specificity, positive likelihood ratio and negative likelihood ratio for PSMA-PET are calculated as 95.00% (75.13 - 99.87%), 85.71% (42.13 - 99.64%), 6.65 (1.08 - 40.94) and 0.06 (0.01 - 0.40) respectively. **Conclusion:** $^{68}$Ga-PSMA-11-PET shows good estimated sensitivity and specificity for HCC diagnostics and might therefore be a valuable tool in the diagnostics of focal liver lesions. However, $^{68}$Ga-PSMA-11-PET might be of limited value in liver transplanted patients. **References:** None.

EP-27

## Clinical -> Diagnostic study -> Adult study -> Oncology study -> Organ-based oncology -> Lung, malignant

October 12 - 16, 2019 e-Poster Area

## EP-0412

### Metabolic Active Tumour Volume Quantified on [$^{18}$F]FDG PET/CT Further Stratifies TNM Stage IV Non-Small Cell Lung Cancer Patients

*H. C. Martins*[1], *P. Lapa*[1,2], *B. Oliveiros*[3,4], *M. Silva*[1], *R. Silva*[1,5], *T. Saraiva*[1], *R. Ferreira*[1,5], *G. Costa*[1,2], *J. Pedroso de Lima*[1,2,5];
[1]*Centro Hospitalar e Universitário de Coimbra, Coimbra, PORTUGAL,* [2]*Faculty of Medicine, University of Coimbra, Coimbra, PORTUGAL,* [3]*Laboratory of Biostatistics and Medical Informatics, Faculty of Medicine, University of Coimbra, Coimbra, PORTUGAL,* [4]*Institute for Biomedical Imaging and Life Sciences, Faculty of Medicine, University of Coimbra, Coimbra, PORTUGAL,* [5]*Institute of Nuclear Sciences Applied to Health-ICNAS, University of Coimbra, Coimbra, PORTUGAL.*

**Aim/Introduction:** Lung cancer remains the leading cause of cancer mortality. The recently revised eighth edition of the TNM staging system defines new T and M descriptors and updates stage groupings, for non-small cell lung cancer (NSCLC), in the effort of improving prognostic accuracy. However, even with the new staging system, there are still substantial differences in the overall survival in patients in the same stage, with similar pathological and clinical characteristics. Stage IV consists of a very heterogeneous group of patients, with very different prognosis and an accurate estimate of the prognosis of patients with advanced NSCLC is essential before starting any palliative treatment strategy.The aim of this work was to investigate if the quantitative parameter whole body metabolic active tumour volume (MATV-WB) allows for improved stratification of TNM stage IV NSCLC patients. **Materials and Methods:** Initial staging [$^{18}$F]FDG PET/CT of 124 NSCLC TNM stage IV patients, performed between January 2010 and July 2018, 53 (42,7%) stage IVA and 71 (57,3%) stage IVB patients, 32 (25.8%) women, 92 (74.2%) men, aged 34-88 years (mean±SD: 66.1±10.6), were retrospectively evaluated, and MATV-WB was quantified. Each patient's follow-up time was recorded: 0.53-98.9 months (mean±SD: 17.0±16.8). An ideal MATV-WB cutoff was determined, and a binary variable was created: cutoff>MATV-WB≥cutoff. Subsequently, the MATV-WB, with the defined cutoff point, and TNM predictive capacity for overall survival (OS) time was evaluated and compared. The SPSS software (version 23; IBM Corp.) and R (R Foundation for Statistical Computing) software were used for the statistical analysis of the data. **Results:** MATV-WB was an independent and statistically significant predictor of OS (p<0.001). The OS predictive ability of MATV-WB was similar than TNM: MATV-WB C Index (95% CI)=0.653 (0,650-0.655); TNM stage C Index (95%CI)=0.562 (0.560-0.565); p (95%CI)=0.018 (0.015-0.021). The optimal cutoff point for MATV-WB was 114.5 (p<0.001). Estimated mean OS times of 29.5±4.0 (95%CI: 21.7-37.3) and 8.7±1.1 (95%CI: 7.5-11.8) (p<0.001), one-year survival rate (SR) (%) of 63.2±5.8 and of 35.7±6.4, and five-year SR (%) of 12.2±5.3 and no survivors, were determined, respectively, for patients with MATV-WB<114.5 and MATV-WB≥114.5. MATV-WB with the defined cutoff point seems to be a better predictor of the estimated mean OS time (MATV-WB: HR=2.541 (p<0.000); TNM: HR=1.476 (p<0.068). **Conclusion:** In NSCLC stage IV patients, MATV-WB, quantified on initial staging [$^{18}$F]FDG PET/CT, allows for improved stratification of these patients, which may contribute to the development of more personalized therapeutic strategies. **References:** None.

## EP-0413

### Joint compensation for motion and partial volume effects in PET/CT images of lung cancer patients: impact on quantification for different image reconstruction methods

*S. Rezaei*[1,2], *P. Ghafarian*[3,4], *A. Jha*[5,6], *A. Rahmim*[7,8], *S. Sarkar*[2], *M. Ay*[1,2];
[1]*Department of Medical Physics and Biomedical Engineering; Tehran University of Medical Sciences, Tehran, IRAN, ISLAMIC REPUBLIC OF,* [2]*Research Center for Molecular and Cellular Imaging, Tehran University of Medical Sciences, Tehran, IRAN, ISLAMIC REPUBLIC OF,* [3]*Chronic Respiratory Diseases Research Center, National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, IRAN, ISLAMIC REPUBLIC OF,* [4]*PET/CT and Cyclotron Center, Masih Daneshvari Hospital, Shahid Beheshti University of Medical Sciences, Tehran, IRAN, ISLAMIC REPUBLIC OF,* [5]*Department of Biomedical Engineering, Washington University in St. Louis, St. Louis, WA, UNITED STATES OF AMERICA,* [6]*Mallinckrodt Institute of Radiology, Washington University in St. Louis, St. Louis, WA, UNITED STATES OF AMERICA,* [7]*Departments of Radiology and Physics, University of British Columbia, Vancouver, BC, CANADA,* [8]*Department of Integrative Oncology, BC Cancer Research Centrer, Vancouver, BC, CANADA.*

**Aim/Introduction:** To develop and rigorously evaluate an image-based deconvolution technique for joint compensation of respiratory motion and partial volume effects (PVEs) for quantitative oncologic PET imaging, including studying the impact of different image reconstruction methods on quantification performance. **Materials and Methods:** An image-

based deconvolution technique was proposed, incorporating wavelet-based denoising within the Lucy-Richardson algorithm to jointly compensate for PVEs and respiratory motion. The method was evaluated using phantom studies with signal-to-background ratios (SBR) of 4 and 8, and using data from 10 patients with 62 lung lesions. In each study, PET images were reconstructed using four different methods: OSEM with time-of-flight (TOF) information, OSEM with point spread function modelling (PSF), OSEM with both TOF and PSF (TOFPSF), and OSEM without PSF or TOF (OSEM). Contrast to noise ratio (CNR), coefficient of variation (COV), and maximum standardized uptake values ($SUV_{max}$) were measured within the tumours, and compared to images that were not processed using the joint-compensation technique. Furthermore, variabilities arising due to the choice of the reconstruction methods were assessed. **Results:** In phantom images, for all reconstruction methods, CNR and $SUV_{max}$ were higher in the images processed using the proposed compensation technique, particularly in small spheres. The mean CNR in all spheres was increased in our proposed method by 49.5%, 41.9 %, 44.9% and 38.9% for OSEM, PSF, TOF, and TOFPSF, respectively, in comparison with uncompensated images for 4:1 SBR, and by 30.6%, 27.4%, 38.0% and 33.6% for 8:1 SBR. Overall, incorporation of wavelet-based denoising within the Lucy Richardson algorithm improved CNR and COV in all cases. In patient data, the median values of the relative difference (%) of CNR for the compensated images in comparison to uncompensated images were 43.4%, 39.5%, 46.3% and 42.8% for OSEM-basic, PSF, TOF, and TOFPSF, respectively. Changes in motion amplitude, target size and SBRs in patient data resulted in significant inter-method differences in images reconstructed using different methods. Specifically, in small spheres, quantitative accuracy was highly dependent on the choice of the reconstruction method. **Conclusion:** Our results provide strong evidence that joint compensation, and in particular, incorporation of wavelet-based denoising, yielded improved quantification from PET images. The choice of the reconstruction method led to changes in quantitative accuracy, especially when the signal support is small. Overall, the reconstruction methods need to be carefully selected when applying compensation techniques. **References:** None.

## EP-0414

### SUV-derived Parameters Assessed on $^{18}$F-FDG PET/CT and Serum Tumor Markers Predict EGFR Mutation: a Retrospective Study of 191 Patients with Lung Adenocarcinoma

*R. Wang*[1,2], *X. Liao*[1], *M. Liu*[1], *Y. Cui*[1], *X. Chen*[1], *J. Zhang*[1];
[1]*Peking University First Hospital, Beijing, CHINA,* [2]*Peking University International Hospital, Beijing, CHINA.*

**Aim/Introduction:** Epidermal growth factor receptor (EGFR) mutation in non-small cell lung cancer (NSCLC) shows a dramatic response to EGFR-tyrosine kinase inhibitors (EGFR-TKIs) therapy in the clinic. To explore a noninvasive method for evaluating EGFR mutation status in lung adenocarcinoma (ADC) patients, we analyzed the potential roles of standardized uptake value derived parameters from $^{18}$F-FDG PET/CT combining with clinical characteristics. **Materials and Methods:** Data of 191 patients pre-treatment who underwent $^{18}$F-FDG PET/CT and EGFR mutation test for diagnosed ADC were collected. Cutoff points for all measuring parameters were calculated using receiver operating characteristic (ROC) analysis. The relationship of EGFR mutant status with four parameters based on $^{18}$F-FDG PET/CT [Maximum standardized uptake value (SUVmax), average of standardized uptake value (SUVmean), metabolic tumor volume (MTV), total lesion glycolysis (TLG)] and patients' clinical characteristics were evaluated respectively through univariate and multivariate Logistic regression. Predictive effectiveness of the model was obtained by using area under the curve (AUC) yielded by ROC analysis. **Results:** EGFR mutation-positive was showed in 33.0% of patients. EGFR mutation was found more frequently in patients with primary tumor of low SUVmean (< 5.29) (36.7% vs. 20.5%,), low MTV (< 8.13 cm³) (48.7% vs. 28.9%,), low TLG (< 256.37) (36.1% vs. 12.0%), and other clinical characteristics. In univariate Logistic regression analysis, SUVmean (< 5.29), MTV (< 8.13 cm³), and TLG (< 256.37) of the primary tumor were significantly relevant with EGFR mutation. Then the multivariate regression analysis with age adjustment revealed that women (OR = 2.106), low MTV (< 8.13 cm³: OR = 3.008), high CA19-9 (≥ 10.34 U/ml: OR = 2.066), and high proGRP (≥ 38.44 pg/ml: OR = 2.611), were independent significant predictor for EGFR mutation. The initial and adjusted AUC which was yielded by the ROC curve analysis for the predictive value of these factors were 0.721 and 0.723 respectively.The primary tumor size (p = 0.017) and MTV (p = 0.005) with in-frame deletion in exon 19were significantly higher than those with substitution mutation in exon 21. While there were no differences in the SUVmax, SUVmean and TLG between the different EGFR mutation types. **Conclusion:** Low SUV-derived parameters (SUVmean, MTV and TLG) might provide predictive value for EGFR mutation status to some extent. Especially, low MTV (<8.13cm³) was an independent predictor and could be integrated with other clinical factors (women, high CA19-9, and high proGRP) to enhance the discriminability on the EGFR mutation status in ADC patients. **References:** None.

## EP-0415

### $^{18}$F-FDG PET/CT In Pulmonary Sarcomatoid Carcinoma And Correlation With Clinicopathological And Genetic Results

*L. Jiang;*
*Shanghai Pulmonary Hospital, Shanghai, CHINA.*

**Aim/Introduction:** Pulmonary sarcomatoid carcinoma (PSC) is a rare subtype of non-small cell lung cancer with high aggression and poor prognosis. This study retrospectively investigated 2-deoxy-2-[18F]fluoro-D-glucose ($^{18}$F-FDG) positron emission tomography/computed tomography (PET/CT) imaging in PSC and correlation with clinicopathological and genetic findings. **Materials and Methods:** Pre-operative $^{18}$F-FDG PET/CT findings were retrospectively analyzed in 24 patients with