

The importance of bacteriophage collection for the development of phage therapy

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The World Health Organization (WHO) recently stated that for common bacterial infections, including urinary tract infections, sepsis, sexually transmitted infections, and gastrointestinal infections, high levels of resistance against antibiotics commonly used to treat them have been observed worldwide. This clearly indicates that we are running out of effective antibiotic and that antibiotic resistance is a very important global public health challenge, which consequences for global health might be devastating if novel antibacterial strategies are not quickly developed. Bacteriophages (phages) are viruses that specifically infect bacteria, being considered bacterial natural predators. The interest in using phages for therapy against bacterial infectious diseases re-emerged on the Western world over the last two decades.

The successful implementation of phage therapy relies in the existence of phage banks, with well characterized phages. Phages are isolated from environmental samples and their characterization includes transmission electron microscopy observation, genome sequencing and annotation and lytic spectra evaluation. Another important aspect is phage taxonomy; historically, phages have been classified according to their morphology, though the advances in sequencing technology boosted a genome-based classification. Indeed, over the last year, the International Committee on Taxonomy of Viruses (ICTV) reported several changes to virus taxonomy with 174 taxonomic proposals being changed and ratified.

In this talk we will describe the general procedures for generating a phage bank for the most important bacterial pathogens, including all steps from phage isolation to deep characterization. I will also discuss the importance of phage banks in a context of a global phage therapy and how the phage bank of the Centre of Biological Engineering has been used to treat national and international patients.