**Xe-MRI and QCT from a subject with COPD**

**Abstract S19 Figure 1** Shows an example of time activity curves from arterial, venous and image derived techniques (on left) and (on right) a Patlak image from venous plasma slope (1st row), intercept (2nd row) and CT (3rd row).

**Introduction** 18FDG PET/CT imaging may be a useful tool to study COPD and lung inflammation; however the optimal protocol for this imaging biomarker has yet to be established.

**Method** We aimed to develop a combined 18FDG-PET/CT imaging protocol optimised to quantify lung inflammation. Six patients with moderate-to-severe COPD underwent dynamic 18FDG-PET imaging combined with blood sampling (both arterial and venous over 60 min) to determine the localised plasma activity time curve. High resolution CT (HRCT) was utilised to segment the lung and determine areas of emphysema. 3 sets of comparative input functions were analysed (arterial, venous and image derived arterial input functions). 18FDG kinetics was fitted using the Patlak method.

**Results** Similar results were obtained using time activity curves from all three input functions. The arterial input was always found to be slightly higher than the others (Figure 1). Patlak analysis of the time-activity curves for each of the CT derived lung lobes allowed generation of images of slope (influx constant Ki) and intercept (initial volume of distribution) (Figure 1). The acquisition of HRCT co-registered to FDG-PET allows more accurate demarcation and quantification of FDG in emphysematous areas of the lung. Attempt to improve the signal by excluding voxels without COPD tissue (-935 to -300 HU) has been undertaken as well. The reproducibility of this technique is currently being studied where 20 patients are being scanned twice 4 weeks apart and compared to a baseline scan from 5 healthy controls.

**Conclusion** 18FDG PET/CT imaging has the potential to be a non-invasive biomarker of lung inflammation in COPD.

**S20**

**18F-FLUORODEOXYGLUCOSE (18FDG) PET PULMONARY IMAGING: COMPARATIVE METHODOLOGY IN COPD PATIENTS**

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**Introduction and aims** The role bacteria play in the development and progression of Chronic Obstructive Pulmonary Disease (COPD) is unclear. We used culture-independent methods to describe differences and/or similarities in microbial communities...
in the lower airways of patients with COPD, healthy non-smokers and smokers.

Methods Bronchial wash samples were collected from patients with COPD (GOLD 1–3; n = 18), healthy non-smokers (HV; n = 11) and healthy smokers (HS; n = 8). Samples were processed using the Illumina MiSeq platform. The Shannon-Wiener Index (SW) of diversity, lung obstruction (FEV1/FVC ratio) and ordination by Non-Metric Multidimensional Scaling (NMDS) on Bray-Curtis dissimilarity indices were analysed to evaluate how samples were related. Principal component analysis (PCA) was performed to assess the effect specific taxa had within each cohort. Characteristics of each cohort are shown in Table 1.

Results There was no difference in taxa richness between cohorts (range: 69–71; p = 0.954). Diversity (SW Index) was significantly lower in COPD samples compared to samples from HV and HS (p = 0.009 and p = 0.033, respectively). There was no significant difference between HV and HS (p = 0.186). The FEV1/FVC ratio was significantly lower for COPD compared to HV (p = 9.10^{-8}) and HS (p = 2.10^{-6}), respectively. NMDS analysis showed that communities belonging to either of the healthy groups were more similar to each other than they were to samples belonging to the COPD group. PCA analysis showed that members of Streptococcus sp. and Haemophilus sp. had the largest effect on the variance explained in COPD. In HS, Haemophilus sp., Fusobacterium sp., Actinomyces sp., Prevotella sp. and Veillonella sp. had the largest effect on the variance explained, while in HV Neisseria sp., Porphyromonas sp., Actino- myces sp., Atopobium sp., Prevotella and Veillonella sp. had the largest effect on the variance explained.

Conclusions The study demonstrates that microbial communities in the lower airways of patients with COPD are significantly different from that seen in healthy comparison groups. Patients with COPD had lower microbial diversity than either of the healthy comparison groups, higher relative abundance of members of Streptococcus sp. and lower relative abundance of a number of key anaerobes.

Methods CSE was prepared as described previously. Briefly, smoke from one, two, three or four cigarettes was bubbled through 100 ml growth medium. Bacterial type strains (Pseudomonas aeruginosa, Moraxella catarrhalis, Streptococcus pneumoniae, Prevotella spp and Haemophilus influenzae) were inoculated into growth medium +/- CSE and incubated either aerobically or anaerobically (Prevotella spp). Total viable counts (TVC cfu/ml) were estimated from 0–48 hrs (aerobes) and 0–72 hrs (Prevotella spp). Changes in minimum inhibitory concentration (MIC) of antibiotics used in the treatment of respiratory infections were determined by E-Test®, in bacterial cultures exposed daily to CSE over 12 days.

Results The growth of Pseudomonas aeruginosa, Strep- tococcus pneumoniae and Haemophilus influenzae were not completely inhibited by any concentration of CSE; however a reduction in growth rate at higher concentrations was observed. Moraxella catarrhalis growth was completely inhibited by two cigarettes/100 ml growth medium. No difference in growth was observed between Prevotella spp +/- CSE. A marked increase in Pseudomonas aeruginosa resistance to tetracycline and doxycycline was observed after repeated CSE exposure: resistance to tetracycline and doxycycline increased from 24 to >256 µg/ml, and 48–>256 µg/ml, respectively.

Conclusions The growth of principal bacteria isolated from COPD patients were not affected by concentrations of CSE utilised in this study, but changes in the susceptibility of P. aeruginosa to tetracyclines was observed. This increase in resistance may be mediated by efflux pump up-regulation, and may lead to cross-resistance with other antibiotics. Work currently underway aims to determine whether CSE induces other key phenotypic changes (virulence factor expression and/or biofilm production) which might enhance the pathogenicity of these bacteria in the presence of CSE and result in poorer outcomes for patients with COPD.

Sleep disordered breathing – assessment and treatment

RESULTS OF A NATIONAL SURVEY OF PRE-OPERATIVE SCREENING FOR OBSTRUCTIVE SLEEP APNOEA

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Introduction and objectives There is currently no UK guidance (from BTS, BSS or RCA) regarding screening for obstructive sleep apnoea in the pre-operative setting. Evidence suggests that undiagnosed OSA is associated with increased post-operative complications but no trials have examined whether screening the UK’s general surgical population is justifiable. We sought to examine current UK practice and opinion in this regard.

Methods A postal survey was sent to all 180 UK sleep service providers asking whether they had a hospital policy for pre-operative screening for OSA and what this consisted of. If there was no policy they were asked how pre-operative patients with suspected OSA were identified. Further details regarding diagnostic confirmation and opinion regarding practice were sought.

Results We received 84 replies. There is a spectrum of current practice amongst respondents. There were 31 centres (37%) with a policy for screening for OSA. Of these, 42% screened all patients with a questionnaire e.g. STOP BANG, 23% screened only patients undergoing certain operations, 13% screened patients with high BMI only. Of those with a policy who