

The DSMZ bacteriophage collection and its relevance for fighting antimicrobial resistance

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Due to the alarming decline in therapeutic options for otherwise common bacterial infections, alternative solutions such as phage therapy are urgently needed. The mission of the Leibniz Institute DSMZ is the research, provision and utilization of microbial and cellular diversity. Microbial and cellular resources are kept safe, authentic and viable for research and applications. The DSMZ is an ISO:9001-certified Bioresource Centre (BRC) housing a phage collection established in the late 1980s and currently holding approximately 1200 phages, with over 600 publicly available. The DSMZ phage group investigates phage diversity, various aspects of phage-host interaction, and the potential of different bacteriophages for translation into therapeutic application. This work is conducted in collaboration with numerous national and international institutions.

Publicly funded translational projects include *Phage4Cure*, *PhagoFlow* as well as *EVREA-Phage* within the German Centre for Infection Research (DZIF). The EVREA-Phage project aims at isolating, characterizing and selecting synergistically acting phages able to eradicate multidrug-resistant (MDR) *Enterococcus faecium*, a growing challenge for immunocompromised patients, without disrupting the established gut microbiota. In addition to the use of animal models demonstrating phage efficacy, an innovative *in vitro* gut model is employed as an integrated step towards translational requirements.

In cooperation with the Research Center Borstel, Leibniz Lung Center, and the Leibniz Research Alliance INFECTIONS, the host spectra of 7 new phages against *Stenotrophomonas maltophilia*, a bacterial species included in the global priority list of the top ten resistant microorganisms isolated in intensive care units and frequently associated with colonization of cystic fibrosis lungs, were determined. An additional goal was to identify potential lytic cross-reactivity of these phages with *Pseudomonas aeruginosa* strains, another important pathogen. An ability displayed by one phage in addition to its anti-biofilm activity was further investigated at genomic level.

The ubiquitous *Acinetobacter baumannii* is another bacterial species of increasing concern and on the WHO antibiotic-resistant priority pathogens list. The species is often MDR and frequently reported in healthcare facilities. As part of the work in the DFG-funded SPP2330, new phages were isolated against clinical and environmental *A. baumannii* MDR strains. These phages, currently being characterized, show great promise as therapeutic agents.