








Review

Phage Therapy as an Alternative Treatment Modality for Resistant *Staphylococcus aureus* Infections

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Abstract: The production and use of antibiotics increased significantly after the Second World War due to their effectiveness against bacterial infections. However, bacterial resistance also emerged and has now become an important global issue. Those most in need are typically high-risk and include individuals who experience burns and other wounds, as well as those with pulmonary infections caused by antibiotic-resistant bacteria, such as *Pseudomonas aeruginosa*, *Acinetobacter sp.*, and *Staphylococci*. With investment to develop new antibiotics waning, finding and developing alternative therapeutic strategies to tackle this issue is imperative. One option reemerging in popularity is bacteriophage (phage) therapy. This review focuses on *Staphylococcus aureus* and how it has developed resistance to antibiotics. It also discusses the potential of phage therapy in this setting and its appropriateness in high-risk people, such as those with cystic fibrosis, where it typically forms a biofilm.

Keywords: phage therapy; antibiotics resistant; *S. aureus*; biofilms; infection



Citation: Atshan, S.S.; Hamat, R.A.; Aljaberi, M.A.; Chen, J.-S.; Huang, S.-W.; Lin, C.-Y.; Mullins, B.J.; Kicic, A. Phage Therapy as an Alternative Treatment Modality for Resistant *Staphylococcus aureus* Infections.

Antibiotics **2023**, *12*, 286. <https://doi.org/10.3390/antibiotics12020286>

Academic Editor: Magdalena Plotka

Received: 19 December 2022

Revised: 25 January 2023

Accepted: 30 January 2023

Published: 1 February 2023



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1. Introduction

Bacterial infections are the cause of major health problems, but after the advent of antibiotics, there was the view that the issue was resolved. However, one pathogen of current global importance, *Staphylococcus aureus* (*S. aureus*), has developed drug resistance mechanisms to the currently available antibiotics, including cloxacillin, vancomycin, daptomycin, and others, and is resultantly responsible for over two million infections and over 23,000 deaths in the United States alone each year [1–3]. With antibiotic development by the pharmaceutical industry waning, there are many unanswered questions, including what alternatives are being developed and whether bacteriophages could be a solution.

Bacteriophages (phages) are found in all habitats, and their interaction with bacteria has attracted greater attention from scientists for almost a decade [4]. Bacteriophage therapy or phage therapy (PT) that consists of specific virulent bacteriophages can be used for targeting multidrug-resistant bacteria and can mimic the action of an antibacterial