POSTER #5

Characterization of ion-leachable glass powders and light transmission of some ILG composite formulations.

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Objective: To characterize ion leachable glass powders and measure light transmission of resin-composites formulated with these filler powders.
Materials and Methods: Scanning electron microscopy (SEM) and X-ray diffraction (XRD) were used to characterize 3 unsilanated ion leachable glasses (ILG), namely: bioactive glass (45S5), Fuji IX and Fuji IX extra powders. Seven resin-composite groups were formulated with 50:50 w/w BisGMA:TEGDMA, and a photo-initiator system of 0.5 wt% camphorquinone (CQ) with dimethyl-amino-ethyl-methacrylate (DMAEM). The composites had a constant filler fraction of 72 wt%. The filler phase comprised silanated barium borosilicate (BBS) powder with progressive substitutions of 10 or 15 wt% of the fillers by each of the ILG glasses. Un-cured disc specimens (4 x 2 mm, n=3) were prepared for each group. The specimens were each irradiated with a 1200 mW/cm^2 blue LED unit. Light transmittance, through each 2 mm thickness, was measured using a UV-visible spectrophotometer (MARC^{TM}-RC).
Results: The ion leachable glasses had a similar size distribution (0.02 to 2000 µm) with an average size ≈10 µm. SEM images showed irregular morphology of the particles with scratches on the surface due to the milling processes. The maximum transmitted irradiance obtained through the ILG composites was 680 mW/cm^2. But the BBS control group had a transmitted irradiance of 716 mW/cm^2. However, there were no statistically significant differences between the groups ($p > 0.05$).
Conclusions: The experimental ILG resin-composites demonstrated adequate light transmission through a 2 mm thickness, when the ILG substitutions were limited to 10-15 wt%.