

Uptake of Calcium and Silicon released from calcium silicate based endodontic materials into root canal dentine

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International Endodontic Journal, July 2011

Aim: To compare Biodentine and White ProRoot mineral trioxide aggregate (MTA) with regard to Ca and Si uptake by adjacent root canal dentine in the presence of phosphate-buffered saline (PBS)

Methodology: Root canals of bovine incisor root segments were instrumented, filled with either Biodentine or MTA ($n=20$ each) and then immersed in Ca and Mg-free PBS for 1, 7, 30 or 90 days ($n=5$ each). Unfilled, unimmersed dentine specimens ($n=5$) served as controls. The specimens were sectioned longitudinally, and the ultrastructure of the dentine-material interface and the elemental composition/distribution in the material-adjacent dentine were analysed using a wavelength-dispersive X-Ray spectroscopy electron probe microanalyser with image observation function. Data were statistically analysed using one-way ANOVA and Tukey's honestly significant difference test or the Mann-Whitney U-test.

Results: Along the material-dentine interface, both materials formed a tag-like structure that was composed of either Ca- and P-rich crystalline deposits of the material itself. The width of a Ca and Si-rich layer detected along the dentine layer of the material-dentine interface showed increases over time. The Ca and Si-rich layer width was significantly larger ($P<0.05$) in Biodentine than MTA at 30 and 90 days.

Conclusions: Both Biodentine and MTA caused the uptake of Ca and Si in the adjacent root canal dentine in the presence of PBS. The dentine element uptake was more prominent for Biodentine than MTA