(61.3 ± 30.9%), KCO 1.05 ± 0.40 mmol/min/kPa/L (66.4 ± 22.2%) and RV 3.58 ± 1.36 L (171.8 ± 50.4%). The mean FIB4 was 1.76 ± 1.36. Eight (26.7%) patients had liver disease on USS. FIB4 cut-off values of 1.45 and 3.25 were utilised, as they are widely validated.[3] Of patients >3.25, 100% had abnormal scans (PPV 100%), and of patients <1.45, 15.8% had abnormal scans (NPV 82%). FIB4 enabled correct identification of patients with abnormal USS with an area under a ROC curve of 0.642. We demonstrate a relationship between liver involvement in A1ATD and BMI. Those with higher FIB4 had higher BMI ($r = 0.453$, $p = 0.008$). We found no relationship between FIB4 and severity of lung involvement.

Conclusions The FIB4 score, calculated from routine laboratory variables and age, may be useful to rule in and out significant liver involvement in A1ATD with reasonable sensitivity and specificity. Further work is required for validation against biopsy, the gold-standard assessment. We confirm a previously noted lack of association between liver disease and emphysema severity,[4] and highlight the association between higher BMI and higher fibrosis risk in A1ATD.

P60 CANNABIS LUNG CAUSING DEBILITATING EMPHYSEMA: ARE WE ON THE VERGE OF AN EPIDEMIC?

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Introduction and objectives Cannabis (or marijuana) is the world's most widely-used illicit drug, according to UN drug report 2012 prevalence of cannabis use between 15–64 years of age is around 1.7% in Europe and 2.6% in USA.[1] It is particularly prevalent amongst adolescents and young adults. As societies reconsider the legal status of cannabis, policy makers and clinicians require sound knowledge of the acute and chronic effects of cannabis. There has been surprisingly little research into its effects on respiratory health. In a rural region of North Wales we have noticed an increasing number of young patients presenting with precocious bullous emphysema associated with very high tobacco and cannabis usage.

Methods A series of 8 patients presenting through the Emergency Department with an exacerbation of COPD were noted to have precocious COPD associated with high cannabis use. The age was between 35–48, all had both physiological and radiological signs of advanced emphysema. All had at least 10–20 years of cannabis usage smoking more than 5 'joints' per day. Of these, 4 patients were significantly impaired to require long term oxygen therapy, and one is actively listed for a single lung transplant. All had normal levels of alpha 1 antitrypsin and chymotrypsin.

Results We found young patients with debilitating COPD secondary to cannabis use i.e. as less as 10 years of use.[2] We postulate that cannabis smoking leads to severe COPD in young patients independent of genetic susceptibility, which is on the verge of increase.

Conclusions The addition of cannabis to the tobacco, and high usage at a young age is leading to increase in the incidence of COPD in general and bullous emphysema as a phenotype in particular. We are concerned that the dangers of cannabis inhalation and these risks are not being appreciated by the wider health community. More research is needed to know the mechanisms of the inflammatory response secondary to cannabis smoking.

REFERENCES

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P61 THE PREVALENCE OF HYPERCAPNIA IN PATIENTS WITH ALPHA-1-ANTI-TRYPSIN DEFICIENCY (AATD)

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Introduction Hypercapnia in the acute phase of COPD exacerbation is common, with CO_2 >6 kPA in 44% of patients at some point during their admission. Little data exists on the prevalence of hypercapnia in stable COPD patients, and even less in those with AATD. As emphysema is more predominant in the lower lobes of AATD patients, this is likely to contribute to hyperinflation and hence potentially increase CO_2 levels.

Methods The Birmingham AATD database (ADAPT) is a registry of with over 1000 patients with AATD. The registry has basic demographics, detailed spirometric parameters as well as baseline blood gases. Hypercapnia is defined as CO_2 greater than 5.5 kPa.

Results The blood gas results of 766 (PiZZ genotypes) individual patients were available for analysis. 93 patients (12.14%) had a type 1 respiratory failure, defined as a PO_2 <8 kPa, 69 had hypercapnia (9.01%) and 16 (2.09%) patients fulfilled both criteria. There is a statistically significant difference seen in the hypercapnic vs non-hypercapnic population with regards to FEV_1 (1.07 vs 1.46, $p = 0.01$), FVC (3.45(CI 3.1–3.81) vs 3.82, $p = 0.02$) and BMI (27.1 vs 24.9, $p = 0.02$). There is no difference in the amount of upper zone emphysema (29.54 vs 30.50 (CI 29.12–33.01)) or lower zone emphysema (40.66 vs 49.13 (CI 42.64–47.32)). Chi-squared analysis of lower zone predominance (lower zone – upper zone) showed no statistical difference either ($p = 0.76$). Factors clinically significant in univariate analysis were taken forward to logistic regression analysis where BMI was the only clinically significant ($p = 0.008$) predictor.

Conclusion Hypercapnia is relatively common amongst AATD patients, but Type 2 respiratory failure is uncommon. There is an increased risk of hypercapnia with worse FEV_1, FVC and higher BMI. The presence or location of emphysema did not seem to influence the CO_2 levels.

P62 CORRELATION OF QUANTITATIVE CHEST CT MEASURES WITH LUNG FUNCTION AND FUNCTIONAL PARAMETERS IN A COHORT OF MODERATE TO VERY SEVERE COPD PATIENTS

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Introduction COPD is a heterogeneous condition consisting of a number of different clinico-pathological subgroups (phenotypes), leading to particular challenges in managing the condition. Recognising these phenotypes may assist in directing the choice of treatment options. CT is being investigated as a tool for identifying key morphological features seen in COPD. Computer

Abstract P62 Table 1

	FEV1 (%)	Log FEF 25–75 (%)	TLCO (%)	RV (%)	mMRC Score	6MWD	BODE index
Emphysema Score	-0.32	**-0.42***	**-0.69***	0.31	0.04	-0.27	**0.37***
Gas trapping Score	**-0.50***	**-0.50***	**-0.68***	**0.40***	0.02	-0.29	**0.47***
%LAA	**-0.47***	**-0.42***	**-0.51***	**0.49***	0.09	-0.32	**0.48***
AWT-Pi10	-0.02	0.03	0.29	-0.02	-0.06	0.07	-0.08
$RVC_{856–950}$	**-0.61***	**-0.65***	**-0.55***	**0.51***	0.15	-0.21	**0.48***

Pearson's correlation coefficient of CT markers with lung function and functional parameters.
*indicates statistical significance with p value <0.05.

analysis of CT scans allows quantification of emphysema, bronchial wall thickening and gas trapping and offers the opportunity to study the heterogeneity of COPD.

This study aims to use quantitative digital software to analyse CT scans from a cohort of COPD patients to define clinically important phenotypes.

Methods Acute Exacerbation and Respiratory Infections in COPD (AERIS) is a longitudinal epidemiological study where patients with moderate to very severe COPD were followed monthly for 2 years. At enrolment subjects had pulmonary function testing and high resolution spiral CT was performed in inspiration and expiration. A sub-cohort of 36 patients is included in this analysis.

CT scans were reported by a thoracic radiologist using a validated scoring system for emphysema and gas trapping. Image analysis was performed using Apollo software. Emphysema was defined as the percent of lungs with low attenuation values below -950 Hounsfield Units (%LAA) on inspiratory scan. Airway wall thickness was standardised by using the square root of the wall area for a theoretical airway with an internal perimeter of 10 mm (AWT-Pi10). Gas trapping was calculated using the relative volume change of low attenuation areas from -856 to -950 between the inspiratory and expiratory scans ($RVC_{856–950}$).

Results Correlation between the reported CT scores (emphysema and gas trapping) and corresponding quantitative measures (% LAA and $RVC_{856–950}$) were strong: $r = 0.79$ and $r = 0.5$, respectively ($p < 0.05$). CT scores and quantitative measures for emphysema and gas trapping were significantly correlated with pulmonary function and BODE index (Table 1).

Conclusion In this study we have shown that quantitative chest CT measures correlate with a number of traditional physiological and prognostic markers in COPD. These measures have the potential to be clinically useful imaging biomarkers for the disease and further work will help validate this by investigating the longitudinal changes of the AERIS cohort.

P63 ASSESSMENT OF REGIONAL VARIABILITY IN MATRIX METALLOPROTEINASE CONCENTRATIONS BY CT INFORMED BRONCHOALVEOLAR LAVAGE IN PATIENTS WITH COPD

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Abstract P63 Table 1 Table showing median values of MMPs corrected for protein concentration and interquartile range in brackets. P value for paired samples using one-tailed Wilcoxon signed rank Test

	Median concentration in Diseased Lobe (pg/ml/μg protein)	Median concentration in Preserved Lobe (pg/ml/μg protein)	P value
MMP-1	0.11 (0.14)	0.03 (0.06)	0.09
MMP-2	66.39 (66.41)	35.77 (27.34)	0.03
MMP-3	0.35 (0.63)	0.19 (0.22)	0.01
MMP-7	13.96 (41.40)	5.44 (12.95)	0.08
MMP-8	10.66 (17.93)	5.08 (22.10)	0.22
MMP-9	19.62 (14.31)	8.10 (17.69)	0.37

Background Matrix metalloproteinases (MMPs) are a family of proteolytic enzymes involved in the normal physiological turnover of the pulmonary extracellular matrix. They have been implicated in animal models of emphysema. However, there have been conflicting results in human studies, largely due to the anatomical regional variability and heterogeneity of COPD not being taken into account. This study aims to understand the role of MMPs in COPD by using CT analysis to guide regional bronchoalveolar lavage (BAL) and employing multiplex profiling of this fluid.

Methods Twelve mild-to-moderate COPD patients (FEV1/FVC ratio <0.7, FEV1 >50%) underwent high resolution spiral chest CT. This was reported by a thoracic radiologist and lobes with most and least evidence of disease (emphysema or bronchial wall thickening) were identified. During bronchoscopy 100 ml of saline was instilled into each of these lobes and the BAL was collected. This fluid was filtered and then concentrated 2-fold by lyophilisation. MMP-1, -2, -3, -7, -8 and -9 were measured using a multiplex ELISA. Sample protein concentration was determined using a Bradford assay. MMP concentration was corrected for BAL protein concentration.

Results MMPs and protein were successfully detected in BAL. Median values for MMP-1, -2, -3, -7, -8 and -9 were all increased in the diseased lobe compared to the relatively preserved lobe. This was significant for MMP-2 and -3 and trended towards significance for MMP-1 and -7 (Table 1).

Conclusion These results suggest that certain MMPs are present in greater quantities in areas of the lungs most affected by COPD, adding to the evidence that they may be involved in the pathogenesis of the disease. This study also demonstrates the regional anatomical variability of COPD in respect to imaging abnormalities and the underlying disease processes. Regional sampling needs to be considered in future studies to enable full understanding of the heterogeneous pathological mechanisms involved in COPD.

P64 EVALUATION OF SALIVA BIOMARKERS AS INDICATORS OF HEALTH STATUS AND EXACERBATIONS IN COPD

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Saliva is increasingly promoted as a suitable alternative diagnostic bio-sample to blood, yet its role in respiratory disease is still to be elucidated.