

Multi-action antibiotics to treat chronic biofilm infections

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In 2015, the Trustees for the Australian Cystic Fibrosis Research Trust (ACFRT) signed a contract with the University of Wollongong (UOW) for a research project called – ‘*Multi-action antibiotics to treat chronic biofilm infections*’. The ACFRT has committed to fund the project to \$588,687 over three years.

Biofilms formed by the bacterium *Pseudomonas aeruginosa* often build up in the lungs of people with CF. The biofilms contain large populations of bacterial cells, encapsulated within gum-like materials that protect the bacteria from the action of antibiotics and the patient’s immune system. Resistance to antibiotics can be increased up to 1000-fold for bacteria in biofilms.

The Chief Investigator for the Project is Associate Professor Michael Kelso from UOW. His colleagues were the first to discover that low concentrations of nitric oxide (NO) can act as a signal that triggers *P. aeruginosa* in biofilms to disperse, thus making them more vulnerable to antibiotics and to the body’s immune system. When the researchers combined the use of NO-releasing compounds with antibiotics, they developed a new way of targeting delivery of NO to biofilms.

Since the start of the project, the researchers have optimised the synthetic chemistry used to make these innovative compounds (NO-donor cephalosporins). They recently completed the synthesis of a range of new generation multi-action compounds designed to disperse *P. aeruginosa* biofilms AND kill the released bacteria, thus making them potentially “all-in-one” anti-biofilm antibiotics.

Testing to date has confirmed that the leading compounds show greater activity against *P. aeruginosa* and other bacteria than comparator antibiotics, and also show superior effects on biofilms. Evaluation of the compounds is continuing with collaborators at Nanyang Technological University (Singapore) and the University of Southampton (UK).