Cystic Fibrosis Research News

Title:

Variability of Lung Clearance Index in clinically stable Cystic Fibrosis Lung Disease in School Age Children

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What was your research question?

The aim of this study was to better understand how Lung Clearance Index (LCI) can be used in clinical practice to monitor early CF lung disease.

Why is this important?

LCI is derived from multiple breath washout, which is a non-invasive method used to measure lung function and is suitable from birth to adulthood. An increased LCI indicates that parts of the lungs empty slower than normal. This can be due to inflammation or infection of the lung, which is common in CF. To interpret LCI changes over time and determine what represents a clinically meaningful change, information is needed on how LCI fluctuates in people with stable CF disease.

What did you do?

In this study 25 school-aged children (6-17 years) with CF performed multiple breath washout and spirometry every three months over a 12-month period. At each visit, a pediatrician evaluated the child's symptoms in a standardized way using Cystic Fibrosis Clinical Score. The aim was to prospectively observe LCI variability every third month independent of current treatment, in clinically stable school-children. The variability of LCI

results from the same child and between different children were determined and the upper limit of normal of LCI was calculated. At visits when the child had an increase in clinical symptoms (e.g. more cough or mucus) and a reduction in lung function as measured by spirometry (FEV1%) the child was considered clinically unstable and this visit was excluded from the final analysis.

What did you find?

25 children with 107 visits were included in the final analysis. Seven visits in four of the children were defined as clinical unstable and they had a significantly higher mean LCI compared to clinically stable children. We found that there was more variability in LCI with higher baseline LCI measurements. Normally actual change in LCI-units are used to determine an important change in lung function over time; however, due to the variability observed, the LCI reference interval was expressed as the percentage increase from the previous examination. We found that the upper limit of normal of LCI was 17%; therefore, an increase in LCI of > 17% compared to the prior LCI-measurement could indicate pulmonary deterioration.

What does this mean and reasons for caution?

The finding of this study strengthen the evidence base for LCI as a useful monitoring tool in CF children. This was a single center study that included only 25 children with CF, so no firm conclusion can be made from our findings. Clinically meaningful changes in LCI might differ between CF centers. This is because LCI is responsive to interventions, such as antibiotics, hypertonic saline or CFTR-modulators (e.g. Kalydeco®, Orkambi®) and treatment policies might vary between CF centers. Therefore, the variability of LCI might also differ between CF centers.

What's next?

This type of study will hopefully be reproduced by other CF centers confirming our results.

Original manuscript citation in PubMed

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