Technische Universität Braunschweig

Masterarbeit

Evaluating Bacteriophage-Antibiotic Combinations and Protocols for the Eradication of *Enterococcus faecium* in the Gut

DSMZ

Background

Antibiotic resistance is one of the biggest challenges in modern medicine, complicating bacterial infections and limiting treatment options. Among multidrug-resistant bacteria, *Enterococcus faecium* stands out due to its tight association with poor clinical outcomes, particularly in hematological oncological patients. Bacteriophages (phages)—viruses that selectively infect and kill bacteria—have emerged as a promising alternative to combat resistant infections. While phages can be used independently, their combination with antibiotics holds the greatest therapeutic potential. However, the interactions between phages and antibiotics can range from synergistic to antagonistic effects, which should be thoroughly evaluated before clinical application can be considered.

Objectives

This project aims to identify the most effective *in vitro* approach to reducing and ideally eliminating *E. faecium* bacterial load. We will assess phages and antibiotics individually before testing various combination strategies to determine the most effective and clinically relevant protocol. A key goal is to rule out potential antagonistic interactions and pinpoint an optimized phage-antibiotic treatment. As the project progresses, the selected protocol will be tested in an *in vivo Galleria mellonella* infection model.

Main methodology

Minimum inhibitory concentration (MIC) technique and variations thereof; Methods required for quantification and efficiency of plating (Spot assay; Plaque assay); Rapid phage susceptibility testing, Manipulating *Galleria mellonella* animal model, Bioinformatic analysis (Sequence alignment and genomic comparison); Basic statistics analysis (ideally through R).

The group

The Phage group is located at the Leibniz-Institute DSMZ in Braunschweig, Science Campus Braunschweig-Süd. Within the group research focus lies on the investigation of phage diversity and therapeutic application.

Start: As soon as possible

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