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1450 Incompatibility of Oxalate Desensitizers with Acidic, Fluoride-Containing Total-Etch Adhesives

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Purpose: To compare the microtensile bond strengths (μTBS) of four single-bottle, total-etch adhesives of different acidity to oxalate desensitizer-treated acid-etched dentin and to examine the ultrastructure of the bonded interfaces. **Methods**: Flat coronal dentin from 84 extracted human third molars were bonded with One-Step (OS, Bisco), Single Bond (SB, 3M ESPE), OptiBond Solo Plus (OB, Kerr) and Prime&Bond NT (PB, Dentsply) after: [1] acid etching; [2] acid etching followed by BisBlock (BB, Bisco) application for 30s and [3] acid etching followed by Super Seal (SS, Phoenix Dental Inc.) application for 30s. Composite build-ups were performed using Filtek Z250 (3M ESPE). After storage for 24h, composite-dentin beams of 0.8mm^2 were obtained for μTBS testing. Representative fractured beams from each group were prepared for fractographic analysis using SEM and energy dispersive X-ray spectrometry (EDX). Undemineralized, unstained, epoxy resin-embedded sections were prepared for TEM after immersion in 50 wt% ammoniacal silver nitrate solution for 24h. The pH and F concentration of the adhesives were also measured. **Results:** μTBS (X±SD, n=40 in MPa; Kruskal-Wallis/Dunn's). For each column, different superscripts indicated difference at $p<0.05$.

Adhesives	pH	F concentration (ppm)	Adhesive only, no desensitizer	BB plus adhesive
OS	4.60	70	48.7±4.2^a	43.4±4.8^a
SB	3.60	130	47.4±4.2^a	39.6±8.1^a
OB	2.81	4527	49.2±7.3^a	12.6±8.6^b
PB	2.68	3641	51.8±4.5^a	6.9±10.6^b

SEM and TEM revealed numerous spherical globules on OB and PB bonded, desensitizer-treated dentin, but not in OS or SB. EDX analysis showed that they were composed not only of Ca and F, but also P and O. **Conclusions**: Oxalate desensitizers such as Super Seal and BisBlock cannot be used with Prime&Bond NT and OptiBond Solo Plus after acid-etching, as formation of calcium-fluoride like globules interferes with dentin hybridization and compromises bond strength.

Seq #177 - Effects of Components and Agents
10:45 AM-12:45 PM, Friday, 11 March 2005 Baltimore Convention Center 337

Back to the Dental Materials: I - Adhesion-Composite Bond Strength Program
Back to the IADR/AADR/CADR 83rd General Session (March 9-12, 2005)