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INFLUENCE OF MATERIAL TYPE AND SURFACE BENZALKONIUM CHLORIDE PRECONDITIONING ON BIOFILM FORMATION AND ACTIVITY

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ABSTRACT

This study investigates the potential of benzalkonium chloride (BAC), a cationic surfactant, on the prevention of biofilm formation on stainless steel ASI 316 and silicone rubber, two distinct surfaces currently used on food processing facilities. The surfaces were preconditionized with several concentration of BAC for 30 min. Treated surfaces were characterized by the sessile drop method, demonstrating that surfactant pre-treatment increased the hydrophobicity of the surfaces, this increase being a function of BAC concentration increase applied for preconditioning. In order to ascertain the preventive effect on biofilm formation, the treated surfaces where inserted in a chemostat continuously inoculated with *P. fluorescens* in the exponential phase of growth, being the biofilm allowed to grow for 6 days. The results showed that BAC preconditioning did not prevent or impair biofilm formation. In fact, biofilms developed on the treated surfaces presented higher biomass and metabolic activity than the ones formed on the untreated surfaces, this phenomenon being more evident for silicone than for stainless steel and for surfaces treated with higher BAC concentrations. Scanning electron microscopy and biochemical analysis reveal that the difference of surface type and surface preconditioning, by itself, gave rise to the formation of structural and biochemical distinct biofilms.

The overall results suggest that preconditioning of stainless steel and silicone rubber surfaces with BAC allowed the formation of biofilms with more recalcitrant properties than the ones found on untreated surfaces.