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Consideration of Serum Glucose Levels during Mediastinal Lymph Node Differentiation in Non-Small-Cell Lung Cancer by FDG-PET

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Purpose: Glucose and FDG compete for uptake by cancers. We aimed to improve the diagnostic accuracy of FDG-PET for determining the mediastinal lymph node (LN) status of NSCLC by considering serum glucose level. **Methods:** NSCLC patients (n=70) who underwent curative lung resection and mediastinal LN dissection within 1 month of FDG-PET were enrolled. MaxSUV was calculated using lean body weight and used to determine a new parameter (maxSUV×serum glucose level; maxSUV-GL). Immunostaining for glucose transporter-1 (Glut-1) was also performed. Histopathologic LN results were compared with maxSUV and maxSUV-GL values. **Results:** Of 71 LN stations whose FDG uptake could be measured, 21 were malignant and 50 benign. MaxSUV of LN had an area under the curve (AUC) of 0.729 (95% confidence interval: 0.610-0.827) by ROC curve analysis with a sensitivity of 47.6% (10/21), a specificity of 94.0 % (47/50) and a cutoff value of >3.3. Using maxSUV-GL the corresponding values were; AUC 0.825 (95% C.I.: 0.716-0.905) and sensitivity 76.2% (16/21), with cutoff value of >290.4, which represented a significant improvement ($p<0.01$) without compromising specificity 88.0 % (44/50) ($p>0.05$). A higher level of serum glucose was associated with a lower degree of FDG uptake despite Glut-1 expression. Glut-1 expression of LNs and primary masses was highly correlated each other ($p<0.01$). The exclusion of neo-adjuvant chemotherapeutic and diabetic patients resulted in a similar improvement in diagnostic accuracy. **Conclusion:** By considering serum glucose level during FDG-PET using the new parameter maxSUV-GL, sensitivity for malignant mediastinal LN was improved.

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NONIOINIC INTRAVENOUS CONTRAST AGENTS DOES NOT CAUSE CLINICALLY SIGNIFICANT ARTIFACTS IN 18F-FDG PET/CT OF PATEINTS WITH LUNG CANCER

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Purpose: This study was performed to evaluate the effects of intravenous contrast agents on semiquantitative values and lymph node stage of 18F-FDG PET/CT in patients with lung cancer. **Methods:** Thirty-five patients with non-small cell lung cancer were prospectively included. After whole body PET and non-enhanced CT images were acquired, subsequently enhanced-CT images were acquired with IV administration of 400mg iodinated contrast agent without positional change. PET images were reconstructed with both enhanced and non-enhanced CTs. For quantitative analysis, ROIs were placed on the each transaxial PET slice (lung mass, lymph nodes, metastatic lesions and normal structures) with 70% threshold of maximun pixel count, then SUVs were compared. To evalute effect of contrast agents on stage, we compared positivity of lymph node based on SUVs (SUVmax>3.5, SUVave>2.5). **Results:** The average difference of SUVmax between enhanced and non-enhanced PET/CT images were 0.64±0.60 (5.89%±3.91%) for lung lesion (n=41), 0.38±0.30 (6.27%±3.79%) for lymph nodes (n=76), 0.16±0.13 (3.30%±3.18%) for metastatic lesions (n=35, 28 bone, 4 liver, 3 adrenal gland) and those of SUVave were 0.19±0.17 (3.22%±3.01%), 0.12±0.09(2.86%±1.71%), 0.07±0.10(1.95%±3.86%), respectively. Only one lymph node changed from benign to malignant because of contrast artifact. There was no up or down staging in all patients after contrast enhancement. The average difference of SUVmax in normal structures between enhanced and non-enhanced PET/CT images were 0.15±0.10(8.53%±6.11%) for aorta, 0.13±0.11(5.77%±4.79%) for liver, 0.05±0.05(5.47%±6.81%) for muscle, 0.08±0.07(15.23%±13.19%) for contralateral lung of mass, 0.05±0.07(2.81%±3.05%) for bone marrow and those of SUVave were 0.14±0.08(10.51%±7.89%), 0.09±0.07(4.95%±3.89%), 0.03±0.05(5.20%±7.04%), 0.04±0.04(10.17%±9.00%), 0.03±0.03(2.49%±2.50%), respectively. **Conclusion:** Intravenous contrast enhancement in PET/CT may be used without clinically significant artifact.