

Amanda Durch: Chemical & Biological Engineering

Mentor: Garth James -- Center for Biofilm Engineering

Three-Species Chronic Wound Model: Targeting Specific Species with Antibiotics

This project involved growing three-species biofilms with *Staphylococcus aureus* (Sa10943), *Pseudomonas aeruginosa* (Pa215), and *Clostridium perfringens* (Cp816). E-test strip assays were conducted to determine antibiotic minimum inhibitory concentrations (MIC). The results revealed Pa215 was sensitive to gentamicin (MIC=3) and ciprofloxacin (MIC=0.38), Sa10943 was sensitive to gentamicin (MIC=0.25), and Cp816 was sensitive to tetracycline (MIC=8) and ciprofloxacin (MIC=0.15). Biofilms were grown in drip-flow reactors and treated with gentamicin (50 or 100 µg/ml) or ciprofloxacin (250 µg/ml). The control biofilms had mean log cell densities (\pm standard deviation) of 8.94(\pm 0.19), 10.71(\pm 0.23), and 8.21(\pm 0.24) for Sa10943, Pa215, and Cp816, respectively. Treatment with gentamicin at 50 µg/ml resulted in a 0.77(\pm 0.53) log reduction (LR) for Sa10943 and no LR for the other species. Increasing the gentamicin concentration to 100 µg/ml resulted in similar LR of 0.88(\pm 0.52) for SA10943, but additionally resulted in a LR of 1.10(\pm 0.13) and 0.82(\pm 0.26) for Pa215 and Cp816, respectively. Treatment with Ciprofloxacin at 250 µg/ml resulted in a LR of 0.73(\pm 0.32), 1.62(\pm 0.32), and 1.21(\pm 0.32) for Sa10943, Pa215, and Cp816, respectively. Interestingly, these results showed that both Sa10943 and Cp816 showed antibiotic susceptibilities in the 3-species biofilms that were not predicted by the E-test.