Lung function and microbiota diversity in cystic fibrosis

Leah Cuthbertson
Alan Walker
Anna Oliver
Geraint Rogers
Damian Rivett
Thomas Hampton
Alix Ashare
Stuart Elborn
Anthony De Soyza
Mary Carroll
Lucas Hoffman
Clare Lanyon
Samuel Moskowitz
George O'Toole
Julian Parkhill
Paul Planet
Charlotte Teneback
Michael Tunney
Jonathan Zuckerman
Kenneth Bruce
Chris van der Gast

Video Byte

Keywords: Cystic fibrosis, lung function, lung microbiota, lung microbiome, disease severity, ecological patterns, microbial surveillance, biogeography, antibiotics, Microbiome, infection, lungs, diversity

Posted Date: May 4th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-27121/v1>

License: This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Cystic fibrosis (CF) is a lung disorder affecting more than 70,000 people worldwide. Genetic mutations leading to defective fluid clearance in the lungs cause progressive airway damage. The most life-threatening challenge in patients with CF is chronic infections, which cause severe airway inflammation. Monitoring these infections could help doctors track patients' health, informing treatment decisions. Unfortunately, current infection surveillance techniques provide a limited picture of the full spectrum of lung microbes in CF. A new study aimed to more fully define the lower airway bacterial microbiota in patients with CF. Using high-throughput sequencing, researchers evaluated sputum samples from 299 patients from Europe and the U.S. The results showed that microbiota diversity decreased when lung function declined. While the microbiome was diverse and dominated by anaerobic bacteria in healthier patients, certain bacterial species began to dominate during disease progression, particularly with increased antibiotic use, leading to lower variation and high proportions of known CF pathogens in patients with advanced disease. These results suggest that microbiota diversity and dominance can be used along with lung function to monitor patients with CF, providing another informative indicator to guide personalized treatment decisions.