Effects on the microbiome during treatment of a staphylococcal device infection

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Abstract

Staphylococcus aureus is a common commensal that can cause an array of serious human diseases, from mild skin infection to life-threatening disease. S. aureus can rapidly adapt to selective pressures such as antibiotics, and this ability is enhanced by biofilm formation on implanted medical devices. With antibiotic resistance on the rise, there is a growing need to find non-antibiotic alternatives to treat serious infections. One such alternative is bacteriophage therapy, which introduces viruses that selectively infect and kill bacteria. A recent study sought to better understand the impact of bacteriophage therapy on the host microbiome. In a follow-up to a case study of a patient with an implanted cardiac device who was treated with bacteriophage therapy combined with antibiotics for a persistent S. aureus infection, researchers used high-throughput sequencing to evaluate patient microbial samples from the gut, saliva, and skin. They found that the microbiota profile of the patient remained largely unchanged throughout treatment. Metabolomic analyses suggested potential indirect effects on the host skin microbiome, and genomes from the bacteriophages used for treatment were not detected in the saliva, stool, or skin samples, while they were present in patient serum. While further studies are needed to expand upon the results of this case study, the data support the use of bacteriophages as a non-antibiotic method of treating bacterial infections without affecting the overall host microbiome.