Long-term monitoring of lung clearance index (LCI) in children with CF

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Background: The lung clearance index (LCI) from the multiple-breath inert gas washout (MBW) test is an index of ventilation distribution reflecting peripheral airway function. It is more sensitive to lung involvement in CF than spirometry (ERJ 2003;32:972–9) and correlates more closely with HRCT structural lung damage (Thorax e-pub Aug 3, 2007). It was hypothesized that LCI can stabilise or even improve in a significant proportion of the cohort over the course of several years and that LCI may be higher and progress faster in patients with vs. without chronic Ps aeruginosa colonisation (PA).

Methods and Subjects: CF subjects born in 1993 or later, who had performed at least 3 MBW tests over a period of >12 month (N=35) were included and separated into 3 groups: chronic PA (CC, n=5), intermittent PA (IC, n=10) and never PA (NC, n=20). Age at first LCI was 2.2 (0.2–7.5) yrs [median (range)] and follow-up time was 4.6 (1.1–11.2) yrs.

Results: LCI did not correlate with age at first or final LCI, with age at diagnosis, genotype or pancreatic status. Regression analysis showed a significant improvement in LCI in relation to the MBW test number (p<0.005) with no significant difference between first and last LCI in either group. CC had already at start a high LCI compared to NC (p<0.01). CC also deteriorated in LCI initially when becoming chronically colonized, but 4/5 subjects improved in LCI with more intensive treatment. NC remained stable all through follow-up.

Conclusion: The course of small airway function in CF determined by LCI is variable, but in general not progressive.

Lung clearance index vs. FEV1 in healthy adults and patients with cystic fibrosis

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Results: LCI tended to be higher in children with CC vs IC group already at the first MBW test (median 10.8 (7.8–13.6) vs 8.3 (6.0–13.0); p=0.17). LCI improved in 4/5 with CC and 7/10 with IC during the study period, being 9.2 (7.4–10.0) and 7.4 (6.5–10.5), respectively at the last test (p=0.07). The median (range) number of i.v. antibiotic courses per subject and year during follow up was 2.1 (1.3–2.9) in CC and 1.3 (0.2–3.0) in IC (p=0.21).

Conclusion: Small airway dysfunction in CF is not necessarily progressive even in subjects with chronic or intermittent Pseudomonas aeruginosa colonisation, supporting the view that aggressive early intervention is important.

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Background: The lung clearance index (LCI) from the multiple-breath inert gas washout (MBW) test, an index of ventilation inhomogeneity, is more sensitive to lung involvement in CF than spirometry (ERJ 2003;32:972–9) and more closely related to HRCT structural lung damage (Thorax Aug 3, 2007, e-pub). It is unknown to what extent the LCI reflects irreversible structural and potentially reversible inflammatory processes. It was hypothesized that LCI may improve if it at least partially measures reversible lung pathology.

Methods and Subjects: LCI was followed in 5 children with chronic Pseudomonas aeruginosa colonisation (CC) and 10 with intermittent colonisation (IC) diagnosed at their last MBW test. Median (range) follow-up time was 10.2 (6.7–11.2) and 6.5 (11.1–11.2) yrs, respectively, with 7 (3–10) follow-up visits in both groups. The number of i.v. antibiotic courses given per year was compared.

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