Michelle Narayan: Cell Biology & Neuroscience
Mentor: Michael Franklin -- Microbiology & Immunology
Characterization of Pseudomonas aeruginosa Antibiotic Resistance to Polymyxin

Polymyxin B is a cationic peptide antibiotic that has efficacy at killing the opportunistic pathogen, Pseudomonas aeruginosa. However, the efficacy of polymyxin B is reduced at high calcium concentrations, which are characteristic of in vivo environments. The goal of this study is to identify P. aeruginosa genes that impart calcium-dependent polymyxin B resistance. In previous research, a series of P. aeruginosa mutant strains was obtained that had increased sensitivity to polymyxin B when cultured at high calcium concentration. Some of the mutants have been complemented with P. aeruginosa DNA that restores polymyxin B sensitivity, and these genes have been sequenced. Sequence analysis has shown that the genes that effect resistance are ones that have not yet been identified previously, and unexpectedly are not related to lipopolysaccharide modification, as been shown in other research. In this project, I used a microtiter plate assay and antibiotic disk diffusion assays to determine the minimum inhibitory concentration (MIC) of the wild-type strain, the mutant strains, and the complemented strains, at low and high calcium concentrations. Unlike prior results using e-strip diffusion assays, the MIC results do not show a significant difference between the strains cultured differing calcium concentration. In future studies, I will modify the MIC methodology and perform e-strip analysis to determine if the difference observed here from prior studies are a result of differing methodologies for determining MICs.