

# Cystic Fibrosis Research News

## Title:

The Effects of Cycled Inhaled Aztreonam on the Cystic Fibrosis (CF) Lung Microbiome

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## What was your research question?

A diverse community of bacteria are found in the cystic fibrosis (CF) airways – beyond merely those grown from sputum by clinical laboratories. We wanted to understand if inhaled antibiotics acted on the bacterial community, which may, in part, explain their beneficial effects.

## Why is this important?

Inhaled antibiotics are effective at improving lung function and quality of life in people with CF chronically infected with *Pseudomonas aeruginosa*. Understanding if these treatments affect the microbes in the bacterial community beyond *P. aeruginosa* is important if we are to understand how these therapies work. Through a detailed understanding of the mechanisms by which existing therapies work, we can effectively identify new therapeutic targets.

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## What did you do?

We enrolled people (n=37) chronically infected with *P. aeruginosa* from 4 adult CF clinics in Canada and asked each person to collect sputum, perform lung function testing and record quality of life symptom scores every 2 weeks through an 8 week cycle of inhaled aztreonam lysine (4 weeks on/4 weeks off as the drug is prescribed). We then performed DNA testing to identify the make-up of the bacterial community (e.g. the diversity and amount of bacteria present) in each sputum sample. Finally, we compared the make-up of the community over time to patient outcomes.

## What did you find?

We observed that despite the very high concentrations of aztreonam achieved by nebulization, only modest changes occurred in the make-up of bacterial communities during treatment. However, we observed a correlation between the make-up of the bacterial community and the potential for improved quality of life while on therapy. In particular, those with communities rich in *Staphylococcus* and *Streptococcus* were less likely to have improvements in quality of life scores. This makes sense, as these organisms have high-level resistance to aztreonam.

## What does this mean and reasons for caution?

This suggests that inhaled antibiotics, and in particular inhaled aztreonam, result in improved outcomes for people with CF, mostly through their effects on *Pseudomonas* – as opposed to other bacterial community members. Bacterial community analysis allowed for a greater understanding of community composition than routine “culture-based” protocols and also predicted improved individual outcomes. Bacterial community analysis may serve as a tool by which inhaled antibiotic therapies can be tailored to individuals as an example of personalized medicine. However, as this was a small observational study its results must be viewed with caution and confirmation with larger studies is needed.

## What's next?

This study was limited to individuals receiving inhaled aztreonam –one of several inhaled antibiotics used in CF. We intend to look at how the bacterial community make-up changes under selective pressure of other inhaled antibiotics and if it again correlates with certain community members.

## Original manuscript citation in PubMed

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