Author’s response: heterogeneity of change in LCI in patients with cystic fibrosis following antibiotic treatment

I thank Yammine et al for their comments on our paper. In their interesting study, Yammine et al have noted similar findings to those we described, albeit in a less severely affected and younger population of cystic fibrosis (CF) patients. This raises important questions about what is happening in the lungs of CF patients during treatment for an exacerbation as well as the utility of lung clearance index (LCI) in this setting. It would appear that forced expiratory volume in 1 s (FEV₁) is the more sensitive marker for change in this circumstance across a wide range of disease severities. Certainly the change in FEV₁ is more impressive than that in LCI, which is at least consistently inconsistent. Some patients show impressive improvements in LCI while others show major deteriorations, and the correlation with change in spirometry is at best modest.

Yammine et al have added plethysmography to this analysis, yet the results are somewhat disappointingly unenlightening. They did not observe any significant changes in measures of trapped gas with treatment. The major positive finding was that FRC<sub>MBW-RV</sub> was identified as a predictor of change in LCI in multiple regression analysis. This is a new composite predictor of change in LCI in multiple regression analysis. The authors note, it is likely however that the relative importance of different processes differ between patients, but so far we have not perfected the tools to accurately identify these from the washout curves. Ongoing imaging studies using hyperpolarised He MRI alongside LCI offer the greatest chance of shining a light on the complex evolution and resolution of ventilation heterogeneity. These will hopefully afford a functional standard against which to compare both new and old measures of gas mixing physiology that can then be applied in clinical practice.

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