

Final Report

LABORATORY EVALUATION

**24 hour Shear Bond Strength of Ceramic to Dentin Using Three
Cement Systems**

Creighton
UNIVERSITY
Medical Center

PRINCIPAL INVESTIGATOR

Mark A. Latta, D.M.D., M.S.
Associate Dean for Research

Creighton University Medical Center
School of Dentistry
2500 California Plaza
Omaha, Nebraska 68178

SPONSOR/MONITOR

Mr. Bill McHale
Premier Dental Products
Dr. Barry Zalsman
BJM Laboratories

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INTRODUCTION

Adhesive cements systems are preferentially used for luting all-ceramic restorative materials for maximizing longevity of the restoration. The purpose of this laboratory study was to evaluate the 24 hour shear bond strength of Empress rods cemented to dentin using three adhesive cement systems in their light and auto cured modes.

METHODS AND MATERIALS

The bonded assemblies were prepared by wet grinding human teeth on a lapidary wheel with 600 grit silicon carbide paper exposing dentin. The teeth were pre-embedded in acrylic. The tooth surfaces were conditioned according to manufacturer's instructions. Empress cylinders were cast approximately 2.4 mm in diameter and cut to approximately 5mm in length. The ends of the cylinders were treated with hydrofluoric acid and silanated. The cylinders were placed using finger pressure on the dentin surfaces following tooth conditioning and cement mixing according to manufacturer's instructions. For the light cured groups specimens were light-cured (Astralis[®] 10 Halogen Light) twice for 20 seconds from opposite sides at a 45 degree angle to the ceramic rod. Ten bonded assemblies with each cement were prepared. For the auto-cured specimens, the bonded assemblies were placed in a 37 degree oven and allowed to cure in air for 10 minutes. They were then stored in water until debonding.

The specimens were placed in an Instron Testing Machine (Model 1123, Instron Corporation, Canton, Mass.) equipped with a custom cross-head member designed to fit the shape of the ceramic cylinder. The specimens were aligned with the shearing member against and parallel to the bonding sites. Each cemented cylinder was placed under continuous loading at 1 mm per minute until failure occurred. Shear bond strength was calculated in Megapascals units (MPa). The fracture sites will be examined to determine where failure occurs during the debonding procedure.

The cements tested were:

Group	Cement	Primer	Manufacturer
I	MaxCem	None	Kerr SDS
II	UniCem	None	3M-Espe
III	BJM cement	None	BJM Labs

RESULTS

24 hour Mean Shear Bond Strength in MegaPascals (MPa) are reported in the table below:

Cement	Light cured	Auto-cured
Unicem	10.4 ± 4.9	7.6 ± 3.7
BJM	8.4 ± 3.4	5.0 ± 2.2
Maxcem	4.8 ± 2.1	1.9 ± 1.2

CONCLUSION

Unicem and the BJM prototype generated statically similar values to dentin after 24 hours. (ANOVA, post-hoc Tukey's $p < 0.05$). Maxcem generated the lowest values under both curing conditions.