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Abstract

PURPOSE: To compare the enamel bonding performance of two commercial and three experimental two-step self-etch adhesives containing acidic functional monomers with different carbon-spacer length and hydrophilicity. The contact angle was also assessed to evaluate the wettability of each tested material.

MATERIALS AND METHODS: Forty extracted human molars were sectioned into four parts (buccal, lingual, mesial, and distal) and divided into 5 groups, according to the adhesives used: Clearfil SE Bond (CSE), AdheSE (ADSE), 10-MDP (15 mol% 10-methacryloyldecalphosphate), CAP-P (15 mol% caprolactone phosphate), and MTEP (15 mol% methacryloyltetraethylene phosphate). Enamel specimens were bonded with each adhesive and submitted to microshear bond strength (μSBS) testing after 24 h. The adhesives were applied onto additional enamel specimens without light curing to assess contact angle. Then the etching pattern was analyzed using SEM and confocal laser scanning microscopy (CLSM). The μSBS and contact angle data were analyzed by one-way ANOVA and Tukey’s test (α = 0.05).

RESULTS: 10-MDP showed the highest μSBS of the tested groups (p < 0.05), followed by CAP-P and CSE (p < 0.05). MTEP and ADSE exhibited the lowest μSBS (p < 0.05), but the difference between them was not significant. 10-MDP, CSE, and CAP-P exhibited lower contact angles (p < 0.05) than did ADSE and
MTEP. The SEM and CLSM analyses showed that 10-MDP and CSE had the most pronounced etching patterns and deepest adhesive penetration. ADSE and MTEP exhibited weak etching ability and adhesive penetration, while CAP-P produced moderate etching and intermediate penetration.

CONCLUSIONS: The length and hydrophilicity of the functional monomer spacer chain tested in this study influenced the enamel bonding performance. Functional monomers with longer chains and more hydrophobic properties, such as 10-MDP and CAP-P, may interact better with enamel and achieve higher enamel bond strength.

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