Diagnostic Performance of Dual Tracer PET/CT in Staging Neuroendocrine Tumors of the Lung

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Background: Different positron emission tomography/computed tomography (PET/CT) tracers may be useful in staging lung neuroendocrine tumors (LNETs). The aim of this study was a) to calculate the diagnostic accuracy of PET/CT using two different tracers (Fluorine-18-fluorodeoxyglucose [FDG], a glucose analogue and Gallium-68-DOTANOC, a somatostatin analogue) in a series of patients with suspected LNETs and b) to correlate histology with PET findings to assess which is the best PET tracer for staging LNETs.

Methods: Twenty-nine patients (14 male/15 female; mean age: 64 y.o.) with suspected LNETs based on radiological and/or biochemical findings underwent PET/CT with FDG and Gallium-68-DOTANOC for presurgical staging. Detection rates of LNETs on a per patient-based analysis were calculated. Histology was used as reference standard. An exact Fisher’s test was used to correlate histology and PET findings.

Results: FDG-PET/CT was true positive in 12 cases, true negative in 6, false negative in 11. Gallium-68-DOTANOC-PET/CT was true positive in 18 cases, true negative in 6, false negative in 5. No false positive results were found. Pathology showed 12 typical carcinoids, 11 atypical carcinoids and 6 benign pulmonary lesions. Overall and histology-based detection rates are shown in Table. Discordant findings using both PET tracers were found in 69% of LNETs. Combining both PET methods, the detection rate was 100%. A significant association between histological type and PET findings with the two tracers was found (p<0.05).

Conclusions: Overall, the diagnostic performance of Gallium-68-DOTANOC-PET/CT is superior compared to FDG-PET/CT in staging LNETs, particularly in typical carcinoids. Nevertheless, FDG-PET/CT seems to be more useful in detecting atypical carcinoids compared to Gallium-68-DOTANOC-PET/CT. Both PET/CT methods should be performed when the histological subtype of LNETs is unknown.

Table

<table>
<thead>
<tr>
<th>23 lung NETs Histologically proved</th>
<th>Overall detection rate</th>
<th>Detection rate in typical carcinoids *</th>
<th>Detection rate in atypical carcinoids</th>
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</thead>
<tbody>
<tr>
<td>FDG-PET/CT</td>
<td>52.2% (CI95%:34.5-76.8)</td>
<td>16.7% (CI95%: 2.1-48.4)</td>
<td>90.9% (CI95%: 58.7-99.8)</td>
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<tr>
<td>Gallium-68-DOTANOC PET/CT</td>
<td>78.3% (CI95%:56.3-92.5)</td>
<td>100% (CI95%: 73.5-100)</td>
<td>54.5% (CI95%: 23.4-83.3)</td>
</tr>
</tbody>
</table>

Legend: CI95%: 95% confidence interval; * statistically significant difference (p<0.05) between the PET/CT methods