Preliminary Evidence That Bioactive Cements Occlude Artificial Marginal Gaps

Scientific Publication: Preliminary evidence that bioactive cements occlude artificial marginal gaps. Published by: SR Jefferies, AE Fuller, DW Boston. Published in: Journal of Esthetic and Restorative Dentistry. 2015*.

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Dentin discs (~1 mm thick) and the dental cement discs were assembled, with a 50 μm-thick Mylar strip separator between them except at one end, thereby creating an artificial marginal gap 50-110 μm in width for all materials compared.

An additional sample using Ceramir C&B was prepared with a 250-300 μm wide gap.

At baseline, the marginal gaps were assessed using light microscopy (50x magnification).

Digital images of the interfacial gap at 50× magnification were recorded at baseline (time zero), and at intermittent time periods from 1 day to 8 months after incubation in phosphate buffered saline at 37°C.

At around Month 5, micro-computerized tomography scans were taken of randomly-selected samples for each cement, to determine if radiodense material was present at the edges and within the marginal gaps.

The dentin-gap-cement assemblies were reconstructed digitally, and virtual cross-sectional slices created.
Observations and Conclusions:

At ~1 month: Complete marginal gap occlusion for 3 of 5 samples containing Ceramir C&B cement.

At Day 35: Ceramir C&B had almost completely occluded all marginal gaps initially 50-110 μm-wide; occlusion was slower for the sample with an initial 250-300 μm-wide gap.

At 5 months: Occlusive ‘mineralized’ material was confirmed to be present at and within the gap areas for Ceramir C&B and White ProRoot MTA.

At 8 months: Complete gap closure was observed for all Ceramir C&B and White ProRoot MTA samples.

There was no evidence of any marginal gap occlusion at any time point for the self-adhesive composite resin, resin-modified glass ionomer and glass ionomer cement assemblies (n=5 each).

Based on these results, bioactive cements may have the ability to partially or completely occlude marginal gaps. If substantiated, the capability of a bioactive reactive cement, such as Ceramir C&B, to reseal and close marginal gaps and defects could potentially add a new, useful protective function.