How PET/CT Changed Management Strategy

Renata Milardović, M.D.
Nuclear Medicine
University–Clinical Center Sarajevo
Bosnia and Herzegovina
Indications for PET/CT in Lung Cancer:

1. Staging
2. Restaging
3. Evaluation of treatment response
4. Recurrence
5. Radiation therapy planning
Referring per Pathology:

- Lymphoma: 45
- Malignant melanoma: 19
- Lung: 18 (13.5%)
- Malignant Melanoma: 19
- Colorectal: 14
- Breast: 6
- Genitourinary: 5
- Head and neck cancer: 5
- Testicular: 3
- Thyroid: 3
- CUP: 2
- Other: 9

Number of Cases (n=133)

- Lymphoma (all types) remain the most common pathology referred to PET/CT
Main Subgroups of Lung Cancer:

WHO/IASLC (International Association for the Study of Lung Cancer) histological classification:

- Adenocarcinoma 40%
- Squamous cell carcinoma: 25%
- Large cell carcinoma: 10%
- Other: adenosquamous carcinomas with pleomorphic, sarcomatoid or sarcomatous elements
carcinomas with spindle and/or giant cells
carcinoid
carcinomas of salivary gland type
unclassified
<table>
<thead>
<tr>
<th>Stage Category</th>
<th>Description</th>
<th>Staging</th>
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<tbody>
<tr>
<td>Occult carcinoma</td>
<td>Occult carcinoma</td>
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<td>Stage IB</td>
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<td>T2aN1M0</td>
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<td></td>
<td>T2bN0M0</td>
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<td>Stage IIB</td>
<td>T2bN1M0</td>
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<td>Stage IIIA</td>
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<td>Stage IV</td>
<td>AnyT AnyN M1a,b</td>
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</table>
Staging, T,M:

T1a  (<2 cm)
T1b  (2–3 cm)
T2a  (<5 cm)
T2b  (5–7 cm)
T3   (>7 cm)
T3   chest wall, diaphragm, pericardium, mediastinal pleura, main bronchus <2 cm from carina, total atelectasis, nodule(s) in the same lobe
T4   mediastinum, heart, great vessels, carina, trachea, oesophagus, vertebra, nodule(s) in a different ipsilateral lobe

M1a nodule(s) in a contralateral lobe, pleural nodules, malignant pleural or pericardial effusion
M1b distant metastasis
Conventional Imaging (ceCT):

- Primarily used for determining the T stage

- Non-invasive staging of the mediastinum (sensitivity 51–64%, specificity 74–86%)

- Additional MRI useful in T4 cases for assessing mediastinal or vertebral ingrowth (Pancoast tumor)
PET/CT:

- Best for non-invasive determining of the N stage
- Should be performed in all patients candidates for surgery who have no evidence of metastatic disease on CT
- Biopsy is recommended if a LN is either >10 mm or PET positive
Case 1:

M, 72 y/o
Hx of lung cancer
P&H: Adenocarcinoma
CT of the thorax +
Clinical question: Preoperative staging

Hx

FDG-avid lesion R upper lobe
FDG + LN R hilum
FDG-avid lesion L ischium
Case 1:
Case 1:

Conclusion:

FDG–avid lesion right upper lobe is primary tumor
FDG–avid LN in the right hilum and subcarinally
Both adrenals hyperfunctional
Solitary focus in the left ischiadic bone
Disemminated

Tx changed from surgery to chemotherapy
Case 2:

F, 63 y/o
Hx of lung cancer
Metastasis to the ipsilateral lung (upper lobe)
P&H: Adenocarcinoma
Clinical question: Staging?

Hx

FDG-avid lesion L hilum
FDG-avid lesion L upper lobe
FDG + LN paraaortally
FDG-avid lesion sacrum
Case 2:
Case 2:

Conclusion:

FDG–avid lesion left hilum and parahillary is primary tumor
FDG–avid lesion left upper lobe intrapulmonary metastasis
FDG–avid LN paraaortally
Hypermetabolic focus in the sacrum

Tx changed from chemotherapy to radiotherapy first
Case 3:

M, 68 y/o
Lung cancer
Brain metastases
P&H: Squamocellular
St. post brain surgery
St. post chemotx
St. post radiotx
Clinical question: Re-staging?

Hx

Infiltrating FDG-avid lesion L hemithorax
Case 3:
Case 3:

Conclusion:
Postoperative brain focal cold lesion
Left hemithorax infiltrative mass FDG + in the hilar area and the periphery only. Mass infiltrates L pulmonary artery, L main bronchus, L lobar bronchi
Complete atelectasis L
Mediastinal shift
Pleural effusion
Pericardial effusion

No new dx information
Cardiac U/S
EF 65%
Takeaway message:

- TNM has changed
- PET/CT superior to ceCT in extrathoracic disease
- PET/CT cannot replace mediastinoscopy (but guides the sampling)