**lung function decline in CHILDHOOD: Longitudinal analysis of national registry data in the US and UK**

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**Background**: Previous cross-sectional analysis found significantly higher lung function in the US pediatric population compared to the UK but cohort effects, differences in casemix and survivor bias make it hard to interpret these results.

**Objective**: To compare longitudinal trajectories of lung function decline in children in the US and UK.

**Methods**: We used data from the UK and US registries collected from 2003 to 2014 before the licensing of lumacaftor/ivacaftor in the US. The US CFF Patient Registry (CFFPR) captures lung function measurements at every clinical encounter over time. In the UK a single lung function measurement is recorded annually at a time at which the patient is stable. Due to difficulties in accurately matching collection methods, we did not harmonize the data, but rather performed parallel analyses of two separate data sets. This initial analysis was restricted to the homozygous deltaF508 CF populations in both countries, and we censored data collected post-transplant. We fitted linear mixed effect models with random intercept and slope to the data from all individuals aged 6 to <18. We adjusted for sex, age at diagnosis and year of birth.

**Results:** There were 3,067 and 9,463 homozygous deltaF508 pediatric patients followed in the UK and US registries, respectively, with at least one FEV1% predicted collected between 2003 and 2014. Out of these, 91 (3.0%) patients in the UK and 398 (4.2%) patients in the US died or received a transplant before their 18th birthday. In the UK, 501 (16.3%) patients were diagnosed by newborn screening vs 1,079 (11.4%) of US patients. Median (IQR) number of pulmonary function tests ( PFT) per individual during the study period was 4 (2, 7) for UK and 24 (11, 40) for US patients; median (IQR) number of PFTs per individual per year in the US was 4 (3, 6). Estimates of mean lung function at age 6 were 87.46 (86.41, 88.5) and 91.17 (90.56, 91.78) for the UK and US cohorts, respectively. Initial results indicate that lung function declines on average by -1.64 (95% CI -1.75 to -1.53) percentage points per year of age in the UK and -1.45 (95% CI -1.51 to -1.4) in the US.

**Conclusions:** Our initial results indicate that rate of lung function decline may be less in the US registry compared to the UK, but differential death, transplant and casemix could introduce bias. Further work will investigate possible reasons for these differences.