Dual-Cure Core Compatibility to DBA using Self-Cured and Self-Etching Activators

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Introduction
Successful adhesion to dentin of dual-cured composite core build-up materials has been a challenge when used with many visible light-cured (VLC) dentin bonding agents (DBA). Manufacturers developed ‘self-cured activators’ (SCA) to enhance the bond com-patibility of their dentin bonding agent to dual-cured composites.

Objective
To evaluate the bond compatibility (Shear Bond Strength SBS) of dual-cured composite core build-up materials to several commercially available DBA with their SCA and an experimental self-etching bond enhancer (EXP).

Methods
• Flat bonding sites were prepared on the buccal surfaces of 24 freshly extracted bovine teeth by grinding the teeth on a water-cooled abrasive wheel.
• 5 dual-cured composite core build-up materials (Table 1) were bonded to bovine dentin, according to the manufacturer instructions, utilizing 5 VLC DBA (Tables 2.3) with their SCA (Table 4).
• A reduced % of solvents.
• The experimental self-etching bond enhancer (EXP) was bonded to etched dentin with and without pre-treatment with:
• 3 absolute molecular weight dimethaclylates.
• 4 difunctional crosslinkers.
• A proprietary activator or ‘self-cured activator’ (SCA) to enhance the bond com-patibility of their DBA to dual-cured composites.

Table 2. 5th generation Visible Light-Cured (VLC) Dentin Bonding Agents (DBA)

Results
The SBS (MPa) test results are presented in the following figures and tables.

Table 3. 6th generation Self-Etching Visible Light-Cured (VLC) Dentin Bonding Agents (DBA)

Discussion
BJM’s POP was modified in order to enhance the compatibility of its bonding agent POP to DC core materials. The modified formulation was later on referred to as the experimental self-etching bond enhancer (EXP).

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Table 6. Shear Bond Strength (MPa) of Different Dual Cure Core Materials Bonded to Bovine Dentin Utilizing 5th Generation VLC Dentin Bonding Agents with and without their Self-Cured Activators and Experimental Bond Enhancer

Table 7. Shear Bond Strength (MPa) of Different Dual Cure Core Materials Bonded to Bovine Dentin Utilizing 6th Generation VLC Dentin Bonding Agents with and without their Self-Etching Primers and Experimental Bond Enhancer

Conclusions
• All 5 core materials bonded to the EXP pre-treated, un-etched, bovine dentin without SCA exhibited significantly higher SBS compared to the same materials bonded with SCA to etched dentin.
• The EXP treated surfaces for all 6 generation DBA exhibited higher SBS then the original DBA primers.