Docket #: S20-368

Highly concentrated phage therapy suspensions stabilized with annexin V

Stanford researchers have developed high-titer bacteriophage and annexin V formulations for rapid, more effective phage therapy against bacterial infection.

Multi-drug resistant bacteria are a growing threat that is driving innovation in phage therapies as new antibacterials with high specificity and negligible side effects. However, key issues remain, including the risk of phage-resistant mutations arising in bacteria and a tendency for phage to precipitate out of solution.

The inventors have developed a phage therapy formulation that overcomes these challenges using annexin V, an enzymatically inert human protein that has already been tested in clinical trials. Annexin V binds to the negatively charged bacteriophage coat, stabilizing phage preparations of up to 10^{12} plaque forming units per milliliter (pfu/ml), instead of the standard 10^{7} to 10^{8} pfu/ml. These highly concentrated preparations potentially allow direct phage lysis, which would speed up treatment and therefore reduce the chance of resistance mutations.

Stage of Development
In vitro/*in vivo*. The formulation rapidly resolves otherwise-lethal *Pseudomonas aeruginosa* wound infection in mice.

Applications

- Stabilized, highly concentrated phage and annexin V preparations for:
  - Antibacterial phage therapy
  - Radiolabeled studies of bacterial infection biodistribution

Advantages

- More concentrated phage potentially facilitates:
  - Direct phage lysis, also known as "lysis from without"
  - Faster treatment
  - Reduced chance of resistance mutations
- Less frequent phage precipitation
- Easier shipment and long-term storage

Patents

- Published Application: WO2022108951
- Published Application: 20240016886

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