

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

**Giorgio Treglia<sup>1</sup>**; Antonella Stefanelli<sup>1</sup>; Giuseppe Cardillo<sup>2</sup>; Filippo Lococo<sup>3</sup>; Guido Rindi<sup>4</sup>; Vittoria Rufini<sup>1</sup>

<sup>1</sup>Institute of Nuclear Medicine, Catholic University of the Sacred Heart, Rome, Italy

<sup>2</sup>Department of Thoracic Surgery, San Camillo-Forlanini Hospital, Rome, Italy

<sup>3</sup>Department of Thoracic Surgery, Catholic University of the Sacred Heart, Rome, Italy

<sup>4</sup>Institute of Pathology, Catholic University of the Sacred Heart, Rome, Italy

**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**

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

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