CHEST Online Supplement

Smoking Cessation in COPD Causes a Transient Improvement in Spirometry and Decreases Micronodules on High-Resolution CT Imaging

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e-Appendix 1.

Lung Function Tests

Lung function tests were carried out in smokers at baseline and at intervals up to one year following smoking cessation **(Fig. 1)** in the Lung Function Laboratory at the Royal Brompton Hospital.

- Spirometry was performed for $FEV_{1,}$ FVC, maximal expiratory flow $(MEF)_{25,\ 50\ \&\ 75}$) (Masterscreen PFT, Carefusion (UK)).
- Lung volumes (residual volume (RV) and total lung capacity (TLC)) were measured by body plethysmography **(Table 1) (**Masterscreen Body**)**.
- Transfer factor for CO (TL_{co}) and transfer coefficient for CO (K_{co}) were measured by the single breath method at full inflation, and corrected for haemoglobin concentration (Masterscreen Transfer).

Predicted values for all parameters were taken from European Community for Steel and Coal tables.

HRCT scans

HRCTs were obtained at baseline in all subjects, and further HRCTs were done at week 12 and week 52 in those subjects who were smokers at baseline (Siemens Somatom Volume Zoom scanner). Five 1mm sections were taken at equal spacings from just below the arch of the aorta to 1-2cm above the right hemidiaphragm, first at full inspiration and then at full expiration, in each case with 90mAs and 120 kVp. Window settings were at levels appropriate for visualising lung parenchyma (width 1500 Hounsfield Units (HU) and centre -500 HU). Two "slabs" of five contiguous 1mm sections were then taken on inspiration at levels 2 and 5 from the first set of scans, using

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40mAs and 120kVp. The total radiation dose for each scan was 0.651 mSv. A high spatial frequency algorithm was used for reconstruction of the images.

Analysis of HRCTs

Features documented were: emphysema; ground glass attenuation; parenchymal micronodules; bronchial wall thickening and bronchial dilatation. The first three parameters were scored on each inspiratory section in terms of percentage of lung affected to the nearest five percent, by two blinded observers (RCT and OMK). Any disagreements greater than ten percent were reviewed and a consensus reached. These cases were also analysed by a third observer, a senior radiologist with over 20 years experience in this field (DMH).

The extent of emphysema, micronodules and ground glass was calculated for each of five inspiratory sections. Scores were calculated for each CT abnormality in three ways: taking the score from the highest section only, taking the higher score for the upper two sections, taking the highest score from any of the five sections (maximum score**) (Figure 3B).**

For the longitudinal analyses, scans were identified on which there was a baseline abnormality. The baseline and either three or 12 month scans were then compared side-by-side for each subject, with the observers blinded to the patient details and timing of the scan. The extent of emphysema, and the presence or absence of micronodules and ground glass attenuation was documented for the left hand scan, and then a comparison was made with the right hand scan as to whether there was more, the same, or a lesser extent of each abnormality.

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