controlled asthma with a mean predicted FEV1 of 54%. 13/24 (61%) were on a maintenance dose of oral corticosteroids (mean dose 19 mg/day). The mean inhaled corticosteroids was 1006 µg. The cause of death was not known in 6 cases, with majority of cases died from non-asthma causes (78%) with cardiovascular disease being the most common. Asthma was the cause of death in 4/18 (22%) cases. Co-morbid diseases were prevalent particularly those that form the metabolic syndrome. Non-concordance with asthma medications and smoking history (current and ex-smokers) were also common (50% and 60% respectively).

Conclusion Although death is a rare event in our severe asthma service (0.7%), patients did die prematurely (mean age 51 yrs) usually from non-asthma causes, but asthma still accounted for death in the fifth of this group. Larger multicentre study with control data will be needed to confirm these finding and look for drivers and predictors of mortality in severe asthma.

New markers of lung physiology

P79 COMPARISON OF CF AND NON CF LCI RESULTS USING THE EXHALYZER D AND INNOCORTM DEVICES

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Background Multiple breath washout (MBW) is a pulmonary function test that allows measurement of lung clearance index (LCI), a marker of ventilation heterogeneity. LCI is increasingly being considered as a clinical trial outcome measure. The Exhalyzer D N_2 washout (N_2/ExD, Ecomedics AG, Switzerland) is the recommended technique by the ECFS CTN. Mostly our group's experience with LCI uses the Innocor^{TM} gas analyser (Innovision, Denmark), SF_6 as a tracer gas (SF_6/Inn). To understand the N_2/ExD technique, the aims of this study were to compare a) intra-test variability; b) LCI values c) LCI and FEV_1 for the two techniques.

Methods 21 CF (14F, mean 20 ± 12 yrs) and 10 non-CF (8F, mean 28 ± 10 yrs) have completed MBW trials with the 2 techniques in random order on the same visit; methods previously described (Horsley *et al*. 2009, Jensen *et al*. 2013).

Results Intra-test CoV (2–3 repeats) was similar for SF_6/Inn and N_2/ExD (3.57 vs 3.78 CF, ns). LCI was significantly higher with N_2/ExD than with SF_6/Inn in both CF (14.05 vs 9.33; p = <0.0001) and non-CF (7.08 vs 6.64, p = 0.04). Both techniques show a significant correlation for LCI and FEV_1%, although the regression slopes were significantly different (p = 0.005); much steeper for N_2/ExD.

Conclusions LCI values cannot be used interchangeably between the Innocor^{TM} and Exhalyzer D. In non CF, there was a statistically significant difference, with higher values in the N_2/ExD. The difference was much greater in CF and increased as LCI did. In the context of similar intra-test variability, the hypothesis that this may translate into improved power in future clinical trials needs to be tested. Sponsored by a non-restricted grant from Novartis.

REFERENCES

1 Horsley AR, Gustafsson PM, Macleod KA. *et al.* Lung clearance index is a sensitive, repeatable and practical measure of airways disease in adults with cystic fibrosis. *Thorax*. 2008;**63**:135–40
2 Jensen R, Stanojevic S, Gibney K, *et al.* Multiple breath nitrogen washout: a feasible alternative to mass spectrometry. *PLoS One*. 2013;**8**:e56868

P80 EXTRAPOLATING LUNG CLEARANCE INDEX (LCI) FROM SHORTENED MEASUREMENTS

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Introduction and objectives Shortened multiple breath washouts (MBW) are attractive in young children, where a long test time may not be tolerable (Thorax 2013;68:586–7). Lung clearance index (LCI) is usually calculated at 1/40th of the starting concentration (LCI_{std}), but in shorter MBWs the LCI is calculated at 1/20th of the starting concentration ($LCI_{0.5}$). $LCI_{0.5}$ and LCI_{std} are closely correlated but not interchangeable, and so we calculated an extrapolated full LCI (LCI_{ex}) from $LCI_{0.5}$. Our hypothesis was that extrapolated LCI (LCI_{ex}) will better reflect LCI_{std} than $LCI_{0.5}$ and be more sensitive to intervention.

Methods Condition-specific equations for cystic fibrosis (CF), primary ciliary dyskinesia (PCD) and asthma, and an overall equation for all 3 groups, were developed to convert $LCI_{0.5}$ to LCI_{ex} from data previously analysed (n = 90, Thorax 2014;69 [Suppl^2]A166). LCI_{std}, $LCI_{0.5}$ and LCI_{ex} were then calculated for new cohorts (n = 70, 20 asthma, 30 CF, 20 PCD), and LCI_{ex} was compared to LCI_{std}. CF patients receiving IV antibiotics (n = 17) and asthma patients receiving triamcinolone (n = 32)) also had LCI_{std}, LCI0.5 and LCI_{ex} calculated and compared. The upper limit of normal for LCI_{std} was calculated from healthy controls. LCI_{ex} was compared to LCI_{std} with a Bland-Altman plot.

Results In CF, at higher LCIs, the spread between LCI_{ex} and LCI_{std} grew but there was no bias. For PCD and asthma agreement remained very good. There was no significant difference between LCI_{std} and LCI_{ex}. Results for positive and negative prediction of LCI_{std} for $LCI_{0.5}$ and LCI_{ex} are shown in the Table 1. LCI_{ex} and $LCI_{0.5}$ were also sensitive to interventions in asthmatic and CF patients, although in general LCI_{std} had better p values.

Conclusions LCI_{ex} performed better than $LCI_{0.5}$ in predicting results of LCI_{std}. However, LCI_{ex} did not always reflect LCI_{std}, particularly in CF, so the two cannot be used interchangeably in lung disease.

Abstract P80 Table 1 LCI_{ex} had an improved false negative rate compared with $LCI_{0.5}$

LCI	Correctly categorised (%)				Sensitivity to intervention	
	True positive	True negative	False positive	False negative	Asthma	CF
LCI_{std}	-	-	-	-	p = 0.001	p = 0.03
LCI_{ex}	37	26	5	2	p = 0.02	p = 0.02
$LCI_{0.5}$	38	26	0	6	p = 0.02	p = 0.04