

## **OLS: INCLUSION / EXCLUSION CRITERIA:**

### Group 1: Healthy Controls (HC)

#### Inclusion criteria

- Able to perform LFTs

#### Exclusion criteria

- Any current respiratory diagnosis, including taking respiratory medications.
- Abnormal LFTs as defined by a FEV<sub>1</sub> of below 80% predicted along with a FEV<sub>1</sub>/FVC ratio of less than 70% (or less than 65% in those over 75 years of age).

### Group 2: Stable Bx

#### Inclusion criteria

- Confirmed primary diagnosis of Bx (all severities are included).
- No recent respiratory infection requiring oral or IV Antibiotics in the last 4 weeks (not including prophylactic antibiotics).
- Able to perform LFTs.

#### Exclusion criteria

- Pregnant.
- Any patients with Cystic Fibrosis
- Recent haemoptysis or pneumothorax (last 4 weeks).

## **OLS: TEST PROCEDURE FOR LCI**

Participants were assessed in the sitting position. The silicone mouthpiece was positioned correctly to ensure relaxed tidal breathing could occur. The investigator ensured the patient was comfortable and the seal optimised, whilst also monitoring the flow and gas signal outputs during the procedure.

The wash-in phase began with participants breathing in a dry gas mixture containing 4% SF<sub>6</sub>, 4% He, 21% O<sub>2</sub>, and balance N<sub>2</sub>. The SF<sub>6</sub> was the marker gas used for this study. SF<sub>6</sub> was connected by large bore tubes to the participant via a T-piece on the outer opening of the PNT. The flow of gas was set greater than the participants inspiratory flow to ensure a bias flow was reached and so that the individual did not re-breathe air. Wash-in continued until the inspiratory and expiratory concentrations of SF<sub>6</sub> were greater than 0.2% of the SF<sub>6</sub> concentration for 3 breaths.

The wash-out phase began at the moment of concentration being reached, with the bias flow system disconnected during expiration. This phase continued until the end tidal SF<sub>6</sub> concentration reached below 1/40<sup>th</sup> of its starting concentration, or when measurements of SF<sub>6</sub> were below 0.004% for approx 3 breaths.

### **Test acceptance**

MBW recordings were defined as technically acceptable if they adhered to all the following:

- No evidence of leak of the tracer gas (SF<sub>6</sub>) and adequate equilibrium of the SF<sub>6</sub> in the wash in phase
- Irregular breathing patterns were accepted, however if the individual was deemed to be hyperventilating (as observed through subjective review of the minute volume by the technician) then the test was stopped and restarted.
- Adequate washout of SF<sub>6</sub> to 1/40<sup>th</sup> of its starting concentration
- FRC values recorded were within 10% variability. Where possible 3 measurements were achieved. However this required offline analysis, so was not used as quality control during data collection

### **Calculation of LCI**

Calculation of LCI required a software package to be used by an experienced technician, who in this study was not the investigator. The washouts were analysed by a trained observer using appropriate software (with thanks to Per Gustaffson, Department of Pediatrics, Central Hospital, Skoevde, Sweden) and

included in this dataset if a minimum of two of the three tests met acceptability criteria. The primary outcome measure was LCI, and CEV and  $FRC_{mbw}$  corrected for deadspace were calculated from the washout and LCI calculated from this calculated.

### **OLS: HIGH RESOLUTION CT IMAGING**

The extent of bronchiectasis was quantified according to the percentage of each lobe involved (0 = none, 1 = <25% of lobe, 2 = 25-50%, 3 = 51-75% and 4 = 76-100%) and the average severity of bronchiectasis was defined according to the degree of dilatation compared to the size of the accompanying vessel (0 = absent, 1 = trivial dilatation, 2 = >1 but less than 2x diameter of vessel, 3 = 2-3x diameter of vessel and 4 = > 3x diameter of vessel). An assessment of bronchial wall thickness in each lobe was made by comparison with the diameter of the adjacent vessel (0 = absent, 1 = trivial wall thickening, 2 = wall thickness up to 0.5x diameter of vessel, 3 = wall thickness >0.5x and up to diameter of vessel, 4 = wall thickness >1 and up to 2x diameter of vessel and 5 = wall thickness >2x diameter of adjacent vessel). Small mucus plugs depicted on CT as a tree-in-bud pattern and large mucus plugs were categorized in each lobe as absent (0), mild (1), or extensive (2). Air trapping (on the interspaced expiratory images only), consolidation and ground glass opacification were quantified as a percentage of the lobe involved to the nearest 5%. Where there was disagreement a consensus was reached between the observers.