A LABORATORY EVALUATION OF AN ADHESIVE RESIN CEMENT

PRINCIPAL INVESTIGATOR

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FAX DESTINATION

To: **Dr. Barry Zalsman, BJM Laboratories**

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From: **Dr. Mark A. Latta**
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Comments:
. For the rexllium to polished rexillum theBJM value (2nd trial) was 27.5 ± 7.6 MPa. I used the Panavia 21 Airblock for these specimens. I alos did'nt remove a lot of the excess cement so I was sure not to disrupt the specimens. This value is very high to polished Rex. For my own benefit I'm going to do 1 more set, but I think you can consluded your cement is as good as or better tahn Panavia 21 to polished non-precious metal and as good as P21 to grit blasted Rexillium.

Mark

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INTRODUCTION

Achieving a durable bond between resin materials and non-precious crown and bridge alloys has proved to be a challenge. Current practice for facilitating metal bonding includes grit blasting with 50 micron alumina, and tin plating. These procedures are not convenient for *in-vivo* applications and a chemical adhesion promoter which can generate high bond strengths is desirable. This high bond strength is desirable for both conventional and acid-etched retained prostheses.

BJM Inc. has developed an adhesive resin cement for multi-purpose crown and bridge applications. The purpose of this laboratory study is to evaluate this material in a variety of clinically relevant situations.

METHODS AND MATERIALS

Ni-Cr-Be metal (Rexillium III) specimens were cast to approximate dimensions of 1 cm x 1 cm x 1 mm. The cast wafers were potted in one inch phenolic rings with epoxy material. Ni-Cr-Be metal posts(Rexillium III) were cast approximately 3.5 mm in diameter and cut to approximately 5mm in length. The end of the Rexillium III cylinders were sandblasted with 50 μ aluminum oxide (Micro Etcher, Danville Engineering, Danville, CA) prior to the bonding procedure. The exposed flat metal surfaces mounted in the phenolic rings (n=48) were ground to 600 grit on a water-cooled abrasive wheel. 24 of the non-precious metal specimens were then grit blasted with 50 μ aluminum oxide. The Rexillium rods were cemented to the polished and grit blasted specimens with the prototype cement and with Panavia 21 (Kuraray America Inc.) cement. Equal amounts of each cement were mixed, placed on the ends of the metal rod and placed with

finger pressure to the metal plate specimen. Excess cement was removed with a dental explorer and Oxyguard was place over the cement margin around each metal post and the cement was allows to set for 10 minutes. Following rinsing of the Oxyguard, the specimens were placed in deionized water at 37 °C and stored for 24 hours. The specimens were placed in an Instron Testing Machine(Model 1123, Instron Corporation, Canton, Mass.) equipped with a chisel-shaped rod to deliver a shearing force. The specimens were aligned with the shearing rod against and parallel to the bonding sites. Each cement or metal cylinder was placed under continuous loading at 5 mm per minute until fracture occurred. Shear bond strengths were calculated in megapascals units (MPa).

RESULTS

Mean 24 shear bond strengths (SBS) for the groups are reported in the following table:

TEST CONDITIONS	MEAN SBS (MPa)
Panavia 21- polished	16.5 ± 5.1
BJM cement - polished	27.5 ± 7.6
Panavia 21- grit blasted	43.8 ± 4.8
BJM cement- grit blasted	43.2 ± 4.9

DISCUSSION

The prototype cement was equally effective in generating high bond strengths of Rexillium to Rexillium when the substrate was air abraded with 50 micron

aluminum oxide. It appears to e equal to or better than Panavia 21 in generating bond strength to polished Rexillium when applied using the Oxyguard product used with Panavia 21.

The results of this study indicate that the BJM cement has the potential to be an easy to use and effective adhesive resin cement. However the long term water stability of this cement remains to be determined as well as its clinical performance.

SHEAR BOND STRENGTH

	% CHART	Kg LOAD	DIAMETER	RADIUS	MPa	FAILURE SITE
1	72.0	50	3.30	1.65	41.28	Adhesive
2	72.6	50	3.30	1.65	41.62	Adhesive
3	84.8	50	3.30	1.65	48.61	Adhesive
4	95.0	50	3.30	1.65	54.46	Adhesive
5	70.0	50	3.30	1.65	40.13	Adhesive
6	74.2	50	3.30	1.65	42.54	Adhesive
7	68.2	50	3.30	1.65	39.10	Adhesive
8	65.8	50	3.30	1.65	37.72	Adhesive
9	79.1	50	3.30	1.65	45.35	Adhesive
10	75.7	50	3.30	1.65	43.40	Adhesive
	MEAN				43.42	
	STANDARD DEVIATION				4.98	

SHEAR BOND STRENGTH: DENTIN

24 HOUR SHEAR BOND STRENGTH

MATERIAL: Rexillium to grit blasted Rexillium withBJM prototype cement

SHEAR BOND STRENGTH

	% CHART	Kg LOAD	DIAMETER	RADIUS	MPa	FAILURE SITE
1	83.0	50	3.30	1.65	47.58	Adhesive
2	73.5	50	3.30	1.65	42.14	Adhesive
3	75.6	50	3.30	1.65	43.34	Adhesive
4	70.0	50	3.30	1.65	40.13	Adhesive
5	80.8	50	3.30	1.65	46.32	Adhesive
6	61.5	50	3.30	1.65	35.26	Adhesive
7	82.0	50	3.30	1.65	47.01	Adhesive
8	70.7	50	3.30	1.65	40.53	Adhesive
9	75.5	50	3.30	1.65	43.28	Adhesive
10	91.3	50	3.30	1.65	52.34	Adhesive
	MEAN				43.79	
	STANDARD DEVIATION				4.76	

SHEAR BOND STRENGTH: DENTIN

24 HOUR SHEAR BOND STRENGTH

MATERIAL: Rexillium to grit blasted Rexillium with Panavia 21

SHEAR BOND STRENGTH

	% CHART	Kg LOAD	DIAMETER	RADIUS	MPa	FAILURE SITE
1	34.9	50	3.30	1.65	20.01	Adhesive
2	28.9	50	3.30	1.65	16.57	Adhesive
3	27.0	50	3.30	1.65	15.48	Adhesive
4	18.2	50	3.30	1.65	10.43	Adhesive
5	21.2	50	3.30	1.65	12.15	Adhesive
6	28.2	50	3.30	1.65	16.17	Adhesive
7	48.0	50	3.30	1.65	27.52	Adhesive
8	21.7	50	3.30	1.65	12.44	Adhesive
9	23.8	50	3.30	1.65	13.64	Adhesive
10	35.3	50	3.30	1.65	20.24	Adhesive
	MEAN				16.46	
	STANDARD DEVIATION				5.05	

SHEAR BOND STRENGTH: DENTIN

24 HOUR SHEAR BOND STRENGTH

MATERIAL: Rexillium to Polished Rexillium with Panavia 21

SHEAR BOND STRENGTH

	% CHART	Kg LOAD	DIAMETER	RADIUS	MPa	FAILURE SITE
1	31.5	50	3.30	1.65	18.06	Adhesive
2	50.1	50	3.30	1.65	28.72	Adhesive
3	33.4	50	3.30	1.65	19.15	Adhesive
4	24.0	50	3.30	1.65	13.76	Adhesive
5	56.5	50	3.30	1.65	32.39	Adhesive
6	55.0	50	3.30	1.65	31.53	Adhesive
7	55.1	50	3.30	1.65	31.59	Adhesive
8	60.5	50	3.30	1.65	34.68	Adhesive
9	51.5	50	3.30	1.65	29.52	Adhesive
10	61.2	50	3.30	1.65	35.09	Adhesive
	MEAN				27.45	
	STANDARD DEVIATION				7.60	

SHEAR BOND STRENGTH: DENTIN

24 HOUR SHEAR BOND STRENGTH

MATERIAL: Rexillium to Polished Rexillium with BJM prototype