# Cystic Fibrosis Research News

**Title:**
Evidence for altered immune-structural cell crosstalk in cystic fibrosis revealed by single cell transcriptomics

**Lay Title:**
Changes in how immune cells and lung cells communicate in people with cystic fibrosis

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**What was your research question?**
Our research goal was to generate a database of all different types of lung cells from people with cystic fibrosis (CF). Using this database, we sought to investigate the differences in how cells function and determine whether there is altered communication between cells in the lungs of people with CF.

**Why is this important?**
Over time, it has become clear that different cell types, such as immune cells and the structural cells of the lung, interact and communicate with each other. This cellular communication can be altered in diseases but has not yet been systematically studied in people with CF, mostly due to technical limitations. With recent advancements in research

technologies, it is now possible to study multiple cell types at the same time and at the level of individual cells. A comprehensive database of all cell types in CF lungs is a valuable resource for the research community to create new theories or find new angles for therapy development.

## What did you do?

Lung biopsies were taken from three people with CF, containing all the different types of cells present in lungs. Thousands of individual cells were analysed and categorized to study their function based on gene activity. This is the first time all the different cell types in CF lung samples have been studied this way. The CF dataset was compared with a database of healthy lung cells. Based on gene activity measurements, predictions were made about how the cells function, their interactions with each other, and how these differ in people with CF compared to healthy individuals.

## What did you find?

Our dataset revealed that certain structural cell types are less abundant in the lungs of people with CF compared to healthy individuals, while certain immune cells are more prevalent. Immune cells also appeared more activated, indicating persistent lung inflammation in people with CF despite treatment. Additionally, CF lungs displayed unique changes in communication between various immune cells and structural cells, further indicating the impaired function of cells, which may contribute to disease progression. Notably, some of these altered interactions can be targeted using existing drugs, highlighting new therapeutic opportunities.

## What does this mean and reasons for caution?

We report the first single-cell gene expression dataset of the CF lung containing the full range of structural and immune cells, providing a valuable resource for the CF research community. While our dataset indicates altered communication between cells, it remains a predictive computational model based on gene activity. Although gene activity often provides useful insight into cellular function, it does not always directly correlate with the actual biological function of cells.

## What's next?

To further support our findings, the next step is to perform laboratory experiments using CF and healthy lung cells. These assays will allow us to further investigate and test the most important changes in cellular communication in CF lungs as predicted by our dataset.

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