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Isolation and characterisation of *Pseudomonas aeruginosa* bacteriophages for use against biofilms of *Pseudomonas aeruginosa* clinical isolates

Abstract

Pseudomonas aeruginosa is a World Health Organization priority 1, ESKAPE pathogen that is capable of causing a wide spectrum of nosocomial and community-acquired infections. It employs a wide range of antibiotic resistance mechanisms and is often difficult to treat. It is a potent biofilm former and is often associated with infections on medical devices and in cystic fibrosis. Biofilms are a commonly employed mechanism by bacteria to aid survival and it is thought that most infections have associated biofilm formation. Given the rise of antimicrobial resistance and the paucity of new antibiotics, novel antimicrobial therapies are required to combat resistant bacteria. In this study, environmental bacteriophages were isolated against a panel of clinical isolates of *P. aeruginosa*. A total of 15 potentially unique bacteriophages were isolated from activated sludge obtained from Avonmouth Sewage Treatment Works, Bristol. These bacteriophages were propagated and host ranges established against a panel of 10 unique clinical strains of *P. aeruginosa*. Of these, 3 exhibited host range of above 50% and were further characterised by transmission electron microscopy. Bacteriophages X, Y and Z are all members of the family *Myoviridae* with an average tail length of 185 ± 13.79 nm, 193 ± 0.22 nm and 196 ± 7.31 nm and isometric capsid diameter of 119 ± 1.17 nm, 123 ± 8.92 nm and 121 ± 2.55 nm, respectively. This characterisation informed which of the isolated bacteriophages were used against biofilms formed from clinical isolates of *P. aeruginosa*.