

TITLE: A PROTEIN-ENRICHED ARTIFICIAL SALIVA FORMULATIONS FOR HEAD AND NECK CANCER PATIENTS (HNC): ANTIMICROBIAL EFFECT UNDER A MICROCOSM BIOFILM MODEL

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ABSTRACT:

Hyposalivation affects the head and neck cancer (HNC) patients treated with radiotherapy when the salivary glands are within the irradiated field. The reduced salivary flow and biochemistry changes of saliva are associated with the rapid development of post radiation caries. Due to the lack of salivary substitutes, the aim of this study was to evaluate the antimicrobial effect of different artificial saliva formulations with CaneCPI-5 and Hemoglobin, isolated or in combination, on the microcosm biofilm formed in irradiated and non-irradiated bovine enamel, from saliva of healthy participants or HNC participants, submitted to radiotherapy. The irradiated and non-irradiated specimens (n = 216) were divided into groups A (saliva of five healthy participants with normal salivary flow) and B (saliva of five irradiated HNC participants with hyposalivation). The specimens were previously washed for 60 s with one of the following treatments: a) Phosphate buffered saline (CTR); b) Inorganic constituents with carboxymethylcellulose at 0.8% (AS); c) AS with 0.1 mg/mL CaneCPI-5 (AS+Cane); d) AS with 1.0 mg/mL Hemoglobin (AS+Hb); e) AS with 0.1 mg/mL CaneCPI-5 and 1.0 mg/mL Hemoglobin (AS+Cane+Hb); and f) BioXtra® (BXT). The microcosm biofilm was formed for 5 days from samples collected from both groups and diluted in McBain (2009) saliva with 0.2% sucrose (5% CO₂, 37°C). Every 24 h the biofilm was treated with its respective formulation for 60 s. The colony-forming units (CFU) were counted for total microorganisms, total streptococci, mutans streptococci (*S. mutans* and *S. sobrinus*) and *Lactobacillus* sp. The data were analyzed by three-way ANOVA and Tukey test (p < 0.05). Regardless of the enamel type and saliva used, the effective treatments in significantly reducing the CFU count for total microorganisms were AS+Cane (p = 0.018), AS+Hb (p = 0.046), AS+Cane+Hb (p = 0.001) and BXT (p = 0.040). For total streptococci, none of the treatments was able to significantly reduce the number of CFU. The treatment capable of significantly decreasing the mutans streptococci counting was BXT (p = 0.015). The total Lactobacilli counting decreased significantly in AS+Cane (p = 0.021), AS+Cane+Hb (p = 0.003) and BXT (p < 0.001). CaneCPI-5 and Hemoglobin, isolated or combination, showed antimicrobial effects under this experimental model and, therefore, could be good candidates to be included in artificial saliva formulations for use by HNC patients.

Keywords: dental caries, oral biofilm, protein incorporation, salivary substitute

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