

Multiple Breath Washout in Pulmonary Fibrosis

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Background: Pulmonary fibrosis (PF) is a progressive disease affecting small airways. Sensitive markers for small airway function in this patient group are lacking. Multiple breath washout (MBW), which evaluates ventilation heterogeneity in small conducting (Scond) and acinar (Sacin) airways, may be useful. We aim to compare MBW outcomes, between patients with PF and healthy controls and to compare perceived exertion associated with performing MBW versus spirometry.

Method: Patients were recruited from a pulmonary outpatient clinic. Healthy controls were defined as having no history of lung disease, no respiratory symptoms during the past year, and $FEV_1/FVC > -1.96$ z-score based on GLI reference equations. Nitrogen MBW was performed using Exhalyzer D. A Borg scale 0-10 measured level of discomfort during the test. Lung clearance index (LCI), Scond, and Sacin were derived and compared between groups using ANCOVA, adjusting for age, sex, and smoking history. Outcomes are reported as mean (SD).

Results: 35 (12 females, 34%) patients, aged 52 to 91 yrs, 72.1 (8.6) and 39 (19 females, 49%) controls, aged 47-81 yrs, 64.2 (8.4) were included. A history of smoking was reported by 19 patients, 19 (11) packyears and 13 controls, 7 (8) packyears, respectively. LCI; 8.89 (1.27) in patients and 7.33 (0.78) in controls, $p < 0.001$. Scond; 0.038 (0.016) versus 0.028 (0.013), $p = 0.021$. Sacin; 0.231 (0.120) versus 0.109 (0.056), $p = 0.001$. The patients scored 2.4 (2.0) on the Borg scale for MBW and 4.9 (2.5) for spirometry, $p < 0.001$.

Conclusion: Small airway involvement in PF can be assessed using MBW, and is less physically demanding to perform than spirometry. Future longitudinal studies will determine if MBW can be used to monitor disease progression.