



Official ERS technical standard: Global Lung Function Initiative reference values for static lung volumes in individuals of European ancestry

Graham L. Hall^{1,2}, Nicole Filipow³, Gregg Ruppel ⁴, Tolu Okitika¹, Bruce Thompson⁵, Jane Kirkby⁶, Irene Steenbruggen ⁷, Brendan G. Cooper⁸, Sanja Stanojevic³, on behalf of the contributing GLI Network members⁹

Affiliations: ¹Children's Lung Health, Wal-yan Respiratory Research Centre, Telethon Kids Institute, Perth, Australia. ²School of Physiotherapy and Exercise Science, Curtin University, Perth, Australia. ³Translational Medicine, Hospital for Sick Children, Toronto, ON, Canada. ⁴Pulmonary, Critical Care and Sleep Medicine, Saint Louis University School of Medicine, St Louis, MO, USA. ⁵School of Health Sciences, Swinburne University of Technology, Melbourne, Australia. ⁶Respiratory Medicine, Sheffield Children's Hospital NHS Foundation Trust, Sheffield, UK. ⁷Pulmonary Laboratory, Isala Klinieken, Zwolle, The Netherlands. ⁸Lung Function and Sleep, University Hospital Birmingham and Institute of Clinical Sciences, University of Birmingham, Birmingham, UK. ⁹Contributing GLI Network members included representatives of centres that submitted data and members of the GLI Network Executive; a list of the Network members can be found in the acknowledgements section.

Correspondence: Graham L. Hall, Children's Lung Health, Telethon Kids Institute, PO Box 855, West Perth, 6872, WA, Australia. E-mail: graham.hall@telethonkids.org.au

@ERSpublications
The GLI Network has developed all-ages reference equations for lung volumes for populations of European ancestry. The unification of GLI lung function reference equations will improve the interpretation of lung function in patients with lung disease. <https://bit.ly/3hHZR1N>

Cite this article as: Hall GL, Filipow N, Ruppel G, *et al.* Official ERS technical standard: Global Lung Function Initiative reference values for static lung volumes in individuals of European ancestry. *Eur Respir J* 2021; 57: 2000289 [<https://doi.org/10.1183/13993003.00289-2020>].

This single-page version can be shared freely online.

ABSTRACT

Background: Measurement of lung volumes across the life course is critical to the diagnosis and management of lung disease. The aim of the study was to use the Global Lung Function Initiative methodology to develop all-age multi-ethnic reference equations for lung volume indices determined using body plethysmography and gas dilution techniques.

Methods: Static lung volume data from body plethysmography and gas dilution techniques from individual, healthy participants were collated. Reference equations were derived using the LMS (lambda-mu-sigma) method and the generalised additive models of location shape and scale programme in R. The impact of measurement technique, equipment type and being overweight or obese on the derived lung volume reference ranges was assessed.

Results: Data from 17 centres were submitted and reference equations were derived from 7190 observations from participants of European ancestry between the ages of 5 and 80 years. Data from non-European ancestry populations were insufficient to develop multi-ethnic equations. Measurements of functional residual capacity (FRC) collected using plethysmography and dilution techniques showed physiologically insignificant differences and were combined. Sex-specific reference equations including height and age were developed for total lung capacity (TLC), FRC, residual volume (RV), inspiratory

capacity, vital capacity, expiratory reserve volume and RV/TLC. The derived equations were similar to previously published equations for FRC and TLC, with closer agreement during childhood and adolescence than in adulthood.

Conclusions: Global Lung Function Initiative reference equations for lung volumes provide a generalisable standard for reporting and interpretation of lung volumes measurements in individuals of European ancestry.