Selection of a broad lytic spectrum phage for *Salmonella* detection

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Salmonella infection continues to be a major cause for food-borne illness throughout the world. Therefore, the rapid detection and identification of this pathogen is extremely important to maintain public health safety. Many conventional methods currently used take several days, therefore new and expedite methods are being developed, based on the direct interaction of the pathogen with a specific bioelement, such as antibodies, DNA, enzymes and very recently bacterio(phages). Phages are viruses that detect and eliminate specific bacteria. As such, they have been applied in phage therapy, water treatment, high-throughput screening and also biosensing. Moreover, compared with other bioelements, phages are more stable and less sensitive to environmental stress, such as pH and temperature fluctuations. Also, their production costs are very low.

In order to obtain a phage suitable to serve as a bioelement, we analysed the lytic spectrum of several *Salmonella* phages (isolated in the scope of the European project Phagevet-P) against *Salmonella* sp. and *E. coli*, among other bacteria. The results showed that *Salmonella* phage phi PVP-SE1 had the broadest lytic spectrum among all tested phages. The morphology of phage phi PVP-SE1 was analysed using TEM. It was shown to have a contractile tail and resembles typical 01-like phages that belong to the Myoviridae family, Comparing the lytic spectrum of this phage to the well known Felix 01 (a virulent phage originally isolated by Felix and Callow), on the different isolates, we observed that phi PVP-SE1 presents a broader host range than Felix 01. Felix 01 only lysed 75% of de strains lysed by phage phi PVP-SE1.This is interesting as Felix 01 is routinely used as a diagnostic tool in the identification of *Salmonellae* due to its capability to lyse up to 99.5% of *Salmonella* strains., The broad range lytic spectrum makes the phi PVP-SE1 a potential tool in phage therapy, because it may cover many types of *Salmonella* strains, which is a huge advantage as method of detection.

Despite having a high throughput, conventional microbiological detection techniques such as enzyme linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR) are time consuming, and require expertise and suitable laboratory conditions. Therefore, this newly isolated phage phi PVP-SE1 can be an excellent element of choice to include in the construction of an advanced and user-friendly biosensing system with high levels of specificity, selectivity and stability.

Keywords: Bacteriophages; Salmonella sp.; Felix 01; lytic spectrum; Biosensing system