We retrospectively analysed 40 consecutive patients with chronic CF, which should be considered for new therapeutic approaches. Densi-TLC (rs=0.47) in CF only (p < 0.05). Importantly, EI increased markedly with age and FEV1% in CF (rs=-0.55) and NORMAL (rs=0.67), but with RV (rs=0.69), and RV/EI was elevated to 7% in CF patients, but 1% in NORMAL. EI correlated well with mean LV was 4681 ml in CF and 3967 ml in NORMAL (n.s). Significant EV changes in TLV and generation: -0.01 (+-0.02), 0.01 (+-0.01), -0.02 (+-0.01), -0.03 (+-0.01), -0.05 (+-0.01), -0.09 (+- 0.00), -0.08 (+-0.00).

Conclusion: Subjects who inspire deeper prior to scanning tend to have larger LD and smaller WT. This effect is more pronounced in higher generation airways. Thus, adjustment for inspiration level is needed to accurately assess airway dimensions. Author Disclosures: M. de Bruijne: Grant Recipient; AstraZeneca.

Purpose: To evaluate whether quantitative assessment of lung density and volume in computed tomography (CT) show differences in patients with and without CB symptoms.

Methods and Materials: 50 heavy smokers with CB symptoms (cough, mucus, dyspnoea and wheezing) and 50 heavy smokers without CB symptoms were randomly selected from 1,413 participants in a lung cancer screening trial. Airway walls were measured on images in thin-slice low-dose CT with a dedicated software tool, for airways with a luminal diameter >5 mm in 5 selected bronchi (RB1, RB4, RB10, LB1+2 and LB10). Differences in measurements between the groups were assessed by t-test. The association between CB symptoms and AWT and WA% was analysed using multiple linear regression adjusted for age, body mass index, smoking habit, amount of emphysema, and lung function.

Results: Mean AWT measured at 5 bronchi was 1.55±0.44 mm and 4.2±0.40 mm in subjects with and without CB symptoms, respectively (P < 0.001). WA% was 47±12% and 43±11%, respectively (P < 0.001). With adjustment for confounders, a significant positive association between both airway wall measurements (AWT and WA%) and lung function was rated visually and pulmonary function tests were obtained by chart review.

Conclusion: The present study was conducted to employ computational densitometry based on multi-detector computed tomography (MDCT) of the chest to characterise and quantify emphysema in cystic fibrosis (CF), identical to its routine clinical application in chronic obstructive pulmonary disease (COPD). Results were validated against pulmonary function testing (PFT, i.e. forced expiratory volume in 1 s predicted (FEV1%), residual volume (RV) and total lung capacity (TLC)). Patients without lung disease (NORMAL) served as controls.

Methods and Materials: MDCT from n=41 CF (median FEV1%=46, median age 20a) and n=20 NORMAL (FEV1%=102, 30a) were subjected to densitometry. Lung volume (LV) and emphysema volume (EV) were segmented (threshold -950 Hounsfeld units), and the emphysema index was computed (EI). All results were correlated with parallelised PFT (median gap 0d, range 0-73d).

Results: Mean LV was 4681 ml in CF and 3967 ml in NORMAL (n.s). Significant EV was found in CF (mean 457 ml) compared to NORMAL (78 ml) (p < 0.05). Median EI was elevated to 7% in CF patients, but 1% in NORMAL. EI correlated well with FEV1% in CF (rs=0.55) and NORMAL (rs=0.67), but with RV (rs=0.69), and RV/TLC (rs=0.47) in CF only (p < 0.05). Importantly, EI increased markedly with age in CF (rs=0.67, p < 0.001), starting at 13a.

Conclusion: Our results indicate the development of progressive emphysema in chronic CF, which should be considered for new therapeutic approaches. Densitometry may introduce new quantitative and prognostic parameters into severity assessment of CF lung disease.