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In vitro recurrent caries inhibition effects by a fluoride-containing rewetting agent

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This study examined the *in vitro* caries inhibiting potential of fluoride (FR) and non-fluoride-containing (NFR) rewetting agents that are applied to acid-etched enamel and dentin before the use of water-free, dentin adhesives. Twelve caries-free bicuspid teeth were divided into three groups. 2 x 3 x 1.5 mm cavities were prepared on the mesial and distal surfaces of each tooth, with half of the cavosurface margin in enamel and half in cementum. In group I (control), One-Step (Bisco, Schamburg, USA) was applied without etching or rewetting agent. In group II, cavities were acid-etched, air-dried for 2s, rewetted with a NFR (Aqua-Prep, Bisco) for 20s, and then bonded with One-Step. Treatment for group III was similar to group II, except that a FR (Aqua-Prep F, Bisco) was used. Bonded cavities were restored with a non-fluoride-containing composite (EliteFlo, Bisco). Artificial carious lesions were induced in these specimens, from which 100±20 µm thick longitudinal sections were subsequently prepared; yielding 16 specimens per group for evaluation with polarizing light microscopy and microradiography. Representative sections were processed for transmission electron microscopy (TEM). Undemineralized ultrathin sections were examined unstained. Results: The outer lesion depths (µm) were 116±5, 114±5 and 113±7, and the lesion area (µm²) were 21,562±2,035, 14,966±1,819, 10,829±2,302 for groups I, II and III respectively. The differences were not statistically significant for lesion depth (p>0.5, ANOVA, Duncan's test), but highly significant for lesion area (p<0.001). Wall lesions were consistently present in group I, while inhibition zones were invariably observed in group III. 87.5% of group II specimens exhibited neither wall lesions nor inhibition zones. Inhibition zones in Group III had a mean width of 52.80±18µm. TEM showed that remnant dentin crystallites within the inhibition zones in group III were larger and denser than the corresponding wall lesions. They were of the same density and size along the same lesion depth in group II specimens. It is hypothesized that a fluoride-containing rewetting agent inhibits recurrent caries *in vitro* by altering apatite dissolution. (Supported by University of Hong Kong CRC grant 10202354)

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