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0024 Incompatibility Profiles of All-in-one Adhesives. II. Contribution of Oxygen Inhibition

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Objectives: Incompletely polymerized ionic resin monomers in oxygen inhibition layers of all-in-one adhesives were thought to be responsible for generating an acid-base reaction with composite tertiary amines and/or creating an osmotic gradient that triggers water movement from dentin through the permeable adhesive layers, leading to compromised bonding with slow setting, auto-cured composites. This study investigated the bonding of four all-in-one adhesives to auto-cured composites in the absence of the oxygen inhibition layer.

Methods: Xeno III (XE, Caulk-Dentsply), Adper Prompt (AP, 3M ESPE), One-Up Bond F (OU, Tokuyama) and iBond ((IB, Heraeus-Kulzer) were bonded to hydrated dentin (H), processed composites (C) and dehydrated dentin (D) under a nitrogen blanket to create experimental groups with cured adhesives that were devoid of oxygen inhibition layers (N). They were coupled to an auto-cured composite (Bisfil 2B, Bisco). For each adhesive, bonding to hydrated dentin with intact adhesive oxygen inhibition layer was used as the control. Microtensile bond strength evaluation was performed after 24 h of water storage, using beams of approximately 0.9 mm^2 in cross-sectional area. TEM was performed following exposure to ammoniacal silver nitrate.

Results: Microtensile bond strengths (X±SD, n=20 in MPa; Kruskal-Wallis/Dunn's). For each column, different superscripts indicated significance difference at $P<0.05$.

	XE	IB	OU	AP
H	11.9 ± 4.8^{b}	7.3 ± 4.0^{b}	5.5 ± 2.1^{b}	0.0 ± 0.0^{c}
HN	13.0 ± 5.8^{b}	10.0 ± 4.8^{b}	7.4 ± 4.4^{b}	0.0 ± 0.0^{c}
CN	57.6 ± 7.9^{a}	28.3 ± 5.7^{a}	47.3 ± 7.7^{a}	42.4 ± 9.9^{a}
DN	48.9 ± 8.0^{a}	25.9 ± 5.5^{a}	36.5 ± 9.4^{a}	14.2 ± 6.0^{b}

TEM revealed the presence of water blisters along adhesive-composite interfaces in group HN of XE, IB and OU, even in the absence of the oxygen inhibition layers.

Conclusions: In adhesives that demonstrate apparent incompatibility, water movement still occurs in all-in-one adhesives the absence of oxygen inhibition layer. Improved coupling attributed to the removal of this layer may be masked by the water permeability present in adhesives that demonstrate true incompatibility to auto-cured composites.

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