Discolouration of glass-ionomer cements at different fluoride gel concentrations

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Objective: This study aimed to examine the threshold of fluoride concentration in staining glass-ionomer cement restorations (GIC).

Materials and Methods: Seventy extracted human permanent molars restored with GIC were treated with acidulated phosphate fluoride (APF) gel at predetermined concentrations ranging from 1 ppm to 12300 ppm with standard procedures. For each tooth, a visual comparison to a shade guide was made 24 hours after the application for aesthetic changes to the GIC restoration. This cycle was carried out twice.

Results: Aesthetic changes presented as obvious loss in translucency and/or changes of shade to the surface of the GIC restoration. The average staining rates of GIC were 5.71% and 32.86% after the first application and the second application, respectively. After the second application, the staining rates were 100%, 90%, 20%, 10%, 10%, 0% and 0% at the fluoride concentration of 12500 ppm, 8000 ppm, 4000 ppm, 2000 ppm, 1000 ppm, 500 ppm, and 1 ppm, respectively. Staining rates increased with fluoride concentration on the second application ($\chi^2=38.314$, df=1, $p<0.001$) but not the first ($\chi^2=2.352$, df=1, $p=0.125$). The logistic regression method further suggested an increasing trend of staining rates upon fluoride concentration after the second application ($p<0.001$, OR=1.001, 95% CI=1.000, 1.001).

Conclusion: Staining of GIC as a result of topical APF application was associated with frequency and concentration of fluoride application. Further clinical trials are indicated.