



Objectives:

The aim of this study was to examine the fracture toughness and dynamic mechanical properties of dental core materials.

Materials and methods:

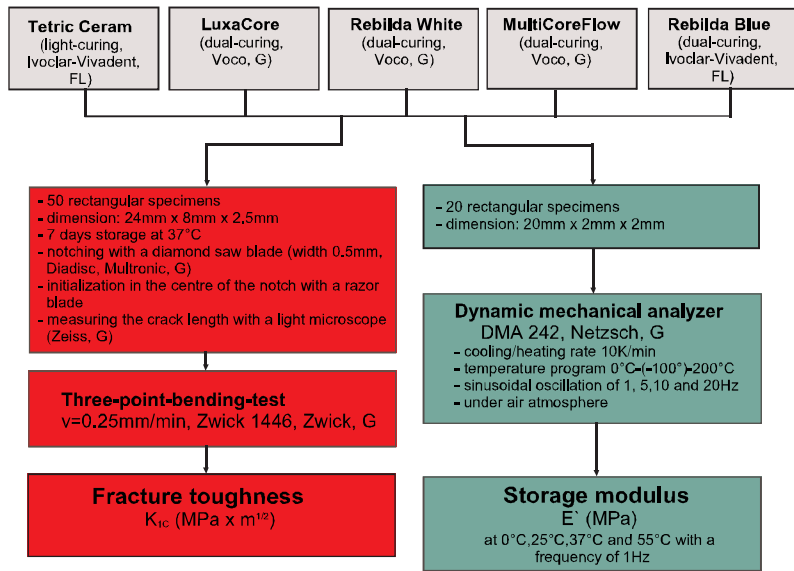


Fig.1: Tested materials and procedures



Fig.2: Device for notching the specimens (Ivoclar-Vivadent, Schaan, FL)



Fig.3: Three-point-bending-test; (Zwick 1446, Zwick, G)



Fig.4: Dynamic mechanical analyzer (DMA 242, Netzsch, G)

Results:

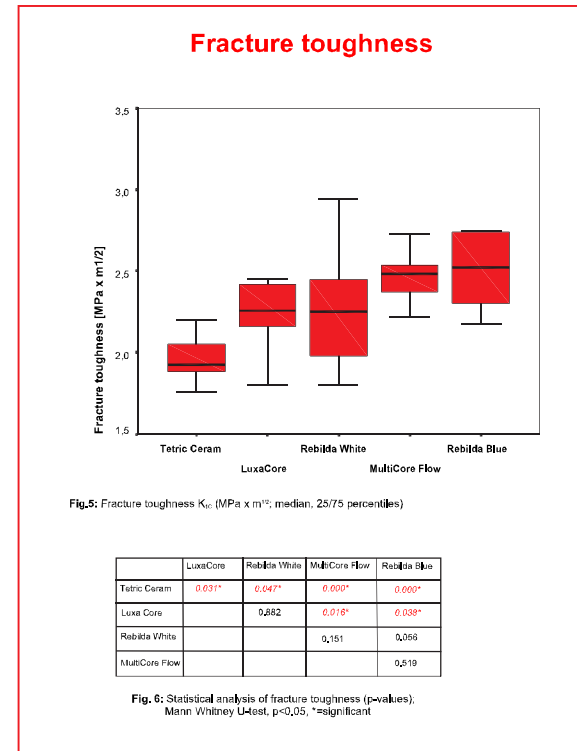


Fig.5: Fracture toughness K_{1C} (MPa x m^{1/2}; median, 25/75 percentiles)

	LuxaCore	Rebilda White	MultiCore Flow	Rebilda Blue
Tetric Ceram	0.031*	0.047*	0.000*	0.000*
Luxa Core		0.882	0.018*	0.038*
Rebilda White			0.151	0.058
MultiCore Flow				0.519

Fig. 6: Statistical analysis of fracture toughness (p-values); Mann-Whitney U-test, p<0,05, * = significant

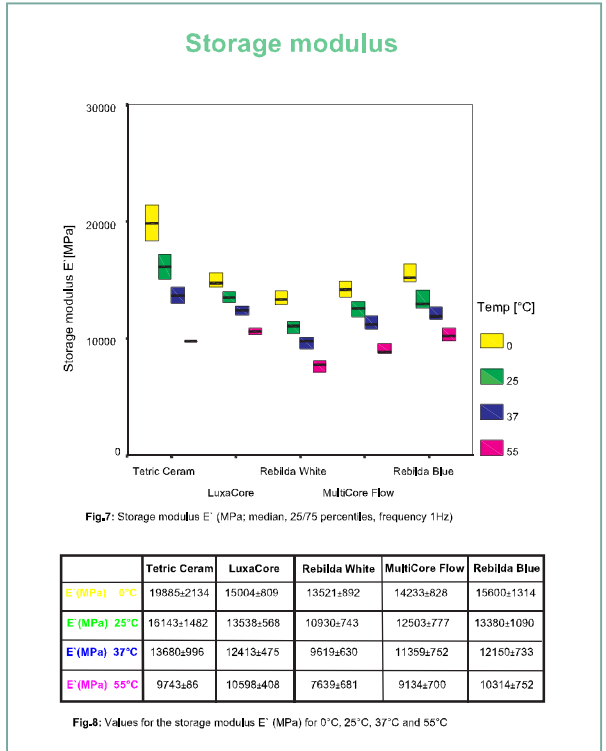


Fig.7: Storage modulus E' (MPa; median, 25/75 percentiles, frequency 1Hz)

	Tetric Ceram	LuxaCore	Rebilda White	MultiCore Flow	Rebilda Blue
E' (MPa) 0°C	19885±2134	15004±809	13521±892	14233±828	15600±1314
E' (MPa) 25°C	16143±1482	13538±568	10930±743	12503±777	13390±1090
E' (MPa) 37°C	13680±996	12413±475	9619±630	11369±762	12150±733
E' (MPa) 55°C	9743±86	10598±408	7639±681	9134±700	10314±752

Fig.8: Values for the storage modulus E' (MPa) for 0°C, 25°C, 37°C and 55°C

Conclusion:

All materials had comparable fracture toughness. The highest K_{1C} -results were found for Rebilda Blue. In the clinical operative temperature range between 0°C and 55°C all materials showed a decrease of storage modulus of about 35% with increasing temperature.