

## ABSTRACT

Evaluation of dental bonding agents *in vitro* using multi-layer vibrational and Iosipescu shear methods

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There is current interest in conservative dentistry regarding the use of adhesive systems for the placement and repair of restorations. Numerous bonding agents are now available and there is a need to evaluate their effectiveness in various applications. *In vitro* testing provides invaluable information for pre-clinical sorting and selection of materials by the clinician.

Two mechanical tests were used in this study, the non-destructive multi-layer vibrating reed test and the Iosipescu shear test. The former assesses the visco-elastic properties from which the elastic modulus and damping factors are obtained. The latter gives the pure shear strength of a notched beam sample. Both tests give 'true' materials properties and are suitable for assessing specimens of small dimensions which are clinically relevant.

These tests were applied to various combinations of restorative materials based on two mercury-based amalgams, a microfine composite and a gallium-based alloy. The adhesives used were a resin-based formulation and a 4-META derivative.

The results of both methods showed that consistent data with low scatter may be obtained. This is particularly important for the shear strength test as high scatter is generally reported in this field. It was found that the use of adhesives in amalgam repair yielded bond strengths lower than when no adhesive was used. However, from both tests the resin-based adhesive showed slightly better performance in alloy-alloy and alloy-composite systems than the 4-META derivative.

These tests were shown to be suitable for assessing effectiveness of bonding and can be further developed for testing bonding to enamel and dentin.

Key words: Dental materials; Shear strength; Elastic Modulus; Vibrational Testing; Iosipescu Shear Test.