Inhibition of MMP Activity in Acid-Etched Dentin by Gluma Treatment

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Objectives: The objective of this study was to determine if Gluma Desensitizer (composed of 5% glutaraldehyde and 35% HEMA in water, Heraeus Kulzer) inhibits the endogenous MMPs of dentin matrix. Materials and Methods: Human coronal dentin from extracted third molars was prepared by removing roots and enamel. Dentin beams of 1 x 1 x 6 mm were prepared. To measure the influence of Gluma treatment time on total MMP activity on dentin, beams were dipped in 37% phosphoric acid (PA) for 15 s and rinsed in water. The acid-etched beams were then dipped in Gluma for 5, 15, 30 or 60 s, rinsed in water and dropped into SensoLyte generic MMP substrate (AnaSpec, Inc.) for 60 min. Controls were dipped in water for 60 s. Additional beams were completely demineralized in 37% PA for 18 h, rinsed and used to measure modulus of elasticity (E) after 60 s of Gluma treatment followed by incubation in buffer for 0, 1 or 4 weeks. E was measured by 3-point flexure. Results: Gluma treatment inhibited total MMP activity of acid-etched dentin by 44, 50, 84 and 86% after 5, 15, 30 and 60 s of exposure, respectively. All completely demineralized dentin beams lost stiffness after 1 and 4 weeks. There were no significant differences between controls and Gluma-treated dentin. Conclusions: Treatment of acid-etched dentin by Gluma for 30 and 60 s produced 84 and 86% inhibition of total MMP activity. Clinical Significance: The use of Gluma Desensitizer may help in the preservation of adhesive interfaces by inhibiting endogenous dentin MMPs. Supported, in part, by R01DE015306 from the NIDCR.