



THE ANTIBACTERIAL PROPERTIES OF BIOACTIVE GLASS

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Particulate bioactive glass (NovaMin®) is a material with a number of potential oral applications. In aqueous solutions, the bioactive 45S5 composition (45% SiO₂, 24.5% Na₂O, 24.5% CaO and 6% P₂O₅) forms silicate and calcium phosphate rich layers. The surface reactivity of the glass also causes a rise in the pH in the surrounding solution. This pH rise may inhibit bacterial colonization of the glass surface. The aim of this study was to investigate the antibacterial effects of the 45S5 particulate bioactive glass, on the oral bacteria; *Streptococcus sanguis*, *Streptococcus mutans* and *Actinomyces viscosus*, suspended in either nutrient broth or Dulbecco's modified eagle medium (DMEM) + 10% fetal calf serum (FCS). The choice of media represented a relatively simple medium with low protein content (nutrient broth) and a medium high in protein, more representative of human tissue fluid (DMEM +10% FCS). Forty-eight hour cultures were resuspended in nutrient broth or DMEM + 10% FCS, and dispensed into tubes containing 0.05g heat sterilized glass granules. Control tubes contained no granules. Solutions were incubated for 1 hour at 37° C before addition of phosphate buffered saline (PBS). The tubes were vortexed for 60s to dislodge adherent bacteria. Viable counts were performed on Tryptone Soya Agar plates. The tubes containing glass granules in nutrient broth compared to nutrient broth alone, showed a 98% loss of viability for *S. sanguis*, 83% for *S. mutans* and 97% for *A. viscosus*. The tubes containing granules in DMEM + 10%FCS however, showed a loss of viability of 71% for *S. sanguis*, 52% for *S. mutans* and 73% for *A. viscosus*. The pH values of both bioactive glass containing media were in the region of 9.1-9.4 following addition of PBS. These results have demonstrated that bioactive glass 45S5 can exert an appreciable antibacterial effect, although this was reduced in the presence of a serum-containing medium.

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