f). And perfusion notably reduced, in the RUL (Figure 1c). ^3He apparent diffusion coefficient (ADC), which estimates acinar airway dimensions, was elevated and heterogeneous (Figure 1c), consistent with hypoplasia. The left lung was well ventilated and perfused with normal ADC values.

Conclusion ^3He MRI shows promise in functional analysis of “horse-shoe” lung with hypoplasia. This can prove useful in surgical assessment of these patients and therefore improve their management.

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CORRELATIONS OF FUNCTIONAL MULTI-NUCLEAR MR IMAGING INDICES WITH PULMONARY FUNCTION TESTS IN THE ASSESSMENT OF IDIOPATHIC PULMONARY FIBROSIS

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Disease progression in idiopathic pulmonary fibrosis (IPF) is variable and unpredictable. Declining forced vital capacity (FVC) and transfer factor (TLCO) of 10% and 15% respectively are common markers of deterioration, but may be insufficiently sensitive to prognosticate and rely on serial measurements. Echocardiography provides screening for pulmonary artery hypertension (PAH), but is insensitive to pulmonary haemodynamic change before PAH is already apparent. Recently established Magnetic Resonance Imaging (MRI) techniques may provide insight into evaluating IPF. Greater septal thickness as measured by hyperpolarised xenon in patients with IPF compared with healthy volunteers was previously demonstrated.¹ Here, we investigate the correlation between MRI indices, including hyperpolarised gas ventilation and gadolinium-enhanced perfusion, with pulmonary function parameters in a pilot cohort of subjects with IPF.

Six subjects with IPF were recruited. T1 mapping was performed in all subjects. Imaging sequences following inhalation of hyperpolarised ^3He were used to calculate estimates for ventilated volume percentage (VV%) and coefficient of variation of ventilation (CoV). Dynamic contrast-enhanced lung perfusion MRI was performed for pulmonary haemodynamic assessment. All subjects underwent pulmonary function testing (PFTs).

VV% strongly correlated with transfer coefficient (KCO) with $R = 0.955$; $p = 0.003$, but also FEV (forced vital capacity)/FVC ratio. CoV is a measure of regional ventilation heterogeneity and trended to correlation with transfer factor TLCO ($R = -0.775$; $p = 0.108$). Time to peak (TTP) of the gadolinium perfusion signal showed negative correlation with FVC ($R = -0.909$ with $p < 0.05$) and trended to a negative correlation with TLCO ($R = -0.766$, $p = 0.131$). All p values two-tailed.

TTP correlation with PFT values suggests that changes in pulmonary haemodynamics may be detectable at an early stage of the disease process. VV% and helium mapping may provide information about regional airways ventilation in IPF.

MRI based assessments could prove useful in assessing different aspects of lung structure-function for use in future research and potentially in clinical assessment of patients with IPF. Sequential imaging with concurrent PFT and echocardiography would help to further assess the applicability of evolving MRI techniques.

Abstract P286 Figure 1 From the same patient: coronal slice computed tomography (A); ^3He ventilation map (B)

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OFFLINE FRACTIONAL EXHALED NITRIC OXIDE AND BREATH FREQUENCY

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Introduction/objectives Fractional exhaled nitric oxide (FeNO) is a noninvasive method of assessing airway inflammation and recommended by NICE (2014) to aid asthma diagnosis and management. Offline measurement techniques demonstrate comparable results to online and are more practical in certain clinical settings, particularly in young children who struggle with online measurements. International guidelines (ATS/ERS 2005) recommend targets for pressure and flow but not for the number of breaths per sample. Young children may take multiple breaths to complete offline reservoir filling, but whether this influences results due to contamination of the sample with ambient gas from equipment deadspace has not been assessed. Our aims were to investigate the magnitude of such effects and form a predictive equation for how increasing breath number dilutes offline measurements.

Methods A prospective observational study was undertaken recruiting 20 volunteers aged 18–42 years (13 female). FeNO was measured online (Medisoft Exp'Air 2001) and offline following exhalation into a one-litre Tedlar bag using one, five or ten breaths to complete bag filling. Airway pressure was maintained above 5 cmH₂O to ensure velum closure and expiratory flow at 50 (+/-5) ml/s.

Predicted percentages of offline FeNO relative to online were calculated by:

- $100 - ((\text{equipment deadspace (53 mls)} \times \text{no of breaths}) / \text{bag volume}) \times 100$
- Predicted offline values were compared to measured.

Results The median (IQR) online FeNO in parts per billion (ppb) was 24 (14–30) ppb. There was a significant reduction in offline FeNO with increasing breath number ($p < 0.0001$). Median (IQR) offline FeNO of 1-breath (22 (15–32) ppb) was

not significantly different to online FeNO ($p = 0.51$). Median (IQR) offline FeNO of 5-breaths was 16 (7–22) ppb and 10-breaths 13 (5–19) ppb, lower than online FeNO ($p = 0.03$ and $p = 0.005$ respectively).

The predicted offline values are compared with measured offline values, expressed as a percentage of online, in Table 1.

Abstract P287 Table 1

	Predicted FeNO as a percentage of online	Offline as a percentage of online FeNO (median)	Interquartile range	p-value
1 breath	94.7%	97.2%	73.1–120.1%	0.81
5 breaths	73.5%	63.6%	42.9–92.8%	0.58
10 breaths	47%	43.4%	30.9–67.8%	0.41

Conclusion One-breath offline collection methods had comparable results to online FeNO measurements, but higher breath number resulted in lower values likely due to sample contamination with ambient gas and dilution of nitric oxide. These results suggest that multiple breaths should not be used to obtain an offline FeNO result.

P288 PREVALENCE OF NON-PULMONARY EMBOLISM DIAGNOSES ON CT PULMONARY ANGIOGRAPHY. ONE YEAR EXPERIENCE IN A DISTRICT GENERAL HOSPITAL

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Introduction and objectives CT pulmonary angiography (CTPA) is recommended as the investigation of choice for suspected pulmonary embolism (PE). Even in appropriately risk-assessed groups, CTPA often proves negative for PE, but additional diagnostic information is still provided by technically adequate scans. We reviewed our CTPAs to assess technical quality and final diagnosis.

Methods Retrospective review of CTPAs performed in 2013 in a 588 bed district general hospital. All patients selected were considered either intermediate or high probability for PE based on Wells PE clinical risk scoring. Only imaging performed on patients presenting as acute admissions was reviewed. Patients under the age of 16 were excluded, but no upper age limit was applied in order to be fully representative of our patient population and clinical practice. Scans were assessed for their diagnostic and technical quality by the reporting radiologist.

Results 720 CTPAs were selected for review. Patient mean age 66.4 (range 17–103). PE was demonstrated in 135 studies (18.8%). 111 CTPAs (15%) excluded PE and were otherwise normal. 355 CTPA (49%) excluded PE but revealed an alternative diagnosis. Of these, cardiac failure (26%), emphysema (19%), pneumonia (16%), interstitial lung disease (10%), bronchiectasis (9%) and pleural disease (8%) were the most frequently reported clinically significant diagnoses. 119 CTPAs were considered technically inadequate to exclude PE based on insufficient contrast opacification, however an alternative explanatory diagnosis was seen in 76 (64%) of these. In the remaining

43 cases no diagnosis was reported, and only 2 patients had repeat CTPA performed during the same admission. Four patients from the non-diagnostic group represented within a 3 month follow up period and were subsequently proven to have PE on repeat CTPA.

Conclusions CTPA can provide an alternative diagnosis in the majority of cases even if PE is excluded. Of these, cardiac failure and emphysema were the most common diagnoses. Physicians must be vigilant for non-diagnostic scans and arrange further tests as appropriate, as in our series 4/43 patients with technically inadequate imaging on initial presentation subsequently represented with PE.

P289 ISOLATED MEDIASTINAL AND/OR HILAR LYMPHADENOPATHY: WHAT CAN EBUS-TBNA ADD?

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Introduction and objectives In recent years, endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) has been increasingly used to investigate patients with isolated mediastinal and/or hilar lymphadenopathy (IMHL). There is currently a lack of high quality research to confirm the diagnostic yield and accuracy for these patients.

The aim of this review was to examine the diagnostic yield of EBUS-TBNA in patients with IMHL, to ensure accurate information is being given to patients considering undergoing the procedure.

Methods A retrospective service review was carried out, including consecutive patients listed for EBUS-TBNA between June 2013–June 2014 in a single UK centre.

Results 135 patients were evaluated who underwent EBUS-TBNA as a first diagnostic test (full results in Table 1). 35 patients with IMHL underwent EBUS-TBNA within the study period; IMHL was defined as the presence of enlarged mediastinal/hilar lymph nodes on computer tomography (CT) without suggestion of intrathoracic/extra-thoracic malignancy. 34 of these had a diagnostic test (97%); pathological cause was found in 9 patients (sarcoïd $n = 7$, malignancy $n = 2$) with the remaining being diagnosed with reactive lymphadenopathy ($n = 25$ 74%).

This group of 35 patients was sub-classified into those with IMHL with a radiologically suggested diagnosis e.g. sarcoïd ($n = 22$) and those with no suggested cause of IMHL ($n = 13$). EBUS-TBNA was diagnostic in 95% and 100% of patients respectively with the most common diagnosis in both groups remaining that of reactive lymphadenopathy.

Conclusions A significant proportion of patients with IMHL were found to have a diagnosis of reactive lymphadenopathy. With a pathological cause only being found in a minority of cases the appropriateness of EBUS-TBNA to investigate these patients could be questioned.

Our results found a significantly higher prevalence of reactive lymphadenopathy than previously published data; Evinson *et al.* reported this diagnosis 48% of patients and the REMEDY trial reported reactive lymphadenopathy in 5% of patients.

The detection of IMHL and its burden on the health service is likely to increase with increasing use of CT. Due to this a large multi-centred prospective study of patients with IMHL would be advisable to further investigate what the most appropriate strategy to manage these patients should be.