

TITLE: Photodynamic therapy mediated by different photosensitizers derived from chlorine against *Streptococcus mutans* biofilms

AUTHORS: Garcia M.T; Pereira A.H.C; Bagnato V.S; Jorge A.O.C; Oliveira L.D; Strixino J.F; Junqueira J.C

INSTITUTION: Institute of Science and Technology, UNESP - Univ. Estadual Paulista, São José dos Campos, SP, Brazil.

ABSTRACT:

Photodynamic therapy (PDT) has been shown significant antimicrobial activity against oral pathogens and different photosensitizers (FT) have been investigated. However, there are no studies focused on the use of Chlorine as a FT to control the growth of cariogenic bacteria. This study evaluated the efficacy of PDT against biofilms of *Streptococcus mutans* using two second generation FTs derived from chlorine: Photoditazine (PDZ) of Russian origin, and Fotoenticine of Spanish origin. These FTs were compared to methylene blue that already has proven antimicrobial effects on *S. mutans*. Standardized suspensions of *S. mutans* (10^8 cells/mL) were cultured in contact with bovine tooth disks (5 mm in diameter and 2 in thickness) to forming the biofilms. After 48 hours, the biofilms formed were treated with PDZ (0.6 mg/mL), Fotoenticine (0.6 mg/mL) or methylene blue (1 mg/mL) and irradiated with laser (λ 660 nm, 50 mW/cm²) for 5 min. The control groups were composed of the following treatments: physiological solution and Laser, FT alone, or physiological solution alone. After the treatments, the bovine disks were sonicated to disperse the biofilms and serial dilutions were seeded on BHI agar to determine the number of CFU/mL (Log₁₀). The results obtained were analyzed by ANOVA and Tukey's test. All FTs used in the PDT reduced the number of *S. mutans* with statistically significance difference in relation to the control groups. The microbial reduction achieved by PDT was 4 Log for MB and 6 Log for PDZ. The PDT using Fotoenticine lead a total elimination of *S. mutans* cells in the biofilms. It was concluded that PDT mediated by FTs derived from Chlorine showed a greater antimicrobial activity against *S. mutans* in relation to PDT with MB. When the FTs derived from chlorine were compared, Fotoencine had higher antimicrobial activity than PDZ.

KEYWORDS: Streptococcus mutans, Biofilm, Chlorine, Photosensitizer, Photodynamic therapy

FINANCIAL SUPPORT: Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), (2016/09296-8).