Addressing the origins and health effects of small lungs

As recently discussed by Peter Burney and colleagues[1] in *The Lancet Respiratory Medicine*, small lung volumes, which could be due to genetics, impaired lung development, or adverse exposures, are common in people without recognised lung disease (obstructive or restrictive) and are related to early-life events, low socioeconomic status, and premature death.[1] Although Burney and colleagues proposed small lungs as a syndrome, we would regard small lungs as a characteristic, similar to being short.

In this Correspondence, we highlight the impact of small lungs in terms of exertional breathlessness, which is the most common, distressing, and limiting symptom in people with cardiopulmonary disease, affecting about 25–30% of people aged 40 years or older.[2] Low absolute lung volumes are associated with worse exertional breathlessness in people with impaired and in those with normal lung function.[3] Moreover, the increased exertional breathlessness in women than in men is related to their lower absolute lung volumes; when comparing men and women with similar absolute lung volumes, they had a similar prevalence of exertional breathlessness.[3] People with small lung volumes are also at higher risk of developing more severe exertional breathlessness due to other factors, such as obesity, than are those with larger lung volumes.[4]

Small lungs due to impaired lung development or adverse exposures might also explain, at least partly, the smaller lung volumes seen in healthy people in socioeconomically disadvantaged groups. Lung volumes have increased substantially across Europe in the past century, probably because of improved life conditions,[5] but this improvement might not be seen in lower-income settings. Knowledge of the prevalence and origins of small lungs is important for an unbiased evaluation of lung function.

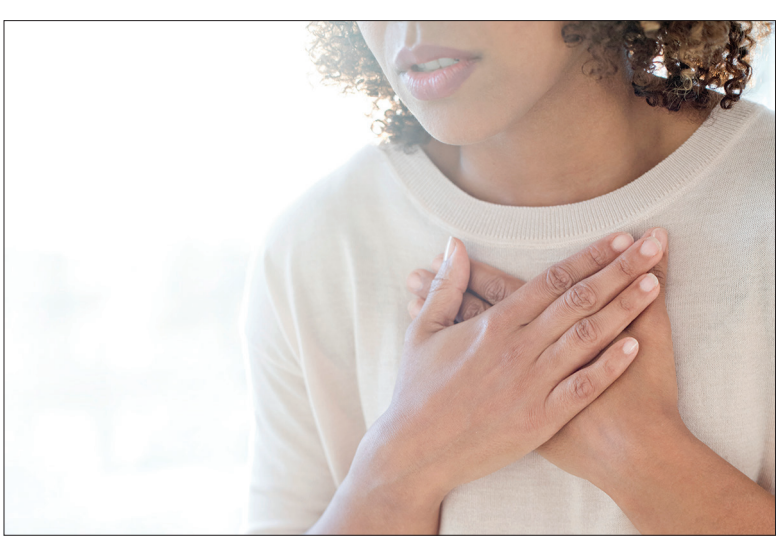
We propose that several points be considered in the evaluation of small lungs. First, in the exclusion of diseases, both respiratory (obstructive, restrictive, and mixed) and non-respiratory (eg, thoracic deformity, neuromuscular impairment, obesity, and heart failure) conditions should be considered. Second, the quality of spirometry is an important factor: as forced vital capacity is dependent on effort, FEV_1 might be a more reliable measure. Finally, the potential presence of small lungs should be evaluated using reference values based on people who are free from both relevant disease (as done today) and relevant adverse exposures, including those in early life. Such reference values could allow us to evaluate the presence of disease and the person's lung volumes in relation to predicted normal values in the absence of relevant socioeconomic and other adverse factors, and enable us to better untangle the interplay of genetics and exposures on lung function and health.

ME is supported by an unrestricted grant from the Swedish Research Council (2019-02081), outside of the submitted work. ME discloses personal fees from AstraZeneca, outside of the submitted work. HB discloses personal fees from AstraZeneca, GSK, and Boehringer Ingelheim, outside of the submitted work. DM is a former employee and current shareholder of GSK, and a consultant to AstraZeneca and the COPD Foundation; he is also an expert witness for Schlesinger Law Offices.

*Magnus Ekström, Helena Backman, David Mannino
magnus.ekstrom@med.lu.se

Department of Medicine, Blekinge Hospital, Karlskrona SE-37185, Sweden (ME); Respiratory Medicine, Allergology and Palliative Medicine, Department of Clinical Sciences Lund, Faculty of Medicine, Lund University, Lund, Sweden (ME); Obstructive Lung Disease in Northern Sweden (OLIN) Unit, Section of Sustainable Health, Department of Public Health and Clinical Medicine, Umeå University, Umeå, Sweden (HB); Department of Medicine, University of Kentucky College of Medicine, Lexington, KY, USA (DM); COPD Foundation, Washington, DC, USA (DM)

1 Burney P, Knox-Brown B, Amaral AFS. Small lung syndrome: the need to reclassify chronic lung disease. *Lancet Respir Med* 2023; **11:** 405–06.
2 Grønseth R, Vollmer WM, Hardie JA, et al. Predictors of dyspnoea prevalence: results from the BOLD study. *Eur Respir J* 2014; **43:** 1610–20.
3 Ekström M, Bornefalk-Hermansson A, Wysham N, Currow DC, MacIntyre N. Spirometric volumes and breathlessness across levels of airflow limitation: the COPDGene study. *Am J Respir Crit Care Med* 2018; **198:** 678–81.
4 Ekström MP, Blomberg A, Bergström G, et al. The association of body mass index, weight gain and central obesity with activity-related breathlessness: the Swedish Cardiopulmonary Bioimage Study. *Thorax* 2019; **74:** 958–64.
5 Allinson JP, Afzal S, Çolak Y, et al. Changes in lung function in European adults born between 1884 and 1996 and implications for the diagnosis of lung disease: a cross-sectional analysis of ten population-based studies. *Lancet Respir Med* 2022; **10:** 83–94.



Science Photo Library

Published Online
June 21, 2023
https://doi.org/10.1016/S2213-2600(23)00185-6