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or thoracotomy (25%) because of lung cancer or suspected lung cancer were included. In the same anaesthesia as mediastinoscopy 100 patients underwent EBUS FNA and 90 EUS FNA.

Surgical verification occurred when mediastinoscopy and EUS FNA was not diagnostic for malignancy disease.

Results: In 3 cases a false negative mediastinoscopy and EBUS TBNA (one station 6, one in station 8) and one metastases in the adrenals was noted.

In 11 cases the mediastinoscopy were false negative and in 4 patients EBUS FNA were false negative.

Patients with NO after mediastinoscopy were referred to toracotomy/thoracoscopy. 9 thoracotomies could therefore have been avoided with the use of EBUS-TBNA. The 75 patients scheduled for mediastinoscopy 7 patients would have undergone an unnecessary primary thoracotomy with EBUS alone. With mediastinoscopy alone 14 unnecessary thoracotomies would have been performed.

Because of positive EBUS 51 mediastinoscopies could be avoided

Following the guidelines 49 mediastinoscopies should be performed with the results of finding 4 false negative EBUS TBNA (8%).

In 90 patients EBUS, mediastinoscopy and EUS were combined.

Combining EBUS with EUS results in only 2% false negative examinations.

Conclusion: EBUS TBNA as a primary procedure prevent half of the scheduled mediastinoscopies and EBUS TBNA alone results in less unnecessary thoracotomies than mediastinoscopy alone. The combination of EBUS TBNA and EUS FNA improves this result with only 2 false negative results.

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Prognostic value of integrated FDG-PET/CT in non-small cell lung cancer

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Aim: The aim of this prospective clinical trial was to evaluate the accuracy of combined anatomical and functional imaging with FDG-PET/CT for staging lung cancer and for prediction of long-term survival.

Material and Methods: To date, 176 pts with histologically proven non-small cell lung cancer were included. All pts underwent whole body FDG-PET/CT imaging using a GE Discovery LS hybrid scanner. CT, FDG-PET and fused PET/CT images were used for evaluation of tumour stage according to the TNM and UICC classification system. Histopathology served as reference in 77 pts undergoing resective surgery. 99 pts received palliative treatment. Median follow-up was 950 days (range, 6 – 1710 days).

Results: On a patient basis, the sensitivity of PET/CT for detecting N1 lymph nodes was 38% (specificity 96%, accuracy 88%), and for N2 lymph nodes 67% (89%, 86%). For differentiation between nodal positive (N1, N2, N3) and negative (N0) pts, the sensitivity of PET/CT was 74%, the specificity 92% and the accuracy 86%. For differentiation of operable (UICC stage I-IIIa, <N2) vs. inoperable pts (UICC stage IIIa, =N2; UICC stage IIIb-IV) the accuracy of PET/CT was 96%. After a median follow-up of 950 days, pts with operable tumour stage at PET/CT subsequently undergoing resective surgery had a favourable outcome and did not show significantly reduced survival. However, in pts staged as having UICC stage IIIb-IV undergoing palliative treatment, median overall survival was as low as 318 days (p<0.0001, hazard ratio 0.32).

Conclusion: Combined FDG-PET/CT imaging offers high accuracy for tumour staging, differentiation of operable vs. inoperable pts and is a strong predictor of survival in pts with non-small cell lung cancer.

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¹⁸F-FDG-PET/CT appearances in pulmonary fibrosis; initial experience

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Purpose: To describe the first experience of using ¹⁸F-FDG-PET/CT in pulmonary fibrosis.

Methods: Institutional Review Board permission and informed consent were obtained. Twenty consecutive patients (17 male, 3 female, mean-age 65.5±10.5 years) with newly diagnosed pulmonary fibrosis were recruited for combined PET/CT and HRCT. The physically co-registered images were displayed and fused on proprietary workstations. The pattern of distribution of pulmonary ¹⁸F-FDG-uptake was recorded using PET/CT. The co-registered HRCT was used to define lung parenchymal patterns at sites of maximum ¹⁸F-FDG-uptake.

Results: 9/20 patients had typical clinical and radiological findings of idiopathic pulmonary fibrosis. There was raised pulmonary FDG uptake in 20/20 patients. At the site of the most intense pulmonary ¹⁸F-FDG uptake, the mean maximum standardized uptake value (SUV_{max}) to TBR = 3.5 (range 2.2-6.8) and the mean SUV_{max} = 2.4 (range 1.4-5.4).

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EBUS TBNA and EUS FNA in preventing unnecessary surgical procedures
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The aim of the study: The goal of this study was to assess to what extent EBUS-TBNA alone and in combination with EUS FNA could prevent surgical interventions.

Material: One hundred consecutive patients scheduled for mediastinoscopy (75%)

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At the site of maximal ^{18}F -FDG uptake, the corresponding lung parenchymal pattern was ground glass predominant in 5/17, reticular/honeycomb predominant in 14/17 and mixed in 1/17. The mean SUV_{max} to TBR in patients with typical idiopathic pulmonary fibrosis = 3.58 ± 0.78 and for the other patients = 3.74 ± 1.55 (t-test, $P=0.730$). The mediastinal nodal mean SUV_{max} was 2.62 (range 0- 4.9) with an $\text{SUV}_{\text{max}} > 3.0$ in 5 patients.

Conclusion: In all the pulmonary fibrosis patients examined there was raised pulmonary ^{18}F -FDG that had a similar distribution as the lung parenchymal abnormality. The mean pulmonary ^{18}F -FDG SUV_{max} was lower in patients with a predominantly inflammatory (ground-glass) pattern on HRCT than those with a predominantly fibrotic pattern (reticular/honeycomb).

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Quantitative perfusion lung SPECT (QPLS): correlation with alveolar volume in smoking patients

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Background: Chronic obstructive pulmonary disease (COPD) may result in poorly perfused areas on perfusion single-photon emission computed tomography (SPECT). These areas are not included on SPECT measurements of perfused lung volume. On the other hand poorly ventilated areas are not included in volumes being measured by gas diffusion techniques.

Purpose: Our objective was to evaluate if the perfused lung volume correlates to alveolar volume measured by a single breath maneuver in smokers.

Methods: A group of fourteen smokers was evaluated (8 male and 6 female; mean age 58 years, ranging from 31 to 80). Alveolar volume measured by single-breath maneuver during carbon monoxide diffusion test and lung volume derived from perfusion SPECT was recorded.

Results: Nine patients had obstructive lung disease and 5 patients had restrictive lung conditions. Perfusion lung volume derived from QPLS had a strong correlation with alveolar volume ($r = 0.871$, $p < 0.001$). Perfusion lung volume was significantly smaller than alveolar volume (0.548 ± 0.608 ml, $p = 0.005$). Patients with restrictive lung conditions had smaller alveolar volume compared to the obstructive lung disease patients (1.733 ± 0.328 ml, $p < 0.001$). Perfusion lung volume was also smaller in restrictive patients compared to obstructive lung disease patients (1.372 ± 0.158 ml, $p < 0.001$).

Conclusion: Perfusion lung volume strongly correlates to alveolar volume in smoking patients. A significant difference in lung volume between restrictive and obstructive lung disease groups was also detected.

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Quantitative analysis of volumetric computed tomography scans and pulmonary function tests in severe emphysema

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Purpose: To investigate relationship between volumetric CT data sets and pulmonary function tests.

Material and Methods: Thirty-seven patients (19-f, 18-m, 62 ± 9 years [\pm SD]) with emphysema due to COPD (GOLD IV) were included. Scans were performed during inspiration and expiration on same standard 16-channel-multi-detector-CT (MDCT). MDCT data were analyzed with MeVisPULMO3D software for: lung volume (LV), emphysema index (EI), emphysema volume (EV), and core to peel distribution for whole lung, each whole lung, each lung lobe separately. Four clusters with different emphysema volumes ($> 2, 8, 65, 120$ mm³) were calculated. These values were correlated with body mass index, FEV1, VCin, RV, TLC, RV/TLC and 6-minute walk.

Results: Inspiratory LV correlated well with TLC ($r=0.92$, $p<0.001$), expiratory LV with RV ($r=0.93$, $p<0.001$), RV/TLC with inspiratory/expiratory-LV ($r=0.68$, $p<0.001$). FEV1 correlated with change of core volume ($r=-0.48$, $p=0.002$), VCin with change of peel volume ($r=0.46$, $p=0.003$). The inspiratory EI of 37 ± 9 decreased by $25 \pm 9\%$ ($p<0.001$) during expiration resulting in a change of EV by $930 \text{ml} \pm 370 \text{ml}$ ($p<0.001$). Patients were divided into predominantly upper-lobe (ULD) and lower-lobe disease (LLD). LLD-patients had lower RV ($p=0.01$) and greater VCin ($p=0.002$) in comparison with ULD-patients. The change of large emphysema-clusters correlated with RV/TLC ($r=-0.65$, $p<0.001$) and inspiratory/expiratory-LV ($r=-0.54$, $p<0.001$).

Conclusion: Inspiratory data sets better reflect structural changes, expiratory scans are closer related to the pulmonary functional changes. Volumetric core to peel and cluster analysis provide insights into the regional hyperinflation areas.

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Narrow band imaging (NBI) – a new method in the diagnostics of pulmonary diseases

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Background: NBI is a new endoscopic technology that enhances the visibility of vessels of the mucosa and differentiation between inflammation and pathological vascularisation of tumor.

Methods: We have analysed a group of 300 patients examined because of hemoptysis, CT or X-ray findings. The patients were examined by white light bronchoscopy, then by NBI bronchoscopy. We used Olympus Evis Lucera system. The pathological findings in NBI mode were separated into four groups. The first was a view of dotted vessels with tortuous course. The second was an abrupt ending of vessels with disturbed architecture. The third was an avascular pattern typical for necrosis. The fourth was a pattern of numerous vessels. We evaluated the findings in the first three groups as a malignancy. The fourth group was evaluated as an inflammation. **Results:** A pathological finding in NBI mode was detected in 197 cases (65,7%). 87 cases (44,2%) were evaluated as a malignancy. Histological examination confirmed malignancy in 82 cases (94,3%). We evaluated 110 cases (55,8%) as an inflammation. Histological examination confirmed inflammation in 100 cases (90,9%).

Conclusions: NBI can help with detection of submucosal tumors, with searching for early stages of lung cancer, with detection of cancer recurrence after surgery and with determination of the degree of affection before surgery. It can increase the effectivity of examination and enable fine targeted biopsy from the pathological area. This is helpful for the lung tumor diagnostics.

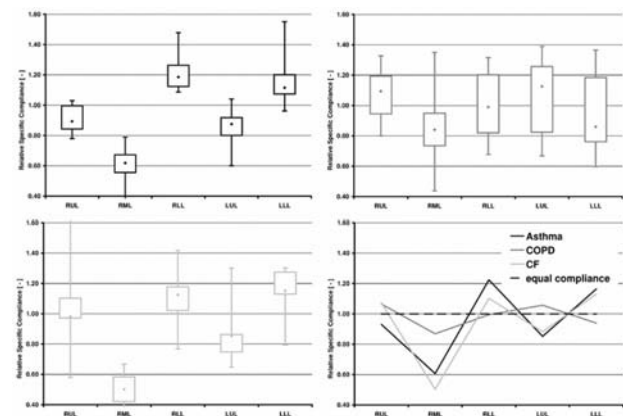
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A novel image based method for the evaluation of regional changes in lung mechanics

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There is an urgent need for tests that describe regional lung function since several interventions are critically dependent on the insight into regional airflow distribution and compliance. At present no technique is available to provide these regional insights. We developed a functional imaging method based on CT scanning that provides regional information of lung mechanics. Based on segmentation algorithms of the complete lung and each separate lobe, measures of local ventilation and compliance differences have been obtained based on lobular growth from FRC to TLC.

A first validation of the method was performed by comparing the differences in lobular growth (as a surrogate for compliance) between patient population with known differences in respiratory mechanics. The results obtained in asthmatics (n=10), COPD (n=10) and CF patients (n=5) are given in the figure below.



From these preliminary data it is obvious that the method allows to detect regional differences in lung compliance between different airway diseases using this imaging approach. Further studies will be performed to determine the place of this method in predicting and assessing regional interventions such as inhaled therapies or endobronchial volume reduction techniques.