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Author(s)	Tay, FR; Smales, RJ
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2993 Bonding of Clearfil Liner Bond 2V to Enamel and Dentin.

F.R TAY* and R J SMALES (Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR)

This *in-vitro* study tested whether there is a difference in resin adhesion when a self-etching primer is applied on its own, or following the use of 37% phosphoric acid, on dentin and enamel The self-etching primer system investigated was Clearfil Liner Bond 2V (CLB) (Kuraray, Osaka, Japan), while the phosphoric acid tested was K-etchant (K) (Kuraray) Examination of three different substrates with two conditioning techniques resulted in six treatment groups Ten bonding sites were prepared from proximal surfaces of caries-free molars Bonding surfaces were treated with (CLB) as recommended by the manufacturer, or combined with the use of K-etchant (K) After a 2 h water storage, shear bond strengths were measured using a Universal tensile tester The shear bond strength results were

Substrate	CLB (MPa) (s d)	K followed by CLB (MPa) (s.d)
Dentin	18 74 ± 4 50	23 33 ± 2 14
Enamel (uncut)	18 24 ± 3 47	27.35 ± 4.74
Enamel (cut)	17 21 ± 2.07	30 22 ± 3 71

Unpaired one-sided t-tests between pairs of means for each substrate revealed significant differences between the self-etch and the phosphoric acid-etch samples SEM examination of cut and uncut enamel specimens showed that the use of self-etch primer alone resulted in less intensive etching patterns compared with (K) TEM results showed a hybridized zone of 1 µm for the self-etch, consisting of a surface hybridized smear layer and a subsurface layer of hybridized dentin A hybrid layer of 5 µm was observed for (K)-conditioned dentin It is concluded that, even for a self-etching primer, the application of 37% phosphoric acid enhances the shear bond strengths for all three substrates (Supported by RGC grant 10201901, The University of Hong Kong)

2994 Micro-shear Bond Strengths to Dentin and Enamel: Pretreatment Effects.

Y SHIMADA[1*], J.M ANTONUCCI[2], G E SCHUMACHER[3], W G.McDONOUGH[2], J TAGAMI[1]
([1]Tokyo Med & Dent Univ., Japan [2]NIST and [3]ADAHF / PRC, Gaithersburg, MD)

The purpose of this study was to investigate the bonding of two adhesive materials, a resin-modified glass ionomer cement (Vitremer, 3M, Vi) and a compomer (Self-Adhesive Compomer Cement, Caulk/Dentsply, SACC) to dentin and enamel after various pretreatments To assess bond strengths a recently developed micro-shear bond test was employed Compared to conventional shear tests, the micro-shear procedure allows for the testing of extremely small bonded surface areas, e g ~0 4 mm² The various pretreatments used on slices of dentin and enamel were (1) none, (2) 40 % H_3PO_4 gel, (3) Vi Primer, (4) 5 0 % N-phenylglycine (NPG) and (5) 6 3 % phenyliminodiacetic acid (PIDAA) Only the H_3PO_4 pretreatment was followed by aqueous washing In addition, the various surfaces, interfaces and debonded areas were examined by SEM The results of the bond tests are given bellow (mean ± standard deviation in MPa) The values in ( ) are the number of specimens tested

	none (control)	40 % H_3PO_4 gel	Vi Primer	NPG	PIDAA
Vi enamel	1 01 ± 0 813 (9)	21.3 ± 9 94 (13)	2.92 ± 2.39 (11)	2 08 ± 1 89 (7)	18 7 ± 5 17 (7)
Vi dentin	4 46 ± 3.70 (7)	19 0 ± 6 19 (14)	13.2 ± 3.55 (8)	15.1 ± 4 46 (12)	25.5 ± 5.53 (10)
SACC enamel	23 5 ± 7 50 (15)	25 4 ± 6 49 (13)	–	22.7 ± 7 75 (8)	24 7 ± 8 60 (9)
SACC dentin	16.3 ± 5.73 (8)	16 5 ± 5 65 (12)	–	24.5 ± 5 43 (10)	27 4 ± 5.59 (10)

Significant difference existed among the mean bond strength values of test groups (one-way ANOVA, $P < 0\ 01$) except SACC for enamel surface ($P = 0\ 835$) Overall efficacy of pretreatment was PIDAA~H_3PO_4 > NPG~Vi Primer > control SEM images revealed that PIDAA had a mild etching effect on dentin and enamel and promoted good adaptation of the adhesive materials to these surfaces NPG and PIDAA pretreatments produced enhanced bonding of Vi and SACC to dentin, while H_3PO_4 and PIDAA gave excellent bonding to enamel

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2995 Dentin adhesives wettability and shear bond strength.

JI ROSALES*, M.TOLEDANO, R.OSORIO, J.HOLGADO, MA.CABRERIZO (University of Granada, SPAIN)

The purpose of this study was to determine the contact angle (CA) and the shear bond strength (SBS) of four adhesive systems and to stablish a correlation between these values. Adhesive systems used were Scotch Bond Multipurpose Plus (3M), Syntac Single-Component (Vivadent), One-Step (BISCO) and Heliobond (Vivadent). 120 third molars were used Superficial and deep dentin was exposed by occlusal paralell sections under enamel-dentin juction or close to the pulp chamber. Slices obtained were polished (500 grit SiC water proof papers) CA mesarurements were used to determine wettability. Dentin sufaces for each group were conditioned following manufacturers' recomendations Resin drops of 0,3 µl volumen were deposited on etched dentin and CA was determined using the Axisymmetric Drop Shape Analysis technique (Coll Surf 1990, 43 151).SBS was determined in an universal test machine by the Watanabe technique (J Dent Res 1994, 67: 2159). Obtained data were statistically analyzed by one-way ANOVA and Student-Newman-Keuls multiple comparison tests and correlation coeficient was calculated between CA and SBS. Results. Mean (SD)

Adhesive systems	contact angle (degrees)		shear bond strength (MPa)	
	superficial dentin	deep dentin	superficial dentin	deep dentin
SBMP	7 (3)a	4 (1)a	8.6 (2 6)d	7 8 (2.6)d
SYNTAC	6 (2)a	5 (2)a	8 4 (1.6)d	7.2 (2.4)d
ONE-STEP	13 (5)b	6 (4)a	10 (3.4)e	7.1 (2 4)d
HELIOBOND	27 (7)c	23(6)c	1.5 (0.7)f	1.7 (0.7)f

Means with the same letter are not different ($p<0.05$) Correlation between CA and SBS on superficial dentin: $r=-0.8714$ and $p=0.1286$; on deep dentin: $r=-0\ 9990$ and $p=0\ 0009$. It can be concluded that: Dentin depth did not influence wetability and shear bond strength of SBMP,Syntac or Heliobond, but influenced when One-Step was used. An incresase in wettability resulted in an increased shear bond strength on deep dentin but not on superficial dentin. Supported by Plan I+D, Grant #MAT95-0578.

2996 Compressive and Shear Bond Strength Properties of an Antimicrobial Composite

T K VAIDYANATHAN*, J VAIDYANATHAN, R E MONTGOMERY, and S A NATHOO (NJ Dental School, Newark, NJ and OraCeutical LLC, Montery, MA)

There has been recent interest in developing antimicrobial properties in restorative materials to help reduce recurrent caries near restoration margins, but previous reports indicate that incorporation of antimicrobial ingredients adversely affect the mechanical properties The objective of this study was to determine whether the incorporation of an experimental antimicrobial agent Halo™ to a commercial composite (conferring demonstrated antimicrobial properties to the composite) has any significant effect on its compressive strength (CS) and shear bond strength (SBS) to dentin Halo™ was incorporated into a light cure composite **Herculite XRV™** (Kerr) in three different concentrations of 0 25%, 0.5% and 1% (w/w) in a light controlled sterile chamber and stored in the dark at room temperature for two weeks Cylindrical specimens (3mm dia x 6 mm long for compressive strength, 4 mm dia x 6mm long for shear bond strength) were prepared from commercial control A, processed control B (commercial paste processed identical to the experimental systems without Halo™) and the experimental systems with Halo™ Prime & Bond (Caulk) was used for bonding the shear bond strength specimens to prepared flat dentin surfaces of recently extracted teeth A sample size of N=4 was used All tests were conducted in a MTS system model 810 at a cross head speed of 0 5 mm/min The mean CS and SBS with their corresponding (SD) values in MPa are as follows CS - Control A 50 03(9 7), Control B 48.90 (2.80), 0 25% Halo 48 87 (2 6), 0 5% Halo 48 24(2.88), 1% Halo 52 05(6 42), SBS - Control A 9 74 (4 3), Control B 10 43 (3 3), 0 25% Halo 10 53 (4 13), 0.5% Halo 13 13 (5 94), 1% Halo 14 13 (0 22) Statistical analysis showed significant differences neither between mean CS nor SBS values of different groups (p>0 05) It is concluded that Halo™ has no adverse effect on the composite properties evaluated.

2997 Dentin Shear Bond Strength of Adhesives Dispensed Prior to Use

JR GALLO*, X XU and JO BURGESS (LSUMC-School of Dentistry, New Orleans, LA, USA)

Dentin bonding agents (DBAs) contain volatile substances, such as acetone and ethanol, which evaporate rapidly Clinically, DBAs are dispensed prior to use The purpose of this study was to measure the bond strengths of four DBAs to dentin when dispensed 10 minutes prior to use 80 freshly extracted teeth were ground to a flat dentin surface (n=10). A bonding area was isolated using Teflon tape A column of Synergy composite resin was applied over the bonding area and light-cured for 40 seconds. In half of the groups, the DBA was dispensed and used immediately In the remaining groups, the DBA was dispensed and used 10 min later The bonded specimens were stored for two weeks in water, placed into a fixture in an MTS machine and loaded in shear until failure The failure loads were divided by the bonding area to obtain the shear bond strength

Bonding agent(control)	(MPa)	(SD)	Bonding agent (10 min delay)	(MPa)	(SD)
One Coat	22 84	± 8	One Coat	22.38	± 8
Prime & Bond 2.1	12 88	± 6	Prime & Bond 2 1	8 58	± 4
Bisco One Step	20 80	± 8	Bisco One Step	14 32	± 5
3M Single Bond	12 94	± 4	3M Single Bond	15 24	± 8

2 Factor ANOVA and Tukey-B post-hoc tests were used for statistical analysis Materials and time were independent variables with significance set at 05 Material was highly significant p< 0001, time before placing the DBA was not significant p> 05 Statistically, within the delay groups, One Coat had the greatest bond strengths, One Step and Single Bond were equal, and Prime & Bond had the lowest bond strengths Time before placement did not statistically effect bond strengths, however, it is clinically prudent to apply acetone containing bonding agents as soon as possible after dispensing.

2998 Adhesion of new simplified adhesive systems to human dentin.

H INOUE*, S INOUE, S. UNO, H KOMATSU and H SANO (Hokkaido University School of Dentistry, Sapporo, Japan)

The purpose of this study was to evaluate the micro-tensile bond strength (TBS) of a newly introduced adhesive system, UniFil Bond (UFB) (GC, Tokyo, Japan) and an experimental adhesive system, KBN (Kuraray, Osaka, Japan) to buccal and occlusal dentin of extracted human teeth Both systems consist of one bottle of self-etching primer and one bottle of bonding agent Buccal dentin of 2 premolars and occlusal dentin of 2 molars were used for each adhesive. Resin composite (Clearfil AP-X, Kuraray) was bonded to the dentin surface using either of the two adhesive systems following the manufacturer's instructions After 24h storage in 37℃ water, the bonded specimens were sectioned into thin slabs (ca 0.7 mm thick), trimmed into a dumbbell shape to give a bonded surface area of 1 mm², and subjected to TBS testing. One-way ANOVA and Scheffe's multiple comparison test were used to test for statistical significance of the difference between the groups ($p<0.05$) Results were shown in the table below. Values having the same superscript were significantly different

TBS(mean ± SD, MPa)	UFB	KBN
Buccal	28.3 ± 9 4(n=21) [a]	44 4 ± 11.5(n=20) [a,b]
Occlusal	32 5 ± 9.1(n=13) [b]	39 0 ± 15 9(n=10)

TBS to buccal dentin for KBN was significantly higher than to buccal and occlusal dentin for UFB It is concluded that these new simplified adhesive systems would be clinically useful in view of bond strength and manipulation simplicity though the micro-tensile bond strength to buccal dentin was material dependent

2999 Bond Strength of Condensable Composite to Dentin and Bases.

B.K. SO*, L.B. ROEDER, and J.M. POWERS (Houston Biomaterials Research Center, UT-Houston Dental Branch, Houston, Texas).

A condensable composite may be placed with a base, in bulk or incrementally, but bond strength may be affected In-vitro bond strengths of a condensable composite (Alert, bulk fill, AL-BF; incremental fill, AL-IF) and two bases (flowable composite, Flow-It, FI; compomer, Hytac, HY) were measured with 2 bonding agents (Bond-1, B1, Bond-It, BIT) to human dentin. Bond strengths were determined using an inverted, truncated cone tensile test with a bond diameter of 3 mm after storage in water at 37 C for 24 h using an Instron at a crosshead speed of 0.5 mm/min. Bond strengths of AL to FI and HY were also determined Means and standard deviations (n=10) of bond strength (MPa) and failure site location (A=adhesive, C=cohesive, %) are listed. Analysis of variance showed no statistical differences among 4

Condition	AL-IF	AL-BF	FI	HY
B1	18.6 (5 6)	17.1 (3 8)	20.4 (4.6)	23 0 (4.2)
	100A†	100A	95A/5C	100A
BIT	22 5 (6 9)	18 1 (6 2)	26.0 (9 1)	18 4 (8.5)
	100A	99A/1C	100A	100A

techniques ($p=0.06$) or between 2 bonding agents ($p=0.30$). The interaction was not significant ($p=0.08$). Most bond failures were adhesive Bond strengths of AL to FI and HY were 22.0 (4.9) and 15 4 (4.9) MPa, respectively, and were different statistically. Techniques (bulk fill, incremental fill, bases) tested for placement of a condensable composite did not affect bond strength to human dentin. Supported by NIH Training Grant DE-07252 and Jeneric/Pentron.

3000 Shear Bond Strengths of Fifth Generation Dentin Bonding Systems.

A ABOUSHALA*, E. HURLEY, M. FERRARI AND G KUGEL (Tufts University School of Dental Medicine, Boston, MA, USA)

Dentin adhesive systems of fifth generation allow clinicians to perform clinical bonding procedures with greater ease and less time The purpose of this investigation was to evaluate the shear bond strength of Everbond (EB), ESPE, two coats (Group 1); Single Bond, 3M (Group 2); and Everbond, ESPE, one coat (Group 3) adhesive systems. Thirty intact human molars were stored in distilled water with 1% sodium azide solution. The teeth were embedded vertically in self-cure acrylic resin, then cut with a low speed saw to expose abundant non-carious occlusal dentin approximately 1.5 mm apical to the deepest pit. The cut surfaces were abraded with 400 grit silicon carbide wet abrasive paper. Samples were randomly divided into three groups of ten and bonded with the three respective systems following the manufacturer's instructions for Groups 1 and 2 Group 3 received only one coat of adhesive, contrary to the manufacturer's recommendation. Gelatin capsules (5 mm diameter) were used to build up Z100 composite resin posts shade A2 (3M) onto the prepared surfaces All specimens were stored in distilled water for 48 hours and tested in shear until failure, using a mechanical testing machine (Instron Corp) with a crosshead speed of 0.5 mm/minute. The shear bond strengths of Group 1, 2 and 3 were (14.95 ± 7.2), (12 3 ± 5.2) and (14.92 ± 3 5) MPa respectively. One-way ANOVA revealed no statistical significant difference among the three groups ($P=0.299$) In conclusion, shear bond strengths obtained using two coats of EB were not significantly higher than using one coat of the same bonding system.