

1425 Milling Disc Wear Effects on Fracture Resistance of Cerec CAD/CAM Restorations. A.L. DAVID*, S.B. DAVID, and L. GETTLEMAN (University of Louisville, School of Dentistry, Louisville, Kentucky 40292 USA, and NYU College of Dentistry, New York City)

The Cerec CAD/CAM (Siemens/Pelton & Crane) is the first commercial chairside computer-designed and -manufacturing device to make esthetic dental inlays, onlays, and veneers. A bonded diamond milling disc (1-sided and edge coated) generates the interior of the restoration. Surface scratches in brittle materials left by the milling discs may initiate cracks which could lead to clinical failure [Kunzelmann & Hickel (1990), Bauer & Fasbender (1995)]. As it wears and the diamond particles are lost, cutting efficiency decreases. The process may take longer, stalling the drive motor, or the disc may become clogged, to produce inefficient cutting, heating and generation of latent surface stresses.

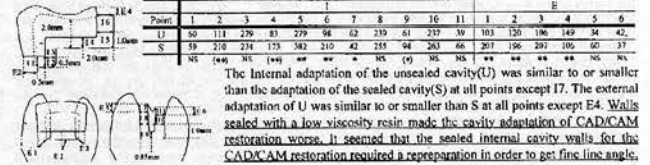
This study characterized the aging of

Cerec diamond discs and the effect on the surface texture of milled Vita Mark II porcelain. Two groups of 21 and of 19 blocks were milled into rectangular bars 2.8 x 4.3 x 12 mm, using new diamond discs until either the drive motor stalled or the elapsed milling time exceeded the estimated time by 10%. The bars were fractured in 3-point bending at 0.4 mm/min on an Instron.

Modulus of rupture for each group was 6.94 (SD=0.69) and 6.59 (SD=0.59) MPa. No significant differences were found over time between specimens cut with new or used discs. The effect of deep cuts by diamond particles may offset latent stresses by a dull disc. Exceeding the estimated cutting time up to 10% had no effect on Vita Mark II porcelain strength.

1426 Effect of Wall Seal with a Low Viscosity Resin on Cavity Adaptation of CAD/CAM Restoration. S.NAKAMURA*, Y.NARA and II.TANAI (Nippon Dental University, School of Dentistry at Tokyo)

Seal the internal dentin walls of a cavity with a low viscosity resin is very effective not only as a layer of stress breaker but also as a layer of pulp protection and leakage control. The purpose of this study was to examine the effect of wall seal with a low viscosity resin on cavity adaptation of the CEREC 2 CAD/CAM system restoration. 10 standardized MO Class 2 cavities: having a same out line, buccolingual/mediodistal width of 1.75.1mm, central / mesial cavity-depth of 2.0/3.1mm, gingival wall width of 1.1mm, were prepared in epoxy models of tooth #24 by a custom - made cavity duplicator. The internal walls corresponding to dentin of five cavities were sealed with a low viscosity resin. Porcelain inlays were designed and milled by the CEREC 2 system (model D3268 and soft C.O.S 4.2). The milled inlays were inserted into two types of cavity and were luted with a dual cured resin luting material. The restored specimens were sectioned buccolingually and mesiodistally, and then polished. 11 points of the internal cavity adaptation and 6 points of the external cavity adaptation (thickness of the luting material) shown in Figure were measured by a measuring scope in μ unit.



The internal adaptation of the unsealed cavity(U) was similar to or smaller than the adaptation of the sealed cavity(S) at all points except 17. The external adaptation of U was similar to or smaller than S at all points except E4. Walls sealed with a low viscosity resin made the cavity adaptation of CAD/CAM restoration worse. It seemed that the sealed internal cavity walls for the CAD/CAM restoration required a reparation in order to get fine line angle.

1427 Marginal Adaptation of Idealized Ceramic Inlays - An In Vitro Study. G. DELCAMPO*, V. DHURU, H. MURDOCH, W. NAGY. Marquette University School of Dentistry, Milwaukee, Wisconsin.

Restorative inlays are prepared from a variety of materials including casting alloys and high alumina ceramics. Differences in material systems and fabrication procedures may produce variation in processing shrinkage. This investigation examined the margin adaptation of inlays fabricated from a high noble casting alloy (Oro B-2, Ney Co.) and a high alumina porcelain material (Vitaclor Alpha, Vident). High strength stone or refractory dies were prepared from vinyl polysiloxane impressions of a stainless steel master die with an idealized Class I preparation. For cast alloy inlays, wax patterns prepared on the dies were invested in a gypsum bonded investment employing the hydroscopic technique. The burnout and casting were accomplished according to the standard laboratory procedures. For the porcelain inlays, ceramic powder and modeling liquid mix was stacked into the refractory dies and then subjected to the firing schedule recommended by the manufacturer. The inlays were seated in the individual dies and the gaps between their margins and the die margins (Margin Discrepancy-MD) were measured at eight equally spaced locations utilizing a traveling microscope to the accuracy of 1 μ . Eight inlays were prepared from each material. Mean MD values for each of the eight locations for the eight inlays as well as the grand mean for all the locations were calculated. The data were evaluated using a t-test. The mean margin discrepancy (MD) values ranged from 17 \pm 13 μ to 30 \pm 11 μ for the alloy and from 25 \pm 5 μ to 38 \pm 5 μ for porcelain. The difference between the overall MD values for Alloy and porcelain were significant (p < 0.001). The cast inlays exhibited significant differences between the MD values for different locations (p < 0.002).

1428 Marginal adaptation and fit of ceramic overlays in vitro. J. MUNACK*, M. SCHUCKAR, W. GEURTSSEN (Dept. Cons. Dentistry & Periodontology, Medical University Hannover, FRG).

It was the purpose of this study to investigate the marginal quality of various ceramic overlay systems in dependence of two types of preparation. 72 extracted cariesfree human molars were used for the experiments. Box-shaped class II-cavities were prepared in all teeth with proximal margins located 1mm approx. coronal to the cementum-enamel-junction. All cavities were lined with a GIC and then two buccal or oral cusps of each molar were reduced for 1.5 mm approx. preparing a chamfer with rectangular transition (A) to the proximal boxes (N = 36) or an oblique transition (B) with an angle of appr. 45° resp. (N = 36). For each 12 molars of the two preparation types ceramic overlays were fabricated using the direct systems Cerec™ I (C I) and II (C II) or the indirect Empress™-system (E) resp. All overlays were fixed with a dual-curing resin composite (Duo cement™), 6 molars of each group were thermocycled (2000 cycles, 5 - 55°C), whereas the other 6 molars of each group served as controls. For the SEM-evaluation of the dimensions of the cementation gaps and the marginal adaptation at the overlay-apex replicas were made before and after the thermocycling. The marginal sealing of each restoration in this area was determined by a dye penetration performed by means of the overlays had been cut in an oro-vestibular direction. Statistical analysis was made using the Kolmogoroff-Smirnow-test (p < 0.05). No dye penetration or marginal defect (SEM) was found before and after thermocycling. The dimensions of the cementation gaps (μ m) were as follows: C I/A - 83.4 \pm 33.5; C I/B - 77.5 \pm 25.8; C I/II - 69.7 \pm 24.1; C I/B - 65.2 \pm 22.9; E/A - 31.3 \pm 15.8; E/B - 31.3 \pm 15.2. Statistically significant differences were determined between E and C I or C II resp. (p < 0.05), but not between C I and C II. Preparation type B resulted in smaller cementation gaps for the Cerec overlays (without statistical significance). From our results we conclude that with the investigated ceramic systems overlays with a good resp. excellent marginal adaptation and fit can be processed. For Cerec-overlays, an oblique transition to the proximal boxes should be prepared.

1429 Marginal Adaptation of Ceramic Veneers to Dentin in Vitro. M. CHRISTGAU, K.-H. FRIEDL, K.-A. SCHMALZ, K.-A. HILLER, U. RESCH, and N. BADER* (Dental School, University of Regensburg, Germany).

The aim of the present study was to examine the marginal adaptation of ceramic veneers to dentin at the cervical margins in comparison to enamel at the palatoincisor margin using 3 different dual-curing luting cements. Caries free, human maxillary incisors with cervical cavity margins located in dentin were used for this study. 27 ceramic veneers [IPS Empress (Vivadent)] were adhesively inserted [Sonocem (SC) with an experimental bonding system (Espo); Variolink high viscosity (VHV) and Variolink low viscosity (VLV) with Syntac (Vivadent)]. Both, the cervical and the palatoincisor margins of the veneers (composite resin cement/dentin or enamel interface) and the composite resin cement/ceramic interface) were evaluated before and after thermomechanical loading (TCLM) [5000 cycles (+5/+65°C), 72.5 N, 1.6 Hz] by quantitative scanning electron microscope (SEM) analysis using an image analysis system. Microleakage at the cervical margins was assessed by dye penetration after TCLM. Statistical analysis (Mann-Whitney-U test; α =0.05) was performed on 9 replicas including the Error-rates-method for testing the overall influence of factors. Before TCLM, the following median percentages of marginal gaps were found at the cervical margins: a) composite resin cement/dentin interface: SC 1.2%, VHV 5.1%, VLV 10.4%; b) composite resin cement/ceramic interface: SC 0.9%, VHV 8.2%, VLV 4.7%. SC showed statistically significantly less marginal gaps than the other luting systems. After TCLM, the median percentages of cervical marginal gaps were: a) composite resin cement/dentin interface: SC 8.8%, VHV 21.8%, VLV 39.5%; b) composite resin cement/ceramic interface: SC 14.3%, VHV 16.5%, VLV 21.3%. The differences between SC and VLV were statistically significant. TCLM had a statistically significant influence on marginal gap formation at the dentin and enamel margins. After TCLM, the cervical dentin and the palatoincisor enamel margins were not significantly different. Dye penetration after TCLM showed no statistically significant differences in microleakage among the 3 luting systems (median dye penetration: SC 9.5%, VHV 2.5%, VLV 2.8%). In conclusion, this in vitro study showed that similarly favorable marginal adaptations of ceramic veneers to dentin and enamel could be achieved using Sonocem or Variolink high viscosity with their corresponding dentin bonding systems.

1430 Porcelain Veneers: A Four-Year Clinical Evaluation. P. KIHN*, D. BARNES AND L. BLANK (University of Maryland Dental School, Baltimore, MD USA) and Ceramco, Inc.

Laboratory fabricated veneers for restoration of discolored or malformed anterior teeth is a widely used technique. Etched Ceramco Colorlog porcelain veneers cemented with the Ceramco Colorlog Bonding System is one technique available to the practitioner. The purpose of this study was to evaluate the clinical longevity of the porcelain veneers and the cementation system. Fifty-nine Ceramco porcelain veneers were placed in 12 patients. An intraenamel preparation was completed with a bullet nosed diamond bur in an ultra speed handpiece with air-water spray, and a polyvinylsiloxane impression made. All veneers were fabricated on die models by the same laboratory technician and placed by one practitioner. All restorations were evaluated by 2 evaluators at baseline and 54 veneers at 4 years using a modified Ryge criteria. The following alpha percentages for baseline/4 years were recorded for 54 veneers: 100%/100% color match to shade tab with veneer after final cementation; 88%/85% marginal adaptation; 100%/96% interfacial staining. Two veneers had small fracture lines in the ceramic at the incisal edge with no clinical significance. No postoperative sensitivity was reported. A decalcification was noted in the interproximal area of one veneer away from the margin interface with no clinical significance. The criteria from baseline and four years were compared for significance using a Fisher's Exact Test. There were no statistical differences in any of the categories when comparing baseline to four years. At four years, all of the restorations were clinically acceptable and all of the patients were satisfied with the esthetic results. This research is supported by Ceramco, Inc.

1431 Adaptability of Glass-ceramic Inlays: Improvement with Die Spacer Application. S. ASANO*, T. YAMADA, I. IREJIMA, M. TAKAMIZU and A. KOHNO (Teurumi Univ. School of Dental Medicine, Yokohama, Japan).

The objective of this study was to evaluate the effect of die spacer application on adaptability of glass-ceramic inlays to cavity. OCC glass-ceramic inlays (Olympus Optical Co., Japan) were processed for a tapered-cylindrical cavity (outer ϕ 5 x 2.5 mm) prepared in an acrylic block. The cavity had a taper degree of 24° and a rounded-line angle. On the plaster working dies, zero, one, two or three coats of DIE SPACER (Benzler Dental, Germany) were applied to the entire wall of the cavity, and wax patterns were then carved. OCC inlays were processed from the patterns. The inlays were seated into the original cavities in the blocks and fixed using a cyanoacrylate adhesive. The inlays and cavities were embedded and sectioned for the measurement of vertical discrepancy (μ m) from the edge of the inlay to the cavity margin. Gap widths (μ m) between the inlay and the cavity wall were also measured at cavity floor, line angle, lateral wall and cavity margin. Data were statistically analyzed by one-way ANOVA and Fisher's PLSD (n=7, p<0.05). The discrepancy (mean \pm s.d.) was 54.0 \pm 23.0 for the zero coat, 29.0 \pm 8.9 for the one coat, 1.9 \pm 18.2 for the two coats, and -29.9 \pm 10.5 for the three coats, showing significant decrease with the increase of the die spacer. The gap widths significantly decreased with the increase of the spacer at the cavity floor, but not significantly at the other measuring points except the zero and the three coats at the lateral wall and the margin. Under the conditions of this study, more than two coats application of the die spacer was necessary for securing the better adaptation of the glass-ceramic inlay to the cavity.

1432 Adaptability of Glass-ceramic Inlays: Effects of Taper and Surface Roughness. T. YAMADA*, S. ASANO, M. TAKAMIZU and A. KOHNO (Teurumi University School of Dental Medicine, Yokohama, Japan).

The objective of this study was to evaluate the effects of taper degree and surface roughness of cavity wall on adaptability of glass-ceramic inlays. Tapered-cylindrical cavities (outer ϕ 5 x 2.5 mm) were prepared in acrylic blocks using diamond points having different taper degree and particle size. OCC glass-ceramic inlays (Olympus Optical Co., Japan) were processed and seated in the cavities. They were embedded in epoxy resin and sectioned for the measurements of vertical discrepancy from the edge of the inlay to the cavity margin. Data were analyzed by two-way ANOVA and Fisher's PLSD (p<0.05).

	Regular		Fine		Superfine	
	115 μ m*		60 μ m*		25 μ m*	
Taper degree 6°	693.7 (117.6)	510.1 (67.9)	443.5 (83.0)			
12°	330.2 (115.2)	201.8 (105.2)	134.5 (29.2)			
18°	229.2 (72.0)	132.7 (73.3)	83.5 (62.2)			
24°	100.1 (51.9)	42.7 (59.7)	32.5 (22.0)			

n=7, mean (s.d.) unit: μ m
*Value showed the average size of the diamond particles.
The P-values for a factor of the taper degree and that of the surface roughness were 321.3 and 67.3, respectively. The smallest discrepancy was found in the 24°-Superfine group, but not statistically significant. The adaptability of the glass-ceramic inlay was influenced by the taper degree more than the surface roughness of the cavity wall.

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Novel X-Linked Inheritance Pattern in Craniofrontonasal Syndrome
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Craniofrontonasal Syndrome (CFNS) is the most common X-linked craniosynostosis syndrome with hypertelorism, coronal synostosis, clefting of the nasal tip and various digital and joint anomalies. In contrast to other X-linked disorders, females are more severely affected than males. As a first step in the localization of a gene involved in CFNS, linkage and cytogenetic studies were performed on familial and sporadic CFNS. We performed linkage analysis on 11 unrelated affected families using 13 well characterized, highly polymorphic microsatellite markers from the X chromosome. A lod score of 2.95 with zero recombination was obtained for marker DXS1224. Crossover events allow the CFNS gene to be placed in a 7cm interval in Xp22 between markers DXS1043 and DXS1053. To further characterize the CFNS critical region we used YACs which contained these linked markers for fluorescent in situ hybridization (FISH) to chromosomes from one CFNS individual with the cytogenetic abnormality: 46,X,del(X)(p22>pter). FISH analysis of the del(X) cell line provided evidence for the CFNS gene to map distal to DXS1043. Hypotheses to explain this unusual inheritance pattern include 1) metabolic interference in which the condition is the result of the interaction of two different alleles to produce an abnormal phenotype, 2) a functional Y-homologue which has an ameliorating effect on the mutated gene on the X chromosome. This study was supported by NIH Grants HD28732 AND HD29862.

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MICROLEAKAGE OF FOUR LUTING AGENTS USED IN FIXED PARTIAL DENTURE
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The purpose of these research was to compare the in vitro microleakage of cemented complete crowns with 4 different luting agents. Standardized preparations were made on 28 recently extracted premolars conserved in water. The finish line in a shoulder and a bevel, in buccal and lingual, was localized in enamel, and the finish line in mesial and distal was localized in cementum and dentin. The crowns were made in a Cu-Al alloy (Duracast) and we standardized the cementation technique according to the manufacturer's instructions. Seven specimens were used for each of the 4 groups: (1) Zinc Phosphate Flock's (MIZZY), (2) Composite resin-glassionomer hybrid Vitremer Luting (3M), (3) Resin Cement Avanto (VOCO) and (4) Resin Cement Panavia 21 Ex (KURARAY). The specimens were thermocycled for 400 cycles, immersed in 2% Methylene Blue solution, sectioned and observed in a stereomicroscope. The group 1 in both finish line experimented significantly more microleakage than the other groups was analyzed with the Chi Square Test and Kruskal Wallis (0,001<p<0,01), only the group 1 experimented significantly difference microleakage in the finish line localized in cementum and dentin than in enamel was used the Exact Fisher's Test (p<0,05). We concluded: **The Zinc Phosphate cemented crowns experimented significantly more microleakage than the rest of the crowns cemented with the other luting agent groups, in the finish line localized in enamel and in cementum and dentin. The luting agents Avanto, Panavia 21 Ex and Vitremer Luting didn't present significant differences for the microleakage in both finish line.**

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MICROLEAKAGE OF TWO DENTIN BONDING SYSTEMS IN CLASS V.
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The purpose of this study was to evaluate the microleakage of two system : Scotchbond MP (3M) and Optibond (Kerr) in Class V facial restorations with composite hybrid. Standardized preparations were made on 60 recently extracted premolars conserved in water. 60 Class V facial restorations with occlusal margin in enamel and gingival margin in cementum - dentin. Thirty specimens were used for both groups: (A) Scotchbond MP (3M) and (B) Optibond (Kerr) were in combination with composite resin Z-100 (3M). The specimens were thermocycled for 200 cycles (5° C to 55° C) and immersed in 2% Methylene Blue solution for 24 hours. Then, they washed for 6 hours, sectioned and observed in a stereomicroscope. The teeth were scored in a ranking system of 0 being no microleakage to 3 being microleakage to the pulp of the preparation. Kruskal Wallis and Mann Whitney test were used. The group A experimented significantly more microleakage that the group B (p < 0.001). **The Optibond experimented less microleakage that Scotchbond (3M).**

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Proximo-cervical microleakage of dentin adhesive/composite restorations in Class II cavities. M.F.L.NAVARRO*, M.SCHUCKAR*, J.MUNACK*, W.GEURTSEN* (Baunz Dental School, Sao Paulo Univ., Brazil; *Dept. Cons. Dent. & Period., Med. Univ. Hannover, FRG)

Previous studies have shown that the proximo-cervical sealing of a composite restoration with margins adjacent to the cementum-enamel-junction (CEJ) may be significantly improved by prior application of a dentin adhesive. It was the purpose of this investigation, to determine the sealing of dentin adhesive/composite resin-restorations in Class II-cavities with proximo-cervical margins at the CEJ with and without acid etching. 40 extracted cariesfree human molars were used for the experiments. In all teeth, mod-cavities were prepared and the proximo-cervical margins were positioned as follows: Groups I, II - 0.5 mm coronal to the CEJ; groups III, IV - at the CEJ (N = 10 for each group). The cavities were lined with a GIC, at all proximo-cervical margins the dentin adhesive Syntac™ (Vivadent) was applied and then the teeth were filled with a hybrid type composite resin (Tetric™, Vivadent). In groups II and IV the cervical margins were conditioned with 37% H₂O₂ for 30 s before application of the dentine adhesive. 1 week after restoration, all specimens were thermocycled (2000 cycles, 5-55°C). The proximo-cervical sealing of each filling was determined by a dye penetration test with 1% fuchsin for 24 h. The dye penetration was measured by means of a stereomicroscope (50fold magnification) after the fillings had been cut in a mesiodistal direction. The statistical analysis of the results was performed by means of H-test (Kruskal-Wallis) and U-tests (Mann-Whitney) (p < 0.05). The following dye penetration depths were determined (µm; mean ± SD): I - 1207 ± 696; II - 496 ± 511; III - 1270 ± 692; IV - 624 ± 364. The H-test revealed a statistically significant ranking with respect to the marginal sealing after thermocycling (p = 0.010): II > IV > I > III. Furthermore, the differences between groups I and II (p = 0.0205) and groups III and IV (p = 0.0256) were statistically significant too (U-tests). From our results we conclude that the acid etching of margins at or slightly coronal to the CEJ may significantly improve the proximo-cervical marginal sealing of a dentine adhesive/composite restoration.

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In vivo leakage of an adhesive system with and without NaOCl as pretreatment.
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Recent studies showed that treating dentin surfaces with NaOCl leads to removal of the collagen network and prevents hybrid layer formation, but does not lead to a decrease of shear bond strength (Wakabayashi, 1994; Gwinnett, 1994; Kanca, 1996). The aim of this study was to evaluate in vivo the marginal sealing ability of the Scotchbond MP Plus (3M) adhesive system with and without pre-treatment with NaOCl. In Group 1 (10 teeth) the adhesive system was used following the manufacturer's instructions. 35% Phosphoric acid was applied for 15" on enamel and then extended to dentin for another 15" (all etch technique). In Group 2 (10 teeth), after phosphoric acid treatment as Group 1, NaOCl was applied at a concentration of 5% for 60", followed by the priming and bonding procedures. The restorations were made in standardized Class V cavities, across the CEJ in periodontally involved vital teeth already scheduled for extraction. The teeth were extracted after two-three months of clinical service of the restorations. Subsequently the samples were kept in a 2% methylene blue solution for 24 hours, then embedded in epoxy resin. Sections were made by a water cooled low speed saw along the crown-apical axis of the teeth. The penetration of the dye was scored both at the coronal and apical sites. Kruskal-Wallis statistical analysis and Newman-Keuls MCT were performed at 5% significance level. The results showed statistically significant better result for Group 1 than for Group 2 both at the coronal and apical margins. This study showed that a hybrid layer formation improves the sealing ability of adhesive system.

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Quantitative Microleakage of Compomers and a Tri-cure Glass Ionomer Cement. J.B. Chain*, M.C. Chain, W.R. Lacefield, C.M. Russell (CAPES, CNPq/UFSC-Brazil; UAB-Birmingham AL, MCG-Augusta GA).

The purpose of this study was to determine the quantitative microleakage of class V dentin cavities restored with a new Compomer class of restorative materials, a tri-cure glass ionomer cement, and a dentin bonding restorative system. Class V preparations with a 90° cavosurface angle were made on the facial surfaces of the root of 48 extracted noncarious maxillary permanent premolars. Twelve teeth were restored with each material, following the manufacturer's instructions. The restorations were finished with 12-bladed carbide burs 15 minutes after placement, the teeth were stored in saline at 37°C for 24 hours, finished with Sof-Lex discs and then thermocycled in 2% methylene blue solution 500 times between 8°C and 50°C with a dwell time of 15s. Quantitative microleakage was determined by a spectrophotometric dye-recovery method and expressed in µg dye/restoration. The data were analyzed by 1-way analysis of variance and the Student-Newman-Keuls multiple comparison test. The results were as follows:

Vitremer™	1.09 ± 0.46µg dye
Compoglass™	0.79 ± 0.41µg dye
SBM/PZ 100™	0.70 ± 0.50µg dye
Dyract™	0.38 ± 0.45µg dye

Analysis of the data by one-way ANOVA showed that the quantitative microleakage was significantly different (p=0.0062). Dyract™ demonstrated significantly less microleakage than Vitremer™.

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Bond Strength, Microleakage of One-Component Dentin Bonding Agent.
XINYI YU and ALAN MATTHEWS* (Dent-Mat Corp., Santa Maria, CA).

The purpose of this study was to test the shear bond strength and microleakage resistance of a one component dentin bonding agent 1-DBA (Tenure Quik With Fluoride(TQF)). A dual component 2-DBA (PermaQuik(PQ)) was used as a positive control. SEM was used to evaluate the morphology of the 1-DBA-tooth. For bond strength testing, flat dentin surfaces were created on the occlusal surfaces of 20 extracted human molars. Ten specimens were prepared for each DBA. Each DBA was prepared and placed following the manufacturer's instructions. Marathon composite resin was placed inside a ring mold on the prepared dentin surface and light-cured. Specimens were stored @ 37°C overnight. Shear bond strength testing was conducted using an Instron 1011 equipped with a knife-edge blade. Mean bond strengths MPa (SD) were 14.6 (4.9) for PQ and 19.5 (8.2) for TQF. Statistical analysis shows a significant difference between the results (P<0.05, t = 2.243). In the microleakage test, Class V preps were created on 10 teeth on the buccal and lingual surfaces. DBAs were applied and all preps were placed with Marathon composites. The restorations were finished with a 30 fluted burr. Samples were immersed in a water bath for 24 hr and thermocycled for 250 cycles (4° - 56°C, 1 min dwell). The restored teeth were stained with Erythrosin B and sectioned and scored on a 4-point scale. There was no leakage at the enamel margin for either group. The number of samples with leakage at the gingival margins were: TQF=3/10; PQ= 8/10. There is a statistical difference (Chi Square Analysis) in microleakage scores between the two groups. For SEM examination, Class V preps were created on two additional teeth. TQF and Marathon restorations were placed on both teeth. SEM revealed that TQF formed a uniform (3 - 5 µm) layer covering the dentin surface and the resin:lig penetration and hybrid layer were clearly evident. These results suggest that it is possible for a one component DBA to outperform a two component DBA.

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Microleakage and Bonding of Amalgam to Dentin with Dentin Adhesives. J.R. DUNN*, F. BERRY, C. CRESSEMAN, K. LAU, J. WILLARDSEN (Loma Linda University, Loma Linda, CA)

This study compared the shear Bond Strength (SBS) of amalgam to dentin and microleakage of class 5 amalgam restorations using dentin adhesive systems (DAS), with and without PANAVIA as a metal primer. For the SBS test 160 freshly extracted human teeth were mounted in phenolic rings with epoxy, sectioned horizontally at mid occlusal dentin, and the surface finished sequentially to 600 grit using SiC paper. Groups of 10 teeth were randomly assigned and pretreated with one of the following DAS and/or treated with a metal primer: All Bond-2, Bisco (AB2), Clearfil Primer Bond, J. Morita (CLB), PermaQuik, Ultradent (PQ), Prime & Bond, Caulk, (PB), One-Step, Bisco (OS), Metal Liners used: Panavia TC (PTC), Panavia 21 (P21), J. Morita, Resinamer (Bisco). Using a split teflon mold, amalgam was then condensed. After thermocycling, teeth were shear tested to failure and analyzed using Multiple ANOVA and SNK. For microleakage, box shaped class 5 cavities were prepared on the M and D surfaces at the CE junction of 65 teeth, and subjected to the same treatments and amalgam condensed. The margins were polished, roots sealed, thermocycled and stored in 0.5% Basic Fuchsin dye for 24hrs. Teeth were embedded in epoxy, sectioned and microleakage scored (0-4) at 100X, and analyzed using Kruskal-Wallis. Results were:

	Microleakage Score (SD)			Shear Bond Strength MPa (SD)			
	DBS	P21	PTC	DBS	P21	PTC	R
AB2		1.20(0.52)	0.88(0.44)				
CLB	1.53(1.03)	1.23(1.12)		4.92(1.76)	2.17(2.24)	8.31(2.83)	
PQ	0.87(0.61)	1.22(1.50)		4.00(1.18)	4.50(2.84)		
PB	1.23(1.17)	1.55(0.77)		3.20(0.70)	4.36(2.56)		
OS	1.10(0.97)	0.77(0.57)	0.99(0.61)	0.66(1.10)	3.96(1.68)	6.84(2.77)	7.13(4.66)
		2.67(2.04)			1.91(1.42)		

We conclude that in SBS, AB2 with Panavia, followed by OS with Panavia were significantly higher than the other treatments (P<0.05). Panavia alone had significantly more leakage while the other treatments were not statistically different.