

Susceptibility of *Streptococcus mutans* biofilms to photodynamic therapy: an *in vitro* study

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Objectives: The purpose of this study was to evaluate the antimicrobial effect of toluidine blue O (TBO), in combination with either a helium/neon (HeNe) laser or a light-emitting diode (LED), on the viability and architecture of *Streptococcus mutans* biofilms.

Methods: Biofilms were grown on hydroxyapatite discs in a constant depth film fermentor fed with artificial saliva that was supplemented with 2% sucrose four times a day, thus producing a typical 'Stephan pH curve'. Photodynamic therapy was subsequently carried out on biofilms of various ages with light from either the HeNe laser or LED using energy densities of between 49 and 294 J/cm².

Results: Significant decreases in the viability of *S. mutans* biofilms were only observed when biofilms were exposed to both TBO and light, when reductions in viability of up to 99.99% were observed with both light sources. Overall, the results showed that the bactericidal effect was light dose-dependent and that older biofilms were less susceptible to photodynamic therapy. Confocal laser scanning microscopy images suggested that lethal photosensitization occurred predominantly in the outermost layers of the biofilms.

Conclusions: Photodynamic therapy may be a useful approach in the treatment of dental plaque-related diseases.