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Research Report

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Shear Bond Strength Comparison of a New Dental Cement to Different Adhesive Surfaces

Purpose: To determine the bond strength of a new adhesive resin cement to different adhesive surfaces comparing similar commercially available primer- based resin-cements.

Materials: ***Panavia V5*** with ***Tooth Primer and Clearfil Ceramic Primer Plus*** *(Kuraray Noritake Dental Inc.)*, and
Multilink Automix with ***Multilink Primer A and B*** *(Ivoclar Vivadent, Inc.)*

Tests: Ultradent Shear Bond Strength Test

Substrates: Human, adult superficial dentin, zirconia *(**BruxZir HT**, Glidewell Laboratories)* and lithium disilicate *(**IPS e.max CAD A2**, Ivoclar Vivadent, Inc.)*

Curing: self-cured

Test Conditions: 24 H in 37 C water

Replications: 5/test type

Methods

Pre-treatment of Substrates

Human, adult, extracted third molars, previously stored in sodium azide solution, then in saline and then in water were embedded in acrylic resin discs and ground through 600-grit SiC paper to form bonding substrates of ground dentin. Zirconia specimens were cut with a diamond saw from the green-state blocks to 12 X 13 X 3 mm coupons, ground flat and smooth using 600-grit SiC paper, sintered, mounted in acrylic discs and sandblast abraded with aluminum oxide (50 um particles). Lithium disilicate specimens were prepared the same way except they were not sand-blasted and were etched with hydrofluoric acid. Zirconia and lithium disilicate specimens were primed (zirconia) or etched and primed (lithium disilicate) in accordance with cement manufacturer's instructions.

Use of Cements

Resin cements were tested using the indirect shear strength method where specimens undergo additional preparation. Single-sided adhesive Teflon tape, 0.13 mm thick, with an approximately 3 mm diameter hole was applied over the previously prepared bonding site and burnished into place. A small dab of the test cement was then placed in the hole in the tape and atop the pre-treated substrate. Stainless steel, 8 mm diameter by 3 mm thick discs, were abraded with 60 grit SiC sand paper, sandblasted and then treated with ***Monobond Plus*** *(Ivoclar Vivadent, Inc.)*, and then placed on top of the cement. The cement was allowed to self-cure for 10 minutes under a load of 100 g and at 37 C. The excess cement was removed immediately after loading the cylinder. ***Liquid Strip*** *(Ivoclar Vivadent, Inc.)* was then applied to the perimeter of the junction between the cylinder and the Teflon tape. During self-curing, the specimen was covered with warm damp towels to prevent drying. At the end of the ten minute curing time, each specimen was moved to a humidor (at approximately 95% relative humidity) for ten minutes and then to a beaker with 37 C water where it remained submerged for 24 H prior to testing.

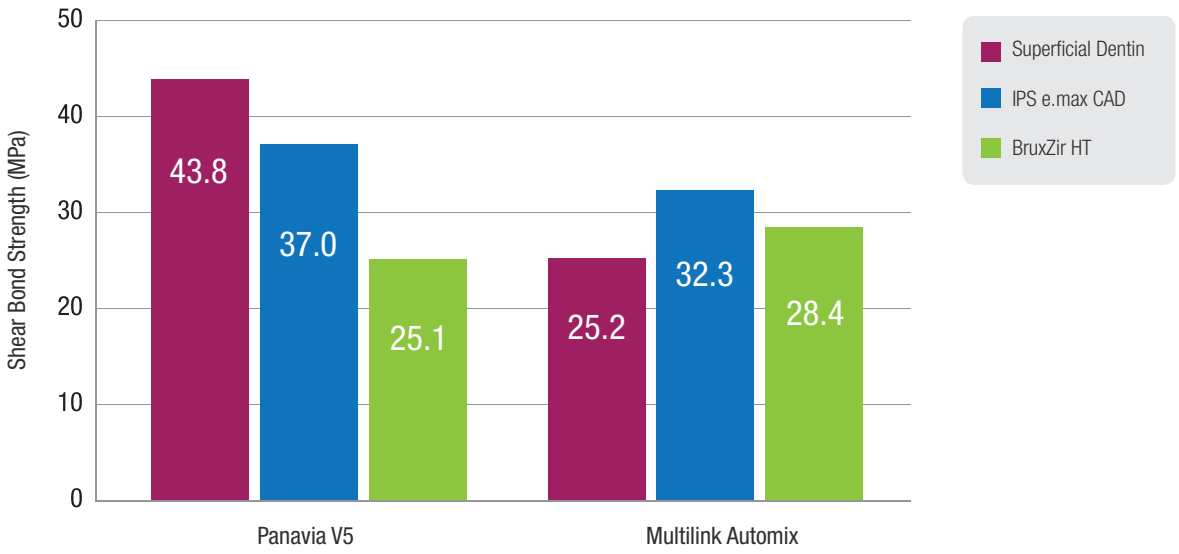
Shear bond strength testing

Testing was performed using a universal testing machine (Instron 5866) at a crosshead speed of 1 mm/min. Means and standard deviations of bond strength were calculated.

Results

Shear Bond Strength Summary

Cement	Primer	Substrate	Avg. Bond Strength (Std. Dev.), MPa	% Adhesive to Substrate
Panavia V5 (Kuraray Noritake Dental Inc.)	Tooth Primer	Superficial Dentin	43.8 (5.0)	17
	Ceramic Primer Plus	IPS e.max CAD A2	37.0 (6.5)	99
	Ceramic Primer Plus	BruxZir HT	25.1 (4.9)	100
Multilink Automix (Ivoclar Vivadent, Inc.)	Multilink Primer A&B	Superficial Dentin	25.2 (4.6)	98
	Monobond Plus	IPS e.max CAD A2	32.3 (6.0)	98
	Monobond Plus	BruxZir HT	28.4 (2.6)	100



Conclusions

Of the two cements tested, ***Panavia V5*** produced higher bond strength to dentin, and lithium disilicate in the self-cure mode.