451e Investigation of *Staphylococcus Aureus* Biofilms: Quantification and Characterization of Planktonic Cells Eroding under Physiologically Relevant Fluid Shear Conditions

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Approximately 2 million cases of nosocomial infections occur every year in the United States. *Staphylococcus aureus* alone is responsible for 200,000 of those cases, with up to 65% associated with biofilms. Bacterial biofilms constitute reservoirs of pathogens and are associated with resistance to antimicrobial agents and chronic infections. Within the bloodstream, biofilm-issued planktonic cells may be responsible for the generation of secondary sites of infection. However, the pathophysiological mechanisms leading to these infections remain unclear. In this study, we sought to elucidate the phenotypical differences expressed by *S. aureus* biofilm-derived cells. We hypothesized that *S. aureus* planktonic cells would demonstrate different adhesion properties depending on the age of the biofilm from which they originated. Biofilm cultures were sustained in vitro, at shear rates of 40- and 100-s^{-1} for up to 24 hours. Using a parallel plate flow chamber and phase-contrast videomicroscopy, adhesion assays on immobilized protein substrates were performed with *S. aureus* planktonic cells collected at different stages of biofilm development. Experimental results reveal that the adhesion properties of eroding planktonic cells differ considerably from the properties of the shake flask grown population used to initiate biofilm development. These results also indicate that, once a mature biofilm has developed onto the surface, eroding planktonic cells express invariant adhesion properties regardless of the age of the biofilm from which they originate. These data suggest that understanding the phenotypical properties of *S. aureus* biofilms and associated planktonic cells may have important clinical implications pertaining to the prevention and annihilation of chronic staphylococcal infections.