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Title: Tidal N_2 washout ventilation inhomogeneity indices in a reference population aged 7-70 years

Dr. Birgitta 12797 Houltz birgitta.houltz@vgregion.se MD [1], Dr. Kent 12798 Green kent.green@rh.regionh.dk MD [2], Dr. Anders 12799 Lindblad anders.lindblad@vgregion.se MD [3], Dr. Florian 12800 Singer Florian.Singer@insel.ch MD [4], Dr. Paul 12801 Robinson dr.pdrobinson@googlemail.com MD [5], Dr. Kim 12802 Nielsen kim.g.nielsen@rh.regionh.dk MD [2] and Dr. Per 12829 Gustafsson per.gustafsson@vgregion.se MD [6]. [1] Department of Clinical Physiology, East Hospital, Sahlgrenska University Hospital, Gothenburg, Sweden ; [2] Pediatric Pulmonary Service, Copenhagen University Hospital, Copenhagen, Denmark ; [3] Queen Silvia Children´s Hospital,, Sahlgrenska University Hospital, Gothenburg, Sweden ; [4] Division of Pulmonology, Department of Paediatrics, Inselspital, University of Bern, Switzerland ; [5] Department of Respiratory Medicine, Children's Hospital at Westmead, Discipline of Paediatrics and Child Health, Faculty of Medicine, University of Sydney, Australia and [6] Department of Paediatrics, Central Hospital, Skövde, Sweden .

Body: Background: The Multiple Breath inert gas Washout (MBW) method is increasingly used in research studies to assess ventilation distribution inhomogeneity. Normative data are needed when using the method clinically. Methods: Spirometry and triplets of nitrogen (N2) MBW using a new device (Exhalyzer D, EcoMedics AG, Duernten, Switzerland) were recorded in 284 healthy subjects aged 7-70 yrs. Mean and SD were calculated in four age groups for LCI (Lung Clearance Index), indices of peripheral airway function based on concentration normalized slope III analysis (Scond, Sacin, Pacin), concentration normalized end-tidal N2 after 6 lung volume turnovers (Cn TO6), washout time (WoT) and moment ratios (m1/m0; m2/m0). Results are tabulated.

Demography and Results (mean (SD))

Age groups	7-19 yrs	20-39 yrs	40-59 yrs	60 -70 yrs
n (males)	44 (24)	82 (37)	110 (58)	48 (20)
Age, yrs	13.8 (3.1)	29.4 (5.6)	50.1 (5.6)	66.1 (2.9)
Height, cm	161 (16)	174 (9)	175 (9)	170 (8)
FEV1, % pred	101 (10)	102 (11)	103 (12)	112 (12)
LCI	6.54 (0.28)	6.70 (0.36)	7.28 (0.43)	7.78 (0.62)
LCI, ULN	7.09	7.41	8.11	9.00
LCI, CV%	3.6 (2.6)	3.0 (1.6)	3.8 (2.2)	3.1 (2.9)

Scond * VT	0.021 (0.004)	0.021 (0.008)	0.022 (0.009)	0.026 (0.013)
Sacin * VT	0.051 (0.012)	0.056 (0.021)	0.069 (0.030)	0.088 (0.038)
Pacin * VT	0.066 (0.023)	0.074 (0.034)	0.082 (0.049)	0.115 (0.075)
Cn TO6	2.89 (0.27)	3.02 (0.33)	3.55 (0.41)	4.03 (0.52)
WoT, s	137(49)	163 (59)	172 (64)	169 (55)
m1/m0	1.46 (0.06)	1.48 (0.07)	1.60 (0.09)	1.72 (0.12)
m2/m0	4.15 (0.36)	4.34 (0.45)	5.14 (0.60)	5.98 (0.97)

ULN, Upper Limit of Normal

Conclusion: Reference values for several different indices of ventilation distribution inhomogeneity obtained in a large healthy population over a wide age range are now available allowing for clinical use of this new N2 MBW method.