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Cystic Fibrosis Research News

Title:

THE FUNGAL AIRWAY MICROBIOME IN CYSTIC FIBROSIS AND NON-CYSTIC FIBROSIS BRONCHIECTASIS

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What was your research question?

Fungal lung infections in patients with cystic fibrosis (CF) and non-CF bronchiectasis are increasingly being recognised. Microbial cultures, the growth of microorganisms in the laboratory, imperfectly detect the presence of fungi in sputum. Instead, this study analysed fungal DNA in the sample to assess the abundance and species of fungi present in the lungs of these patients.

Why is this important?

An increased incidence of fungal disease is a major concern because of difficulties with the diagnosis, management and treatment of these infections. In order to develop effective methods to manage and treat infections it is vital to understand the numbers and types of fungi that are present, both when patients have symptoms of fungal disease and when without symptoms.

What did you do?

Sputum samples were collected from 176 patients with CF or non-CF bronchiectasis. Some of the participants had previously been diagnosed with fungal disease including; allergic bronchopulmonary aspergillosis (ABPA), chronic necrotizing pulmonary aspergillosis (CNPA), or fungal bronchitis. Patients without a known fungal infection were used as controls, and were sub-classified by the presence or absence of another germ, non-tuberculosis mycobacteria (NTM). Using DNA sequencing technologies to read the DNA present in the sputum, we can determine the fungi present within all these samples.

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What did you find?

Far greater numbers and species of fungi were detected in the lungs by DNA sequencing than be microbiological culture. Diverse and abundant fungal communities were observed even in samples from patients without symptoms of fungal disease and negative fungal cultures.
Sputa from patients with CF had a greater amount of fungi present than sputa from those with non-CF bronchiectasis, but there were less fungal species present in CF sputa. The most common fungal species identified from patients with CF was *Candida parapsilosis*, whereas in non-CF bronchiectasis patients *Candida albicans* was more common. CF patients diagnosed with fungal bronchitis were dominated by newly recognised fungi, that may become an increasing problem for the management of CF lung infection.

What does this mean and reasons for caution?

This research has shown that a significant fungal burden in the lungs is much more common in CF than suggested by the clinical culture reports. The results suggest that diagnosis by culture alone may be inadequate for effective clinical management of fungal disease in patients with CF and non-CF bronchiectasis. Although sequence-based methodologies are a powerful tool for exploration of the fungi within the lungs, they are expensive and time consuming to perform.

What's next?

The next step in this research is to investigate which of the many organisms present have the most impact on fungal damage of the airways and lung. Refinement of DNA sequencing technology and its eventual rapid deployment at point of care will allow us to create robust methods for the diagnosis and management of fungal infections.

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