THE DENTAL ADVISOR™

"Improving Patient Care Through Research & Education"

THE DENTAL ADVISOR
3110 West Liberty
Ann Arbor, MI 48103
Toll free: 800.347.1330
E-mail: info@dentaladvisor.com
Web Site: www.dentaladvisor.com

NUMBER 35 - FEBRUARY 2011

Bond Strength of Several 7th-generation Bonding Agents to Un-ground and Ground Enamel and Dentin

R. Yapp, M.S., J.M. Powers, Ph.D., M. Heiss*, and K. Hirano*
THE DENTAL ADVISOR Biomaterials Research Center, Dental Consultants, Inc., Ann Arbor, Michigan
***GC America, Alsip, Illinois**

Purpose – The study determined the Ultradent shear bond strength of several 7th-generation bonding agents to un-ground and ground human enamel and ground human dentin at 24 hours and after thermocycling. The effect of etching on bond strength of ***G-aenial Bond*** was also determined.

Materials – **Bonding agents:** ***G-aenial Bond*** *(GC America),* ***BOND FORCE*** *(Tokuyama Dental Corporation/Tokuyama America),* ***Xeno IV*** *(DENTSPLY Caulk),* ***Optibond All-In-One*** *(Kerr Corporation)* **Etchant:** 37% phosphoric acid **Composite:** ***TPH3*** *(DENTSPLY Caulk)* **Substrates:** Un-ground enamel, Ground enamel, Ground dentin **Conditions:** ***G-aenial Bond*** on both etched and un-etched tooth structure. Testing after storage for 24 hours in 37°C water. Testing after 5000 cycles from 5°C to 55°C with a dwell time of 28 seconds per bath.

Methods –- Specimens of freshly extracted human teeth were prepared as un-ground and ground enamel and ground dentin. Enamel and dentin were ground flat finishing with 600-grit silicon carbide paper. ***G-aenial Bond*** was placed on un-ground and ground enamel and ground dentin specimens prepared both with and without 37% phosphoric acid acid etchant. ***BOND FORCE, Xeno IV,*** and ***Optibond All-In-One*** were not used with phosphoric acid etchant. Ultradent shear bond strengths were determined on a universal testing machine (Instron 5866, Canton, MA) at a cross-head speed of 1 mm/min after 24 h storage in water at 37°C and after thermocycling of 5000 cycles in water between 5 and 55°C with a dwell time of 28 seconds per bath.

Results – Means and standard deviations of shear bond strength for 24-hour and thermocycled (TC) specimens are shown in the table. Data were analyzed by analysis of variance and Fisher's PLSD at the 0.05 level of significance. Means with the same letters are statistically the same.

Substrate	Shear Bond Strengths, MPa							
	G-aenial Bond		Optibond All-In-One		Xeno IV		BOND FORCE	
	24 h	TC	24 h	TC	24 h	TC	24 h	TC
Un-ground enamel, un-etched	19.9 (4.8)	26.5 (4.8)^{j}	17.9 (7.0)	13.5 (4.3)^{e}	14.1 (8.2)	8.8 (3.9)^{a}	9.6 (3.3)	13.6 (5.0)^{e}
Un-ground enamel, etched	25.0 (4.9)	27.3 (4.8)^{j}						
Ground enamel, un-etched	29.3 (2.8)^{i}	30.5 (5.0)^{b}	25.7 (2.9)^{d}	29.6 (1.7)^{g}	20.6 (2.8)	20.0 (2.6)^{h}	24.7 (1.0)^{dg}	19.6 (3.2)^{ch}
Ground enamel, etched	27.9 (4.0)^{i}	32.1 (4.1)						
Ground dentin, un-etched	31.4 (3.6)^{f}	30.3 (4.1)^{bk}	32.9 (5.1)^{f}	39.8 (8.5)	26.4 (5.1)	8.5 (2.1)^{a}	17.8 (1.6)	18.5 (2.7)^{c}
Ground dentin, etched	29.2 (6.1)	30.6 (2.0)^{k}						

Conclusions – Bond strengths of ***G-aenial Bond*** to un-ground un-etched enamel at 24 hours were statistically higher than those of ***Optibond All-In-One, Xeno IV*** and ***BOND FORCE.*** Bond strength of ***G-aenial Bond*** to un-ground etched enamel was statistically higher than to un-ground un-etched enamel after 24 hours. Bond strengths of ***G-aenial Bond*** on un-ground enamel, ground enamel and dentin in the un-etched condition were statistically higher than those of ***Xeno IV*** and ***BOND FORCE*** at 24 hours and after thermocycling. *Supported in part by GC America.*

636002