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PhaDRiM - Phage induced Strain Replacement in Microbiomes

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Within the last decades microbiome research became more and more relevant to the field of public health. It vastly contributed to understanding the pathogenesis of major human diseases but also generated knowledge on the emergence and spread of antibiotic resistances (ABR). Nevertheless, new insights always open up more questions. An important one is: How can we use this knowledge to specifically eliminate harmful or ABR bacteria from the human gut without harming or disrupting overall microbiota composition?
To address this question, we focus on a new strategy termed "phage induced strain replacement within microbiomes", which aims at combining phage- and probiotics-based therapy within one treatment. The idea behind this approach is to pose a fitness disadvantage on the targeted strain by a strain-specific phage cocktail and introduce a second, closely related, but phage-resistant competitor that competes for the same niche within the gut environment as the target strain. Ideally, this approach leads to strain replacement and elimination of the targeted strain without disturbing the overall gut microbiota composition. We focus on the three species Escherichia coli, Enterococcus faecalis and Phocaeicola vulgatus (formerly Bacteroides vulgatus). These species were chosen due to their clinical relevance, genetic diversity and high prevalence in the human gut. Currently, we are experimenting with a range of different environmental conditions in vitro and in vivo to further evaluate the potential efficiency of strain replacement as a new therapeutic approach to combat ABR and chronical intestinal diseases.

Reference #1

Reference #2

Reference #3

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