A PROSPECTIVE COHORT STUDY TO MEASURE IN-VIVO INCREASED FDG UPTAKE IN AREAS OF THORAX BY PET IMAGING

The cRGD1 and cRGD4 with fluorine and gallium resulted in IC50 (clone10D5) played strong affinity for 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)

A PROSPECTIVE COHORT STUDY TO MEASURE IN-VIVO CHANGES IN LUNG GLUCOSE METABOLISM IN PATIENTS WITH SSCL-ILD USING FDG-PET

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Background Systemic sclerosis (SSc) is a chronic inflammatory autoimmune rheumatic disease with a UK prevalence of 2–10 per 100,000. It is a heterogenous disease characterised by varying degrees of dermal and organ fibrosis. Interstitial lung disease (ILD) occurs in 60–80% of patients and ranges from mild, clinically trivial disease to extensive fibrosis that results in respiratory failure and premature death. Therapeutic options include cyclophosphamide, mycophenolate mofetil and rituximab. Clinical decisions are complex and decisions to treat or not have historically been based on radiology and lung function tests, neither of which (at a single time point) give a dynamic view of disease progression. Novel biomarkers are urgently needed to predict disease activity, progression and response to treatment in patients with SSc-ILD.

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

Methods 35 SSc-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 SSc-ILD underwent combined high resolution CT scan (HRCT)/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) and target-to-background uptake (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 SSc-ILD. These PET findings can be used to give additional information, supplemental to PFTs, which may then aid clinical treatment decisions.

Poster sessions

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

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Background Idiopathic pulmonary fibrosis (IPF) has a variable disease course and we lack biomarkers that accurately predict prognosis 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 can 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 HU within ROI between IPF and controls (−719 ± 79 HU in IPF and −723 ± 147 HU in
controls. P = 0.92). Areas of normal lung in IPF patients exhibited increased \(^{18}\)F-FDG uptake compared to controls measured by maximum SUV (0.98 ± 0.32 in IPF and 0.70 ± 0.20 in controls, P < 0.01) and mean SUV (0.80 ± 0.29 in IPF and 0.57 ± 0.18 in controls, P < 0.01).

Conclusions We confirm that in IPF, areas of normal appearing lung exhibit increased \(^{18}\)F-FDG uptake compared to corresponding areas in controls. A longitudinal study is required to establish the relationship between \(^{18}\)F-FDG uptake, disease progression and treatment response.

REFERENCE


Abstract P43 Figure 1 25 mm coronal plane (top row) and axial plane 129Xe-MRI of a healthy volunteer