Association of lung clearance index with survival in individuals with cystic fibrosis

Johanna Manuela Kurz [1,2], Kathryn Angela Ramsey [1], Romy Rodriguez[1], Ben Spycher[3], Reta Fischer Biner[4], Philipp Latzin [1] and Florian Singer [1]

[1]Division of Respiratory Medicine, Dept of Paediatrics, Inselspital University Hospital Bern, University of Bern, Bern, Switzerland. [2]Graduate School for Health Sciences, University of Bern, Bern, Switzerland. [3]Institute of Social and Preventive Medicine, University of Bern, Bern, Switzerland. [4]Quartier Bleu, Lindenhofspital, Bern, Switzerland.

Corresponding author: Florian Singer (florian.singer@insel.ch)

Shareable abstract (@ERSpublications)
The lung clearance index (LCI) is a measure of global ventilation inhomogeneity that increases early during the course of cystic fibrosis (CF) lung disease. This study shows that LCI is associated with death or lung transplantation in individuals with CF. https://bit.ly/2T3ia9C

Cite this article as: Kurz JM, Ramsey KA, Rodriguez R, *et al*. Association of lung clearance index with survival in individuals with cystic fibrosis. *Eur Respir J* 2022; 59: 2100432 [DOI: 10.1183/13993003.00432-2021].

Received: 11 Feb 2021
Accepted: 28 June 2021

Abstract

Background The lung clearance index (LCI) assesses global ventilation inhomogeneity and is a sensitive biomarker of airway function in cystic fibrosis (CF) lung disease. We examined the association of LCI with the risk of death or lung transplantation (LTx) in individuals with CF.

Methods We performed a retrospective analysis in a cohort of individuals with CF aged ⩾5 years with LCI and forced expired volume in 1 s (FEV_1) measurements performed between 1980 and 2006. The outcome was time until death or LTx. We used the earliest available LCI and FEV_1 values in a Cox proportional hazards regression adjusted for demographic and clinical variables. For sensitivity analyses, we used the mean of the first three LCI and FEV_1 measurements, stratified the cohort based on age, and investigated individuals with normal FEV_1.

Results In total, 237 individuals with CF with a mean (range) age of 13.9 (5.6–41.0) years were included. The time-to-event analysis accrued 3813 person-years and 94 (40%) individuals died or received LTx. Crude hazard ratios were 1.04 (95% CI 1.01–1.06) per 1.0 z-score increase in LCI and 1.25 (95% CI 1.11–1.41) per 1.0 z-score decrease in FEV_1. After adjusting LCI and FEV_1 mutually in addition to sex, age, body mass index and number of hospitalisations, hazard ratios were 1.04 (95% CI 1.01–1.07) for LCI and 1.12 (95% CI 0.95–1.33) for FEV_1. Sensitivity analyses yielded similar results and using the mean LCI strengthened the associations.

Conclusions Increased ventilation inhomogeneity is associated with greater risk of death or LTx. Our data support LCI as novel surrogate of survival in individuals with CF.