. microhardness) between composites and human teeth may result in failure of the restoration. Therefore it is necessary that an ideal dental composite yields behavior similar to human teeth.

Methods: Composites were polymerized (Celalux 2, 1000 mW cm-2, curing time according to the manufacturer) and sectioned (2mmx2mmx50mm, Medim Histosaw). Extracted human molars, which were embedded in epoxy resin before sectioning, served as a control (EpoThin, Buehler). Mean microhardness according to Vickers (MHT4 Anton Paar, force 1 N, holding time 5 sec, force velocity 0.2 N s-1) was measured in consistent distances over the whole surface. Statistics: Microhardness (HV) is given as averaged values with standard deviations (%).

Results: Highest microhardness in enamel varied between 480 HV (in tooth axis) and 100-300 HV (transversal to tooth axis). Near enamel-dentine junction hardness values between 58-200 HV were found. In the pulpal area, hardness of dentine was lowest with 65 HV in comparison to the coronal dentine with 75 HV. Microhardness decreased to ≤ 55 HV towards the cement interface. Clearfil Majesty Posterior and GrandioSO showed comparable values to enamel, whereas Filtek Supreme XT and Clearfil Majesty Flow are more similar to enamel-dentine junction. No differences were found between dentine and Filtek Silorane, Tetric EvoFlow/EvoCeram, Estelite Flow Quick and Spectrum.

Reference	Tooth Region	MHV (HV)	SD (%)
Human Tooth	Enamel	100-480	-
	Enamel-dentine	58-200	-
	Dentine	65-86	-
	Dentine-cement	<55	-

Producer	Composite	MHV (HV)	SD (%)
3M Espe	Filtek Supreme XT	93.8	16
	Filtek Silorane	70.2	24
Dentsply	Ceram X Mono	90.9	21
	Spectrum	83.7	11
Ivoclar Vivadent	Tetric EvoCeram	84.9	6
	Tetric EvoFlow	63.2	32
Kuraray Dental	Clearfil Majesty Posterior	176.6	15
	Clearfil Majesty Flow	89.6	21
Tokuyama Dental	Estelite Quick	81.0	11
	Estelite FlowQuick	69.6	18
VOCO	GrandioSO	210.9	16
	GrandioSO Flow	158.4	15
	GrandioSO Heavy Flow	175.3	12

Conclusion:

Microhardness differed depending on the tooth region and direction of loading. Regarding differences in hardness, most composites seemed to be suitable either for application in dentine or enamel. Since high hardness is required substituting the enamel, material development should be optimized with respect to enamel characteristics to reduce abrasion of the occlusal surfaces.

CLEARFIL MAJESTY™ Flow (CED/IADR)

368 Shear Bond Strength of Self-Adhering Flowable Resins to Dentin Substrates

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Objectives: The aim of this study was to compare the shear bond strength (SBS) of two self-adhering flowable resins to a flowable resin and its bonding agent.
Methods: Thirty freshly extracted human teeth were sectioned longitudinal to expose superficial dentin and dentin substrates were polished with 600 grit SiC paper. The materials tested were: two self-adhering flowable resins, Fusio Liquid Dentin (Pentron Clinical) and Vertise Flow (Kerr) and a self-etch adhesive/flowable resin, S3 Bond/Clearfil Majesty Flow (Kuraray). Manufacturers' instructions for applying of materials were strictly followed. A cylindrical teflon mould (3x4mm) was placed over the dentin substrate and filled with each of the tested materials. Ten specimens were prepared for each material and all specimens were stored in distilled water at 370 C for 24 hours. SBS was measured using a universal testing machine at a rate of 0.5mm min⁻ until failure. The load to fracture was calculated in MPa and mean data were statistically analyzed with the Welch robust analysis of variance and Games-Howell statistic at $p<0.05$. Failure patterns were analyzed using a stereomicroscope x40 in order to determine the failure modes. Representative specimens were evaluated under SEM at various magnifications.
Results: No statistically significant differences ($p>0.05$) were found between the two self-adhering materials. Significant higher SBS values were observed with the self-etch adhesive/flowable resin (Welch statistic $p<0.001$) in comparison to the self-adhering flowables. Stereoscopic evaluation of the failure patterns showed that failures of the self-adhering systems were exclusively adhesive, while the failure patterns of the self-etch adhesive/flowable resin were mixed types of failure. SEM findings confirmed the results.

Conclusion:
SBS of the self-adhering flowable resins to dentin substrates was lower than the flowable resin and its bonding agent tested.

CLEARFIL MAJESTY™ Posterior and Esthetic (CED/IADR)

315 Improvement of Archimedes method to characterize continuous composite shrinkage

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Objectives: Progress Archimedes method to obtain a better reproducibility of the continuous recording giving informations about stress between charges and matrix, during and after photopolymerization process.
Materials and method: Four composite resins have been used, Gradia Direct (GC); Clearfil Majesty™ Posterior (KURARAY); Clearfil Majesty™ Esthetic (KURARAY); Grandio® (VOCO). Samples (sphere of 5 mm diameter) made by an holder are weighted with a balance XS205DU with a tenths of a milligram precision and the LabX software (Mettler Toledo LTd, UK) in the dry air and then in the auxiliary liquid. The sample is held in suspension in the auxiliary liquid and stay between two LED lights (GC). After 30 seconds (needed time to obtain stable measurement) the two LED lights are both simultaneously switched on during 20 seconds. The weight is computed during 480 seconds by the software every second. This method allows a better understanding of the behavior of composite resin during curing process.
Results: From 30 to 60 seconds, there is an exothermic peak due to the rise of temperature of the auxiliary liquid. Results give the volumetric contraction as shown in the table below:

Product	Average weight in the dry air	Average contraction at 50sec	Average contraction at 480sec	Exothermic peak
Gradia Direct	0.1081±0.0027	1.2099±0.0069	1.8827±0.0016	0%
Clearfil Majesty™ Posterior	0.1817±0.0024	0.8157±0.0030	1.3777±0.0024	0.42%
Clearfil Majesty™ Esthetic	0.1252±0.0022	1.1954±0.0018	1.4531±0.0018	0%
Grandio®	0.1621±0.0031	0.7911±0.0069	0.7911±0.0068	0.42%

The analysis of graphics reveals different stress evolutions between charges and matrix of each resin in relation with their density. A 40 seconds polymerization time (higher rate polymerization) could be of course realized to quantify the final contraction.

Conclusion:
With the improvement of methodology, results show a good reproducibility and explain materials behavior regarding shrinkage. There are differences between each composite resin, which demonstrate the interest of this continuous registration technique

CORE BUILD-UPS

CLEARFIL™ DC CORE AUTOMIX

CLEARFIL™ DC CORE AUTOMIX

600 Effect Of Delayed Light-polymerization On Volumetric Shrinkage Of Dual-cured Composites

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Objectives: To measure the effect of time delay before light-polymerization on volumetric shrinkage (VS) of dual-cured composite core materials.

Methods: Clearfil DC Core (DC - Kuraray America), LuxaCore Dual (LU - DMG), Gradia Core (GC - GC America), FluoroCore 2+ (FC -Dentsply-Caulk) and MultiCore (MC - Ivoclar-Vivadent) were light polymerized for 40 s (Optilux 501-Kerr, output >600mW/cm2) after different delay times (0, 30, 60, 90, 120 s). VS (n=4) was measured using AccuVol (BISCO). Original volume was recorded 5 s after sample placement and VS was recorded at 10 min after light-polymerization. Data were analyzed using Two-Way ANOVA with material and time delay as independent variables.

Results: The volumetric shrinkage curves of the materials were shown in the graph below. There was a significant difference in VS for both material ($p < 0.001$) and time delay ($p < 0.001$). There was also a statistically significant interaction between material and time delay ($p \leq 0.001$). Immediate light-polymerization had the highest VS for all materials tested - LC (5.34 ± 0.23%), MC (5.09 ± 0.12%), GC (4.88 ± 0.17%), FC (4.54 ± 0.22%) and DC (4.17% ±0.21%). A significantly lower VS was observed after a 30 sec delay in light-polymerization for DC (3.07 ± 0.27%), GC (4.23 ± 0.14%) and LC (4.84 ± 0.13%). Further decreases in VS occurred after longer delay periods to different degrees. DC had the lowest VS at each light-polymerization interval; MC had the highest VS at most polymerization intervals.

Conclusion:
Delayed light-polymerization reduced VS of all dual-cured composite core materials tested to varying degrees.

Sponsored by Premier Dental Company.

RESIN CEMENTS

CLEARFIL™ ESTHETIC CEMENT
PANAVIA™ F 2.0

CLEARFIL™ ESTHETIC CEMENT

1910 A Comparison of Shear Bond Strength Using Three Curing Lights

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Objectives: To evaluate in vitro shear bond strength of indirect composite to various cements using three curing lights with and without thermocycling.
Methods: Extracted human teeth were sectioned, ground to expose superficial dentin and embedded in acrylic. Indirect composite cylinders, 3mmX4mm (Premise, Kerr) were polymerized under nitrogen pressure. The cylinders were then bonded to dentin using either Clearfil Esthetic cement (Kuraray) or RelyX Unicem cement (3M ESPE) according to manufacturer's instructions. The specimens were cured contacting the cylinder using one of three curing lights, Flash Lite Magna (Discus), Valo (Ultradent), Optilux 501 (Kerr), Half of the specimens were thermocycled for 500 cycles at 5-55°C and the remaining were stored at 37°C for 24 hours prior to shear strength testing using an Instron machine. Data was analyzed by one-way ANOVA and Tukey's post hoc test at the 0.05 level of significance.
Results: Mean shear bond strengths in megapascals (MPa) for non thermocycled and thermocycled, respectively were: Flash Lite Magna 10.41, 7.58; Valo 14.26, 12.57; Optilux 501 12.43, 8.42. Mean shear bond strengths for nonthermocycled and thermocycled cements were: Clearfil 14.81, 10.0; RelyX Unicem 9.93, 9.05; respectively. Significant differences were found between: the Valo and Optilux 501 (p=.026), Valo and Magna (p=.001). Significant differences were also found between the two cements (p=.007) and thermocycled versus non thermocycled results (p=.014).

Conclusion:
The Valo curing light showed significantly higher bond strengths amongst the three lights evaluated, while Clearfil cement outperformed RelyX Unicem. Thermocycling significantly lowered the bond strengths of indirect resins for all light and cement combinations. Supported in part by Kerr, Kuraray, and 3M ESPE.

CLEARFIL™ ESTHETIC CEMENT (CED/IADR)

230 Bond strength of resin cements to bleached-ozone applicated enamel

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Objectives: To evaluate the bond strengths of two resin based cements bonded to ozon-treated or non-treated bleached enamel.

Methods: Eighty freshly extracted sound human maxillary incisor crowns were assigned to eight groups (n = 10): (G1, G2) bleached (10% carbamide peroxide, Opalescence) without or (G3,G4) with application of gaseous ozone (40%, 50 second, CR probe, Biozonix; High-Frequency Ozone Generator, Germany), (G5, G6) ozon treated without bleaching and (G7, G8) untreated control groups. The crowns were embedded in acrylic resin and flat enamel surfaces were exposed. Specimens were bonded with one of the two resin cements: Secure Cement (Sun Medical) (G1, G3, G5, G7); Clearfil Esthetic Cement (Kuraray) (G2, G4, G6, G8). Three x 3 build-ups were created with the resin cements and allowed to set (37°C, 100% humid, 24 hrs) and then tested to failure for shear bond strength (0.5 mm/minute). The data was calculated as MPa and analyzed using Kruskal-Wallis test ($P < 0.05$).

Results: There was no statistically significant difference among groups ($p>0.05$), except ozone treated unbleached Secure Cement group (G5) ($p < 0.05$). The bond strength results were significantly decreased by the application of ozone in unbleached Secure Cement group.

Conclusion:

Ozone application on bleached enamel surfaces can not alter Secure Cement and Clearfil Esthetic Cement bonding to enamel. In addition, following the ozone treatment on enamel surface, the use of Secure Cement may not be prefered in clinical conditions.

CLEARFIL™ ESTHETIC CEMENT (CED/IADR)

120 Bonding effectiveness of luting composites to zirconia ceramics

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Bonding to dental zirconia ceramics has been shown to be challenging.

Objectives: To evaluate the effect of mechanical surface conditioning and artificial aging on the micro-tensile bond strength (μTBS) of two dual-cure composite cements to zirconia ceramics.

Methods: Fully sintered IPS e.max ZirCAD (Ivoclar-Vivadent) blocks were either (1) not pre-treated or (2) subjected to tribochemical silica coating (CoJet, 3M ESPE) for 2 sec (at a distance of about 10 mm). Next, the silane coupling agent Clearfil Ceramic Primer (Kuraray) was applied during 60 sec, followed by gentle air-drying, after which two zirconia blocks were bonded together using one of two dual-cure composite cements (Panavia F2.0 or Clearfil Esthetic Cement, Kuraray). The specimens were trimmed at the interface to a cylindrical hour-glass shape (diameter = about 1.2 mm). All specimens were stored for 7 days in distilled water at 37°C, after which they were randomly divided into 2 sub-groups; half of the specimens were subjected to 10,000 thermocycles between 5 and 55°C during 10 days; the other half were further immersed in 37°C water for 10 days (n=15-20 per group). After storage, the μTBS was determined in MPa. Data were analyzed with Weibull, three-way ANOVA and Turkey's test ($P<0.05$). Fractographic analysis was performed using SEM.

Results: Weibull analysis revealed the highest (scale-parameter of 54), most reliable (shape-parameter of 3.5) and least low (Blife significantly higher at 10% unreliability) values for the CoJet-Panavia F2.0 group, thereby scoring significantly higher than any other group. Without tribochemical silica coating, the lowest μTBS was measured for Panavia F2.0 (Tukey, $p<0.05$). When Clearfil Esthetic cement was used, neither tribochemical silica coating, nor thermocycling influenced the μTBS.

Conclusion:

Mechanical surface conditioning using tribochemical silica coating appeared needed for Panavia F2.0 to effectively bond to zirconia ceramics, while not for the more hydrophobic Clearfil Esthetic Cement.

CLEARFIL™ ESTHETIC CEMENT (CED/IADR)

437 Efficiency of Bonding Agent on Dentin for Self-Adhesive Resin Cements

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Objectives: This study evaluated the effect of additional bonding agent application prior to the application of three self-adhesive resin cements on dentin surface.

Methods: Occlusal surfaces of 105 human third molars were flattened and wet ground with 600 grit SiC paper to expose deep dentin surface. The teeth were embedded in acrylic resin. The molar specimens were divided into 7 groups (n=15 per group). For group 1 Maxcem (Kerr, USA) resin cement was applied onto dentin surfaces. For group 2 bonding (Clearfil DC, Kuraray, USA) was applied and light cured, followed by application of Maxcem resin cement. For group 3 RelyX Unicem(3M ESPE, USA) resin cement was applied onto dentin surfaces. For group 4 bonding was applied and light cured, followed by application of RelyX Unicem resin cement. For group 5 Clearfil SA(Kuraray, USA) resin cement was applied onto dentin surfaces. For group 6 bonding was applied and light cured, followed by application of Clearfil SA resin cement. For group 7 Panavia F 2.0 (Kuraray, USA) was applied onto total-etched dentin surfaces after application of bonding (Panavia F 2.0 ED Primer, Kuraray, USA), as a control group. The shear bond strength of the specimens were evauated using a universal testing machine (Shimadzu AG-IS, Shimadzu, Japan(0.5 mm/min). The data were submitted to one-way analysis of variance (ANOVA), followed by Tukey's HSD post-hoc test (α=.05). Additionally, the hybrid layer and surface pattern was investigated for all groups using scanning electron microscopy (SEM).

Results: Higher mean bond strengths were obtained using bonding to dentin before application of self-adhesive resin cement (P<.001). Maxem self-etch resin cement yielded to the lowest mean bond strengths, while control group showed the highest bond strength among all groups (P<.001).

Conclusion:
Application of bonding agent on dentin increased the bond strength of self adhesive cements.

PANAVIA™ F2.0 (CED/IADR)

371 Ferrule-effect and fiber-post placement: influence on fatigue and fracture resistance

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Thanks to the significant progress adhesive dentistry has made, post placement might be avoided in light of a less-invasive tooth build-up approach.

Objectives: To evaluate the influence of the ferrule effect (1) and the fiber-post placement (2) on the fracture resistance of endodontically treated teeth subjected to cyclic fatigue loading.

Methods: 40 extracted single-rooted upper premolars were sectioned at the CEJ (groups a and b) or 2 mm above the CEJ (groups c and d), and subsequently endodontically treated. After 24-hour water storage at 37°C, specimens were restored according to four build-up approaches (n=10 per group): a. NF-NP (no ferrule, no post), b. NF-P (no ferrule, fiber-post), c. F-NP (ferrule, no post), d. F-P (ferrule, fiber post). RelyX Posts (3M-ESPE) were used in groups NF-P and F-P, and were cemented with Panavia F 2.0 (Kuraray). A standardized composite core was built, after which the specimens were restored with an all-ceramic crown (IPS Empress CAD, Ivoclar-Vivadent) that was cemented with Panavia F 2.0. Specimens were fatigued by exposure to 1,200,000 cycles using a chewing simulator (Willytech). All specimens that survived fatigue loading were fractured using a universal loading device (Microtester, Instron). Data were statistically analyzed using ANOVA.

Results: Only one NF-NP specimen failed under fatigue. The ferrule effect significantly enhanced the fracture resistance of the restored teeth, regardless the use of a post (p=.003). F-NP obtained the highest fracture resistance (758.52±121.89 N), which was not significantly different from F-P (647.58±132.95 N); NF-NP presented the lowest fracture resistance (361.52±151.69 N). For all groups, only 'repairable' failures were recorded.

Conclusion:
Avoiding extra-removal of sound tooth structure, rather than placing a fiber post, can protect endodontically treated teeth against catastrophic failure. However, when any ferrule can be preserved, a fiber-post may improve the retention and fatigue resistance of the restoration.

KURARAY'S EXPERIMENTAL MATERIALS

CLEARFIL™ SE BOND, CLEARFIL™ S³ BOND (Tri-S BOND) and MTB-200 (New Kuraray Bonding Material)

1090 Bond-durability of an Experimental 1-bottle Self-adhesive After 3-months Water Storage

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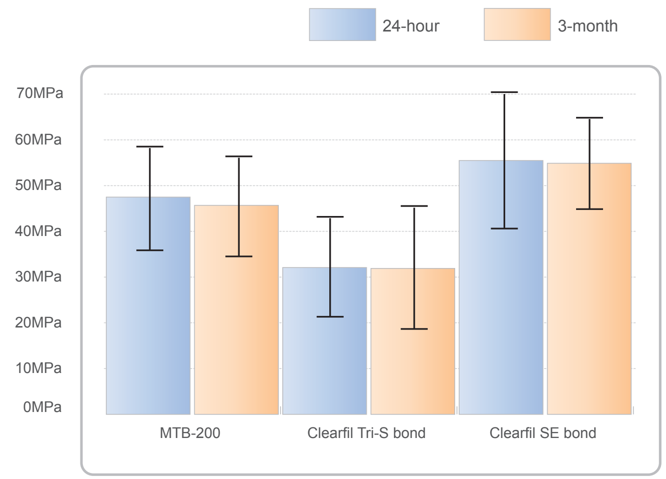
Objective: Studies have established the clinical success of 1-bottle self-adhesive systems. The purpose of this study was to evaluate dentin bond-durability using an experimental one-bottle self-adhesive over 3-months water storage.

Methods: 30-non-carious extracted human molars were prepared with a diamond saw & the dentin surfaces were prepared with a 600-grit SiC paper & randomly divided into 3-adhesive groups: an experimental 1-bottle self-adhesive MTB-200 (Kuraray Medical, Tokyo, Japan), 1-bottle self-adhesive Clearfil Tri-S Bond (Kuraray Medical, Tokyo, Japan) & 2-step self-etch adhesive Clearfil SE Bond (Kuraray Medical, Tokyo, Japan). Each adhesive was applied to the dentin surface following manufacturer's instructions. Clearfil AP-X resin composite (Kuraray Medical, Tokyo, Japan) was incrementally built to bonded area 1.0 x 1.0mm & a height of 10mm & light cured. After 24-hours or 3-months storage in distilled water at 37°C, micro-tensile bond-strength tests (CHS=1.0mm/min) were performed using an Instron 4443 (n=45). Data were analyzed by ANOVA & Tukey's test (p<0.05).

Results: The table shows mean & S.D. in MPa. Same superscript indicates no statistically significant difference.



Conclusion:

Statistical analysis showed no differences between the bond-strengths after 24-hours or 3-months storage times for the 3-adhesives. Our data suggests the dentin bond-strength of MTB-200 was very stable & not negatively affected by 3-month storage in water.

CLEARFIL™ S3 BOND (Tri-S BOND) and MTB-200

1088 Adhesive Property of a New Self-etching Bond System "MTB-200"

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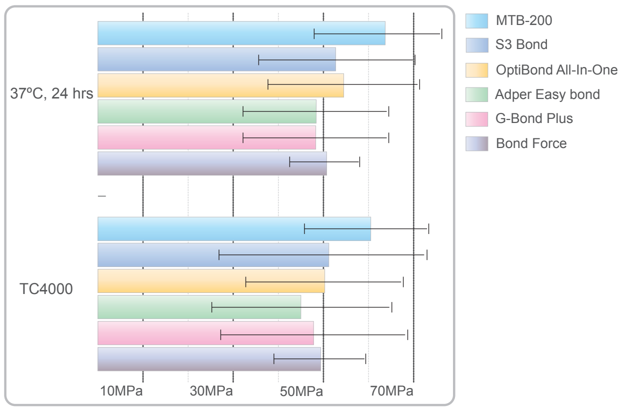
Kuraray Medical Inc. has developed a new self-etching bond system "MTB-200". "MTB-200" is a single-component and light-cured single-step fluoride-releasing bonding system comprised of an adhesive phosphate monomer (MDP), methacrylate monomers, water, ethanol, initiators, sodium fluoride and filler. It contains a new photo-initiator for enhanced curing characteristic and a new hydrophobic methacrylate for reduced water absorption.

Objectives: The purpose of this study was to compare the micro-tensile bond strength (μTBS) of "MTB-200" to human dentin with other 5 commercial single-step adhesives; CLEARFIL S3 BOND/ Kuraray Medical, OptiBond All-In-One/ Kerr, Adper Easy Bond/ 3M ESPE, G-BOND PLUS/ GC and BOND FORCE/ Tokuyama.

Methods: Crowns of extracted human molars were removed using a low-speed cutting device to create flat dentin surfaces. Surfaces were finished with 600-grit SiC paper and adhesives were applied according to the manufacturer's instructions. CLEARFIL AP-X (Kuraray Medical) was used for composite build-up to a thickness of 4mm. After storage in 37˚C water for 24 hrs, the specimens were cut in two perpendicular directions to obtain sticks with approx. area of 1.0mm2. Sticks of each group were further divided into two groups, and half of the sticks were subjected to thremocycling (4˚C-60˚C, 1 min. each, 4,000 cycles: TC4000). The μTBS was measured using a universal testing instrument (Shimadzu).

Results: The μTBS after 24 hrs immersion and TC4000 are shown in Table 1. "MTB-200" showed the highest bond strengths to human dentin both after 24hrs and TC4000 among the single-step adhesives tested in this study.



Conclusion:

This result indicated that the μTBS of "MTB-200" might exhibits reliable clinical performance equal or superior to single-step adhesives used in this study.

MTB-200, CLEARFIL™ S3 BOND (Tri-S BOND)

1902 Microtensile Bond Strength of the newly developed one-step adhesive

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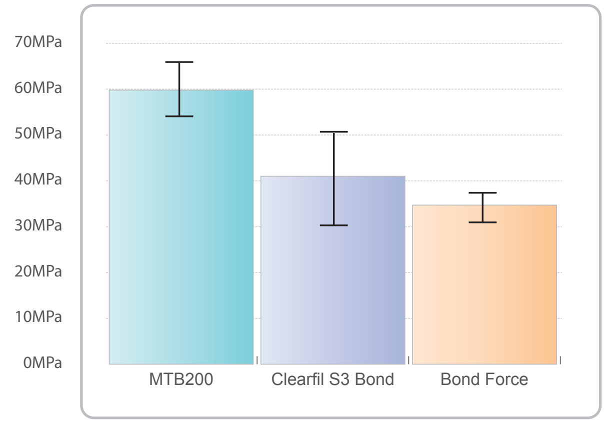
Objectives: To evaluate the newly developed one-step adhesive system bonded to dentin, compared with commercially available one-step adhesives.

Methods: Flat coronal dentin surfaces of extracted third human molars were prepared. One-step adhesive systems, MTB-200 (Kuraray Medical Inc.), Clearfil S3 Bond (Kuraray) and Bond Force (Tokuyama Corp.) were applied to the dentin surfaces according to the manufacturer's instructions. A hybrid resin composite (Clearfil AP-X, Kuraray) was used for the coronal build-up. After storage in water for 24h, the specimens were vertically sectioned into slabs that were trimmed to hourglass shapes and subjected to micro-tensile bond testing (μTBS). The data were statistically analyzed using a one-way ANOVA and Dunnett T3 test (α=0.05).

Results: Values are in MPa±S.D.(n=10). Groups identified by the different superscript letter are significantly different (p<0.05).

	MTB200	Clearfil S3 Bond	Bond Force
mTBS	59.8±6.8A	41.0±9.6B	34.7±3.1C

MPa (SD)



Conclusion:

μTBS of newly developed one-step adhesive was significantly higher than other one-step adhesives tested in this study. Supported by GCOE program at TMDU and #20791382 from MEXT of Japan.

CLEARFIL MAJESTY™ Flow and MTB-200 (New Kuraray Bonding Material)

3203 Early No Interfacial-Gap Incidence vs. Flexural Modulus with Injectable Composites

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Objectives: A major research concern is the relationship between the no interfacial-gap incidence in restorations (NG) and their flexural modulus (FM) (Dent Mater 2010; 26: 608-615). This study was analyzed the relationship between NG and FM with injectable composites/self-etching adhesives [Sure-Fil SDR Flow/Xeno IV, Dentsply/Caulk (SX); Premise Flowable/Kerr SE Adhesive System, Kerr (PK); G-aenial Universal Flo/G-Bond Plus, GC (GG); Beautifil Flow Plus F03/FL Bond II, Shofu (BF); Estelite Flow Quick/DBC-510, Tokuyama (ED); Clearfil Majesty Flow /MTB-200, Kuraray (CM)].

Methods: Class II cavities were placed in extracted premolars. Restorative procedure were performed according to manufacturers' instructions and via incremental technique. Groups of restored teeth were polished and then sectioned in a mediodistal direction through the center of the restoration immediately (IM) and after one-day storage (1-D). The presence or absence of gaps around the restorations was measured at 14-points (each 0.5 mm apart) along the cavity restoration interface (N=10; total points measured=140). The incidence of tooth/adhesive interfaces with no gaps for 10 specimens was expressed as a percentage of measured total points (NG). The flexural moduli were measured for the same composite materials and conditions (FM). Statistical analyses were conducted by Mann-Whitney U-test (for NG) and t-test (for FM). Possible correlation between pairs of two parameters was analyzed by linear regression.

Results: NG (%), FM (GPa, Mean (SD), N=10) SX PK GG BF ED CM IM 94, 1.0 (0.1) 93, 1.9(0.3) 93, 5.5(0.8) 94, 4.0(0.3) 94, 4.1(0.4) 94, 4.7(0.4) vs. NS, S NS, S NS, S NS, S NS, S NS, S 1-D 94, 7.2(0.3) 94, 6.7(0.3) 94, 8.6(0.6) 96, 8.7(0.5) 94, 9.2(0.6) 96, 10.2(0.6) S: Significant different ($p<0.05$), NS: Not significant different ($p>0.05$). No relationship was found between two parameters ($r=-0.42$, $p>0.50$, N=12).

Conclusion:

There was no relationship between NG and FM in injectable composites.

MTB-200 (New Kuraray Bonding Material)

2462 Influence of Dentin Surface Conditions on Bond-strength with 1-bottle Systems

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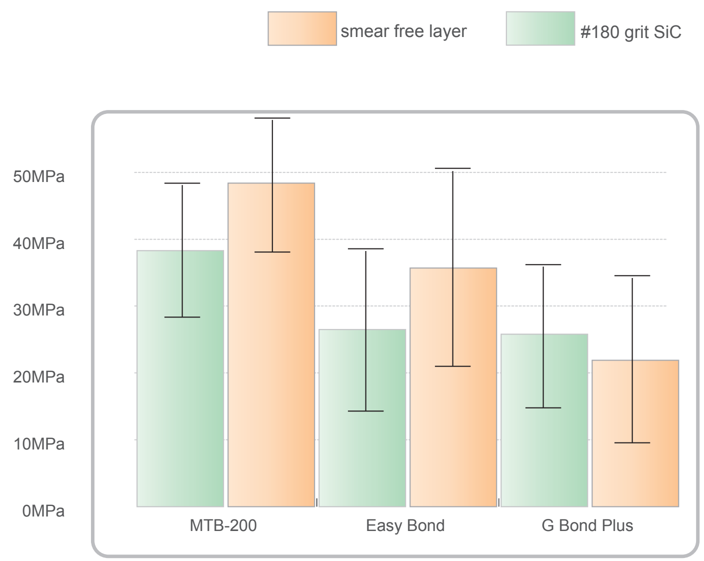
Objectives: The purpose of this study was to compare the influence of dentin surface conditions on microtensile bond-strength tests of 1-bottle self-adhesive systems.

Methods: Eighteen non-carious extracted human third-molars were prepared using a diamond saw to expose the dentin surface and then prepared with a 180-grit SiC paper, or a diamond paste to create a smear free layer. Teeth were randomly divided into 3-groups of 1-bottle self-etching systems, MTB-200 (experimental, Kuraray Medical, Japan), Adper Easy Bond Self-Etch Adhesive (3M, USA) and G Bond Plus (GC, Japan). Each adhesive was applied to the dentin surface following manufacturer's instructions and Clearfil AP-X resin composite (Kuraray Medical) then incrementally built on a bonded area of 1.0 x1.0mm to a height of 10mm and light-cured. After 24-hour storage in distilled water at 37ºC, microtensile bond tests were performed at CHS=1.0mm/min on an Instron 4443 (n=27). Data were analyzed by ANOVA & Tukey's test ($p<0.05$).

Results: Table shows mean and S.D. in MPa. Same superscript in the table indicates no statistically significant difference.



Conclusion:

There were statistically significant differences between the bond-strength of the dentin surface conditions with the experimental 1-bottle adhesive MTB-200 and Easy Bond. Our data show the dentin bond-strength of MTB-200 and Easy Bond were affected by dentin surface conditions.

MTB-200 (New Kuraray Bonding Material)

2464 Influence Saliva Contamination on Dentin Bonding Using Experimental Adhesive

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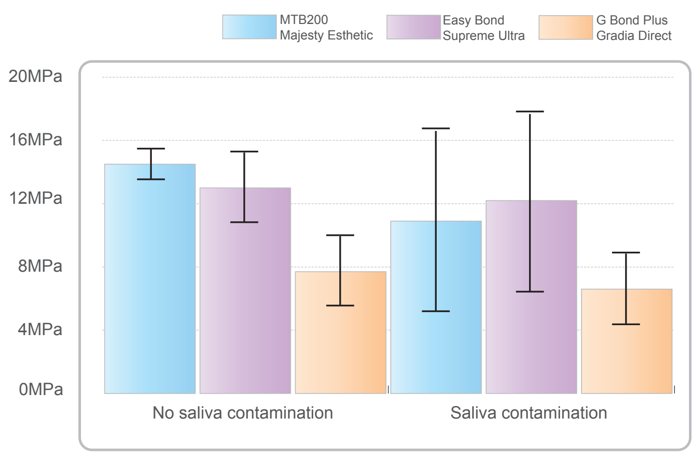
Objective: To evaluate the influence of saliva contamination on dentin bond-strength of a new experimental 1-bottle self-etch adhesive.
Methods: Flat dentin surface was prepared on 60-bovine teeth and then attached to plastic molds by a self-curing acrylic resin. The labial surface was ground with 180-grit Si-C paper to expose the dentin and create a smeared layer. Teeth were randomly divided into 6-groups (n=10). Dentin surfaces were treated with 1-bottle self-etch adhesives, MTB-200 (experimental, Kuraray Medical), Adper Easy Bond (3M) and G Bond Plus (GC) per manufacturers' instructions for control groups. In the saliva contaminated group, human saliva was applied for 20-secs before adhesive application. A split polyethylene mold (inner diameter; 4mm) was placed onto the dentin surface and resin composite (Majesty Esthetic (Kuraray Medical), Supreme Ultra (3 M) and Gradia Direct (GC)) was filled into the mold and light cured for 40-secs. Shear bond-strength test was carried out after storage in distilled water at 37 °C for 24-hrs (CHS= 1.0 mm/min). Data was statistically analyzed (one-way ANOVA and t-test, $p = .05$).
Results: The table shows both mean and S.D. in MPa. Same superscript indicates statistically significant differences.



Conclusion:
Saliva contamination did not affect the dentin shear bond-strength of the experimental 1-bottle self-etch adhesive MTB-200 system.

MTB-200 (New Kuraray Bonding Material)

1557 Long term bonding performance of contemporary and experimental self-etching adhesives

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Objectives: The objective of the present study was to evaluate the long-term bonding performance of two commercial self-etching systems (SESs) and one experimental SES using a PCR thermal cycler.
Methods: Twelve human third molars were used in this study and every four teeth were randomly assigned to each system. The adhesives employed were two commercial all-in-one SESs, CLEARFIL TRI-S BOND (TriS, Kuraray), BeautiBond (SHOFU), and one experimental all-in-one SES, MTB-200 (Kuraray). BeautiBond was a HEMA-free adhesive, whereas TriS and MTB-200 were HEMA-contain adhesives. MTB-200 also incorporated hydrophobic monomers. After removal of crown segment, #600 SiC paper was employed to polish the dentin surface under water. Then the adhesives were applied following the instruction of each manufacture and followed by the resin composite build-up. After storage in 37oC distilled water for 24 hours (1day) or in PCR thermal cycles for 20,000 times (TC20k), the specimens were sectioned into the beams with the cross sectional area 1.0mm2 for the micro-tensile bond strength test (MTBS) at a crosshead speed of 1mm/min. The obtained data were expressed as MPa and statistically analyzed with one-way ANOVA and Tukey HSD test.
Results: The mean±SD of MTBS in descending order were: 72.52±17.17 (MTB-200, 1day), 69.70±19.30 (MTB-200, TC20k), 64.78±14.19 (TriS, 1day), 58.71±12.86 (TriS, TC20k), 31.03±17.08(BeautiBond, 1day), 26.89±14.78 (BeautiBond, TC20k). In statistical analysis, MTB-200-1day showed a significantly higher MTBS ($p<0.05$) than the TriS-TC20k.

Conclusion:
Newly developed SES (MTB-200) showed comparable or better bonding performance compared to marketed SESs over time.

New Clearfil Core Material (NDC-100) and Bond (MTB-200) System

1110 Characteristics of a New Core Build-up System "NDC-100" and "MTB-200"

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Kuraray Medical Inc. has developed a core build-up system consisted of a new dual-curing composite resin "NDC-100" and a new one bottle self-etching bond system "MTB-200". "NDC-100" is a two-paste formula composed of methacrylate monomers, initiators, new polymerization accelerator and fillers delivered in an auto-mix dual-syringe. "MTB-200" is a single-component and light-cured single-step bonding system which contains an adhesive phosphate monomer (MDP) and chemical initiator to work effectively with "NDC-100" in self-curing mode.
Objectives: The purpose of this study was to compare tensile bond strength of the core build-up system "NDC-100" and "MTB-200" with those of other commercially available core materials (CLEARFIL DC CORE AUTOMIX; Kuraray medical, LuxaCore Dual; DMG, Rebilda DC; VOCO, ESHTELITE-CORE QUICK; Tokuyama Dental, Unifil Core EM; GC).
Methods: Bovine dentin surfaces were treated with core build-up systems according to each manufacturer's instructions. All the specimens were immersed in water at 37˚C for 24 hours prior to performing the tensile bond strength test.
Results: Table 1 showed the tensile bond strength of each core build-up systems to bovine dentin.

Core build-up system			Curing condition	Composite/Bond
Core material	Bond	Bonding system	light/light	self/self
NDC-100	MTB-200	One Bottle One Step	18.5(6.4)	12.4(2.8)
DC Core Automix	DC BOND	Two Bottle One Step	17.6(5.1)	7.5(1.3)
LuxaCore Dual	Contax	Three Bottle Two Step	9.9(2.7)	2.3(2.2)
Rebilda DC	Futurabond DC	Two Bottle One Step	6.2(3.0)	1.3(1.2)
Esthelite Core Quick	Esthelite Core Quick Bond	Two Bottle One Step	17.3(6.4)	10.2(5.5)

MPa (SD)

Conclusion:
New core build-up system "NDC-100" and "MTB-200" showed the highest bond strength to bovine dentin both in light/light and self/self mode among the evaluated core build-up systems.

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All abstracts were submitted and accepted for the Scientific Program of the 89th General Session of the International Association of Dental Research, San Diego, USA and the 45th meeting of CED/IADR in Budapest. The abstracts (objective, methods, results, and conclusion) were reproduced unchanged as submitted by their authors. The data in the abstracts are reformatted into charts or graphs, and the data are the same as in the original. This is permitted by the International Association of Dental Research.

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