In patients with cystic fibrosis (CF), interpretation of cross-sectional FEV1 data is greatly influenced by choice of spirometry reference equation, particularly during childhood (Stanojevic; J Cyst Fibros 2014). We hypothesised that availability of the Global Lung Function Initiative (GLI) spirometry reference equations (Quanjer; ERJ 2012) will also affect the apparent rate of decline in lung function over time, thereby potentially altering our understanding of disease progression in CF.

**Background**

In patients with cystic fibrosis (CF), interpretation of cross-sectional FEV1 data is greatly influenced by choice of spirometry reference equation, particularly during childhood (Stanojevic; J Cyst Fibros 2014). We hypothesised that availability of the Global Lung Function Initiative (GLI) spirometry reference equations (Quanjer; ERJ 2012) will also affect the apparent rate of decline in lung function over time, thereby potentially altering our understanding of disease progression in CF.

**Methods**

Data were extracted from two patient registries: the UK CF Registry (n = 6043 subjects; 20,013 test occasions over a period of 5 years) and the Toronto CF database (n = 1023 subjects; 27,868 test occasions over a period of 23 years). Spirometric outcomes were interpreted using%predicted FEV1 calculated from GLI, Knudson (as currently used by the UK CF Registry), and Wang-Hankinson (as used by the US CF Foundation) reference equations. Patients >30 yrs or with FEV1 > 130% predicted were excluded. We used a non-linear mixed effects model to describe the average change in FEV1 with age. To illustrate the importance of reference equation in evaluating risk factors, FEV1 decline according to patient gender was also explored.

**Results**

The pattern of lung function decline at the population level differed according to selected equation (Figure). Average rate of decline was steeper with Knudson or Wang-Hankinson than GLI. Importantly, GLI equations showed a steady decline in FEV1 starting at 6 yrs, whereas the other equations suggest greater decline during adolescence. Similar patterns were observed in both UK and Toronto populations. When analysed according to gender, the rate of lung function decline was steeper in females during early adolescence compared with males where the decline was steady.

**Conclusions**

In both datasets, Knudson and Wang-Hankinson reference equations suggest relative preservation of spirometry in childhood followed by rapid decline in adolescence. However, using the more robust GLI equations, steady decline throughout childhood with a less dramatic acceleration during adolescence is seen, with differences in pattern of change over time according to patient gender. Accurate identification of critical periods of lung function decline offers novel opportunities to target care.

Funded by the UK CF Trust.

**References**


**Abstract S66**

**THE GLI SPIROMETRY REFERENCE EQUATIONS INFLUENCE THE APPARENT RATE OF DECLINE IN FEV1 AMONG CHILDREN AND ADOLESCENTS WITH CYSTIC FIBROSIS**

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Data were extracted from two patient registries: the UK CF Registry (n = 6043 subjects; 20,013 test occasions over a period of 5 years) and the Toronto CF database (n = 1023 subjects; 27,868 test occasions over a period of 23 years). Spirometric outcomes were interpreted using%predicted FEV1 calculated from GLI, Knudson (as currently used by the UK CF Registry), and Wang-Hankinson (as used by the US CF Foundation) reference equations. Patients >30 yrs or with FEV1 > 130% predicted were excluded. We used a non-linear mixed effects model to describe the average change in FEV1 with age. To illustrate the importance of reference equation in evaluating risk factors, FEV1 decline according to patient gender was also explored.

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