1: Arch Oral Biol. 2009 Apr 15. [Epub ahead of print]

The anti-adherence activity and bactericidal effect of microparticulate silver additives in composite resin materials.

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OBJECTIVE: Resin composite materials tend to accumulate microorganisms and dental plaque, which in turn may induce secondary caries around adhesive restorations. The aim of the present in vitro study was to evaluate the antibacterial activity of a resin composite material loaded with silver microparticles against Streptococcus mutans. DESIGN: Circular specimens (10.0mm in diameter) of a resin composite matrix loaded with two different concentrations of a silver additive (Comp0.3: 0.3%; Comp0.6: 0.6%) and one unloaded reference composite matrix (Comp0: 0%) were made. Surface roughness R(a) was assessed by perthometer measurements and hydrophobicity according to water contact angles was determined by computerized image analysis. The specimens were incubated in a S. mutans suspension (1h, 37 degrees C) and adhering streptococci were quantified by using a biofluorescence assay (Alamar blue/Resazurin). Additionally, the viability of adhering bacteria was assessed by live/dead cell labelling in combination with fluorescence microscopy. RESULTS: Statistically significant differences between the median water contact angles of Comp0 (66.3 degrees), Comp0.3 (76.7 degrees), and Comp0.6 (89.4 degrees) were observed ($p<0.001$). A three- to fourfold higher amount of adhering S. mutans was found on reference Comp0 (12,093relative fluorescence units) than on Comp0.3 (4258rfu) and Comp0.6 (3292) ($p<0.001$ for both). Significantly higher percentages of dead cells than on Comp0 (0.5%) were found on Comp0.3 (6.1%) and on Comp0.6 (10.1%) ($p<0.001$ for both). CONCLUSIONS: The addition of microparticulate silver to a resin composite material increased the surface hydrophobicity and reduced the number of adhering streptococci. Simultaneously it increased the percentage of dead and inactive cells on the composite surface. Thus, silver additives seem to demonstrate anti-adherence activity as well as a bactericidal effect.