Nanoparticle-encapsulated Phage Therapy for Treating Infections in Cystic Fibrosis

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Abstract:

Cystic fibrosis (CF) is a hereditary condition marked by persistent lung infections, often driven by antibiotic-resistant bacteria. These infections pose considerable hurdles for current medical treatments. One promising alternative is phage therapy, which uses bacteriophages, viruses that infect and destroy specific bacterial species, offering targeted action with minimal impact on human tissues.

The continued discovery and characterization of novel bacteriophages is essential to broaden the therapeutic application of this approach, particularly against multidrug-resistant bacterial strains. Expanding the available phage arsenal is key to increasing treatment success and overcoming bacterial resistance.

Despite its potential, the clinical application of phage therapy faces several challenges, particularly in achieving consistent pharmacokinetics and effective dosing. Nanotechnology offers a powerful solution through the encapsulation of phages in nanoparticles. These nanoscale carriers can shield phages from degradation, enhance delivery to infection sites, and provide controlled release, thereby improving their therapeutic performance and reliability.

Keywords:

Nanomedicine, nanotechnology, encapsulation, infections.