European Cystic Fibrosis Society

Journal of Cystic Fibrosis
The Official Journal of the European Cystic Fibrosis Society

Cystic Fibrosis Research News

Title:

Widespread alterations in systemic immune profile are linked to lung function heterogeneity and airway microbes in cystic fibrosis

Lay Title:

The structure of the blood immune system in people with cystic fibrosis and how this affects their lung capacity and the microorganisms colonizing their airways.

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What was your research question?

Are there specific differences in the type of immune cells circulating in the blood of people with cystic fibrosis (CF) compared to healthy people? Do these differences influence the severity of CF disease, and are they affected by the microorganisms infecting the airways?

Why is this important?

Newer CF drugs (known as CFTR modulators) have greatly improved the quality of life for people with CF. However, these drugs still cannot solve or prevent infections. Therefore, it is important to understand how the immune system works to identify flaws. This can help us understand why some people with CF cannot clear microorganisms that cause infection and why some have worse lung function.

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What did you do?

We collected blood and sputum (mucus from the lungs) from 28 people with CF. We measured all the different types of immune cells in the blood in great detail using a technique where many different antibodies bind to certain targets on cells. In sputum samples, we identified which living microorganisms (bacteria and fungi) were to be found in the individuals' airways.

What did you find?

All immune cells in people with CF had markers on their cell surface that showed they were hyperactivated, and there was a substantial change in many cell types compared to those from healthy people. For example, different types of B cells were reduced; these cells are involved in the production of antibodies and protection against recurrent infection. Further, regulatory T cells, whose role is to keep the inflammatory response in check, were not working correctly. Impaired B cells and regulatory T cells were associated with the severity of lung disease. These differences in immune cells were greater when specific microorganisms were present in the lungs.

What does this mean and reasons for caution?

We now know more about which defects in the immune system are likely to play a role in how severe the CF disease is, including how well or poorly the lungs function. This is very important because these defects could be targets for new therapies. However, there are limitations. Our analysis was restricted to a small group of people with CF and their blood. Thus, we could have missed other important mechanisms in other areas of the body. Also, these data cannot prove that the severity of CF lung disease is due to the immune cell differences and the microbes other specific experiments are needed to show this.

What's next?

We need further investigations to see if the same results will be found in a larger and more diverse group of people with CF worldwide. If our results are replicated, this evidence could then be used to design treatments to help normalize the immune cells, eliminate microorganisms, and improve the health of people with CF.

Original manuscript citation in PubMed
https://pubmed.ncbi.nlm.nih.gov/38702223/