Anti-Biofilm Activity of Isolated Bacteriophages for the Treatment of Multidrug-Resistant Pulmonary Infections

Brodsky, Julia (School: H-B Woodlawn Secondary Program)

A rise in the prevalence of antibiotic-resistant infections has prompted a search for alternative methods to combat bacteria in the human body. Bacteriophages are a type of virus that can kill specific strains of bacteria, and were first observed in the early 20th century, just before the discovery of penicillin. The difficulty associated with finding phages targeted to a specific infection is one reason the treatment is used relatively infrequently. The prospect of personalizing phage treatment by isolating new species for individual infections is promising. This study aimed to isolate phage species for multidrug-resistant strains of Pseudomonas aeruginosa and Staphylococcus aureus, the most common causes of chronic infections in patients with cystic fibrosis. Three samples of human fecal matter, one sample of feline fecal matter, and one sample of rich soil were tested for the presence of both S. aureus- and P. aeruginosa-hosted phages. Using the double agar overlay method of phage enumeration, it was found that six of the ten stocks contained bacteriophages, at titers ranging from 3.9x10^4 pfu/mL to 2.8x10^7 pfu/mL. The potency of the Pseudomonas-hosted isolates in eradicating biofilms was compared to the efficacy of an antibiotic cocktail and the enzyme cellulase through an in vitro resazurin cell viability assay. Each treatment was performed in sextuplicate. Metabolic reduction of resazurin to resorufin (which proceeds in the presence of live cells) was quantified at 24 and 48 hours of growth using a microplate reader set to measure absorbance at 570nm and 595nm.

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