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CFWA Golf Classic Scholarship 2019

Final Report from Renee Ng

Project Name: . Exploring the therapeutic potential of phage therapy to treat Pseudomonas aeruginosa infection in people with cystic fibrosis

Multidrug resistance is a current threat to global health, and there is an urgent need to identify and implement new treatment methods for bacterial infections. This study aims to explore the use of bacteriophages ('phages'), a virus that targets and "eats" bacteria, eliminating them and delaying resistance development. To do this, phages that were active in killing *P. aeruginosa* were collected from both environmental and wastewater systems around Perth. These phages were checked to be without any harmful genes and safe for human use. Following that, the bacterial killing capabilities of these phages were tested against *P. aeruginosa* isolated from the lungs to identify the top performers. However, this process was time-consuming and laborious, and an efficient method of screening was required. This led to us scale down the tests required to streamline the identification process. In this study, we trialled how well the combination of phages with commonly used antibiotics such as ciprofloxacin and tobramycin with a chemical called EDTA worked together. We were successful in finding combinations that were able to kill *P. aeruginosa* more effectively. Additionally, the combinations used were able to reduce the load of antibiotics used for treatment. Results from this study show the potential of combining the right phages and chemicals to treat multidrug resistant infections that may not be responding to single drug therapies. Next, we wanted to know if the combination treatment could be safely used in humans. We had tested this in the laboratory with "mini-lungs" we had grown, and had assessed the immune responses against the treatment. The use of phage therapy was shown to be safe and did not induce any damaging effects on these "mini-lungs". Overall, this project was successful in discovering phages that were effective against *P. aeruginosa* that could be screened in a timely manner. Combinations that had shown enhanced bacterial killing abilities that were not harmful were successfully formulated.