CORRESPONDENCE

Author's response: understanding the natural progression in %FEV_1 decline in patients with cystic fibrosis: a longitudinal study

We thank Professor Miller for his comments[1] regarding our paper,[2] in which we outline a novel approach to modelling repeated lung function measures in people with cystic fibrosis (CF) over long follow-up periods. We agree that it would be interesting to apply our methodology using alternative methods of expressing lung function across the age range, and reiterate that our approach can be usefully applied to any clinical outcome measured repeatedly over extended periods.

While the merits of different approaches are appreciated, we chose to model forced expiratory volume in 1 s as a percentage of predicted (%FEV_1) for a number of reasons. First, %FEV_1 is still currently recognised as a key outcome measure in CF[3] as it is predictive of survival, and is currently an important criterion in international lung transplant guidelines.[4] Second, %FEV_1 has been modelled previously over long follow-up periods, across the paediatric and adult age range in CF using a random-intercept and slope approach,[5] and we wanted to compare our method with this. Third, standardised %FEV_1 was the most commonly collected outcome measure in the Danish CF registry.

While we agree that use of recently developed all-age equations, such as those published by Stanojevic[6] or Quanjer[7] would be advantageous in avoiding arbitrary breaks, for the purposes of this analysis, we adhered to the approach that is currently used in Denmark to facilitate comparisons with previously published data. Irrespective of the precise outcome used, our finding that the error in repeated measurements of %FEV_1 within individuals is large (average within-person SD of 6 percentage points) remains valid. Furthermore, our approach provides more realistic estimates of the underlying lung-function trajectory of people with chronic lung disease, by acknowledging the imprecision in individual measurements over time, and the correlation structure of repeated measurements on the same individual, issues that have all too often been disregarded in the past.

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