Methods: As a part of an on-going collaboration between PneumCare Ltd. and Queen Elizabeth (QE) Hospital (Birmingham, UK), 107 healthy adult subjects between ages of 18 to 69 were measured with SLP during 4 to 5 minutes of seated tidal breathing. Parameter means and standard deviations for males and females aged 18–39 and 40–69 were calculated and gender and age related comparisons were made (t-test).

Results: Tables 1 summarises the normative values for males and females older and younger than 40 years. Three parameters showed age related differences and one parameter showed a gender related difference.

Conclusion: Preliminary normal values for SLP derived tidal breathing parameters are reported. Some gender and age related differences are apparent. It is interesting that tPTEF/SE was significantly lower in the older participants, possibly a sign of natural airway obstruction associated with age.

Introduction: Structured Light Plethysmography (SLP) captures movements of a light grid projected onto the thoraco-abdominal (TA) wall to produce a waveform from which a primary derived output is Respiratory Rate (RR). Assessment of repeatability is essential for clinical use, however, physiological variability can confound results. RR agrees within ± 2 breaths per minute (brpm) with Respiratory Inductance Plethysmography (RIP) measured simultaneously on one occasion. We propose that if measurements are repeatable, there would be no difference in agreement between devices over a series of sessions.

Aim: This study assessed repeatability of the agreement between SLP and RIP.

Methods: 14 subjects (7 male, 7 female) with no respiratory diagnosis underwent 5 minutes of simultaneous measurement with SLP and RIP during quiet breathing. This was repeated on 3 occasions over 2 days, by the same operator, at the same location and using the same devices. RR were calculated for thorax (TARR), abdomen (ABRR) and the entire thoraco-abdominal (TARR) signals for both devices. Agreement between the two devices was assessed using Bland-Altman plots with LOA set at < ± 2 breaths/min.

Results: For TARR and THRR, all points were within 2 SD of the mean; for ABRR, 1 of 14 points was outside of 2 SD, but the LOA were within ± 2 breaths/min. The mean differences between the two devices were 0.476, 0.605 and 0.524 breaths/min for TARR, THRR and ABRR, respectively.

Conclusion: Agreement was observed between the two devices for each set of repeated measurements. We conclude that measurement of RR are repeatable.

REFERENCE


P39 CTAS – A CT SCORE TO QUANTIFY DISEASE ACTIVITY IN PULMONARY SARCOIDOSIS

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Introduction: A major gap in the management of sarcoidosis is the lack of accessible and objective methods to measure disease activity. Since 90% of patients have pulmonary involvement, we explored if a disease activity score based on thoracic CT scan could address this clinical issue.

Methods: High resolution CT scans from 100 consecutive sarcoidosis patients at a regional sarcoidosis service were scored for extent of CT abnormalities known to relate to granuloma or lymphocytic infiltration from published CT-pathological studies. These individual abnormality scores were then correlated against serum ACE, sIL-2R and change in forced vital capacity (FVC) to identify CT abnormalities that reflect contemporaneous disease activity. The sum of these scores, or CT Activity Score (CTAS) was then validated against FVC response to treatment.

Results and discussion: CT extent scores for nodularity, ground-glass opacification, inter-lobular septal thickening and consolidation correlated significantly with at least one of the disease activity parameters and were used to form CTAS. CTAS was found to predict FVC response to treatment at one year and was highly reproducible between radiologists. An abbreviated CTAS (aCTAS), constructed from presence or absence of the four CT abnormalities also showed significant correlation with FVC response to treatment. CTAS and aCTAS also correlated with response to treatment in the fibrotic subgroup.

Conclusions: CTAS provides a concept for an objective and reproducible CT scoring method to quantify disease activity in sarcoidosis. The score can potentially be used to stratify patients according to disease activity, determine response to treatment and establish if fibrotic sarcoidosis is active.

P40 DEVELOPMENT OF 18F AND 68GA-LABELLED CYCLIC PEPTIDES FOR POSITRON EMISSION TOMOGRAPHY IMAGING OF αVβ6 IN IDIOPATHIC PULMONARY FIBROSIS

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Biomarkers, capable of identifying the stage and aggressiveness of idiopathic pulmonary fibrosis (IPF) at the time of diagnosis, would improve the accuracy of prognostication and facilitate targeting anti-fibrotic drug therapy to patients who are most likely to benefit. The integrin αvβ6 is highly expressed in injured lung epithelium and is a key activator of transforming growth factor β (TGF-β), which plays a crucial role in the initiation and maintenance of fibrosis. Positron emission tomography (PET) imaging tracers that permit visualisation of lung αvβ6 expression have potential as novel therapeutic and prognostic biomarkers in IPF.

Several αvβ6 integrin-binding cyclic peptides were synthesised using solid phase supported peptide synthesis and functionalised...
P41 A PROSPECTIVE COHORT STUDY TO MEASURE IN-VIVO CHANGES IN LUNG GLUCOSE METABOLISM IN PATIENTS WITH SSCL-ILD Using FDG-PET

Aims To investigate the potential of 18Fluooro-deoxyglucose Positron Emission Tomography (FDG-PET)/CT to act as a prognostic and response biomarker in patients with SScl-ILD.

Methods 35 SScl-ILD patients were prospectively recruited for 18F-FDG-PET/CT. Patients were screened for lung involvement using clinical assessment, chest X-ray and pulmonary function testing (PFT). Those with confirmed SScl-ILD underwent combined high resolution CT scan (HRC)/PET scanning. The imaging signal and clinical findings were correlated with the need for, and response to, therapy. Follow up was with clinical assessment, PFT and when a change in treatment was indicated, repeat imaging.

Results The overall maximum pulmonary uptake of 18F-FDG (SUVmax), the maximum pulmonary uptake or background-lung activity (SUVmin) and target-to-background (SUVmax/SUVmin) ratio (TBR) were quantified using routine region-of-interest analysis. Kaplan-Meir analysis was used to identify associations with disease progression and response to treatment

Conclusions We have shown that high pulmonary uptake of 18F-FDG is associated with disease activity and progression in patients with SScl-ILD. These PET findings can be used to give additional information, supplemental to PFTs, which may then aid clinical treatment decisions.

Poster sessions

via their N-terminus or side chain amino group with a 6-amino- or a 6-azidohexanoic acid spacer to provide a convenient attachment site for either 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA) or an 2-ethynyl-6-[18F]-fluoropyridine prosthetic group for radiolabelling with 68Ga or 18F, respectively. The αβ6-binding capability of these peptide derivatives was assessed by competitive binding enzyme-linked immunosorbent assay (ELISA) and flow cytometry. Peptide derivatives that displayed strong affinity for αβ6 were taken forward to "hot" cell surface binding experiments to evaluate their selectivity for the target. Stability of radiolabelled peptides was measured in human serum.

Competitive binding ELISA experiments (Figure 1) and flow cytometry experiments, showed that cRGD1 and cRGD4 were able to inhibit the binding of αβ6-specific 10D5 mAb to αβ6 with IC50 values of 6.6 nM and 1.6 nM, respectively. Labelling cRGD1 and cRGD4 with fluorine and gallium resulted in IC50 values of 12.2 nM and 1.2 nM for 19F-Pyr-cRGD1 and 68Ga-DOTA-cRGD4, respectively. Serum stability studies of 68Ga-DOTA-cRGD4 have shown that this tracer is >90% stable after 2 half-lives of 68Ga (136 min).

Radiolabelled cyclic RGD peptides have showed favourable binding and stability characteristics and warrant their investigation by PET imaging in vivo. A xenograft murine model using αβ6+ and αβ6– tumours is currently under development to validate tracer uptake and biodistribution in vivo.

Abstract P40 Figure 1 αβ6 competitive binding ELISA between labelled/non-labelled cyclic peptides and the αβ6–specific mAb (clone10D5)

P42 INCREASED FDG UPTAKE IN AREAS OF 'NORMAL' LUNG IN IDIOPATHIC PULMONARY FIBROSIS

Background Idiopathic pulmonary fibrosis (IPF) has a variable disease course and we lack biomarkers that accurately predict progression or treatment response. Positron Emission Tomography-Computed Tomography (PET-CT) provides structural and functional information about the lung. A study of 25 IPF patients reported increased 18F-FDG uptake in areas of normal lung compared to controls.1 If confirmed, this raises the possibility that PET-CT may identify 'microscopic fibrosis' with prognostic implications. We assess 18F-FDG uptake in areas of lung with normal CT appearance in a second IPF cohort.

Methods PET-CT scans undertaken for cancer staging at an interstitial lung disease tertiary referral centre were reviewed. IPF patients and controls without lung disease were identified. 18F-FDG uptake was assessed using manual region of interest (ROI) placement in areas of lung with normal CT appearance in IPF patients and controls. ROI were placed away from the mediastinum and concomitant tumours. 18F-FDG uptake within ROI was expressed as maximum and mean standardised uptake values (SUV) normalised using body weight. Mean Hounsfield Units (HU) were evaluated to assess for subtle differences in radiodensity within ROI. Data are presented as mean ± SD. Unpaired, 2-tailed T-tests were used to compare between group differences with a P value < 0.05 considered significant.

Results Forty-five subjects were included in this study (15 IPF and 30 controls). Lung cancer was the most common concomitant malignancy in both groups. There was no difference in mean SUV within ROI between IPF and controls (~719 ± 79HU in IPF and ~723 ± 147 HU in controls. 2Hull and East Yorkshire NHS Trust, Hull, UK)