



THREE-BODY WEAR OF DIFFERENT TYPES OF CEMENTS

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Objectives:

The aim of this investigation was to compare and rank the wear of different types of cements (n=7). The wear resistance was determined in a three-body abrasion test.

Methods:

The tested materials were:

Material	Panavia F	Compolute	Variolink 2	Rely X Unicem	Fuji Plus	Dyract Cem	Harvard PHL
Manufacturer	Kuraray, J	3M Espe, G	Ivoclar-Vivadent, FL	3M Espe, G	GC, USA	Dentsply, USA	Richter & Hoffmann, G

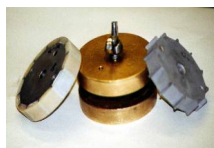


Figure 1: Sample wheels

Specimens fabrication:

The 12 moulds of the metal sample holding wheel were filled with the different cements according to the manufactures instructions. Six specimens of each group were adhesively fixed onto the sample holder (Rocatec, 3M Espe, G; Variolink II, Ivoclar-Vivadent, FL).

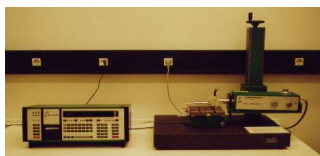


Wear:

Three-body testing was performed (ACTA-Willytec, G): sample wheel 60 rpm, antagonist wheel 130 rpm, force 15N. The third medium was a food bolus made of 30g millet sheet, 120g rice. Both were mixed in a grinding machine (La Moulinette, Moulinex, G).

Figure 2: ACTA-Willytec G

Figure 3: ACTA-Willytec G



Wear measurements:

The wear trace was quantified by profilometry (Perthometer S6P, Mahr-Feinprüf, G) in comparison to the non-worn surface after 50.000, 100.000 and 150.000 load cycles.

Statistical analysis was performed using Mann-Whitney-U-test (p=0.05).

Figure 4: Perthometer S6P, Mahr-Feinprüf, G

Results:

Wear [μm]	Panavia F	Compolute	Variolink II	Rely X Unicem	Fuji Plus	Dyract Cem	Harvard PHL
50.000	45 (43/54)	42 (39/46)	37 (27/45)	57 (39/61)	131 (127/147)	103 (91/123)	121 (100/156)
100.000	65 (72/81)	58 (54/67)	59 (52/73)	65 (50/77)	159 (113/177)	148 (129/151)	194 (185/206)
150.000	122 (115/134)	102 (81/116)	97 (89/113)	90 (57/136)	178 (131/213)	187 (177/209)	--

Figure 5: Wear after 50.000, 100.000 and 150.000 wear cycles. Median (25th/75th percentile) = higher than 25% out of range

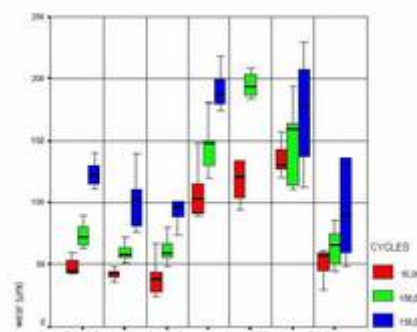


Figure 6: wear after 50.000, 100.000 and 150.000 wear cycles

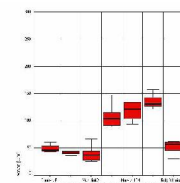


Figure 7: wear after 50.000 wear cycles

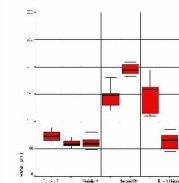


Figure 8: wear after 100.000 wear cycles

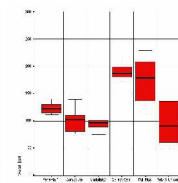


Figure 9: wear after 150.000 wear cycles

	Compolute	Variolink II	Dyract Cem	Harvard	Fuji Plus	Rely X
Panavia	0,012	0,019	0,000	0,000	0,036	0,328*
Compolute		0,627*	0,000	0,000	0,005	0,637*
Variolink II			0,000	0,000	0,005	0,637*
Dyract Cem				0,000	0,637*	0,001
Harvard					0,000	0,016
Fuji Plus						

Figure 10: P-values of the Mann-Whitney-U-test (p=0.05)

*: no significant differences

Conclusion:

Up to 150.000 the wear increased with the number of load cycles. After 150.000 cycles Fuji Plus, Dyract Cem and Harvard showed the highest wear results. The significantly highest wear resistance was found for resin cements.