for TGF beta (TGFBR2; $p = 0.014$) and sex-determining region Y-box 9 (SOX9; $p = 0.038$). Tumors in non-smoking females exhibited 4-fold higher PgR expression ($p < 4 \times 10^{-4}$) and 2-fold higher androgen receptor expression (AR; $p < 2 \times 10^{-4}$) compared to their smoking counterparts. NLT in smokers vs. in non-smokers was characterized by higher expression of AHR and RRAD ($p = 0.01$ and $p = 7x10^{-3}$; not corrected). Tumors in smokers exhibited exclusive and significant 44-fold overexpression of aldo keto-reductase (AKR1B10) in contrast to tumors in non-smokers and NLT in both smokers and non-smokers ($p = 7x10^{-6}$). Tumors in both smokers and non-smokers overexpressed survivin (BIRC5; more than 7-fold; $p = 1x10^{-7}$) and nicotine receptor for acetyl-choline subunit A6 (CHRNA6; 4-fold; $p = 1x10^{-7}$) compared to NLT. Expression of CHRNA6 in tumors was higher in non-smokers than in smokers ($p = 0.03$; not corrected). P16 (CDKN2A) was expressed at a low level in NLT in both smokers and non-smokers, however, its expression was 5-fold higher in tumors, particularly in non-smokers ($p = 7 \times 10^{-4}$). Expression of TGFBR3 and TGFBR2 was lower in tumors compared to NLT. TGFBR2 expression in tumor samples was higher in non-smokers than in smokers.
Conclusions: NSCLC is characterized by a specific gene expression profile related to smoking history. Some of the analyzed genes seem to play a role in adaptive response of lung tissue to smoking insult (RRAD, AHR, SOX). The overexpression of PgR and AR in non-smoking women suggests possible hormonal dependence. Some other molecular distinct features (e.g. downregulation of RRAD, TGFR2 and TGFR3) may prompt new therapeutic strategies.

9042 POSTER

Pre-operative radiological staging (CT and PET-CT) compared with pathological staging in patients with resected non-small cell lung cancer attending a regional thoracic centre

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Background: Accurate clinical staging of NSCLC is essential in order to identify resectable patients. Clinical staging is based upon CT and more recently PET/CT in those deemed resectable. We have compared CT and PET/CT staging of NSCLC with pathological staging to determine their impact on pre-operative staging.
Materials and Methods: Patients referred from 10 hospitals (2 tertiary centres, 8 district general hospitals) that underwent lung resections at Birmingham Heartlands Hospital between August 2006 and August 2008 were identified using the pathology database. Medical records including CT and PET/CT, MDT discussions and mediastinoscopies were reviewed. Pre-operative staging using AJCC criteria was compared to pathological staging.
Results: 154 patients were identified and 135 patients were suitable for analysis. 20 patients were excluded (not NSCLC or insufficient data). The mean age of patients was 66 years (46−83); 82 were male, 53 were female. Pathological findings were correlated with CT in 124 patients and with PET/CT in 99 patients. CT correctly T staged 71 patients (57%), 30 patients (24%) were over-staged and 23 patients (19%) were under-staged. CT correctly N staged 67 patients (54%), 25 patients (20%) were over-staged and 32 patients (26%) were under-staged. CT staged 22 patients as T1NO. 15 underwent PET/CT and of these 7 were correctly staged, 3 had upstaged T staging, and 5 had a higher pathological T stage. In the 7 patients who did not undergo PET/CT, 4 had a higher pathological T stage. PET/CT ruled out metastatic disease in 4 patients. 46 (63%) were correctly N staged, 13 (13%) were over-staged (these had negative mediastinoscopy) and 11 (11%) were under-staged. No patient had inappropriate surgery.
Conclusion: Our data confirms the use of CT in T staging and PET/CT in assessing nodal and distant disease. The role of PET-CT in T1N0 disease remains unclear. Targeted mediastinoscopy was useful in 13% of patients. This data emphasises the role of multidisciplinary working in the management of NSCLC.

9043 POSTER

Computer-assisted prediction of microscopic disease extension around non-small cell lung cancer using a pathology-validated PET/CT classifier

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Background: In radiotherapy planning of non-small cell lung cancer (NSCLC), uncertainties exist about potential presence of microscopic disease extension (MDE) around the CT-visible tumor. Prior studies have shown that these additional tumor foci may extent up to 15 mm from the edge of the visible tumor. The primary aim of this study was to develop a computer-assisted prediction model to distinguish between lung cancers of limited extent (MDE absent) and extended lung cancers (MDE present).
Methods and Material: Thirty-four patients undergoing a lobectomy for treatment of NSCLC underwent CT- and PET prior to surgery. The excised lung lobes were examined at pathology for the presence of MDE. The tumor was delineated on the CT scans by an experienced radiotherapist; on the PET scans the tumor was automatically delineated using a threshold of 42% of the maximum value. Imaging features at CT (tumor volume, mean CT Hounsfield unit (HU), shape, irregularity) and at PET (tumor volume, max SUV) were semi-automatically extracted and tested for possible correlations with the presence of MDE. Tumor type (presence/absence) of adenocarcinoma was considered as well. Using multivariate logistic regression with backward feature selection, a subset of features was obtained that is associated with presence or absence of MDE. Receiver operating characteristics (ROC) analysis was performed to quantify the performance of the model.
Results: MDE was found in 18 of the 34 patients. The tumor volume and mean HU within the tumor showed weak, but statistically significant correlation with the presence of MDE ($p = 0.01$ for both CT and PET volume and $p = 0.02$ for the mean HU). Multivariate analysis yielded a two-parameter model (mean HU and tumor circularity) with ability to distinguish between presence (high HU and low circularity) and absence of MDE (area under ROC curve 0.82). At the 90% sensitivity point on the ROC curve, 14 patients were identified by the model who may be potential candidates for smaller treatment margins.
Conclusions: We developed a pathology-validated model based on pre-treatment PET/CT to stratify NSCLC patients into two groups: high-risk and low-risk of microscopic disease extension. Our results suggest that the model may reduce treatment margins in 41% of patients, but further validation in larger clinical study is required.

9044 POSTER

Curative surgery in oligometastatic non-small cell lung cancer patients

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Background: Patients (pts) with metastatic non-small cell lung cancer (NSCLC) have a poor prognosis, with a median survival (MS) usually measured in months. Chemotherapy is considered the standard of care, whereas surgery and radiotherapy are reserved for symptoms relief. Retrospective reports suggest that - in selected pts with a solitary site of metastases (SSM) - radical treatment of the primary disease as well as of the metastatic site may provide long-term survivals. The aim of this review was to investigate the outcomes and extent of adoption of this therapeutic approach.
Methods: MEDLINE search of all the studies published in English between January 1990-December 2008; and ASCO abstract database search over the period 2003−2008. Combinations of the following keywords were used: “non-small cell lung carcinoma”; “NSCLC”; “oligometastatic”; “solitary/isolated metastasis”; “metastasectomy”; “adrenalectomy”; “brain/adrenal/lung metastasis”. A database was created with main pt and disease characteristics, type and site of radical treatment and pt outcomes.
Results: The data of 643 oligometastatic pts were collected. Median age varied between 32−85 years. Three-hundred and fifty-eight pts presented with isolated brain lesions (group 1); 196 pts with adrenal metastases