Review of Bacteriophages as a Targeted Solution to Antibiotic Resistance and Multidrug Resistant (MDR) Infections

Palveen Dhoat

Dr. Cline

TBIOMD 492

February 29, 2025

ABSTRACT

Antibiotics have emerged as a revolutionary way to treat bacterial infections. However, the widespread use of antibiotics has led to overuse in healthcare and agricultural industries causing a rise in antibiotic resistance. Furthermore, the development of hard to treat multidrug resistant (MDR) bacteria is a result of excessive antibiotic use. Therefore, an effective alternative to antibiotics called bacteriophage (phage) therapy has been developed. Bacteriophages are viruses that target and kill bacteria and will be the focus of this review. These viruses have many advantages including specificity and low impact on the microbiota of the organism. Recent studies show the effectiveness of bacteriophage therapy, and in some cases combined with antibiotics to treat infections including but not limited to *Pseudomonas aeruginosa* and *Staphylococcus aureus.* Bacteriophages are able to evolve along with bacterial strains allowing them to reduce the risk of resistance. Their targeted approach offers a new and effective treatment along with preventative applications. However, researchers are presented with challenges in standardizing such treatments along with understanding the long-term immune responses. Future research is necessary for understanding the full effects of this therapy with combinatorial antibiotics and for developing guidelines for its usage in clinical trials. With future advancements in this research, bacteriophages can be seen as a promising tool to combat antimicrobial resistance and manage infections.