imaging biomarkers have potential role in personalized therapy of EGFR positive brain metastasis in NSCLC.

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**73P**

**PET and neck US for the detection of cervical lymphadenopathy in patients with lung cancer and mediastinal lymphadenopathy**

M. Ahmed  
*Respiratory Medicine, Galway University Hospital, Galway, Ireland*

**Background:** Cervical lymph nodes are frequently involved in patients with lung cancer and indicate inoperability. Some guidelines recommend neck ultrasound (NUS) in patients with bulky mediastinal lymphadenopathy. Positron emission tomography (PET) is indicated for patients with potentially curable disease. We aimed to assess the diagnostic yield of NUS and the diagnostic accuracy of PET for cervical lymphadenopathy among patients with suspected lung cancer and mediastinal lymphadenopathy.

**Methods:** Records of all patients with lung cancer who underwent a NUS over a consecutive 5-year period were reviewed. Only patients with mediastinal lymphadenopathy on CT were included. The diagnostic accuracy of PET was assessed with NUS-guided fine needle aspiration cytology used as the reference test.

**Results:** During the study period 123 patients met the inclusion criteria. Malignant cervical lymphadenopathy was confirmed in 39.8% (95% CI 31.1–49.1%). PET-CT had a specificity of 81.1%, sensitivity of 87.5%, negative predictive value of 96.8% and positive predictive value of 50% for the detection of cervical lymphadenopathy, and it contributed no additional staging information in the neck area. Overall, PET led to changes in management in only 2.2% of cases.

**Conclusions:** A significant proportion of patients with lung cancer and mediastinal lymphadenopathy have cervical lymphadenopathy detected by NUS. In this group of patients PET offers minimal additional value in staging and management.

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**74P**

**Spatial concordance of tumor proliferation and accelerated repopulation from pathologic images to 18F-FLT PET images: A basic study guided for PET-based radiotherapy dose painting**

C.M. Li¹, X. Meng²  
¹Radiotherapy, Shandong Cancer Hospital, Jinan, China; ²Shandong Cancer Hospital, Jinan, China

**Background:** PET imaging with ¹⁸F-fluorothymidine (¹⁸F-FLT) can potentially be used to identify tumor subvolumes for selecting dose escalation in radiation therapy. The aim of this study was to monitor tumor cell proliferation and repopulation during fractionated radiotherapy and investigate the spatial concordance of tumor cell proliferation and repopulation with ¹⁸F-FLT tracer uptake.

**Methods:** Mice bearing A549 xenograft tumors were assigned to 5 different irradiated groups (3f/6d, 6f/12d, 9f/18d, 12f/24d and 18f/36d) with 2 Gy/fractions and non-irradiated group. Serial ¹⁸F-FLT micro PET scans were performed at different time points, the maximum of standard uptake value (SUVmax) were measured to detect the feasible time of tumor repopulation during irradiation. Ex vivo images of the spatial pattern of intratumor ¹⁸F-FLT uptake and Ki-67 labeling index (LI) were obtained from thin tumor tissue sections. A layer-by-layer comparison between SUVmax and Ki-67 LI results, including the thresholds at which maximum overlap occurred between FLT-segmented areas and areas of active cell proliferation, were conducted to evaluate the spatial imaging pathology correlation.

**Results:** The SUVmax were observed decreases in the 3f/6d group (P = 0.000), compared to these for non-irradiated tumors. However, it was significantly increased in the 6f/12d later, and then gradually reduced with treatment time prolonged again after 6f/12d group. Proliferation changes on pathology imaging at 6f/12d were also confirmed. Significant correlations were found between the SUVmax and Ki-67 LI of all ROIs in each *in vitro* tumor of cell proliferation group (Ps < 0.001). Similar results were also found in each tumor of accelerated repopulation group (Ps < 0.001). Furthermore, both the mean ORRs were more than 50% in all layer of the tumor cell proliferation and accelerated groups. Regions of high-intensity ¹⁸F-FLT uptake in the autoradiographs exhibited prominent staining for Ki-67.

**Conclusions:** ¹⁸F-FLT PET may be a promising imaging surrogate of tumor proliferative response to fractionated radiotherapy and might help make adaptive radiation oncology treatment plan.
76P
Robustness of radiomic features in [18F]-FDG PET/CT and [18F]-FDG PET/MR

D. Vuong1, M. Bogowicz1, M. Huellner2, P. Veith-Haibach2, N. Andratschke1, J. Unkelbach1, M. Guckenberger4, S. Tanadini-Lang1 1Department of Radiation Oncology, University Hospital Zürich, Zurich, Switzerland; 2Department of Nuclear Medicine, University Hospital Zürich, Zurich, Switzerland

Background: Radiomics is a promising tool for identification of new prognostic biomarkers. However, image reconstruction settings may affect the absolute values of radiomic features, which reduces their value as reliable biomarkers. PET/MR is becoming more available and often replaces PET/CT. The aim of this study was to quantify to what extend [18F]-FDG PET/CT radiomics models can be transferred to [18F]-FDG PET/MR.

Methods: Nine patients with non-small cell lung cancer underwent first an [18F]-FDG PET/MR scan followed by an [18F]-FDG PET/CT scan (SIGNA PET/MR and Discovery PET/CT 690, GE Healthcare) with a delay time of 38 min +/-5 min. Patients had one single FDG injection for both scans. The primary tumors were segmented independently on the PET scans from PET/CT and PET/MR with two semi-automated methods (gradient-based and threshold-based). Resampling was performed to the lowest resolution. In total, 1358 radiomic features were calculated, i.e. shape (18), intensity (17), texture (137), wavelets (1186). The intra-class correlation coefficient was used to compare the radiomic features in both image modalities. An ICC >0.9 was considered stable among both types of PET scans.

Results: The median relative volume difference of the tumors segmented on PET/CT and PET/MR was 4.8% (range 0.4-39.9%) for the gradient-based and 18.0% (range 0.7-71.2%) for the threshold-based method. A larger number of radiomic features was stable using the gradient-based method compared to the threshold-based method, which concurs with the improved reproducibility of tumor volume using gradient-based method. More than 70.6% of shape and intensity features yielded an ICC >0.9 among both segmentation methods. However, only 51.5% of texture and 27.2% of wavelet features reached this criterion (for gradient-based and even less in threshold-based method). In the wavelet features analysis, more features were robust in smoothed images (low-pass filtering) in comparison to images with emphasized heterogeneity (high-pass filtering).

Conclusions: Shape and intensity radiomic features were robust comparing the two types of [18F]-FDG PET scans (PET/CT and PET/MR). In contrast, texture and wavelet features showed reduced stability, which needs to be considered for their use in prognostic modelling.

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77P
Is there an incremental benefit with 68 Ga DOTA PET/CT in staging of broncho-pulmonary carcinoid tumors?

G. Karimundackal Surgical Oncology, Tata Memorial Hospital Centre, Mumbai, India

Background: The staging of well differentiated bronchopulmonary neuroendocrine tumours (carcinoids) is complicated by the unpredictable incidence of nodal and distal metastases. PET CECT which has become the standard for staging of lung cancers has proven ineffective in the staging of carcinoid tumours. 68 Ga DOTA NOC PET/CT which depends on radio-tracer uptake in somatostatin receptors appears to be an attractive modality for the staging of these neuroendocrine tumours.

Methods: We performed a retrospective analysis of patients who underwent 68 Ga DOTA NOC PET/CT followed by surgical resection from October 2014 to November 2017. Data was retrieved regarding demographics, standardized uptake value (SUV), surgery performed and final histopathology report including degree of differentiation, nodal positivity and Mib index. The study included only patients who underwent resection since the focus of the study on corelation with histopathological features. An attempt was made to corelate the SUV with diagnosis of typical vs atypical carcinoid, nodal metastases and Mib index.

Results: During the study period 38 patients underwent surgical resection following DOTA PET. All details of imaging including SUV were available for 35 patients, while complete histopathological details were available for 37 patients. DOTA PET was not able to differentiate between typical and atypical carcinoids (32 vs 3) based on SUV. The mean SUV of typical carcinoids was 41.4(SD-39.4) whereas that of atypical carcinoids was 34.4(SD-41.2) whereas that of atypical carcinoids was 34.4(SD-39.4) and the difference was not statistically significant (p = 0.7). 6/37 cases had nodal metastases of which