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Biomaterials Research Report

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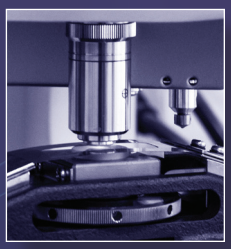

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Novel Cement Bond Strength to Multiple Substrates

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Objectives:

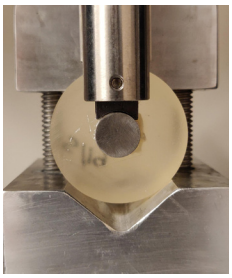
To measure the bond strength of a new self-adhesive cement containing a silane primer to various substrates.

Introduction:

A novel self-adhesive cement ***Panavia SA Cement Universal*** was released which contains Long Carbon-chain Silane Coupling Agent (LCSi) monomer which purports to bond to porcelain, lithium disilicate and composite resin. Previous self-adhesive cements have not included silane monomers which have required a separate primer to be used for glass ceramics. In this study, we measured the initial self-cured bond strength of 3 cements to dentin, zirconia and lithium disilicate substrates after 24 hours of storage.

Methods:

Human extracted third molars were sterilized in 0.5% chloramine T solution, sectioned, mounted in acrylic and abraded on the facial surface with 600-grit SiC paper to form bonding substrates of superficial dentin. 14 mm x 3 mm thick ***Katana STML*** (KSTML, Kuraray America) and ***IPS e.max CAD*** (IEC, Ivoclar Vivadent), specimens were mounted in acrylic discs, ground flat through 600-grit diamond discs (6MB8, 3M) and the zirconia specimens were sandblasted with 50 um alumina at 3 bar, while the IPS e.max CAD specimens were etched with 5% hydrofluoric acid gel (IPS Ceramic Etching Gel, Ivoclar Vivadent) and ultrasonically cleaned.

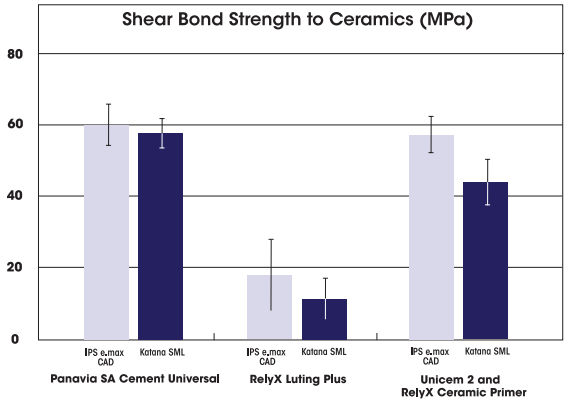


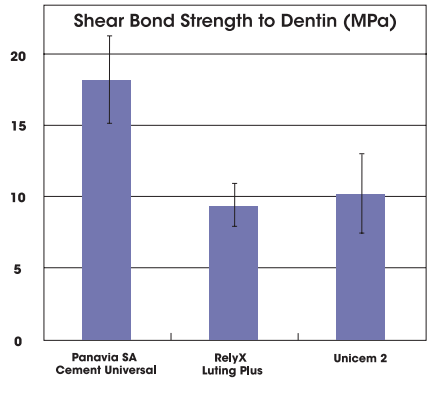
Shear bond strength test

Specimens were prepared in which single-sided adhesive Teflon tape, 0.13 mm thick, with an approximately 3 mm diameter hole is placed over the bonding site and burnished into place. 10 mm diameter by 3 mm thick stainless-steel metal cylinders were ground with 60 grit SiC Paper, sandblasted and primed to simulate an indirect restoration which should have a higher bond strength than the substrate being tested. Materials tested were ***Panavia SA Cement Universal*** (PCU, Kuraray), ***RelyX Luting Plus*** (RLP, 3M) and ***Unicem 2*** (UC2, 3M) with ***RelyX Ceramic Primer*** (3M) on IEC. A dab of the cement was placed in the center of the hole in the tape and the disc gently applied concentric with the hole with finger pressure before being placed in a loading jig where a 1 kg weight was applied inside a 37°C oven at 99% humidity. The cement was tack cured and then the excess removed and allowed to cure for a total of 10 minutes under load. They were then transferred to a container with 37 °C water for 24 hours prior to shear testing. The shear bond strength test was performed on a universal testing machine (Instron model 5866) at a crosshead speed of 1 mm/min. Means and standard deviations were determined. Data were analyzed by ANOVA and Fisher's PLSD at the 0.05 level of significance.

Results:

Shear bond strength (MPa) results with means and standard deviations.





Fisher's PLSD interval at the 0.05 level of significance for comparisons of means for products and substrates was 3.7 MPa.

PSA had the highest bond strength to all substrates, followed by UC2 with primed IEC and self-adhesive to KSTML, and UC2 had equivalent bond strength to dentin as RLP.

Conclusion:

Panavia SA Cement Universal with an incorporated silane primer has exceptional initial bond strength to dentin, lithium disilicate and zirconia.