

[ID: 377] Bacteriophage interaction with *P. aeruginosa* and *A. baumannii* biofilms and colonizing human airway epithelium

Diana Priscila Pires, Ana Rita Costa, Ana Catarina Duarte, Rodrigo Monteiro, Joana Azeredo

Centre of Biological Engineering - University of Minho, Braga, Portugal

Antibiotic resistance constitutes one of the major worldwide public health problems. According to the World Health Organization, *Pseudomonas aeruginosa* and *Acinetobacter baumannii* are currently considered as top priority pathogens urgently requiring the development of effective therapies. These bacterial species are a common cause of hospital-acquired pneumonia, which is considered the leading cause of mortality among nosocomial infections. Besides displaying resistance to a wide range of antibiotics, both bacterial species have an ability to form biofilms on different surfaces, including biomedical devices and human epithelium. The complete eradication of biofilms is currently an almost impossible task and unless new and effective antibacterial strategies quickly emerge, the implications on public health will be devastating.

In this work, the interaction of phages with biofilms of different ages (24h, 72h, 7d) was analysed, as well as their efficacy against bacteria colonizing human bronchial epithelium. Two phages were used in this study: a newly isolated and characterized *P. aeruginosa* phage (vB_PaeP_PE3) and the previously characterized *A. baumannii* phage vB_AbaP_B5. After 3 and 6h of phage treatment, the number of viable cells and total biomass present in *P. aeruginosa* and *A. baumannii* biofilms was significantly reduced in most cases, depending on biofilm age and culture medium used for biofilm formation. After 24h of biofilm infection, as expected, phage insensitive mutants (BIMs) emerged causing an increase of biofilm cells. Among the isolated bacterial colonies at this time point, the percentage of BIMs found was approximately 77% for *P. aeruginosa* and 100% for *A. baumannii*. Nonetheless, phage treatment of NuLi-1 airway epithelial cells colonized with each species resulted in a significantly reduced cell death.

Overall, bacteriophages vB_PaeP_PE3 and vB_AbaP_B5 demonstrated to be a valuable approach for the treatment of biofilms formed in both abiotic and biotic surfaces.