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Title: Upper and lower airway nitric oxide levels in primary ciliary dyskinesia

Ms. Annabelle 20450 Liew al5v07@soton.ac.uk [1], Dr. Walker 20451 Woolf w.walker@soton.ac.uk MD [1,2], RN. Amanda 20452 Harris Amanda-Lea.Harris@uhs.nhs.uk [2], Ms. Janice 20453 Coles J.L.Coles@soton.ac.uk [1,2] and Dr. Jane 20454 Lucas jlucas1@soton.ac.uk MD [1,2]. [1] Primary Ciliary Dyskinesia Research Group, Clinical and Experimental Sciences, Faculty of Medicine, University of Southampton, United Kingdom and [2] Primary Ciliary Dyskinesia Diagnostic Service, University Hospital Southampton NHS Foundation Trust, Southampton, United Kingdom .

Body: Introduction Patients with primary ciliary dyskinesia (PCD) have low nasal nitric oxide (nNO) and fractional exhaled NO (FeNO). The reasons are unclear but might be related to ciliary function. Analysis of nitric oxide (NO) from different regions of the airway and comparisons with other disease states may guide our understanding. Aim To compare differential bronchial (J_{NO}) and alveolar ($Calv_{NO}$) NO in patients with PCD, cystic fibrosis (CF), asthma and healthy subjects. Methods Exhaled NO at different flow rates (50, 100, 200 and 250 ml/s) and nNO were measured (NIOX flex®, Aerocrine, Sweden) in patients with PCD (n=12), asthma (n=18), CF (n=12) and healthy controls (n=17). J_{NO} and $Calv_{NO}$ were derived using a model of pulmonary NO exchange-dynamics. Results $FeNO_{50}$ and nNO were significantly lower in PCD than in healthy subjects, as was J_{NO}, 271 pl/s (228) vs. 965 pl/s (963) (p=0.004) (mean (SD)). However $Calv_{NO}$ was similar between the two, 1.6 ppb (0.5) vs. 2.4 ppb (1.4) (p=0.174). (Table 1 for CF and asthma data)

Table 1 - Nitric oxide readings by respiratory disease

Reading	PCD	Healthy	Asthma	CF
nNO (ppb)*	23 (16-61)	856 (536-988) (p<0.001)	769 (560-1126) (p<0.001)	521 (457-609) (p=0.028)
$FeNO_{50}$ (ppb)**	9.2 (7.9)	21 (21) (p=0.019)	43 (41) (p<0.001)	15 (11) (p=0.161)
J_{NO} (pl/s)**	271 (228)	965 (963) (p=0.004)	2100 (1935) (p<0.001)	564 (492) (p=0.387)
$Calv_{NO}$ (ppb)**	1.6 (0.5)	2.4 (1.4) (p=0.174)	5.4 (3.5) (p<0.001)	2.3 (1.1) (p=0.195)

*Median(IQR), **Mean(SD), p values compared to PCD

Conclusion PCD patients have significantly lower J_{NO} but similar $Calv_{NO}$ to healthy controls. As there are no cilia in the alveolar region this might support the hypothesis that NO biosynthesis is coupled to ciliary function. Data collection continues.