

Influence of temperature on fluoride release by glass ionomer cements

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INTRODUCTION: Fluoride release by glass ionomer cement (GIC) has been widely studied according to different parameters such as the powder/liquid ratio, the composition, and the media.^{1,2} But there is little information about the incidence of temperature^{3,4}. The aim of this study was to determine the influence of temperature on fluoride release using a conventional GIC (C-GIC) and a resin-modified GIC (RM-GIC).

METHODS: Five disc-shaped samples (12 mm in diameter and 1.2 mm thick) of a C-GIC (Fuji IX, GC, Tokyo, Japan) and five samples of a resin-modified glass ionomer cement (Fuji II LC) were made. The RM-GIC samples were light-cured for 60 s on each side (mode HIP, Astralis 7, Ivoclar-Vivadent, Saint Jorioz, France). Specimens were immersed in flasks containing 6 ml of distilled water. The temperature was maintained constant using a climatic chamber (Secasi Technologies, SH 340, Pessac, France). The experiments were conducted at 5°C, 37°C and 55°C. The solution was changed at 1, 2, 3, 4, 7 and 14 days. Then, the samples were immersed for 1 hour in a solution of potassium fluoride at 0.1 M (1900 ppm) and the same method as above was conducted for 7 days instead of 14 days. Fluoride release was measured using an Ion Selective Electrode (ISEC301F-9, Radiometer Analytical, Villeurbanne, France).

RESULTS: Statistical analysis was performed with the Kruskal-Wallis test and the Bonferroni-Dunn test.

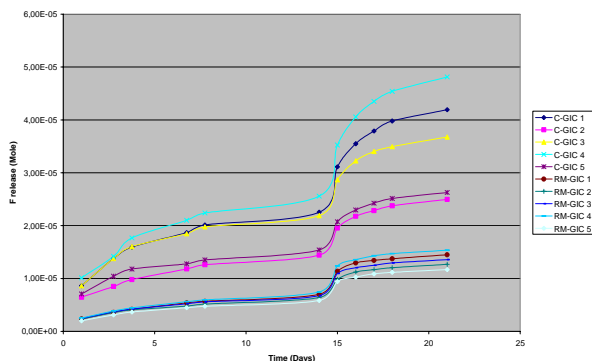


Fig. 1: Initial fluoride release and release after re-uptake at 5°C

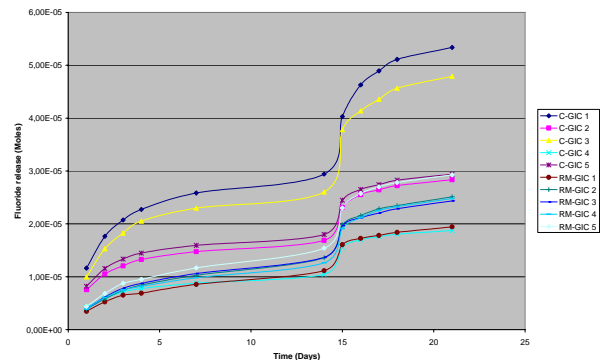


Fig. 2: Initial fluoride release and release after re-uptake at 37°C

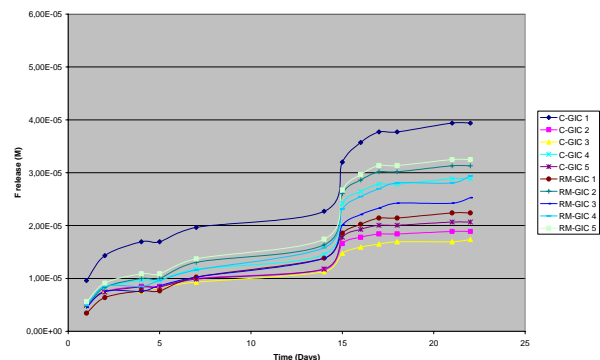


Fig. 3: Initial fluoride release and release after re-uptake at 55°C

Statistical analysis showed that temperature had no significant influence on the initial fluoride release and release after re-uptake for the C-GIC whereas it had an influence on the RM-GIC except between 37°C and 55°C for the fluoride release after re-uptake (Figure 1-3).

DISCUSSION & CONCLUSIONS: Fluoride release is high during the maturation phase for the 2 materials. When the materials are quite mature, the release is linear. It seems that the fluoride release is influenced by the temperature increase for the material containing a polymer matrix.

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