Phage Therapy Encyclopedia Article

Phage Therapy

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Phage Therapy

Bacteriophage are well suited to deliver therapeutic payloads (i.e., deliver specific genes into a host organism). Characteristic of viruses, they require a host in which to make copies of their genetic material, and to assemble progeny **virus** particles. Bacteriophage are more specific in that they infect solely **bacteria**.

The use of phage to treat bacterial infections was popular early in the twentieth century, prior to the mainstream use of **antibiotics**. Doctors used phages as treatment for illnesses ranging from cholera to typhoid fevers. Sometimes, phage-containing liquid was poured into the wound. Oral, aerosol and injection administrations were also used. With the advent of antibiotic therapy, the use of phage was abandoned. But now, the increasing resistance of bacteria to antibiotics has sparked a reassessment of phage therapy.

Lytic bacteriophage, which destroy the bacterial **cell** as part of their infectious process, are used in therapy. Much of the focus in the past fifteen years has been on nosocomial--hospital acquired--infections, where multi-drug-resistant organisms have become a particularly lethal problem.

Bacteriophage offer several advantages as therapeutic agents. Their target specificity causes less disruption to the normal host bacterial flora, some **species** of which are vital in maintaining the ecological balance in various areas of the body, than does the administration of a relatively less specific antibiotic. Few side effects are evident with phage therapy, particularly allergic reactions, such as can occur to some antibiotics. Large numbers of phage can be prepared easily and inexpensively. Finally, for localized uses, phage have the special advantage that they can continue multiplying and penetrating deeper as long as the infection is present, rather than decreasing rapidly in concentration below the surface like antibiotics.

In addition to their specific lethal activity against target bacteria, the relatively new field of **gene therapy** has also utilized phage. Recombinant phage, in which carry a bit of nonviral genetic material has been incorporated into their **genome**, can deliver the recombinant **DNA** or **RNA** to the recipient genome. The prime use of this strategy to date has been the replacement of a defective or deleterious host **gene** with the copy carried by the phage. Presently, however, technical safety issues and ethical considerations have limited the potential of phage genetic therapy.