Towards better detection and treatment of mycobacterial disease.

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Background: Mycobacterial disease is a major cause of fatality, with 1.5 million deaths per 10 million infections annually. Due to the emergence of multi- and extensively-drug resistant clinical isolates, mycobacteriophage (MP) are being investigated as an alternative to antibiotics.

Objectives: To characterise an emerging cohort of MP; to determine suitable *in vivo* modes of delivery for MP including encapsulation; to examine the application of a MP-based viability assay, and to examine the functionality of MP in raw milk.

Methods: The fast-growing *Mycobacterium smegmatis* was used as a host in all assays to demonstrate phage activity. MP LOCARD was employed as a model phage for all assays pertaining to encapsulation, the viability assay, and the demonstration of phage propagation in milk.

Results: Characterising the MTU MP revealed three novel species with differing phenotypic stability. LOCARD proved to be the most resilient, warranting its selection as the model MP used for the remaining studies. Encapsulation of LOCARD increased the survival rate of particles exposed to simulated gastric fluid and allowed for the pH-dependent release of viable MP into simulated intestinal fluid. LOCARD was successfully used in the viability assay, allowing for optimisation and demonstration of the functionalities of the assay. The usefulness of LOCARD in raw milk is limited however, as it was not recoverable from raw milk following 24 h propagation.

Conclusion: MP may be a useful tool in the control of mycobacterial disease, with regard to applications in phage therapies and diagnostic/characterisation assays, although some limitations do exist.