Cystic Fibrosis Research News

Title:

OPTICAL COHERENCE TOMOGRAPHY DETECTS STRUCTURAL ABNORMALITIES OF THE NASAL MUCOSA IN PATIENTS WITH CYSTIC FIBROSIS

Authors:

Ute Oltmanns[1,2,3], Karin Palmowski[1,2], Mark Wielpütz[2,4,5], Nicolas Kahn[1,2], Eva Baroke[1], Ralf Eberhardt[1,2], Sabine Wege[1,2], Matthias Wiebel[1,2], Michael Kreuter [1,2], Felix J.F. Herth[1,2], Marcus A. Mall [2,3]

Affiliations:

[1]Department of Pneumology and Respiratory Critical Care Medicine, Thoraxklinik, University Hospital Heidelberg, Heidelberg, Germany

[2]Translational Lung Research Centre Heidelberg (TLRC), Member of the German Center for Lung Research (DZL), Heidelberg, Germany

[3]Department of Translational Pulmonology, University Hospital Heidelberg, Heidelberg, Germany

[4]Diagnostic and Interventional Radiology, University Hospital Heidelberg, Germany

[5]Department of Diagnostic and Interventional Radiology with Nuclear Medicine, Thoraxklinik, University Hospital Heidelberg, Germany

What was your research question?

Patients with cystic fibrosis (CF) frequently suffer from symptoms of chronic infections in the nose and nasal cavities (rhinosinusitis) as a result of an inflammation and infection of the nasal mucous membrane (mucosa). Our aim was to examine if a novel imaging technology called optical coherence tomography (OCT) is sensitive to detect structural abnormalities of the nasal mucosa in patients with CF.

Why is this important?

Chronic rhinosinusitis causes substantial complaint and reduced quality of life in patients with CF. Apart from localised symptoms such as facial pain and obstruction of the nose, rhinosinusitis in CF has been linked with recurrent infections of the lower airways which - over time - may lead to progressive and irreversible damage of the lungs. For this reason, it is important to find out more about the structural details that characterize nasal mucosal inflammation in CF and how these respond to treatment - especially in view of the new treatment options (e.g. CFTR modulators, nebulized antibiotics) that have recently become available for patients with CF.

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What did you do?

We used a new imaging technology called optical coherence tomography (OCT) in order to examine the nasal mucosa of 25 patients with CF and 25 healthy persons. In addition, we compared OCT images of 7 CF patients before and after antibiotic treatment for an exacerbation. The principle behind OCT imaging is similar to ultrasound with the exception that OCT uses light waves rather than sound waves. As a result, OCT images have the highest resolution currently available for imaging and even allow the identification of microscopic details such as mucosal glands and vessels.

What did you find?

We obtained high resolution images of the nasal mucosa using OCT. The images identified microscopic details of the nasal mucosa such as different layers of the mucosa, including the underlying bone and cartilaginous structures. The nasal mucosa of patients with CF was increased in thickness compared to healthy persons. In addition, we found that antibiotic therapy - either long term or short term for an acute exacerbation - resulted in reduced nasal mucosa thickening in CF patients.

What does this mean and reasons for caution?

OCT is a new high resolution imaging tool that allows imaging of mucosal surfaces. Applied to the nasal mucosa of CF patients, OCT imaging is sensitive to detect structural changes that are suggestive of chronic inflammation. OCT imaging also allowed us to detect changes of the nasal mucosa in CF patients in response to antibiotic treatment. This suggests that OCT may be a useful tool in clinical trials where the effectiveness of new drugs on chronic rhinosinusitis in patients with CF is assessed. However, further studies with more patient numbers will have to be done to fully assess the role of OCT in the assessment of airway disease in people with CF.

What's next?

Developments in OCT technology including improved resolution are ongoing and will hopefully enable the visualisation of abnormal ciliary beating and mucus transport and effects of therapeutic interventions on mucosal surfaces of the upper airways as well as the lungs in the near future.

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