Changes in lung clearance index in newborns who screened positive for cystic fibrosis with an inconclusive diagnosis

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Background: Routine follow-up of newborns who screened positive for cystic fibrosis (CF) with an inconclusive diagnosis (CFSPID) is considered standard of care to observe for indications of clinical features of disease [1]. Standard measures of lung function may not be sensitive enough to pick up early signs of disease. The lung clearance index (LCI), as measured by multiple-breath washout (MBW), has been found to be a sensitive measure of early lung disease and progression in cystic fibrosis and could be a useful tool for tracking the CFSPID population over time. Our previous analysis of this cohort was limited primarily to preschool-aged children [2]; with the availability of school-aged data in this group, this study aims to describe changes in LCI over time in CFSPID individuals.

Methods: Children identified as CFSPID were prospectively followed annually with routine sweat chloride testing and clinical assessments, as outlined previously [1]. A subset of performed MBW during their annual visits, using the Exhalizer D (Eco Medics AG, Switzerland) with nitrogen as a tracer gas, and results were generated out of Spiroware v3.3.1 (Eco Medics AG). Visits were classified as stable or symptomatic if the individual had respiratory symptoms at the time of testing based on physician assessment. Spirometry and sweat chloride results were collected for each visit.

Results: Fifty-eight MBW measurements were collected in 20 children (55% female). CFSPID children had a median of 3 (interquartile range 2–5) MBW measurements. Mean ± SD age at first MBW measurement was 5.4 ± 1.1. Overall, the mean ± SD LCI for all visits was 6.34 ± 0.67. The LCI was higher for symptomatic visits than for stable visits (95% CI, 0.60–1.51; p < 0.001), with six of the seven symptomatic visits occurring in children younger than 7, reflecting the higher incidence of viral infections in younger children. All school-aged children with previously high LCI for whom repeated measurements were available demonstrated decline (improvement) in LCI on follow-up, and LCI remained within the range defined for healthy children (Figure 1) [3].

Figure 1. Longitudinal measurements of the lung clearance index (LCI) over time for newborns who screened positive for cystic fibrosis with an inconclusive diagnosis. X = physician-determined symptomatic visits.

Conclusions: Our current analysis suggests that children with CFSPID have normal lung function measured according to LCI during early school age. Follow-up measurements in children with previously high LCI may be useful to ensure that the initial measurement is not interpreted as evidence of significant lung disease.

References

