Identifying Bacteriophages, Nature's Own Secret Weapon Against Antibiotic Resistant Bacteria, for Achromobacter Treatment

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In 2019 almost five million deaths were attributed to antibiotic resistance. If there is no future medical development to address this rising issue, the estimated death rate between now and 2050 is about 39 million. Achromobacter, a bacteria that is resistant to several first-line antibiotics, can cause a broad range of infections. These infections have no efficient treatment, especially for patients with Cystic Fibrosis. Bacteriophage therapy against antibiotic resistant bacterial infections is a promising alternative or adjunct to antibiotics. The objective of this project is to identify phages and create novel phages cocktails to help people with Achromobacter infections. In this work, fifteen unique Achromobacter phages, including one jumbo phage, are isolated from environmental wastewater sources. The morphological and genomic characterizations of these phages are collected and compared to public, pre-existing Achromobacter phages. The results confirmed that four of the fifteen phages are new and unique in the proteomics tree. Host ranges of these phages are studied in 35 Achromobacter strains. 91% of the 35 bacteria strains can be lysed by at least one of the phages collected, which is higher than 78% of other phage collections published in literature. The results also suggest the combination of Papale, Taco, and Thup phages can kill 89% of Achromobacter strains, thus is a viable candidate of a future phage cocktail to treat Achromobacter. This approach to identify appropriate phages or phage cocktails for therapeutic applications can be applied to other antibiotic resistance bacteria, and can save millions of people from these superbugs.

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