EBUS and Other Methods to Stage Lung Cancer

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  - Oncocyte
  - Prolung
  - Veracyte
  - Veran
Outline

- Why stage
- Is EBUS comparable
- Cases
- Summary
Staging

- Accurate staging is critical
  - Treatment options are stage dependent
  - Prognosis is based upon stage
  - Enrollment in clinical trials by stage
  - Provides a common language when discussing cases
  - Allows for study of large cohorts of patients
Overview of NSCLC Treatment

**Stage I**
- Surgery (Radiation if inoperable)

**Stage II**
- Surgery With Adjuvant Chemotherapy

**Stage III**
- Radiation With Chemotherapy
  - ? Adjuvant immunotherapy

**Stage IV or Recurrent Disease**
- Chemotherapy
  - Targeted Therapy
  - Immunotherapy
  - Supportive Care
Staging for Lung Cancer

Non-invasive Staging
- CT
- PET

Invasive Staging
- Non-surgical
  - EUS
  - EBUS
- Surgical
  - Mediastinoscopy
  - Anterior Mediastinotomy (Chamberlain procedure)
  - VATS
Question 1

The most accurate method to stage the mediastinum in a patient with known or suspected lung cancer is?

1. CT scan with contrast
2. Mediastinoscopy
3. PET scan
4. EBUS
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1. CT scan with contrast
2. Mediastinoscopy
3. PET scan
4. EBUS
Why do Invasive Staging?

Isn’t CT, PET good enough?
Why Do Invasive Staging?
Accuracy of CT and PET Staging
Mediastinal Lymph Nodes

Summary of 43 (CT) and 45 (PET) trials

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
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<tbody>
<tr>
<td><strong>CT</strong></td>
<td>55%</td>
<td>81%</td>
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<tr>
<td>N=7,368</td>
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<tr>
<td><strong>PET</strong></td>
<td>80%</td>
<td>88%</td>
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<tr>
<td>N=4,105</td>
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Confirmation of Intrathoracic Stage

Extensive Infiltration

CT neg. but central, adeno, N1

Peripheral clinical stage I
Radiographic Groups

Enlarged Nodes

- Radiographic group A
  - Mediastinal infiltration
    Encircles vessels & airways
  - Discrete lymph nodes can not be discerned or measured

- Radiographic group B
  - Mediastinal node enlargement
    Size of discrete nodes can be measured

Normal Nodes

- Radiographic group C
  - Central tumor or suspected N1 disease
    N2,3 nodal involvement relatively high

- Radiographic group D
  - Peripheral clinical stage I tumor
    Distant metastases or mediastinal involvement is low

Methods of Obtaining Tissue

- Mediastinoscopy
- Mediastinotomy
- Thoracoscopy
- Trans bronchial needle aspirate
- EUS with FNA
- EBUS with FNA
Complementary Access to Mediastinum

- Complementary Access of
  - EUS
  - Mediastinoscopy
  - Bronchoscopy
  - EBUS
Mediastinoscopy
Linear EBUS

Gomez M and Silvestri GA, PATS 2009
Mass

Lymph node

Trachea

Esophagus
Mass  Lymph node
## Accuracy of Staging Tests in Lung Cancer Patients

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number of Studies</th>
<th>N</th>
<th>Sens</th>
<th>Spec</th>
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<tbody>
<tr>
<td>Mediastinoscopy</td>
<td>33</td>
<td>9267</td>
<td>78</td>
<td>100</td>
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<tr>
<td>EUS</td>
<td>26</td>
<td>2443</td>
<td>88</td>
<td>100</td>
</tr>
<tr>
<td>EBUS</td>
<td>31</td>
<td>2756</td>
<td>89</td>
<td>100</td>
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<tr>
<td>EBUS/EUS</td>
<td>7</td>
<td>811</td>
<td>91</td>
<td>100</td>
</tr>
</tbody>
</table>

ACCP guidelines 2007: Many invasive techniques for the confirmation of the N2,3 node status are suggested as reasonable approaches (e.g., mediastinoscopy, EUS-NA, TBNA, EBUS-NA, or TTNA)

ACCP guidelines 2013: In patients with high suspicion of N2,3 involvement, either by discrete mediastinal lymph node enlargement or PET uptake (and no distant metastases), a needle technique (EBUS-NA, EUS-NA or combined EBUS/EUS-NA) is recommended over surgical staging as a best first test

Detterbeck F et al. ACCP 2 guidelines Chest 2007
Silvestri et al. CHEST 2013; 143(5)(Suppl):e211S–e250S
Extensive Mediastinal Infiltration
Confirmation of Intrathoracic Stage

- Extensive mediastinal infiltration:
  - No discrete nodes visible, encasement of structures

- Intrathoracic Stage is clear (stage IIIb)

- Issue is simply to confirm the diagnosis (could be SCLC)

- Use whatever test is easiest, least invasive
  - Sputum, Bronchoscopy with TBNA
  - EBUS-NA, TTNA
Discrete Mediastinal Enlargement or Central Tumor

In patients with high suspicion of N2,3 involvement, either by discrete mediastinal lymph node enlargement or PET uptake (and no distant metastases) or Central tumor, a needle technique (EBUS- NA, EUS- NA or combined EBUS/EUS - NA) is recommended over surgical staging as a best first test.
4.4.10.1. For the patients with a LUL cancer in whom invasive mediastinal staging is indicated as defined by the previous recommendations, it is suggested that invasive assessment of the APW nodes be performed (via Chamberlain, VATS, or extended cervical mediastinoscopy) if other mediastinal node stations are found to be uninvolved (Grade 2B).

Silvestri et al. CHEST 2013; 143(5)(Suppl):e211S–e250S
Chamberlain Procedure or VATS
Peripheral T1a Tumors

4.4.8.1. For patients with a peripheral clinical stage IA tumor (negative nodal involvement by CT and PET), it is suggested that invasive pre-operative evaluation of the mediastinal nodes is not required (Grade 2B).
Illustrative Cases

- 62 y/o WW with >20 pack year tobacco
- CT for abnormal CXR prior to elective surgery
PET
EBUS Mediastinum – 4R (11mm)

- Simultaneously diagnosed & staged
  - Adenocarcinoma stage IIIA
  - Patient went from surgical candidate to unresectable
Case 2

- 76 y/o never smoker
- CT chest during evaluation of abd pain
CT – 4R
Patient 2 PET – 4R
CT – 10R
Pre-EBUS T1N2M0 (stage 3a) -> Post-EBUS T1N0M0 (stage IA)
RLL resection confirmed stage IA adenocarcinoma
Summary

- Imaging alone cannot establish an appropriate stage and should not be relied upon to make clinical decisions. Tissue confirmation is necessary.

- Multiple tools exist to make a diagnosis and depend upon the patient's presentation, availability of the technology, and local expertise.

- EBUS is the first test of choice for evaluating the mediastinum in patients with suspected lung cancer.