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Cystic Fibrosis Research News

Title:

Objective airway artery dimensions compared to CT scoring methods assessing structural cystic fibrosis lung disease

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What was your research question?

Several scoring methods are used to measure the amount of diseased lung on computed tomography (CT) chest images of people with cystic fibrosis (CF). We aimed to compare two pre-existing scoring methods of lung disease with the actual physical change in the airways of children with CF.

Why is this important?

Children with CF develop damaged airways that can be detected on CT. First, there is destructive dilation of the airways (bronchiectasis). Second, airways could have thicker walls. Third, airways could be obstructed by mucous. These changes can be assessed objectively by measuring airway and artery dimensions, but this is very time consuming. Most scoring methods were developed for adults with more severe CF lung disease like the CF-CT. Recently a scoring method was developed for young children with CF, called PRAGMA-CF. Scoring methods are less time consuming than measuring all airway and artery dimension manually but first must be validated as accurate in children.

What did you do?

We collected chest CT scans of 11 children with CF and 12 controls (non-CF children) in the Sophia Children's Hospital (Rotterdam, the Netherlands). The scans were randomized before scoring and the scorers were blinded to patient information. The lung images were scored

for bronchiectasis and total disease (includes bronchiectasis, wall thickening and mucous plugging) using the two different scoring methods. In addition, all visible airway and artery dimensions were measured on the images. The two scoring methods were compared to all visible airway and artery dimensions.

What did you find?

There was a high correlation between the two scoring methods. A total of 4,861 airway and artery pairs were measured. The PRAGMA-CF score was better related to the physical airway and artery dimension measures than CF-CT score, for both bronchiectasis and the total disease score. Also, the actual number of airway and artery pairs visible on the lung images correlated well with the CF-CT and PRAGMA-CF scoring methods.

What does this mean and reasons for caution?

Both CF-CT and PRAGMA-CF can be used to score lung damage in children. However, the PRAGMA-CF method was more sensitive than CF-CT at detecting damage. Additionally, those with more diseased airways have more dilated airways. This leads to more number of airway and artery pairs to be visible on CT. Thus, the number of airway and artery pairs on CT could be another potential marker for lung damage.

What's next?

Currently scoring of CT scans is mostly performed manually. Measuring thousands of airway and artery pairs costs a lot of labour and time. Our next aim is to develop automatic scoring of chest CT images by computer algorithms.

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