Title: Preventing Mature Biofilm Formation on Colonized Surfaces Using Antibiotics

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Introduction: Microbial biofilm formation on implanted medical devices is an important contributor to nosocomial infections. We are interested in determining whether there is a dose of antibiotic that could prevent the development of mature biofilms following surface colonization of a medical device. We hypothesized that a preventative antibiotic concentration would increase as a function of the microbial areal density (number of cells per mm^2). Our initial research seeks to characterize the relationship between the aereal cell density of *Bacillus subtilis* and the amount of ampicillin required to prevent biofilm growth.

Methods: Overnight cultures of *B. subtilis* were recirculated through a flow cell in order to attach specific numbers of cells, followed by 24 hour continuous flow of Luria-Bertani broth containing antibiotics at varying concentrations. After the growth period, the biofilms were stained and imaged by confocal laser scanning microscopy and the resultant images were digitally quantified.

Results: Results from the 2 hour recirculation indicate a linear relationship between the concentration of cells recirculated and the number of cells that attached to the flow cell surface. Preliminary results indicate that a concentration of 25 ppm ampicillin is sufficient to inhibit growth, thickness, and biomass of *B. subtilis* at 600 cells per field. However, this is not enough to inhibit 1000 cells per field. 30 ppm ampicillin is found to inhibit this number of cells per field.

Conclusion: These findings demonstrate that an antibiotic concentration of 30 ppm is sufficient to inhibit biofilm formation of both 600 and 1000 cells per field. This will be examined further in future work and expanded to other species of bacteria to see if they will behave similarly.