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Title: Lung clearance index in paediatric exercise induced asthma

Dr. Helen 9976 Sheridan helensheridan@ed.ac.uk MD¹, RN. Debbie 9977 Miller Debbie.Miller@luht.scot.nhs.uk¹, Dr. Jasneek 9978 Chawla jchawla@nhs.net MD¹, Dr. Kenneth 9979 Macleod drkennymacleod@gmail.com MD¹, Dr. Nicholas 9980 Bell mail@nickbell.org MD² and Dr. Steve 9981 Cunningham steve.cunningham@nhs.net MD¹. ¹ Department of Child Life and Health, Royal Hospital for Sick Children, Edinburgh, United Kingdom and ² Bristol Adult Cystic Fibrosis Centre, Bristol Royal Infirmary, Bristol, United Kingdom .

Body: Introduction Exercise induced bronchoconstriction is reported commonly by asthmatic children. We assessed whether lung clearance index (LCI) can detect it. Methods Following symptom questionnaire, spirometry, and Multiple Breath Washout (MBW, Innocor 0.2% SF₆), children performed a standard treadmill exercise challenge. One minute post exercise we measured MBW and spirometry. Measures repeated 10 mins post bronchodilatation. If baseline FEV₁ decreased > 20% baseline, testing only post salbutamol. Results 21 asthma patients and 21 healthy controls (13M:8F, mean 12 yrs in both groups). In asthma LCI 7.2(0.7) (mean (SD)) significantly > control 6.8 (0.4), p=0.02. In asthma, post exercise LCI increase by 4.8(10.2)% (Fig 1), with no change in FEV₁(-0.01(3.3)%). Post exercise LCI +1.4(5.5)% in healthy volunteers (ns). In those asthma with >20% fall FEV₁ (n=3), post salbutamol LCI remained high, 8.0(0.3). Post exercise change in LCI higher in asthma who reported exercise intolerance; No symptoms 2.8(8.5)%; controlled symptoms 5.0(9.3)%; limited despite salbutamol 17.7(16.7)%. No trend for FEV₁; 0.3(3.9)%, vs -1.0(3.1)% vs -0.2(0.3)%.

Conclusions LCI tends to rise following exercise. However rise in LCI was non-significant, consistent with the discrepancy between symptoms and altered lung function in asthmatic children. Change in LCI is greatest in the symptomatic, with largest LCI change in those reporting poor treatment response (not demonstrated by FEV₁).