Remineralizing Effect of Fluoride-releasing Materials on Dentin in vitro

—Influences of pH and Viscosity as Remineralization Conditions—

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**Abstract:** It is unknown whether the ability to induce remineralization occurs in any tooth surface condition. The aim of this study was to evaluate this property in solutions simulating different oral conditions of pH and viscosity in vitro. Bovine dentin single-sections were immersed in an acetic acid gel system to make baseline lesions at pH 5.0 for 5 days at 37°C. Glass-ionomer cement (GIC) or resin composite (CR) was placed in artificial cavities in perspex blocks and a demineralized dentin single-section was put into the groove leaving 1 mm from the material. These combinations were subjected to one of four remineralization conditions (4 weeks, 37°C). Group 1: pH 7.0 solution group (Ca/P04: 1.5/0.9), Group 2: pH 7.0 Gel group (8% MC gel covered with pH 7.0 solution), Group 3: pH 6.5 Gel group (8% MC gel covered with pH 6.5 solution), Group 4: pH 6.0 Gel group (8% MC gel covered with pH 6.0 solution). Transversal Microradiography were taken before and after the remineralization. The difference between integrated mineral loss values (ΔZ) was calculated as ΔZa. The collected data were analyzed statistically using one-way ANOVA and Duncan’s multiple range test as the post-hoc test. In Group 1, remineralization was shown for both GIC and CR, however, ΔZa was not significantly different. Group 2: Remineralization was shown for both GIC and CR, however, CR was not markedly different from GIC. Group 3: In comparison with CR, GIC induced prominent remineralization accompanying "hyper remineralization" and ΔZa was significantly higher than CR (p<0.05). Group 4: ΔZa shifted to a negative value as demineralization in both materials, however, it was lower in GIC (p<0.05). In conclusion, in this study, small differences of pH and viscosity affected remineralization, and in the pH 6.5 gel condition, which may simulate a slightly acidic condition on the tooth surface with plaque accumulation, GIC as a representative fluoride-releasing filling material will induce prominent remineralization on marginal subsurface lesions.

**Key words:** Remineralization, Fluoride-releasing materials, Dentin