

Effect of arginine-based surfactants on Pseudomonas aeruginosa biofilms

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Antiseptics and disinfectants are the first line agents with the ability to interrupt the spread of potential pathogens. A plethora of chemical agents are available to be used alone or as part of a formulation. Among them, surfactants consist in a group of molecules with diverse chemical structures sharing an amphiphilic nature: a polar group and a hydrophobic moiety (Figure 1). This characteristic is responsible for their tensioactive properties. Although the activity antimicrobial of arginine-based surfactants has been extensively reported against planktonic cultures, information about their antibiofilm activity is generally scarce.



Figure 1: Synthesis and structure of the arginine-based surfactant.

Bz-Arg-NHC_n•X (n=10 or 12; X= Cl⁻ or Br⁻)

Pseudomonas aeruginosa PA14 and PA5017 were used to test the effect of $Bz-Arg-NHC_n \cdot X$ (n=10 or 12; X=Cl or Br) in biofilm disruption.

Growth curves were registered measuring OD_{600} in LB or M63 medium added with the surfactants and incubated at 30°C for 24h and 30h, respectively (Figure 2). Biofilm disruption assays were made using M63 medium and incubating for 16h at 37°C with a with a subsequent incubation of 5h with the surfactant (Figures 3 and 4).

For all assays, we used the surfactant at the corresponding minimum inhibitory concentration (MIC). Chlorhexidine (CHX) and cetyl trimethyl ammonium bromide (CTAB) were included as controls.



Growth curves



- → Results showed the ability of these surfactants disrupting preformed Pseudomonas aeruginosa biofilms.
- > The biofilm disruption assay in eppendorf tubes demonstrated that the strain PA14 was more resistant than PA5017 for all the surfactants including the controls.
- -> Unexpectedly, for the biofilm disruption assay in the 8-well chamber slide, fluorescence analysis showed an increase of biofilm formation for both strains. A disruption and change over the biofilm's morphology was observed. Concentrations higher than MIC and other growing conditions should be tested.
- → These assays are the first step towards assessing the action of these arginine-based surfactants on bacterial biofilms.