Viruses to the Rescue: Using D. tsuruhatensis to Demonstrate Phage Therapy's Effectiveness Against Antibiotic Resistant Bacterial Biofilms in a Medical Setting

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The occurrence and spread of antibiotic resistant bacteria and genes in the environment is a global concern. The problem is further exacerbated when a single bacterium offers resistance to multiple antibiotics resulting in few or no antibiotics effective towards their infections. This project demonstrated the use of bacteriophage therapy to eradicate biofilms formed by the multidrug resistant bacterium Delftia Tsuruhatensis. Biofilms are a consortium of bacteria embedded in a matrix of extracellular polymeric substances excreted by the bacteria themselves. A lytic phage infecting Delftia Tsuruhatensis was isolated from wastewater biomass. Phage characterization using various techniques revealed this phage belonged to the pedoviridae family of phages due to its short tail. A one step growth curve revealed the burst size of the particular phage to be 52 phages per burst and the latent period to be approximately 20 minutes. Delftia Tsuruhatensis biofilms were grown on glass slides as well as indwelling catheters (obtained from the University of Utah hospitals) for five days and then suspended in different treatment solutions, namely a phage solution, an ampicillin solution and a kanamycin solution. Compared to the treatments by the antibiotics, the lytic phage demonstrated the most degradation of biofilm and bacterial death when viewed under an epifluorescence microscope. The catheter treatment had very similar results, which leads this research to suggest that phage therapy will be excellent in a medical setting. Ongoing research focuses on the isolation of polyvalent phages and their effectiveness against multi species biofilms.

Awards Won:
Third Award of $1,000