An analysis of EGFR expression and tumour imaging in non-small cell carcinomas of lung
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Introduction: Non-small cell carcinomas (NSCLC) accounts for 80% of all lung cancers. Epidermal growth factor receptor (EGFR) is frequently overexpressed in NSCLC and it plays a significant role in tumour cell proliferation and progression. EGFR is a member of the epidermal growth factor family of tyrosine kinase receptors and its utility for targeted therapy. A positive EGFR correlation was noted with tumour size, regional lymphnode enlargement and pleural effusion which reflect its role for targeted therapy.

Methods: Seventy-four consecutive patients with potentially curable lung cancer were prospectively recruited for combined positron emission tomography (PET) and computed tomography (CT). A total of 10 technical failures led to a study population of 64 patients (35 males; 29 females. Mean age 67.5). Studies were an integrated 64-detector PET/CT. The uptake of 18F-FDG quantified as the Standard Uptake Value (SUVmax) was assessed tumor metabolism.

Results: The mean tumor SUVmax, PE and SPV were 13.8, 37.6 HU and 6.5. No statistically significant relationships between tumor metabolism and vascular parameters. There were significant associations between tumor size and vascular-metabolic parameters. SUVmax v size (r = 0.4, p = 0.001), SUVPE v size (r = 0.4, p = 0.001), SUVmax/SUVPE were higher in SCC than in adenocarcinoma (17.4 versus 11.8; p = 0.026 and 0.57 versus 0.35, p < 0.021 respectively). A phenotype with low metabolism and high vascularity was significantly more common amongst adenocarcinomas (p < 0.01), whilst high vascularity with high vascularity was more common amongst SCC (p = 0.005).

Conclusion: Vascularity and metabolism are uncoupled in NSCLC. Since some lung cancer patients have inadequate tissue sampling metabolic function could be helpful clinically in managing lung cancer patients to targeted therapy using non-invasive 18F-FDG PET/CT scan.

285. Imaging, functional evaluation and staging for lung cancer patients

P2746
An EGFR mutation associated with lower glucose metabolism in the FDG-PET
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Background/Aim: In non-small cell lung cancer (NSCLC), new therapies that target specific oncogenic pathomechanisms like the epidermal growth factor receptor (EGFR) were developed. Positron emission tomography (PET) using fluorodeoxyglucose (FDG) is commonly implemented in diagnosis and staging of NSCLC. In this study, we analysed the correlation between molecular markers like EGFR and the glucose metabolism of NSCLC.

Methods: 80 patients with NSCLC were examined with FDG-PET/CT using standard scanning protocols; routinely the maximal standardized uptake value (SUVmax) of the tumour was determined. The demographic criteria of all patients were similar; all underwent surgical excision of the tumour. The tumour tissue was characterized histologically and by molecular typing, including the EGFR status.

Results: The tumour histology showed in 36 patients a squamous cell carcinoma (45%), in 33 an adenocarcinoma (41%) and in 11 other tumour entities (14%). The average SUVmax were 12.1±4.8 (±SD), 9.0±4.4 and 11.9±4.8, respectively. In only 5 patients an activating EGFR-mutation was found, all others showed the EGFR wild-type. All but one mutation were found in patients with adenocarcinoma (12.1% of that histology); these tumours showed a very low SUVmax of 4.1±0.9.

Conclusion: In our patient cohort with NSCLC, all patients with adenocarcinoma and EGFR-mutated tumours showed a very high SUV of 20.3. This finding may suggest that these tumours have down regulated metabolism and may be anticipated by lower SUV in FDG PET scans.

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P2747
Integrated 18F-FDG PET dynamic contrast enhanced CT to phenotype non-small cell lung cancer
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Objectives: To apply molecular and functional imaging to the pre-treatment assessment of disease using combined Dynamic Contrast enhanced CT (DCCT) and 18F Fluorodeoxyglucose PET/computed tomography (18F-FDG PET). In lung carcinomas to define the cancer phenotype.

Methods: Seventy-four consecutive patients with potentially curable lung cancer were prospectively recruited. Out of those, 64 were PET/CT scanned. 34 patients were found to have adenocarcinoma (52%), squamous cell carcinoma (27%) and 8 other tumour entities (12%). In total, 45 patients underwent PET/CT scanning. No statistically significant differences concerning the patients' demographic criteria were observed.

Results: The tumour histology showed in 36 patients a squamous cell carcinoma (45%), in 33 an adenocarcinoma (41%) and in 11 other tumour entities (14%). The average SUVmax were 12.1±4.8 (±SD), 9.0±4.4 and 11.9±4.8, respectively. In only 5 patients an activating EGFR-mutation was found, all others showed the EGFR wild-type. All but one mutation were found in patients with adenocarcinoma (12.1% of that histology); these tumours showed a very low SUVmax of 4.1±0.9.

Conclusion: In contrast, the one EGFR-mutated squamous cell carcinoma showed a very high SUVmax of 18.5±2.4. The SUVmax was correlated with diverse parameters. There was a significant difference in survival between patients who had a low vs high SUV max, hazard ratio for an increase in SUVmax of the primary of 5 points of 2.8 (p=0.03). This relationship was maintained when multiple factors were adjusted for, with a hazard ratio for an increase in SUVmax of the primary of 5 points of 2.8 (p=0.03).

Conclusion: FDG-PET provides additional information about prognosis in NSCLC, independent of stage at presentation. The relationship between SUVmax of the primary and survival is maintained, even in patients with advanced disease.
P2750
Late-breaking abstract: Is primary tumour standardized uptake value (SUV) an independent prognostic factor for non small cell lung cancer (NSCLC)? A meta-analysis based on individual data

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Background: 18F-fluoro-2-deoxy-D-glucose positron emission tomography has been studied in numerous studies as well as in two literature based meta-analyses. To assess further its independent value, we carried out a meta-analysis based on individual data.

Methods: Following literature search, we contacted the authors of identified studies and tried to identify some unpublished data with a written protocol for the meta-analysis. Primary outcome was overall survival (OS) and data analysis used Cox regression models stratified for study. SUV was used as a binary covariate (cut-off: median value for each study).

Results: Data were collected for 1462 patients (out of 2596 identified patients) from 10 publications and 1 unpublished series (median age: 64 years, gender: 61% male, 55% squamous cell, 45% adenocarcinoma, stage I: 49%, II: 8%, III: 32%, IV: 12%). Lower SUV was significantly associated with female gender, smaller tumour size, earlier stage and adenocarcinoma. Analyzing OS, univariate hazard ratio for SUV was 1.44 (95% CI: 1.23-1.68) without important heterogeneity in subgroups except for stage IV. When adjusted for stage, histology, age, tumour size and gender, HR estimate for SUV effect was 1.62, statistically significant in all subgroups except for stage IV. Prognostic power for SUVm was 50%.

Conclusions: This meta-analysis based on individual patients data shows that SUV is an independent prognostic factor for OS, at least in non metastatic stage. Selection bias and methodological differences are however present and further prospective studies are needed.

P2751
Is our preoperative TNM staging reliable?

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Introduction: Agreement between preoperative and surgical TNM staging is usually <50%.

Aim: To compare our preoperative staging (cTNM) with surgical-pathological staging (pTNM).

Methods: Cross-sectional study of patients with lung cancer surgically treated from 1-1-08 to 31-12-09, excluding relapses or neoadjuvant therapies. Preoperative stag-

ing based on: CT scan, positron emission tomography (PET-CT), endobronchial ultrasonography (EBUS), endoscopic ultrasonography (EUS), mediastinoscopy. Agreement between cTNM and pTNM (according to 1997 TNM classification) was analyzed.

Results: 166 cases (characteristics in table 1). In table 2, concordance between cTNM and pTNM. cTNM and pTNM matched in 80 cases (48,2%), understaging occurred in 5 cases (3%) and overstaging in 81 (48,8%). But in most cases, this lack of agreement would not suppose changes in the therapeutic decision, just in 21 cases (12,5%) the cTNM carried out a wrong therapeutic procedure (18 N2 found in thoracotomy and 3 T4 unresectables). TC and PET-TC used in all cases, EBUS in 35, EUS in 2 and mediastinoscopy in 3. In N staging, PET-CT was cN0 in 133 cases (where 7 were pN2, 5,2% and cN1 21 (8 pN2, 25,8%). We performed 35 EBUS (33 cN0, 2 cN1) and final pN was N2 in 3 cases (FN rate 8,5%).

Conclusions: 1. Low agreement between cTNM and pTNM (48,2%), but only in 12,5% of cases would suppose a change in the treatment. 2. 25% of pN2 when cN1 by PET-CT (EBUS should be done). 3. When EBUS negative for N2, only 8,5% pN2.
P2753
Assessment of physical functioning in surgical candidates with non-small cell lung cancer: Preliminary comparison of performance status to symptom burden in a population undergoing pulmonary exercise testing
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Background: Performance status (PS) scoring systems are used routinely by clinicians to guide management of patients with non-small cell lung cancer (NSCLC). However, PS scoring systems are subjective with poor inter-rater reliability and do not provide an objective measure of functional status. The aim of this study was to compare the variability in an objective measure of cardiopulmonary fitness (VO2peak), among surgical candidates with histologically confirmed NSCLC across different PS categories as assessed by the Eastern Cooperative Oncology Group (ECOG) score.

Methods: Using a cross-sectional design, 389 subjects underwent an incremental cardiopulmonary exercise test with expired gas analysis to determine VO2peak prior to surgical resection.

Results: Mean VO2peak significantly declined across increasing ECOG categories (Table 1). There was a wide range in VO2peak in each ECOG category with similar ranges in VO2peak within groups, in particular in subjects classified as ECOG 1 and 2.

Table: Comparison of VO2peak to ECOG PS in NSCLC

<table>
<thead>
<tr>
<th>ECOG</th>
<th>VO2peak (ml kg–1 min–1)</th>
<th>Mean VO2peak (ml kg–1 min–1)</th>
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</table>

Conclusions: VO2peak may provide a more sensitive evaluation of physical functioning than ECOG. Accurate assessment of functional status may have important implications for mortality risk and therapeutic management in the oncology setting.

P2754
Comparison of predictive respiratory function parameters of lung cancer patients having COPD diagnosis with postoperative and relation with mortality and morbidity
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Introduction and aim: Lung cancer with COPD increases surgical morbidity and mortality. In this research, non-small cell lung cancer (NSCLC) patients with COPD diagnosis with postoperative and relation with mortality and morbidity were investigated.

Methods: This research was planned in a prospective manner. 46 NSCLC patients having pulmonary resection were grouped into 2. Group A: 23 moderate COPD patients. Group B: 23 non-COPD patients. We checked patients for respiratory function tests, DLCO and arterial blood gases. Group A was also checked for ventilation/perfusion scintigraphy and VO2max. We calculated predictive preoperative FEV1 and DLCO. We repeated respiratory function and DLCO tests during postoperative 1st, 3rd and 6th months.

Results and conclusion: There wasn’t any significant difference between 2 groups over demographic data, operative skill, stage of cancer and type of resection (p>0.05). Mortality and morbidity rates of Group A were significantly higher than Group B. Group A patients reached predicted results in 1st month and FEV1, DLCO results gained at 6th month were higher than predicted. In both groups, especially in Group B, best remarkable indicator for prediction of postoperative complications was DLCO%.

Conclusions: Every patient going on pulmonary resection, should be tested for DLCO decline under Ctbv for not only complications but further attention. Moreover baseline lung function parameters do not impact treatment failure.

P2756
Radiofrequency ablation of lung neoplasms in patients being no candidates for surgery. The impact of the intervention on the pulmonary function
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Introduction: CT guided percutaneous Radio Frequency Ablation (RFA) of pulmonary lesions is an alternative option for patients being no candidates for surgery. The pulmonary function should not be impaired substantially by the procedure. In this study the pulmonary function subsequent to RFA of lung neoplasms as well as the morbidity related to the intervention was analyzed.

Methods: A total of 26 CT guided percutaneous RFA procedures were performed (in a total of 16 patients) after discussion in the national comprehensive cancer centre due to limited pulmonary reserve or other co-morbidities. Histology was proofed by CT guided percutaneous biopsy (NSCLC: n=22, pulmonary metastasis: n=4) prior to the RFA procedure.尚 belongs to the lung function test (ICT). Morbidity related to the intervention and the pulmonary function subsequent to the intervention was analyzed.

Results: The median forced expiratory volume (FEV1) pre RFA was 1.7l (range 0.7-2.9l; 65%, range 38%-129%). It was unchanged post RFA: 1.6l (range 1.1-2.4l; 64%, range 38%-118%) during median 160d follow-up (range 28-393d). Pneumothorax requiring drainage as solely major complication occurred in 6/26 procedures (23%). Median hospitalization time was 5 days (range 4-12 days). Local control by CT was reached in all cases; systemic disease progress was verified by PET in 4 patients.

Conclusions: Mid-term change in pulmonary function due to pulmonary RFA has a negligible clinical impact. Therefore RFA seems to be suitable especially in patients with severely limited pulmonary function, if other local strategies are unfeasible.

P2757
Is radiologic evidence of interstitial infiltrate enough to predict FEV1 and DLCO disparity in lung cancer patients?
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Guidelines have been established for the physiological evaluation of lung cancer patients considered for surgery. While some recommend routine measurement of DLCO, others require this measure if there is evidence of interstitial disease, relying on FEV1 alone in most cases. Our objective in this study was to evaluate if radiologic evidence of interstitial disease is a good predictor of disparities between FEV1 and DLCO. We studied a sample of 50 patients with NSCLC referred to perform lung function measurement. Based on clinical, CT image combinations, patients were divided into two groups according to presence of interstitial disease. The correlation between FEV1 and DLCO was tested.

Results: 48 individuals completed the study. 11 patients had diffuse interstitial disease in CT (Group ICT) while 37 patients had no signs of interstitial pattern (Group NCT). Both groups were similar in terms of age, gender and BMI. Mean DLCO% predicted was lower in ICT group 42 x 6% (p=0.01) VEI1 and TLC were also significantly lower in ICT. 7 patients in ICT and 32 in NCT had an obstructive pattern on spirometry (p=NS).

509s
FEV1 and DLCO had a significant correlation (R=0.376 p=0.009). The same analysis for both groups showed that FEV1 and DLCO correlated better in ICT (R=0.630 p=0.03) than in NCT (R=0.249 p=NS). In NCT group, 10 from 14 patients with COPD had impaired diffusion capacity. Interstitial infiltrate predicts impaired lung function and diffusion capacity but disparities between FEV1 and DLCO are more frequent in lung cancer patients without diffuse interstitial pattern. These findings support the routine assessment of DLCO in patients who are candidates for surgical treatment of NSCLC.

Lung function in lung cancer – Room for improvement?
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COPD and lung cancer both have clear associations with cigarette smoking and frequently present late. The aim of the study was to identify whether newly diagnosed lung cancer patients had spirometry consistent with undiagnosed COPD or had COPD which was undiagnosed.

The clinic and discharge letters of all patients diagnosed with lung cancer at Southend University Hospital in 2010 were reviewed for a previous diagnosis of COPD and their spirometry at the time of diagnosis. Of the 189 patients diagnosed with lung cancer in 2010, 136 (52.2% female) had documented spirometry at the time of diagnosis and were therefore included in the database. Of these, 43 patients (31.6%) had been previously diagnosed with COPD, and 90.7% of these were on appropriate treatment for their COPD. 59 patients (43.4%) had spirometry consistent with COPD but had not been diagnosed or treated for COPD; 11 (18.6%) mild COPD, 31 (52.5%) moderate COPD and 17 (28.8%) severe COPD.

Many patients with lung cancer have undiagnosed COPD. The high rate of undiagnosis and under treatment during lung cancer is suggestive of either an unwillingness or the inability of primary care to diagnose COPD and other respiratory disease. Both may be associated with the late presentation in the UK of many patients with lung cancer. Earlier diagnosis and management of COPD might result in improved lung function and performance status thus allowing more aggressive management of lung cancer and also lead to a greater awareness of symptoms thus resulting in earlier presentation.

Lung cancer size and thoracic lymph nodes metastatic involvement: A correlation
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Objective of the study was to determine the frequency of lymph node metastases depending on the lung cancer size.

Material of the investigation included 136 lung resection samples obtained on surgery of the lung cancer patients, 114 males and 22 females at the mean 54.8 years of age.

Results and discussion: Squamous carcinoma was the most frequent lung cancer type (66.9%), followed by adenocarcinoma (27.2%), while small-cell (4.4%) and largest (1.2%) cancer types were more rarely found. Metastatic involvement of the lymph nodes was discovered in 80 (56.7%) of 136 examined lung resection samples. The total of 489 thoracic lymph nodes were examined and metastases found in 207 (40.3%). The tumors sized 1.1-2.3 cm metastasized in 47% of the lymph nodes; the tumors sized 2.1-3.0 cm involved 32.7% of the lymph nodes by metastases; the tumors sized 3.1-4.0 cm metastasized in 36.3% of the thoracic lymph nodes; the tumors sized 4.1-5.0 cm involved 36% of the lymph nodes by metastases; the tumors in the size of 5.1-6.1 cm metastasized in 28.6% of the lymph nodes while those of over 6 cm in diameter involved 69% of the lymph nodes by metastases.

Conclusion: The number of lymph nodes involved by metastases does not increase with the size of the tumor of up to 6 cm, however, a further increase of the tumor size (over 6 cm in diameter) significantly increases the number of metastatic lymph nodes.

FNA of palpable supraclavicular lymph nodes in lung cancer: Comparison between palpation and ultrasound
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Introduction: Clinical evaluation of the supraclavicular region is important for patients with suspected lung cancer as it is estimated that 26-42% of them had metastases to supraclavicular lymph nodes at diagnosis. Fine needle aspiration (FNA) cytology provides an easy method of obtaining both a diagnosis and pallable supraclavicular lymph nodes. All patients underwent US and palpation guided FNA at the same time. Samples were studied by immunohistochemical tests.

Results: Sixty-four out of 71 patients had positive cytology by US (sensitivity: 93%) while the sensitivity of palpation was 90% (62/69). Seven patients underwent surgical sampling of lymph nodes and the diagnoses were: 3 patients with adenocarcinoma, 2 with small cell lung cancer (SCLC) and 2 M. tuberculosis. Cytological diagnoses by FNA were: SCLC (23 patients), adenocarcinoma (22), squamous (7), undifferentiated non-small cell lung cancer (NSCLC) (6), unknown origin (2), lymphoma (2), carcinoma (1), and large cell carcinoma (1).

Conclusion: FNA of palpable supraclavicular lymph nodes using clinical examination among patients with suspected lung cancer is a safe, cost-effective and as accurate as US guided method.
Table 2

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Conclusion: Good pick up rate with complications well within acceptable standards were achieved in our study population. Depth of the lesion correlated well with pneumothorax and hemorrhage while size correlated with pneumothorax. Size was also a good predictors of conclusive biopsies.

P2763
The frequency and significance of radiologically detected indeterminate pulmonary nodules in patients with colorectal cancer
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Background: This study aims to investigate the frequency and significance of indeterminate pulmonary nodules in patients with non-metastatic CRC.

Methods: We retrospectively evaluated 1344 patients with CRC who underwent thoracic CT scans between the years January 2003-December 2009. Those with evident metastatic disease or already known to have pulmonary malignancies were excluded.

Results: Among all patients assessed, 55 (0.4%) of them had nodules that met the criteria of indeterminate pulmonary nodule. We analyzed the cases by size and number of nodules. A multivariable analysis demonstrated that indeterminate pulmonary nodules with irregular border (p=0.002), parenchymal localization (p=0.016) and being multiple in number (p=0.006) were predictors of metastatic disease.

Conclusion: The characteristics of indeterminate pulmonary lesions in CRC cases with no evidence of metastasis elsewhere have to be defined more comprehensively. We believe that for appropriate decision of the frequency for follow-up interval, further studies are required.