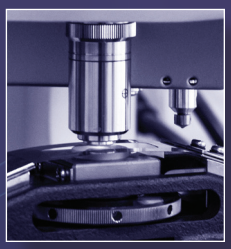
DENTAL ADVISOR
Product insights you can trust.

Biomaterials Research Report

Matt Cowen, B.S.
DENTAL ADVISOR Biomaterials Research Center
3110 West Liberty, Ann Arbor, MI 48103
(734) 665-2020, ext. 111
matt@dentaladvisor.com



Number 133 – July 10, 2020

Resin Cement Bond Strength to Multiple Substrates

M. Cowen, J.M. Powers

Purpose:

To determine bond strengths of a new cement and bonding agent, ***3M™ RelyX™ Universal***, and ***3M™ Scotchbond™ Universal Plus*** to the most common substrates in adhesive and self-adhesive modes compared to competitive systems. ***3M RelyX Universal*** is part of a new class of luting cements with the versatility to be used with or without adhesives.

Experimental Design:

MATERIALS:

Self-Adhesive Group:

3M RelyX Universal, ***3M™ RelyX™ Unicem 2*** and ***RelyX Ceramic Primer*** on lithium disilicate (3M), ***Maxcem Elite Chroma*** and ***Kerr Silane Primer*** (KaVo Kerr)

Adhesive Cements:

3M RelyX Universal with ***3M Scotchbond™ Universal Plus, Variolink Esthetic DC*** with ***Adhese Universal*** on teeth and ***Monobond Plus*** on ceramics (Ivoclar Vivadent, Inc.)

Substrates:

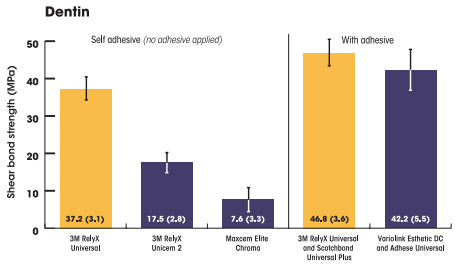
Self-etched Superficial Dentin, Self-etched Ground Enamel, ***Lava Esthetic*** Zirconia (sandblasted), Lithium Disilicate ***IPS e.max CAD*** (Hydrofluoric acid etched)

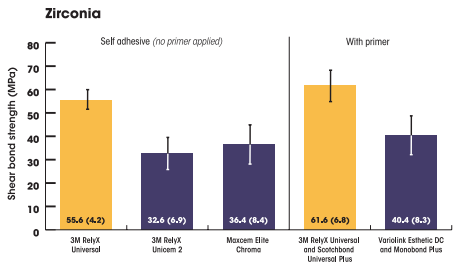
Methods:

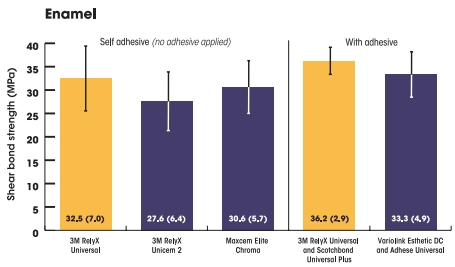
Pretreatment of Surfaces: Human, adult, extracted third molars, sterilized in 0.5% chloramine T solution were embedded in acrylic resin discs and ground through 600-grit SiC paper to form bonding substrates of superficial dentin and ground enamel. ***Lava Esthetic*** specimens were made to have final dimensions of 10 x 10 mm and mounted in acrylic, ground through 600-grit diamond grit abrasive and sandblasted with 50-µm alumina particles at 50 psi. ***IPS e.max CAD*** specimens were ground through 600-grit diamond abrasive and etched with ***IPS Ceramic Etching Gel*** (5% hydrofluoric acid) for 20 seconds and rinsed thoroughly.

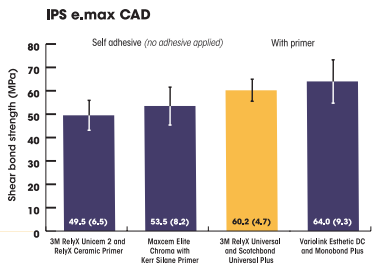
Cement Indirect Bond Testing (n=6): Specimens, if applicable, were treated with primers or adhesive before applying single-sided adhesive PTFE tape, 0.13 mm thick, with an approximately 3 mm diameter hole over the bonding site and burnished into place. A dab of cement was placed into the hole. Metal discs, 9 mm diameter by 3 mm thick, roughened with 60-grit SiC paper, and sandblasted at 50 PSI and primed with Monobond Plus, were then placed on top of the cement concentric with the hole and the loading rod lowered. The excess cement was tack cured and removed according to manufacturer's instructions. The assembly was allowed to cure for 10 minutes under a load of 1000 g before being transferred to a 37°C deionized water bath for 24 hours until testing. Bond strength specimens were tested in shear using an Instron 5866 universal testing machine with a crosshead speed of 1 mm/min. Mean shear bond strength with standard deviations are reported in the Results.

Results:









Conclusion:

Self-adhesive bond strengths of the 3M cements to dentin, enamel and zirconia substrates are the highest of any self-adhesive cements tested with this method by DENTAL ADVISOR. Adhesive bond strength to dentin and enamel was excellent, and in particular, the zirconia bond strengths are the highest among the universal adhesives tested in DENTAL ADVISOR Biomaterials Lab.