Sensitivity of N\textsubscript{2} single breath washout compared to multiple breath washout in adults with cystic fibrosis

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**Background:** The N\textsubscript{2} multiple breath washout (MBW) method is increasingly used in research studies to assess ventilation distribution inhomogeneity. In addition to global indices such as the lung clearance index (LCI), specific indices of inhomogeneity in the conducting airway zone (Scond) and more peripherally (Sacin) can be calculated (1). The MBW is, however, time consuming and N\textsubscript{2} single breath washout (SBW) based on a single breath, either a vital capacity manoeuvre or a 1 litre inspiration of pure O\textsubscript{2} from functional residual capacity (FRC), are much quicker to perform. The sensitivities of these tests have not been compared before in cystic fibrosis (CF).

**Methods:** Spirometry and triplets of N\textsubscript{2} MBW, VC and FRC+1 L SBW were recorded using the Exhalyzer D (Eco Medics AG) in 20 CF subjects aged 27 (7) yrs and 20 healthy controls also ages 27 (7) yrs. From the SBW tests concentration and volume normalized phase III slopes (sn\textsubscript{III} * Vol,exp) were calculated. The results from the controls were use to calculate z-scores from the N\textsubscript{2} washout indices. Spirometry data were related to Swedish reference values (2-3).

**Results:** LCI and Scond were abnormal (z >+1.96 SD) in all 20 subjects. Compared to LCI and Scond, Sacin was abnormal in only 12/20 subjects (p=0.003), VC Sn\textsubscript{III} * Vol,exp in 13/20 (p=0.008), and FRC+1L Sn\textsubscript{III} *Vol,exp in 18/20 subjects (n.s.). FEV\textsubscript{1} was abnormal (<-1.96 SD) in only 6 subjects (p<0.001).

**Conclusion:** LCI and Scond are the most sensitive indices, but a single breath test based on inspiration of 1 L of O\textsubscript{2} from FRC followed by a slow maximal expiration is almost as sensitive as Scond or LCI.

**References:**