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Normative data for multiple breath washout outcomes in school-aged Caucasian children

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This study provides reference values for nitrogen multiple breath washout outcomes in healthy Caucasian children from 6 to 18 years old, measured with a commercially available device http://bit.ly/2rsab8v

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ABSTRACT

Background: The multiple breath nitrogen washout (N_2MBW) technique is increasingly used to assess the degree of ventilation inhomogeneity in school-aged children with lung disease. However, reference values for healthy children are currently not available. The aim of this study was to generate reference values for N_2MBW outcomes in a cohort of healthy Caucasian school-aged children.

Methods: N_2MBW data from healthy Caucasian school-age children between 6 and 18 years old were collected from four experienced centres. Measurements were performed using an ultrasonic flowmeter (Exhalyzer D, Eco Medics AG, Duernten, Switzerland) and were analysed with commercial software (Spiroware version 3.2.1, Eco Medics AG). Normative values and upper limits of normal (ULN) were generated for lung clearance index (LCI) at 2.5% ($LCI_{2.5\%}$) and at 5% ($LCI_{5\%}$) of the initial nitrogen concentration and for moment ratios (M_1/M_0 and M_2/M_0). A prediction equation was generated for functional residual capacity (FRC).

Results: Analysis used 485 trials from 180 healthy Caucasian children aged from 6 to 18 years old. While

LCI increased with age, this increase was negligible (0.04 units·year^{-1} for $LCI_{2.5\%}$) and therefore fixed ULN were defined for this age group. These limits were 7.91 for $LCI_{2.5\%}$, 5.73 for $LCI_{5\%}$, 1.75 for M_1/M_0 and 6.15 for M_2/M_0, respectively. Height and weight were found to be independent predictors of FRC.
Conclusion: We report reference values for N_2MBW outcomes measured on a commercially available ultrasonic flowmeter device (Exhalyzer D, Eco Medics AG) in healthy school-aged children to allow accurate interpretation of ventilation distribution outcomes and FRC in children with lung disease.