Effect of Cathepsins’ Inhibitor E-64 on Dentin-resin Bonding
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Objectives: The purpose of this study was to investigate the effect of cathepsins on dentin-resin bonds and the use of its specific inhibitor E-64 in an adhesive system, in vitro. Materials and Methods: Fifty recently extracted human third molars were divided into five groups where adhesives with different molarity of E-64 were used. They were 2.5 µM, 5.0 µM, 10 µM, 20 µM, and a control group were E-64 was not used. Adper Single Bond 2 (3M ESPE) was the adhesive used. Half of the specimens were tested after 24 h of water storage (37°C) and the other half after 90 days of water storage (37°C) followed by 3,000 cycles of thermocycling (5-55°C) in a universal testing machine. Fractured specimens were analyzed using scanning electron microscopy (SEM). The integrity, continuity, and rarefaction of the collagen fibrils were observed at 10,000X magnification. Results: After 24 h water storage, microtensile bond strength (µTBS) values were similar without significantly differences among groups (P>0.05). Experimental groups presented µTBS higher than control after aging (2.5 µM – 18.7±2.7 MPa; 5.0 µM – 20.8±3.4 MPa; 10 µM – 18.3±2.8 MPa; 20 µM – 19.1±2.7 MPa); control – 15.1±3.0 MPa), P<0.05. No differences in µTBS overtime were noticed for the 5.0 µM group. The other groups had significant decrease in µTBS overtime. Collagen fibrils seem to be less degraded in the hybrid layer of groups using E-64. Conclusions: E-64 as part of the composition of an adhesive system affected dentin bonding. That might be explained by the effect of E-64 on cathepsin. Clinical Significance: E-64 might improve the longevity of dentin-resin bonds.