

**A LABORATORY EVALUATION
OF AN
ADHESIVE RESIN CEMENT**

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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.

Itena 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 (Rexillum III) specimens were cast to approximate dimensions of 1 cm x 1 cm x 1mm. The cast wafers were potted in one inch phenolic rings with epoxy material. Ni-Cr-Be metal posts (Rexillum III) were cast approximately 3.5 mm in diameter and cut to approximately 5mm in length. The end of the Rexillum III cylinders were sandblasted with 50 μ aluminium 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 aluminium oxide. The Rexillum 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 placed over the cement margin around each metal post and the cement was allowed 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
TotalCem - polished	27,5 ± 7,6
Panavia 21 - grit blasted	43,8 ± 4,8
TotalCem - grit blasted	43,2 ± 4,9

DISCUSSION

The prototype cement was equally effective in generating high bond strengths of Rexillum to Rexillum when the substrate was air abraded with 50 micron aluminium oxide. It appears to be equal to or better than Panavia 21 in generating bond strength to polished Rexillum when applied using the Oxyguard product used with Panavia 21.

The results of this study indicate that the Itena cement, TotalCem, 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	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	50	3,30	1,65	54,46	Adhesive
5	70	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: Rexillum to grit blasted Rexillum with Itena prototype cement, TotalCem

SHEAR BOND STRENGTH

	% CHART	Kg LOAD	DIAMETER	RADIUS	MPa	FAILURE SITE
1	83	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	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	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: Rexillum to grit blasted Rexillum 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	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	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: Rexillum to Polished Rexillum 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	50	3,30	1,65	13,76	Adhesive
5	56,5	50	3,30	1,65	32,39	Adhesive
6	55	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 7,6

SHEAR BOND STRENGTH: DENTIN
24 HOUR SHEAR BOND STRENGTH

Material: Rexillum to Polished Rexillum with Itena prototype cement, TotalCem