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Hygroscopic expansion of a compomer and a composite on artificial gap reduction.

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965

This study compared the effect of water sorption on the extent of marginal gap reduction in a compomer (Dyract AP, Dentsply) and a composite (Spectrum, Dentsply) over a 3 month storage period. Artificial gaps were created in forty borosilicate glass cylinders, each 5 mm deep and with an internal diameter of 5.5 mm. Half of the internal bonding surface of each cylinder was sandblasted, silanized and coated with Primer&Bond NT (Dentsply). Twenty bonded cylinders were incrementally filled with Dyract AP (AP) and the rest with Spectrum (S). For each material, ten specimens were stored in deionized water (W), and ten (control) in Dow-Corning silicon oil (O) at 37°C. The dimension of the same maximum gap created in each specimen was repeatedly measured at 0,1,2,4,6,8,10 and 12 weeks, using a light microscope (Orthoplan, Leitz) under incident light at 570x magnification. Gap widths in each of the four groups (n = 10) were statistically compared. Correlations between mean gap width reduction and storage time were also examined. Friedman repeated measures ANOVA on ranks revealed significant differences (p<0.001) among the gap widths measured at different time intervals in groups AP-W and S-W. No significant differences (p>0.05) were found in groups AP-O and S-O. Tukey multiple comparison tests indicated that no significant differences (p>0.05) were detectable beyond the 6th week in AP-W and the 4th week in S-W. Linear regression analyses showed that mean gap widths decreased exponentially with time for AP-W (r = 0.97) and S-W (r = 0.90). From the slopes of the regression lines, the rate of marginal gap reduction in AP-W was 4.6 times faster than S-W. It is concluded that marginal gap reductions in both materials are directly attributable to water sorption and that the reduction is more extensive and rapid in Dyract AP. (Supported by Dentsply DeTrey, Konstanz, Germany and grant DE06427 from NIDCR, USA)

2127

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