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| **Multiple Breath Nitrogen Washout provides mechanistic insight into PCD**  |
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| **Introduction:** Primary ciliary dyskinesia (PCD) is a rare disease in which patients have impaired mucociliary clearance and peripheral airway obstruction. Standard lung function tests have difficulty detecting impairment in small peripheral airways. Multiple breath nitrogen washout (MBNW) is a sensitive measurement of ventilation inhomogeneity which may better detect functional abnormalities in PCD. This study outlines the practical and clinical utility of performing MBNW to quantify small airway disease in patients attending a ciliary function clinic.**Methods:** Patients over the age of 8 years performed MBNW during a single visit to our ciliary function clinic, in addition to standard PCD diagnostic tests including nasal nitric oxide (nNO) (CLD 88sp chemiluminescence analyser) and nasal brushings for high-speed video microscopy analysis of ciliary beat frequency and pattern, immunofluorescence and electron microscopy. MBNW was performed according to ATS/ERS standards (2013). After confirmation of PCD diagnosis, the patient group wasdivided into those with confirmed PCD vs non-PCD. Statistical analysis of variables between groups was completed using an unpaired t-test.**Results:** 15 patients (mean age 28.7 ± 8.7) attempted MBNW alongside their cilia function testing. All patients achieved acceptable and reproducible results. Patients with confirmed PCD had higher Sacin compared to patients without PCD. There was no difference in FRC, LCI or Scond between the two groups.

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| **Variable****(Mean ±SD)** | **PCD (n=8)** | **Non-PCD (n=7)** | **p-value** |
| Age (range) | 32.75±11.9 | 24.14±4.5 | 0.5 |
| FRC (L) | 3.16±1.49 | 2.57±1.50 | 0.5 |
| LCI | 9.50±6.50 | 7.04±6.04 | 0.08 |
| Sacin (L-1) | 0.220±0.15\* | 0.074±0.04# | **0.001** |
| Scond (L-1)  | 0.075±0.04\* | 0.046±0.03# | 0.1 |

*Table 1.* Comparison of variable between PCD and non-PCD patients\*n=6, #n=7**Conclusion:** PCD positive patients have worse ventilation heterogeneity in airways where the predominant mechanism of gas flow is by diffusion, compared with non-PCD patients. This study confirms peripheral airway involvement in PCD and provides mechanistic insight into the disease process, especially at the time of diagnosis. MBNW is a useful and practical test to perform in patients attending the ciliary function clinic.**Key Words:** Primary ciliary dyskinesia (PCD),multiple breath nitrogen washout (MBNW), nasal nitric oxide, ciliary beat frequency, lung clearance index, Sacin and Scond.**Grant Support:** Applied for ASM Grant |