57. Functional imaging in pulmonary oncology and COPD. Radiation dose in chest CT: survey and real life

P260

Agreement between tumor measurement on computer tomography and resected specimen size in lung cancer

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Lung cancer (LC) treatment relies on accurate staging based on tumor size. The 7th Ed AJCC TNM classification of LC difference tumors that are ≤2 cm, 2–3 cm, 3–5 cm and ≥5 cm in maximum dimension These differences are important in prognosis based on CT.

Aim: To compare the radiologic preoperative size of the primary tumor in LC with their pathologic size following excision.

Materials and methods: 88 LC patients who undergone surgery in our institution from 2008 - 2011, CT-staged T1 or T2 were included. Images were reviewed by two independent observers. Tumor maximal diameter on axial-plane was obtained using PACS caliper segmentation algorithm and adjusted based on a radiologist's input; largest single diameter from Pathology gross report was utilized. Agreement was evaluated between CT and Pathology using Bland-Altman methods for measurements and using Cohen-Kappa for T-staging classification.

Results: 46 adenocarcinoma, 31 squamous cell carcinoma. The mean CT measurement was 30,27mm, pathology was 30,63mm. The mean difference between CT and Pathology measurements was -0,35 mm (95% Confidence Interval -2,15; 1,45, p-value < 0,001). The lower and upper 95% limits of agreement were -17,33mm and 16,62mm. Clinical T-staging based on CT was T1A=21, T1B=34, T2A=20, T2B=13 and on pathology was T1A=30, T1B=22, T2A=27, T2B=9. Stage agreement was seen in T1A=17/30 (57%), T1B=16/22 (73%), T2A=14/27 (52%) and T2B=8/9 (88%) with a moderate agreement (κ= 0,491).

Conclusion: There was moderate agreement between CT and pathology measurements. Clinical and pathological T-stage revealed a moderate agreement. These results may have implications in clinical decisions.

P261

Staging of non-small-cell lung cancer with FDG-PET/CT: Is there a correlation of morphologic tumor characteristics and metabolic activity?

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Aim: FDG-PET/CT is widely accepted for staging of non-small-cell lung cancers [NSCLC]. The aim was to determine morphological data as well as the metabolic activity in patients with NSCLC. These data were correlated with TNM stage and histology to test for possible predictive values.

Methods and materials: This retrospective study examined lung cancer patients which received a whole-body PET/CT for tumor staging. The maximal and mean size and the maximal and mean density in Hounsfield units [HU] of the primary tumor were measured in CT. Metabolic activity was measured as standardized uptake value [SUVmax]. The individual tumor stage (clinical and postoperatively) as well as histology and grading were determined. Univariate analysis was performed between all tumor parameter.

Results: 202 patients were included in our study. Mean tumor size was 49±22 mm, the mean tumor density was measured with 53±66 HU. The SUVmax ranged from 0.4 to 42. In 123 cases histological grading and in 144 patients complete TNM staging was documented with c or p N-stage. Tumor size (r = -0.13) as well as density (r = -0.095) and metabolic activity (r = -0.077) showed no relevant correlation. There was no correlation between tumor grading and size (r = -0.15), volume (r = -0.097), and metabolic activity (r = -0.085). Multivariate analysis will be added.

Conclusion: There was no significant correlation between the different metabolic and morphologic tumor parameter from PET/CT and clinical data of patients with NSCLC. Up to now we could not identify a combination of imaging data from PET/CT with a predictive capability for tumor staging.

P262

Performance of segmentation software on large longitudinal database of pulmonary nodules in the Danish Lung Cancer Screening Trial (DLCST)

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Introduction and aim: Growth measurements of pulmonary nodules are subject to great interest due to the risk of malignancy. We examined the reproducibility of lung nodule volumetric software that offers two different volumetric algorithms.

Materials and methods: In the Danish Lung Cancer Screening trial, 2,052 participant with high risk of lung cancer where randomized to five annual multislice low-dose scans. All scans were double-read by two experienced chest radiologists and the location and size of nodules were registered. Subsequently the nodules were linked chronologically (same nodule in different scans) and independently reviewed by two readers using volumetric software. The software offers readers two different analysing algorithms, "solid nodule algorithm" and "partsolid/nonsolid algorithm". We compared the inter-observer variability regarding use of algorithm and rate of success.

Results: 1442 nodules were measured 5988 times. The readers reviewed the segmentations visually and were able to correctly segment and measure 94% and 97% of the nodules, respectively. In 90% of these cases, the readers chose the same algorithm.

Conclusion: Using this volumetric software on a large database with longitudinal data shows a high success rate and large agreement in choosing algorithm.

P263

Usefulness of magnetic resonance imaging with optimized conventional and non-conventional sequences in the assessment of solitary pulmonary nodules and large size lesions: Preliminary experience

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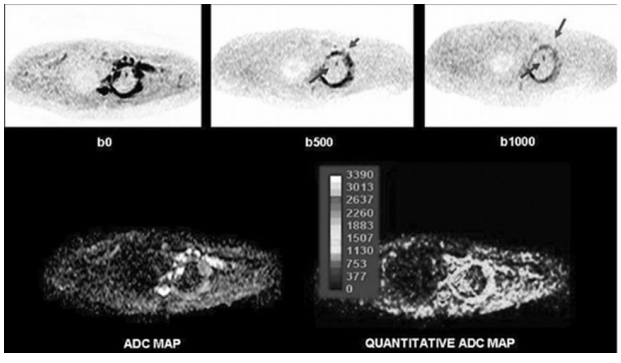
Despite the current availability of diagnostic procedures, the diagnosis of solitary pulmonary nodules still remains challenging. The aim of this clinical study is to evaluate the lung magnetic resonance imaging (MRI) with focused conventional sequences and diffusion weighted imaging.

Methods: We assessed 55 subjects with pulmonary lesions under blinded conditions using a MRI scanner. The exam was carried out with diffusion-weighted sequences (B500 and B1000 DWIBS) and ADC map with a qualitative and quantitative study.

Results: Out of 5 mm nodules (n=23) studied with DWIBS, 16 did not show abnormalities and were unchanged in 1 year follow-up and 3 were not identified compared with CT. DWIBS was positive in 2 cases, false-positive in 1 case and false-negative in 1 case. In 32 lesions >10 mm, histologically confirmed, DWIBS helped the biopsy planning, the definition of neoplastic tissue within atelectatic lung parenchyma, the differentiation of parietal pleura from pleural effusion and the characterization of mediastinal lymph nodes.



Conclusion: The study on large size lesions and nodules showed a considerable statistical significance (p<0.001; diagnostic accuracy 86.5%). The technique, despite the limitations of a preliminary study, may increase nodules detection and, with CT or PET, provide additional useful information.

P264

Contrast-enhanced ultrasound examination of pulmonary lesions

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Aim: The aim of this study is to assess the clinical value of contrast-enhanced ultrasound (CEUS) for the diagnosis of peripheral pulmonary lesions (PPL).

Materials and methods: We examine 30 patients using a 2nd generation transpulmonary contrast Sonovue and US system Philips XE-11 equipped with low acoustic power mode software.

Results: By 15 patients (8 with pneumonia and 7 with atelectasis), the baseline US examination presents PPL with preserved bronchial and vascular structure. CEUS establishes a short time to enhancement (TE) < 6 sec ('x ± SD = 4.1±1.1 sec.) and hyperechogenic tissue enhancement during the parenchymal phase, due to preserved pulmonary artery (PA) blood supply. By 6 patients (PTE n=2; abscess in the infiltrated lung tissue n=2; pneumosclerosis n=1; metastasis n=1), CEUS does not show contrast enhancement. Peripheral lung cancer (n=8pts) as well as some types of pulmonary metastasis are characterized by delayed TE>7sec. ('x ± SD = 15.1±5.7 sec.) and sparse tissue enhancement, suggesting bronchial arterial (BA) supply.

Conclusion: CEUS is a safe and effective method for differentiating PA from BA blood lesions supply. It could be a useful method for diagnosis of pneumonia/atelectasis and is particularly valuable to differentiate them from PTE. CEUS improves the US control of transthoracic needle biopsies especially in lesions among atelectasis or inflammatory infiltrate. It is reasonable to carry out further research to clarify the role of CEUS among the diagnostic procedures in patients with PPL.

P265

Radiological features of solitary pulmonary nodule (SPN) and application of two lung cancer prediction models

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Objective: To summarize the imaging features of solitary pulmonary nodules, and compare the two types of lung cancer prediction models for solitary pulmonary nodules.

Methods: A retrospective study of Ruijin Hospital between 2002 and 2009 with newly discovered SPNs which is less than 30mm. The patients all received pathological diagnosis. Summarize the clinical and imaging characteristics, then validate and compare the diagnostic accuracy of two lung cancer prediction models for estimating the probability of malignancy in patients with SPNs.

Results: 90 patients were enrolled, of which 32 cases are benign, 58 cases are malignant. Our study showed that we can identify the SPNs between benign and maligant by the SPN edge features of lobulation (P<0.05). The area under ROC curve of VA model was 0.712 (95% CI 0.606 to 0.821); Area under ROC curve of Mayo Clinic model was 0.753 (95% CI 0.652 to 0.843), and it is superior to VA model.

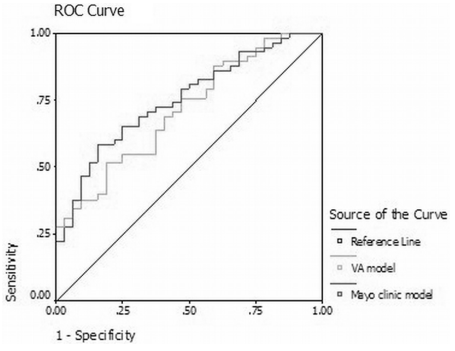

Figure 1. The ROC curve of VA model and Mayo Clinic model.

Conclusions: It is meaningful for the identification of benign and maligant SPNs by the lobulation sign in CT scan. We can integrate the clinical features and the lung cancer predicting models to direct our clinical work.

P266

Does PET-CT predict the results of CT-guided core biopsy in the diagnosis of peripheral lung lesion?

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Introduction: Percutaneous CT-guided transthoracic needle biopsy (CT-Bx) and Positron emission tomographic scanning (PET-CT) aids in the diagnosis of a peripheral pulmonary lesion (PN) where bronchoscopy is unhelpful. Our aim was to evaluate the diagnostic yield of CT-Bx in relation to standardised uptake value (SUV) on PET-CT.

Method: A retrospective analysis was performed of all patients who had PET-CT and CT-Bx from Jan 2008 to June 2010. CT-Bx was performed with a Temno biopsy needle by an experienced radiologist. The SUV on the PET-CT, size of nodule and diagnosis were recorded.

Results: 95 subjects who had the PET-CT and CT-Bx were included. The mean age was 66.05 years (range 30-90years). 48 (51%) were male. 61 (64%) had diagnostic CT-Bx where as 34 (36%) subjects had non diagnostic CT-Bx. The mean size of lesion was 2.47cm in subjects with diagnostic CT-Bx where as it was 2.38cm in non-diagnostic subjects, the difference which was not statistically significant (*p value 0.37*). The Mean SUV on PET-CT was higher in subjects where the CT-Bx was diagnostic compared to, where CT-Bx was non-diagnostic (*12.750 Vs 7.982; p value 0.002*).

Conclusion: The SUV on PET-CT may predict the diagnostic yield of CT-Bx. The high value of SUV may result in diagnostic outcome of CT-Bx.

P267

Epicardial fat mass is increased in patients with COPD: A non-invasive cardiovascular marker in a high risk population

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Background: Epicardial Fat Mass is associated with an increased cardiovascular events in the general population. This marker has not been explored in patients with COPD.

Hypotesis: COPD patients have an increased Epicardial Fat Mass volume (EFMV).
Methods and results: This cross-sectional observational study evaluated 120 participants (53 smokers without COPD and 67 with COPD). They underwent a clinical and radiological evaluation (Chest CT measuring cm^3). Patients' general characteristics and differences between groups are presented in Table 1.

Table 1: General Characteristics according to group

	Smoker	COPD	p
Group, n	53	67	
Age, years (+/-SD)	53 (9,7)	64 (10)	**< 0,001**
Male (%)	43 (81,1)	49 (72,1)	**0,032**
Pack years (p25-p75)	34,06 (23-40)	47,41 (25-60)	**0,012**
BMI, Kg/m2 (+/-SD)	27,5 (4,6)	26,9 (4,6)	0,96
Total Cholesterol, mg/dL(+/-SD)	207,6 (43,8)	204,7 (45,8)	0,45
HDL Cholesterol, mg/dL(+/-SD)	55,5 (15,1)	54,7 (17,9)	0,52
Glucosa, mg/dL (+/-SD)	96,2 (14,1)	103 (25,2)	0,15
CRP, mg/L (p25-p75)	0,22 (0,09-0,46)	0,31 (0,14-0,82)	0,46
Hypertension, n (%)	20 (37,7)	33 (48,5)	**0,02**
DM, n (%)	6 (11,3)	9 (13,2)	0,17
FEV1% (+/-SD)	97,28 (13,3)	75,82 (19,8)	**0,001**
FVC% (+/-SD)	103,58 (+/- 14,2)	104,79 (20,2)	0,7
FEV1/FVC% (+/-SD)	77,36 (6,4)	56,94 (10)	**0,04**
EFMV, cc(p25-p75)	102,3 (65,4-133,2)	134 (107-190)	**< 0,001**

BMI=Body Mass Index, HDL= High-density lipoprotein, CRP= C reactiv protein, DM= Diabetes Mellitus
FEV1= Forced expiratory volume in one second, FVC= Forced vital capacity, EFMV= Epicardial Fat Mass Volume

Variables with statistically significant differences were included in the multivariate analysis to determine those that independently predict EFMV. Male gender, hypertension, pack years history and COPD diagnosis were predictors of EFMV.

Table 2: Multivariate analysis $r2 = 0,31$

Variable	B coefficient	95% Confidence Interval	p
Hypertension	35,23	15,14 to 55,32	**0,001**
Pack years	0,22	0,03 to 0,89	**0,038**
COPD	28,09	5,8 to 50,38	**0,014**
Female gender	-23,319	-46,03 to -0,6	**0,044**

Variables included in the model: Age, hypertension, Pack years, COPD diagnosis and female gender

Conclusions: COPD is an independent risk factor for an increased EFMV. Further studies should assess the impact of this finding as a non invasive marker of cardiovascular events in this high risk population.

P268

High resolution CT scan (HRCT) thorax differences between biomass-smoke exposure induced COPD (BM COPD) and tobacco-smoking COPD (TS COPD)

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BM COPD accounts for a substantially large proportion of COPD especially in developing countries. However, little is known whether this COPD is different from TS COPD radiologically.
Aims: To study and compare the radiological changes in the lung parenchyma between BM COPD and TS COPD.
Method: 20 stable BM COPD (M:F 1:19) and 34 stable TS COPD (M:F 34:0) underwent HRCT thorax. Helical HRCT sections were taken from apex to domes of diaphragm at 1mm thickness and 10mm intervals during deep inspiration maneuver. Emphysema was quantified using " Quantification of Emphysema" software and depicted as area less then -950HU, while bronchial wall thickness was defined as presence of >1.5mm thickness. Independent sample t -test was used to compare the two groups of COPD.
Results: BM COPD [age: 65yrs (8.5)] subjects showed significantly lesser mean lung volumes (cc) compared to TS COPD [age:63 yrs (5)] [2916±2589 vs 4347±4507; $p<0.0001$] TS COPD subjects had more mean % emphysema compare to BM COPD [13%±11.5% vs 6.42%±6.3%; p=0.022]. 80% of subjects with BM COPD showed presence of pure form of emphysema pattern {either centrilobular (40%) or panlobular (40%)}, whereas there was no distinct pattern seen with TS COPD. There was no significant difference in bronchial wall thickness between the two COPD phenotypes, although TS COPD trended to show greater wall thickness (p=0.09).
Conclusions: The BM COPD has lesser lung volumes and emphysema compared to TS COPD. There is predominance of either centriacinar or panacinar in BM COPD. Biomass smoke-induced COPD subjects showed lower lung volumes and lesser mean % emphysema than TS COPD on HRCT imaging.

P269

Phantom-based evaluation of computed tomography parameters: Understanding the differences in automated emphysema scoring

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Purpose: Automated lung emphysema (E) measurements vary strongly between examinations.We examined the effect of CT scanners, acquisition parameters, kernels and windowing on the software-based E scoring (S) in a phantom.
Material and methods: A human preserved torso in epoxy was used as phantom and was scanned on 5 different scanners using various settings of the following parameters: KV, mAs, care dose, slice/increment, window and kernel. For each of these data sets, the E was evaluated. The ES was performed using both 2D and 3D software. A multiple linear regression analysis (LRA) was used to evaluate the importance of each examined parameter.
Results: Measured E values ranged between 17.0% and 70.5% for 3D software evaluation. A similar range could be seen at 2D evaluation, ranging between 13.7% and 66.8%. The used kernel had the strongest impact on the measured ES, and a strong effect could also be seen for slice/increment, mAs, window and KV. However, the scanner-dependent parameters and the usage of the caredosis option proved to have only a minor impact on the measurement of E. The LRA found a very strong correlation between the measured values, and the estimated values based on the optimal regression formulas, with R^2 values of 0.828 and 0.772 for the right and left lungs on 3D evaluation, and 0.872 and 0.851, resp., on 2D evaluation.
Conclusion: A fixed phantom allows assessing the influence of different scanners, acquisition parameters and evaluation techniques on the software-based ES. The current dataset indicates that scan parameters and the used kernels have the strongest effect, and that the induced differences can be estimated using multiple LRA.

P270

Interobserver variability in visual evaluation of thoracic CT scans and comparison with automatic computer measurements of CT lung density

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Introduction: Emphysema is defined by pathology, but is most precisely evaluated in vivo by computed tomography (CT).
Aims were to determine the reproducibility of visual evaluation of emphysema, i.e. the observer variability, and furthermore to compare the visual evaluations to automatic CT lung density measurements, i.e. densitometry.
Methods: In a pilot study 60 CT scans were selected from a sample of 3980 CT scans from The Danish Lung Cancer Screening Trial (DLCST). The amount of emphysema in these scans was scored independently by two observers, who were blinded regarding clinical information.
The lung was segmented automatically by in-house developed computer software, and the percentage of pixels below -950 HU was used as a surrogate marker for emphysema.
The observer variability, as well as the correlation with the lung density measurements, was analysed using Spearman's rank correlation.
Results: Spearman's correlation coefficient between the two observers was $r = 0.85$, $p < 0.001$. However, the combined observations for both observers had a correlation with the CT lung density measurements of $r = 0.25$, $p = 0.05$.
Conclusions: We found a high degree of interobserver consistency in emphysema grading. However, the agreement with the CT lung density measurement was poor, indicating that the two types of evaluation represent different aspects of emphysema. Most likely, they should be seen as complementary rather than competitive evaluations. Future comparison with physiological tests might elucidate the reason for differences and demonstrate the usefulness of these evaluations.

P271

A new method for evaluation of severity in COPD using dynamic chest x-ray examination

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Purpose: Spirometry which requires maximum effort tasks COPD patients. In this study, we purposed a new method for evaluation of severity in COPD using dynamic chest X-ray examination without effort breathing.
Subjects: Dynamic chest X-ray from 29 normal volunteers, 30 mild COPD patients (GOLD Stage I or II) and 31 severe COPD patients (GOLD Stage III or IV) were obtained in the upright position in about 10 seconds of tidal breathing at rest. The dynamic image data captured at 7.5 frames per second was synchronized with the pulsed X-ray. The institutional review board approval and written informed consent were obtained in all persons.

Methods: We calculated the maximal differential values in each ventilation phase at the corresponding small local area of lung in the series of dynamic chest X-ray. The regional relative flow rate ratio was obtained from the peak values of inspiratory phase divided by the peak values of expiratory phase. All groups were compared about the standard deviation of flow rate ratio.
Results: The average of the ratio in normal volunteers, in mild COPD patients and in severe COPD patients were 0.21±0.03, 0.22±0.04 and 0.26±0.04 (mean±SD),respectively. Significant difference was confirmed between the normal volunteers and the severe COPD patients (p=0.00047), and between the the mild COPD patients and the severe COPD patients (p=0.0092),respectively.
Conclusion: The variation of the inspiratory/expiratory flow rate ratios in COPD patients were larger than those of healthy volunteers. The new method for ventilation function has possibility to evaluate severity of COPD.

P272
Ultrasonographic assessment of the diaphragm in patients with chronic obstructive pulmonary disease (COPD): Relationships with pulmonary function and the influence of body composition
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Background: Skeletal muscle weakness and loss of fat-free-mass (FFM) is one of the main systemic effects of COPD. Also diaphragm is involved leading to disadvantageous conditions and poor contractile capacities. We measured the thickness (TD) of diaphragm by ultrasonography to evaluate the relationships between echographic measurements, parameters of respiratory function and body composition data.
Material and methods: 24 patients (17 males) underwent: a) pulmonary function tests; b) echographic assessment of TD in the zone of apposition at various lung volumes (TDRV, TDFRC, TDTLC); c) bioelectrical body impedance analysis. BMI was calculated.
Results: Mean FEV1 as percentage of the predicted value was 49,6% (min 22%, max 86%). Mean BMI was 27±5,3 kg/m^2 (min 17,2 max 38,8). TDRV, TDFRC and TDTLC measured 3.28, 3.58, 5.92 mm respectively. Reproducibility of measures was good (Ri=0.93, 0.93, 0.77 for TDRV, TDFRC, TDTLC respectively). All the TD were found correlated to FFM being the relationship greater for TDFRC (R^2=0.51, p=0.0002). As regards lung volume IC, was found related to TDRV (R^2=0.21, p=0.025), TDFRC (R^2=0.16, p=0.05), TDTLC (R^2=0.36 p=.002). No significant association was found between TD and TLC, FRC, RV. Using a multiple regression model TDTLC was found related to RV/TLC, FEV1/FVC and FFM (R^2: 0,55 p: 0,004). Lastly, the difference between TDTLC and TDRV was closely related to FVC (R^2=0.33, p=0.0036).
Conclusion: Ultrasonographic assessment of the diaphragm could be a useful tool to study the progression of the disease in COPD patients in terms of static hyperinflation and loss of FFM.

P273
Longitudinal imaging characterisation of a model of chronic allergic lung inflammation in mice
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The aim of the study was to investigate the role that imaging could have for longitudinally assessing allergic lung inflammation. This is usually assessed using terminal procedures eg bronchoalveolar lavage (BAL) & tissue histology. We describe how MRI & CT methods provide sensitive early readouts of inflammation where individual animals are tracked throughout enabling longitudinal intervention, potentially reducing animal numbers & providing a translational approach.
Balb/c mice were exposed to inhaled House Dust Mite (HDM) or saline for 7 weeks. MRI groups included: 12ug daily HDM dose; 25ug daily HDM dose; vehicle. CT groups: 25ug/mL HDM±Budesonide (3mg/kg, weeks 5-7); vehicle. Mice were scanned weekly by MRI or CT. AHR & IgE measurements were taken on weeks 3,5&7. After the last imaging session BALs were taken & lungs prepared for histology.
MRI showed a gradual weekly increase in lung tissue intensity (LTI) in HDM treated animals *cf* control. The 25ug HDM group showed a continual sig. increase in LTI between weeks 3-7, the 12ug HDM treated group showed similar rates of increase & plateaued by week 5. A corresponding increase in AHR, cell counts & IgE were observed. CT showed sig. increases in LTI from week 1 of HDM & this was maintained for 7 weeks. Budesonide treatment showed a reversal in the increase in LTI.
MRI & CT provide a non-invasive & sensitive method for longitudinally assessing lung inflammation in the chronic HDM mouse model. LTI changes correlate directly with classical inflammatory readouts allowing more accurate assessments to be made within animal & provide a clinically translatable approach.
This collaborative study was carried out part of the U-BIOPRED project.

P274
Using micro-CT to map the small airways
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Introduction: The loss or narrowing of small airways (<2mm) leads to an increase in peripheral resistance and is a major site of airway disease in COPD. Quantitative studies of the three dimensional architecture and organisation of the lung are required to assess this. Micro-CT permits direct examination of the small airways and microvasculature. However, most studies to date have used osmium or other contrasting agents precluding the use of historical samples.
Aim: To use micro-CT to identify and measure the small airways in paraffin embedded tissue without contrasting agents.
Methods: Tissue from the distal airways was fixed and embedded in paraffin wax. It was scanned with a Nikon/Metris HMX XCT scanner at the μ-VIS X-ray imaging centre, University of Southampton to obtain CT data with a scan time of four hours. An acquired voxel resolution of 7.9μm allowed examination of airway lumen along its length and a 3D volume reconstruction of a branching small airways network created using VG Studio Max (v2.1) and Aviso 7 image processing software.
Results: Lung tissue was clearly distinguishable from the airspaces in scans permitting a clear 3D reconstruction of all airways and blood vessels in the sample. Airway cross section measurement was possible down to the respiratory bronchioles at <0.15mm. This will permit the estimation of potential volumetric air flows from the alveoli to the small airways.
Conclusion: We have shown that it is possible to use micro-CT to analyse and reconstruct small airways structure in human tissue down to the respiratory bronchioles with a resolution of 7.9μm. Using formalin fixed and paraffin embedded tissue without any contrasting agents can provide robust 3D structural data from archival material.

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CT protocols in interstitial lung diseases – A survey among members of the European Society of Thoracic Imaging
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Objective: To survey the current HR-CT protocols used by members of the European Society of Thoracic Imaging (ESTI) to evaluate patients with interstitial lung diseases.
Materials and methods: A questionnaire was e-mailed to 173 ESTI members. The survey focused on questions regarding the practice of CT protocols in patients with suspected interstitial lung diseases. In particular, the members were asked whether they used discontinuous HR-CT or volume CT protocols, performed additional expiratory scans, or obtained scans in the prone position. In addition, the questions focused on dose considerations and on which reconstructions were performed routinely.
Results: The overall response rate was 37%. Seventy-seven percent of the respondents indicated that they evaluated their patients with routine protocols; 85% used either volume CT alone or in combination with discontinuous HR-CT, only a minority of 15% performed discontinuous HR-CT only. Fifty-three percent reported that they applied a low-dose volume CT protocol. Expiratory scans or scans in prone position were performed by a majority of the respondent on demand only (58% and 59%, respectively). The number of reconstructions ranged from two reconstructions to up to eight standard reconstructions. Fifteen respondents reconstructed two series, 18 respondents routinely reconstructed three or four series, and 16 respondents reconstructed five series or more
Conclusion: ESTI members seem to prefer volume CT to investigate patients with suspected interstitial lung diseases. The reported and surprisingly high prevalence of low-dose CT protocols may be due radiation dose considerations and requires further investigation.

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Cumulative exposure to ionising radiation in adults with non-CF bronchiectasis
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Background: As treatments improve and patients with non-CF bronchiectasis are surviving longer, the cumulative exposure to potentially carcinogenic ionising radiation is important. We looked at the amount of ionising radiation given to adults with this condition (n=66) attending our Respiratory clinic over a 12-month period.
Method: All ionising radiation studies were reviewed for their impact on management. Radiation was calculated using standard reference doses and expressed as milliSievert [mSv].
Results: See Table. The average radiation dose was 11.43 mSv. Overall, only 15%

Radiation exposure and % impacting care

	Mean % predicted FEV1 [SD]	Mean Radiation Dose (mSv)	% impacting care
All patients (n=66)	68 [27]	11.4	56
Underlying COPD (n=27)	53 [21]	11.1	28
Pseudomonas (n=14)	56 [24]	13.6	25
Non-Pseudomonas (n=52)	59 [26]	10.9	34

of chest X-rays and 62% of Chest CT's resulted in a change in management. Those with more severe disease had a greater cumulative dose of radiation.
Conclusion: Patients with bronchiectasis receive significant medical radiation each year, but most impacts on their management. Those colonised with *Pseudomonas* are associated with greater levels, in keeping with the more significant disease burden in these individuals. Care should be taken when ordering investigations associated with ionising radiation, to reduce the long term effects of potentially harmful investigations.

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Cumulative exposure to ionising radiation in adults with interstitial lung disease (ILD)

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Background: The cumulative exposure to potentially carcinogenic ionising radiation is important in patients with ILD as they are exposed to multiple radiological investigations. We looked at the amount of ionising radiation given to adults with ILD (n=41) attending our Respiratory clinic over a 12-month period.
Method: All ionising radiation studies were reviewed for their impact on management. Radiation was calculated using standard reference doses and expressed as milliSievert [mSv].
Results: See Table. The average radiation dose was 12.33 mSv with 56% of investigations impacting care. Those with UIP pattern of fibrosis had a greater cumulative dose of radiation.

Radiation doses and % impacting care

	Mean Radiation Dose (mSv)	% impacting care
All patients (n=41)	12.33	56
UIP (n=24)	12.98	62
NSIP (n=8)	11.29	71
Other fibrosis (n=9)	11.9	68

Conclusion: Patients with ILD receive significant medical radiation each year, but most impacts on their management. Those with NSIP had a greater number of investigations impacting care as compared to those with UIP, in keeping with the wider spectrum of disease and more treatment options being available in this sub-group of patients. Care should be taken when ordering investigations associated with ionising radiation, to reduce the long term effects of potentially harmful investigations.