AMJ
ISSN: 0005-2523

ISSN: 0005-2523

Volume 70, Issue 06, 2025

# Phage Therapy Against *Pseudomonas aeruginosa* Biofilms in Cystic Fibrosis: A Personalized Bacteriophage CocktAil Approach Guided by Host-Pathogen Genomics

**Dr. Benjamin Foster[1]*, Dr. Amara Osei[2], Dr. Klaus Weber[3]**

[1]Cystic Fibrosis Research Institute, University of Cambridge, Cambridge, UK

[2]Department of Medical Microbiology, University of Ghana, Accra, Ghana

*Corresponding Author: b.foster@mrc-cu.cam.ac.uk

## Abstract

Antibiotic resistance in *Pseudomonas aeruginosa* biofilms represents the leading cause of morbidity in cystic fibrosis (CF). We report a precision phage therapy protocol utilizing a cocktail of four lytic bacteriophages (ΦF1-ΦF4) selected based on patient-specific bacterial genotyping and CRISPR-spacer analysis. In a 24-month prospective cohort of 45 CF patients with multidrug-resistant infections, nebulized phage administration reduced bacterial load by 3.5 $\log_{10}$ CFU/mL and improved forced expiratory volume (FEV1) by 18%. Whole-genome sequencing confirmed minimal phage resistance evolution, attributed to cocktail synergy and host immune modulation. This individualized phagetherapeutic framework offers a paradigm shift in managing recalcitrant respiratory infections.

**Keywords:** bacteriophage therapy, Pseudomonas aeruginosa, cystic fibrosis, biofilm disruption, personalized medicine, antimicrobial resistance