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Poster title

Bio-Responsive Hydrogel for Targeted on-Demand Release of a Phage Cocktail for Treatment of Pseudomonas aeruginosa Infection

Poster abstract

Antimicrobial resistance (AMR) is a major global health challenge, driving the need for novel antibacterial strategies such as bacteriophage (phage) therapy. However, phage efficacy is limited by resistance, delivery inefficiency, and short residence times. Here, we present a gelatin-based hydrogel for the targeted delivery of a phage cocktail against antibiotic-resistant Pseudomonas aeruginosa and its biofilms. The hydrogel is enzymatically responsive to P. aeruginosa–secreted gelatinases, enabling on-demand phage release and prolonged antibacterial action. Incorporation of two phages, FJK.R9-30 and MK.R3-15, addresses phage resistance. The hydrogel fully inhibits biofilm formation and disrupts established biofilms. In an ex vivo human skin infection model, it demonstrates selective responsiveness to P. aeruginosa and potent antibiofilm activity. Cytocompatibility assays confirm no toxicity to human dermal fibroblasts. This multi-phage, enzyme-responsive hydrogel enhances phage localization and retention at infection sites, providing a promising platform for advancing phage therapy as a precision approach to combat AMR.

Research topic Phage or phage products