Neoplasms of the LUNG and PLEURA

2015-2016 FCDS Educational Webcast Series
Steven Peace, BS, CTR
September 19, 2015

2015 Focus
- Anatomy
- SSS 2000
- MPH Rules
- AJCC TNM

Presentation Outline

- Overview of Neoplasms of the Lung and Pleura
- Classification of Lung and Pleural Neoplasms
- Anatomy of the Lung and Pleura
- MPH Rules – Quick Review
- Anatomic Staging – SS2000
- Anatomic Staging – AJCC TNM
- Non-Anatomic Site-Specific Factors
- Practice Cases – Live Polling
- Text Documentation

Source: https://www.mesothelioma.com
Trends in Cancer Death Rates* Among Men, US, 1930-2011

*Age-adjusted to the 2000 US standard population.
Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2014.

Trends in Cancer Death Rates* Among Women, US, 1930-2011

*Age-adjusted to the 2000 US standard population.
Uterus includes uterine corpus and uterine cervix combined.
Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2014.
Trends in Tobacco Use and Lung Cancer Death Rates* in the US

*Age-adjusted to 2000 US standard population.

U.S. Adult Smoking Rates

Adult Smoking Rates - http://www.cdc.gov
Radon Gas

http://pillartopost.com/epa

Classification of Lung Neoplasms
Based on WHO Classification, 3rd ed. (2004)

http://stageiv.files.wordpress.com
Classification of Lung Neoplasms
Based on WHO Classification, 3rd ed. (2004)


Association with Smoking

Kenfield SA, Wei EK, Stampfer MJ, Rosner BA, Colditz GA (2008), Tobacco Control 17 (3): 198-204
Classification of Lung Neoplasms
Based on WHO Classification, 3rd ed. (2004)

Characteristics of SCC of Lung

- Most **arise centrally** within main, lobar, segmental or subsegmental bronchi

- Peripheral tumors often **undergo central necrosis** with cavitation

- Tumor growth usually **intrabronchial and peribronchial**

- **Slow growing neoplasm** with late metastatic spread

- Better prognosis than adenocarcinoma
Characteristics of AdenoCA of Lung

- More easily detected on imaging
- More common in women and non-smokers
- Most arise in the smaller peripheral airways
- Central tumors more likely to have lymph node metastasis
- More often associated with pleural effusion(s) and distant metastasis

Characteristics of Small Cell CA of Lung

- 15-25% of all lung cancers and almost exclusive to smokers
- TNM Staging can be used but VALG Staging System is often used by MDs
  - Limited disease – confined to 1 side of thorax - includes contralateral LN
  - Extensive disease – beyond boundaries noted above
- Most arise centrally with large hilar mass and bulky mediastinal nodes
- Characteristic rapid growth with early development of diffuse metastasis
  - Metastasis include brain and CNS, bone marrow, liver, adrenal(s) and bone
- Associated with paraneoplastic syndrome and poor survival
Characteristics of Non-Small Cell CA

- “Non-Small Cell Lung Cancer is a generic term (aka; NSCLC).

- Use of the term NSCLC should be avoided as a single diagnostic term.

- The following terms are acceptable when IHC can distinguish the two:
  - “NSCLC favor adenocarcinoma” or
  - “NSCLC favor squamous cell carcinoma”

- EGFR testing is strongly recommended in all “NSCLC favor adenocarcinoma”

2015 WHO Classification, 4th ed.

**Highlights**
- Multi-Disciplinary Correlation
- Invasive Neoplasm classified according to predominant subtype
- Stop Using the Term “BAC” and “bronchio-alveolar carcinoma”
- Replace BAC with 5 new adenocarcinoma subtypes
  - Add “in situ” classification
  - Add “minimally invasive”
- Add genetic test/markers
  - EGFR, Alk, KRAS, TTF-1, p40
- SCC with minor changes
Mesothelioma

Asbestos

Sources: http://www.mesothelioma.com and http://www.usaep.org

Dangers of Asbestos

Asbestos

http://www.mesothelioma.com/asbestos-cancer
Lung Anatomy

http://www.omnimedicalsearch.com/conditions-diseases/images/lung-cancer.jpg

http://www.damav.com/mare/lung/

http://legacy.owensboro.kctcs.edu

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Lung Anatomy

C34.0  Main bronchus
C34.1  Upper lobe, lung
C34.2  Middle lobe, lung
   (right lung only)
C34.3  Lower lobe, lung
C34.8  Overlapping lesion
C34.9  Lung, NOS

Source: SEER Training: ICD-O-3  Site Codes

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Lung Anatomy

The **hilum** is the space in each lung where the bronchus and blood vessels enter the lung.

The **apex** is the rounded area at the top of each lung.

Source: 2008 Encyclopedia Britannica, Inc. on-line
The lingula, found only in the left lung, is a projection of the upper lobe of the left lung thought to be a remnant of an ancient middle lobe of the left lung.

Source: SEER Training: ICD-O-3 Site Codes

Source: Springer Images. Figure adapted from Atlas of Human Anatomy, 2nd ed. Contents of the superior and middle mediastinum. http://www.springerimages.com/Images/MedicineAndPublicHealth/1-10.1007_978-1-60527-372-5_4-9
Lung Anatomy

NX Regional lymph nodes cannot be assessed

N0 No regional lymph node metastases

N1 Metastasis in **ipsilateral peribronchial** and/or **ipsilateral hilar** lymph nodes and **intrapulmonary** nodes, including involvement by direct extension

N2 Metastasis in **ipsilateral mediastinal** and/or **subcarinal** lymph node(s)

N3 Metastasis in **contralateral mediastinal**, **contralateral hilar**, **ipsilateral** or **contralateral scalene**, or **supraclavicular** lymph node(s)

IASLC lymph node map from Memorial Sloan-Kettering Cancer Center, 2009

Lung Anatomy

NX Regional lymph nodes cannot be assessed
N0 No regional lymph node metastases
N1 Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes and intrapulmonary nodes, including involvement by direct extension
N2 Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
N3 Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)

IASLC lymph node map - WHO Classification of Tumours of the Lung, 2015

Lung Anatomy

A pleural effusion is an accumulation of fluid between the parietal pleura and the visceral pleura.

Chest X-ray frontal view: 100-200ml pleural fluid

Source: www.slideshare.net/pleuraleffusion/drmahesh
Lung Anatomy

Collaborative Stage Data Collection System, Part I Section II – Lab Tests, Tumor Markers, SSFs

Genetic Abnormalities

Source: WHO Classification of Tumours of the Lung, Pleura, Thymus and Heart, 2015 and NCCN Guidelines NSCLCv7.2015
Biomarkers and Genetic Abnormalities

CK7 and CK20 – CKs are cytokeratins, markers common to carcinomas. Sometimes when the site of origin of an adenocarcinoma isn’t certain, CK7 and CK20 can help. The typical lung pattern is CK7+ and CK20-.

TTF-1 (thyroid transcription factor-1) – 85% of adenocarcinoma of the lung and a minority of squamous cell cancers will bear this marker. Most non-lung cancers do not express TTF-1 (prominent exceptions include thyroid cancer and cancers of the female genitourinary tract).

p63 – A marker for squamous cell carcinoma

Genetic Abnormality: EGFR mutation, K-RAS mutation, ALK rearrangement, EML4/ALK translocation. (Note: genetic testing for these mutations can help predict efficacy of agents; erlotinib (tarceva), gefitinib (iressa) and crizotinib)

Source: NCCN and GRACE (Global Resource for Advancing Cancer Education)

Pleura Anatomy

Pleural Mesothelioma

Lung MPH Rules
Terms and Definitions

Based on WHO Classification, 3rd ed. (2004)
Lung Equivalent Terms, Definitions, Charts, Tables and Illustrations
C340-C349
(Excludes lymphoma and leukemia M9590-9989 and Kaposi sarcoma M9140)

Introduction
Use these rules only for cases with primary lung cancer.

Lung carcinomas may be broadly grouped into two categories, small cell and non-small cell carcinoma. Frequently a patient may have two or more tumors in one lung and may have one or more tumors in the contralateral lung. The physician may biopsy only one of the tumors. Code the case as a single primary (See Rule 41, Note 2) unless one of the tumors is proven to be a different histology. It is irrelevant whether the other tumors are identified as cancer, primary tumors, or metastases.

Equivalent or Equal Terms:
- Low grade neuroendocrine carcinoma, carcinoid
- Tumor, mass, lesion, neoplasm (for multiple primary and histology coding rules only)
- Type, subtype, predominantly, with features of, major, or with ___ differentiation

Obsolete Terms for Small Cell Carcinoma (Terms that are no longer recognized):
- Intermediate cell carcinoma (9046)
- Mixed small cell large cell carcinoma (8045) (Code is still used, however current accepted terminology is combined small cell carcinoma)
- oat cell carcinoma (8043)
- Small cell anaplastic carcinoma (No ICD-O-3 code)
- Undifferentiated small cell carcinoma (No ICD-O-3 code)

Definition:
Adenocarcinoma with mixed subtypes (8255): A mixture of two or more of the subtypes of adenocarcinoma such as acinar, papillary, bronchioloalveolar, or solid with mucin formation.

Adenocarcinoma (8560): A single histology in a single tumor composed of both squamous cell carcinoma and adenocarcinoma.

Bilateral lung cancer: This phrase simply means that there is at least one malignancy in the right lung and at least one malignancy in the left lung. Do not base multiple primary decisions on this phrase; bilateral does not mean this is a single primary. Use the multiple primary rules to decide whether to code bilateral lung cancers as a single or multiple primary.

Combined small cell carcinoma (8045): A small cell carcinoma that is combined with a non-small cell carcinoma. The combinations are small cell and adenocarcinoma, or squamous cell carcinoma, or large cell carcinoma.
Classification of Lung Neoplasms
Based on WHO Classification, 3rd ed. (2004)

Lung MPH Rules
Multiple Primary Rules
Based on WHO Classification, 3rd ed. (2004)

FCDS ANNUAL CONFERENCE
ST PETERSBURG, FLORIDA
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• Required - Florida Mandate
  • FCDS will not purchase
  • Facility may purchase
  • Individual may purchase

• Also Required to Purchase 8th Edition in 2016-2017

• https://cancerstaging.org
• http://springer.com
• 1-800-SPRINGER

## Chapter Outline and Contents

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<td>Overview of factors affecting staging and outcome</td>
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 N: Regional lymph nodes  
 M: Distant metastasis |
| Anatomic Stage Prognostic Groups |  |
| Prognostic Factors (SSFs) | a. Required for staging  
 b. Clinically significant |
| Grade |  |
| Histopathologic Type |  |
| Bibliography |  |
| Staging Form |  |

AJCC Cancer Staging Manual, 7th ed. – Chapter 1, Table 1.10, p.14

## Identifying Neoplasms by Chapter

### At-A-Glance

| ANATOMIC STAGE/PROGNOSTIC GROUPS | T corresponds to primary tumor  
 N corresponds to regional lymph nodes  
 M corresponds to distant metastasis |
|----------------------------------|------------------------------------------|
| Site-Specific Factors (SSFs) | Required  
 For staging  
 Clinically significant |
| Histopathologic Type | Grade  
 Histologic Type  
 NOS |

AJCC Cancer Staging Manual, 7th ed. – Chapter 52, Retinoblastoma, p.561 and p.564
Neoplasms Not in the AJCC Manual

- Not all types of cancer are AJCC-stagable.

- **Use the Primary Site Codes** listed at the beginning of each chapter in the AJCC Cancer Staging Manual. **Use the List of Histopathologic Types** in each chapter to indicate the types which can be AJCC-staged using that staging scheme.

- **Histologic Types listed as inclusions (or not listed – because they are exclusions) for each individual chapter should NOT be AJCC-staged using that chapter.**

- **Note:** Some chapters are specifically limited to certain cancer types only with a certain anatomic site (such as skin melanomas). Some chapters are specifically limited to certain histologic types 9590-9729 regardless of primary site. This site and/or histology limitation does not limit coding for the primary site here.

Read the Chapter Introduction, Anatomy and Rules Before You Start

- These 3 sections, Chapter Introduction, Anatomy and Rules, are often overlooked or skimmed. This is where most of your questions will be answered...not in the coding section.

- The Rules for Classification instruction you as to which diagnostic and staging tests, imaging, biopsy, sentinel or resected nodes, etc., can and should be used when assigning clinical or pathologic TNM.

- Sometimes the Cancer Staging Form and/or the AJCC Chapter includes anatomic drawings to help clarify local/regional anatomy.

- Always review the Prognostic Features as this will help you identify which laboratory tests, symptoms, or other factors are important for staging.
Refer Directly to the AJCC Manual

- Once you have sized up the case and read through all of the imaging studies, diagnostic biopsy (any type), resection including lymph nodes if done, neo-adjuvant therapy status, operative report, consultations, etc. Be sure to include and annotate in text the physician stage if provided as a component of your assessment.

- PLEASE - DO NOT JUST USE THE PHYSICIAN STAGE WITHOUT ASSESSING THE CORRECTNESS. You may have additional information in the medical record that was not available or not included in the physician or pathologist assignment of TNM or AJCC Stage Group.

- Use the Definitions of TNM Section in the Chapter to assign the most appropriate T, N, and M values using the AJCC Staging Manual Instructions and Rules for assignment. Remember the Down-Staging Rule when assigning stage when for some cancers or cases you may not be able to assign a value as precisely as you did in CS Ext or CS LN.

- Make sure you include any prognostic factors (anatomic or non-anatomic) that are required for determining the correct Anatomic Stage/Prognostic Groups – most are SSFs may also include; age, histologic type, grade, as well as other non-anatomic SSFs.

- Assign the appropriate Anatomic Stage/Prognostic Group using T, N, M and SSFs.
AJCC TNM Staging Form

Other Helpful Information

TNM Help
- AJCC 6th ed. & 7th ed. Help
- Introduction Help
- Abbreviated Chapter
- Explanatory Notes
- Common Questions
  - FREE!

Cancer Staging Basics

1. Where did the cancer start (primary site)?

2. Where did the cancer go (how far did it spread)?

3. How did the cancer get to the other organ or structure?

4. What is the SS2000 and AJCC TNM for this cancer?

   ➢ Incorporate SSFs Required for Staging but not for SS2000

There are three components to AJCC Cancer Stage and to assign Summary Stage:

- Where and how big the original mass or primary tumor is = T
- Which nodes the cancer has spread to including how many positive = N
- Whether the cancer has spread to 1 or more distant site(s) = M

The T, N, and M information is joined to assign a Summary Stage and an AJCC “Stage Group” (now called Anatomic Stage/Prognostic Group with addition of genetic and bio-molecular tumor markers and other prognostic factors in the AJCC 7th edition)

All cancers must be assigned a Summary Stage – SS2000
All cancers are assigned clinical stage – verify histology inclusion for TNM Chapter
Surgically resected cancers can be assigned pathologic stage – verify inclusion list
Criteria Used to Stage Lung Cancer

What To Look For & Document When Reviewing Lung Cancer Cases

Physical Exam – paraneoplastic syndrome, nerve or vessel obstruction

CT Chest – tumor location, tumor size, nodes, pleural effusion

CT Abdomen – liver or adrenal mets

CT/MRI Brain – brain mets

Pathology Report(s) – Resection of Primary and Nodal Status

Pathology Report(s) – Extension to/thru visceral pleura

Pathology Report(s) – Extension to parietal pleura

Cytology Report(s) – Pleural Fluid (blood/exudate)

Genetic Abnormalities – EGFR, KRAS, BRAF, ALK

SS2000

<table>
<thead>
<tr>
<th>BRONCHUS AND LUNG</th>
</tr>
</thead>
<tbody>
<tr>
<td>C34.0-C34.5 C34.6-C34.9</td>
</tr>
<tr>
<td>C34.0 Adenocarcinoma (primary carcinoma) of lung &amp; thorax</td>
</tr>
<tr>
<td>C34.1 Upper lobe (including apical), lung</td>
</tr>
<tr>
<td>C34.2 Middle lobe, lung</td>
</tr>
<tr>
<td>C34.3 Lower lobe, lung</td>
</tr>
<tr>
<td>C34.4 Overlapping lesions of lung</td>
</tr>
<tr>
<td>C34.9 Lung, NOS</td>
</tr>
</tbody>
</table>

SUMMARY STAGE

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>In situ, Noninvasive, Nonmalignant</td>
</tr>
<tr>
<td>1</td>
<td>Localized</td>
</tr>
<tr>
<td>2</td>
<td>Regional</td>
</tr>
<tr>
<td>3</td>
<td>Distant</td>
</tr>
</tbody>
</table>

* Distant sites involved

<table>
<thead>
<tr>
<th>Distant sites involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical, NOS</td>
</tr>
<tr>
<td>Carinomial hilus (paratracheal) (peripheral lobe) (pulmonary root)</td>
</tr>
<tr>
<td>Carinomial bilateral mediastinal</td>
</tr>
<tr>
<td>Solitary (adenocarcinoma), bilateral or contralateral</td>
</tr>
<tr>
<td>Supraclavicular (transverse cervical), unilateral or contralateral</td>
</tr>
<tr>
<td>Other distant lymph node(s)</td>
</tr>
</tbody>
</table>

Extension to:

- Abdominal organs
- Adjacent rib(s)
- Contrasitual lung
- Contrasitual main stem bronchus
- Heart
- Pericardial effusion (malignant or NOS)
- Pericarditis (malignant or NOS)
- Mediastinal nodes
- Others of chest
- Stomach
- Renal
- Viceral pericardium

Further contiguous extension

- Severe tumor nodal(s) in different lobe(s)
- Severe tumor nodal(s) in contralateral lung
- Metastasis
Steps to Assign SS2000

Three summary stage groups can be ruled out quickly:
in situ, distant, and localized

**FIRST**

*In situ*

1. **Rule out in situ stage disease.** Carcinomas and melanomas are the only types of cancer that can be classified as in situ. Only carcinomas have a basement membrane. Sarcomas are never described as in situ. A pathologist must examine the primary organ and state that the tumor is in situ. If the cancer is anything except a carcinoma or melanoma, it cannot be in situ.
2. If there is any evidence of invasion (or extension to), nodal involvement or metastatic spread, the case is not in situ even if the pathology report so states. This is a common error in staging cervical cancer where the path report states that the cancer is “in situ with micrometasis”—such a case would be staged as localized.

**SECOND**

3. **Rule out distant disease.** If metastases can be documented, there is no need to spend a great deal of time identifying local or regional spread. If distant metastases are recorded on x-ray or needle biopsy, the stage is already determined and the patient does not need to undergo a lot of other tests.
4. Hematopoietic diseases, such as leukemia and multiple myeloma, are considered disseminated or distant at time of diagnosis.
5. Rule out distant spread by reading the operative report for comments about seeding, implants, liver nodules, or other indications of metastases. Read diagnostic reports for references to distant disease.
6. If nodes, organs, or adjacent tissues are not specifically mentioned in the description of the various categories, attempt to cross-reference the term you have with those outlined. If there is no match, assume the site in question represents distant disease.
Steps to Assign SS2000

Three summary stage groups can be ruled out quickly: in situ, distant, and localized

THIRD

Localized
7. Rule out that the cancer is “confined to the organ of origin.” In order for a lesion to be classified as localized, it must not extend beyond the outer limits of the organ and there must be no evidence of metastases anywhere else.
8. Terms such as “blood vessel invasion” or “perineural lymphatic invasion” do not necessarily indicate that the cancer has spread beyond the primary organ. If tumor at the primary site has invaded lymph or blood vessels, there is the potential for malignant cells to be transported throughout the body. Step 1 (invasion) has occurred, but not necessarily steps 2 (transport of cancer cells) and 3 (growth at the secondary site). The case may still be localized.
9. Vascular invasion within the primary is not a determining factor in changing the stage unless there is definite evidence of tumor at distant sites.

SS2000

BRONCHUS AND LUNG
C34.0-C34.4, C34.8-C34.9
C34.0 Malignant neoplasm of lungs, bronchi, and bronchioles
C34.1 Malignant neoplasm of lungs, bronchi, and bronchioles, except bronchus carcinoid
C34.2 Malignant neoplasm of lungs, bronchi, and bronchioles, unspecified
C34.3 Malignant neoplasm of lungs, bronchi, and bronchioles, specified as metastatic
C34.4 Malignant neoplasm of lungs, bronchi, and bronchioles, in situ
C34.5 Malignant neoplasm of lungs, bronchi, and bronchioles, not elsewhere classified
C34.6 Malignant neoplasm of lungs, bronchi, and bronchioles, in situ or unspecified
C34.7 Malignant neoplasm of lungs, bronchi, and bronchioles, not elsewhere classified
C34.8 Malignant neoplasm of lungs, bronchi, and bronchioles, in situ
C34.9 Malignant neoplasm of lungs, bronchi, and bronchioles, unspecified

SUMMARY STAGE
0 In situ
1 Localized

1 Localized
- Confined to the organ of origin
- Confined to the organ of origin, not elsewhere specified
- Confined to the organ of origin, not elsewhere classified
- Confined to the organ of origin, in situ
- Confined to the organ of origin, not otherwise specified
- Confined to the organ of origin, not otherwise classified
- Confined to the organ of origin, in situ or unspecified
- Confined to the organ of origin, not elsewhere classified
- Confined to the organ of origin, in situ
- Confined to the organ of origin, unspecified
- Confined to the organ of origin, not elsewhere specified

Distant sites (nodes) involved

- Distant lymph nodes
- Distant lymph nodes, specified as metastatic
- Distant lymph nodes, not otherwise specified
- Distant lymph nodes, not otherwise classified
- Distant lymph nodes, in situ
- Distant lymph nodes, unspecified
- Distant lymph nodes, not elsewhere specified
- Distant lymph nodes, not elsewhere classified

Further contiguous extension
- Involvement of regional nodes
- Involvement of regional nodes, specified as metastatic
- Involvement of regional nodes, not otherwise specified
- Involvement of regional nodes, not otherwise classified
- Involvement of regional nodes, in situ
- Involvement of regional nodes, unspecified
- Involvement of regional nodes, not elsewhere specified
- Involvement of regional nodes, not elsewhere classified

Note: SS2000 staging is based on the American Joint Committee on Cancer (AJCC) staging system.
Steps to Assign SS2000

Three summary stage groups can be ruled out quickly: in situ, distant, and localized

FINAL (if needed)

**Regional**

10. If in situ, local and distant categories have been ruled out, the stage is regional.

11. For carcinomas, if there are lymph nodes involved with the tumor, the stage is at least regional.

12. For tissues, structures, and lymph nodes, assume ipsilateral unless stated to be contralateral or bilateral.

**Unknown if Extension or Metastasis**

13. If there is not enough information in the record to categorize a case, it must be recorded as unstageable.

---

**SS2000**

1. Regional by direct extension only:
   - Regional obstructive parapneumonic
   - Extension to:
     - Blood vessel(s) (major)
     - Aorta
     - Pulmonary artery or vein
     - Superior vena cava (SVC)
     - Hilar (from superior pulmonary vein)
     - Main bronchus from superior sulcus

2. Regional IPILATERAL regional lymph node(s) involved only:
   - Regional lymph nodes:
     - Amygdala (other than bronchial), NS
     - Para-aortic, NS
     - Ascending aorta (other)
     - Substernal (sternum-pulmonary window)
     - Bronchial
     - Intrapulmonary, NS
     - Intralobar
     - Lobular
     - Segmental
     - Subsegmental
     - Mediastinal, NS
     - Anterior
     - Posterior (posterior mediastinal)
     - Percutaneous
     - Peri-aortic, NS
     - Para-aortic, NS
     - Para-aortic, NS
     - Paratracheal, NS
     - Paracardiac, NS
     - Pulmonary ligament
     - Subclavian
     - Multiple regional lymph node(s) involved
   - Collar (c) (d)

3. Regional, NS
SS2000

Note 1: “Bronchopneumonia” is not the same thing as “obstructive pneumonitis” and should not be coded as such.
Note 2: Assume tumor ≥2 cm from carina of lobectomy, segmental resection, or wedge resection is done.
Note 3: If no mention is made of the opposite lung on a chest x-ray, assume it is not involved.
Note 4: Ignore pleural effusion which is negative for tumor. Assume that a pleural effusion is negative if a resection is done.
Note 5: If at mediastinoscopy: X-ray, the description is “mass,” “adenopathy,” or “enlargement” of the mediastinum or of any of the lymph nodes listed under Regional Lymph Nodes (see page 156), assume that at least regional lymph nodes are involved.
Note 6: The words “no evidence of spread” and/or “remaining examination negative” are sufficient information to consider regional lymph nodes negative in the absence of any statement about nodes.
Note 7: “Vocal cord paralysis,” “superior vena cava syndrome,” and “compression of the trachea or the esophagus” are classified as mediastinal lymph node involvement unless there is a statement of involvement by direct extension from the primary tumor.

AJCC Staging for Lung Cancer

Size > 7cm
T2 ➔ T3

Same lobe nodules
T4 ➔ T3

Different lobe, same lung nodules
M1 ➔ T4

Contralateral lung nodules
M1 ➔ M1a

Pleural / Pericardial effusion
T4 ➔ M1a

Intrathoracic Metastases M1 ➔ M1a
Extrathoracic Metastases M1 ➔ M1b

Nair A et al. Radiographics 2011;31:215-238
Clinical Classification - cTNM

- Based on Evidence Acquired Before Any Treatment
- Physical Exam
- Imaging (CT Scan, PET Scan)
- Laboratory Tests
- Thoracentesis
- Endoscopy with ultrasound or other “directed” biopsy (core/FNA)
  - Bronchoscopy (EBUS)
  - Esophagoscopy (EUS)
  - Mediastinoscopy
  - Thoracoscopy (VATS without resection of primary tumor)
- Exploratory Thoracotomy

Pathologic Classification - pTNM

- Includes Any Evidence Acquired Before Any Treatment PLUS
- Pathologic Assessment of Resected Primary Tumor (to highest pT) *
- Pathologic Assessment of Regional Lymph Nodes (to highest pN) *
- Isolated Tumor Cells (ITCs) in Lymph Node(s) are Classified N0 or M0
  - pN0
  - pN0(i-)
  - pN0(i+)
  - pN0(mol-)
  - pN0(mol+)
- pM can be either cM or pM when the T and/or N categories are valid

* “Pathologic staging depends on the proven anatomic extent of disease, whether or not the primary lesion has been completely removed. If a biopsied primary tumor technically cannot be removed…and if the highest T and N categories or the M1 category of the tumor can be confirmed microscopically, the criteria for pathologic classification and staging have been satisfied without total removal of the primary cancer.”
Post-Neoadjuvant p Classification - ypTNM

- **Best Demonstrates Need for Accurate Clinical Stage** when the first cancer surgery follows radiation therapy, chemotherapy, hormones, immunologic agents meant to alter the tumor behavior, size, extension, lymph node status, etc. resulting in down-stage of disease at time of first surgery and with some current regimens showing no primary tumor and negative nodes at surgery.

- **Patient must have received planned presurgical therapy(s):**
  - Radiation Therapy (any modality)
  - Chemotherapy
  - Hormone(s)
  - Biologic Agent (BRM/Immuno)
  - Combination of above

- **Patient must have post-therapy excision of primary site and nodes sufficient to meet the criteria to assign AJCC Stage Pathologic Classification or pTNM.**

### Definitions for T, N, M

<table>
<thead>
<tr>
<th>T</th>
<th>Primary Tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>No evidence of primary tumor</td>
</tr>
<tr>
<td>T1a</td>
<td>Tumor ≤ 2 cm in greatest dimension</td>
</tr>
<tr>
<td>T1b</td>
<td>Tumor &gt; 2 cm but ≤ 5 cm in greatest dimension</td>
</tr>
<tr>
<td>T2</td>
<td>Tumor &gt; 5 cm but ≤ 7 cm in greatest dimension</td>
</tr>
<tr>
<td>T3</td>
<td>Tumor &gt; 7 cm or one that directly invades any of the following: aorta, superior vena cava, or main pulmonary artery</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N</th>
<th>Regional Lymph Nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>N0</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in ipsilateral hilar lymph nodes and/or ipsilateral mediastinal lymph nodes</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in contralateral mediastinal lymph nodes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M</th>
<th>Distant Metastasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>MX</td>
<td>Distant metastasis cannot be assessed</td>
</tr>
<tr>
<td>M0</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
</tbody>
</table>

- **Note:** The aforementioned tumor size is limited to the bronchial wall, which may extend without the bronchial wall being involved. The tumor size is measured in the direction of invasion. The involvement of the bronchial wall must be determined histologically.

*Source: NCCN Guidelines NSCLCv7.2015*
Definitions for T, N, M

Anatomic Stage/Prognostic Groups

Source: http://library.med.utah.edu/WebPath/jpeg1/NEO118.gif

http://journal.publications.chestnet.org/data/Journals/CHEST/22152/zcb9990921590008.jpeg
Anatomic Stage/Prognostic Groups

Stage IIA

T2b N0 or N1
T1a N1
T1b N1

Stage IIB

T3a N0 or N1
T3b N0
T3c N0

General Note:
All Stage I-III tumors are N0
T3c-N0 or Mx should be used only if no information at all is available about T N or M stage (including no clinical staging information)

http://journal.publications.chestnet.org/data/Journals/CHEST/22152/zb9990921590008.jpeg

Anatomic Stage/Prognostic Groups

Stage IIIA

T4a N0,1
T3a N0,1
T3b N1
T4a N1

Stage IIIB

T4b N2
T3a N3
T4b N2

http://journal.publications.chestnet.org/data/Journals/CHEST/22152/zb9990921590008.jpeg
Atelectasis and Pleural Effusion

**Atelectasis** is the collapse or closure of the lung that may affect part or all of one lung. Atelectasis (lung collapse) may be caused by pleural effusion or may be caused by other factors that impair function of part or all of one lung.

**Pleural effusion** is excess fluid that accumulates between the two pleural layers, the fluid filled (pleural) space that surrounds the lungs. Extensive amounts of pleural fluid can impair breathing by limiting the expansion of the lungs. Pleural effusion in lung cancer is presumed malignant even following negative cytology from thoracentesis.

Small Cell Lung Cancer VALG Stage

**Veterans Administration Lung Study Group’s (VALG) Staging Classification for Small Cell Lung Cancer**

**Limited-Stage:** AJCC (7th edition) Stage I-III (excludes most T3-T4 due to multiplicity of tumors in same lung – cannot radiate for local control)

**Extensive-Stage:** AJCC (7th edition) Stage IV and most T3-T4

Still use AJCC TNM when can be more specific. But, most clinicians will refer to the VALG “limited” or “extensive” when assessing for treatment options, particularly for inclusion/exclusion of XRT to chest when T3-T4.
IMIG Staging - Pleural Mesothelioma

<table>
<thead>
<tr>
<th>T</th>
<th>Primary Tumor</th>
<th>N</th>
<th>Regional Lymph Nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0</td>
<td>No evidence of primary tumor</td>
<td>N0</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>T1</td>
<td>Tumor limited to the ipsilateral parietal pleura with or without mediastinal pleura and with or without diaphragmatic pleural involvement</td>
<td>N1</td>
<td>Metastasis to ipsilateral bronchopulmonary or hilar lymph nodes</td>
</tr>
<tr>
<td>T1a</td>
<td>No involvement of the visceral pleura</td>
<td>N2a</td>
<td>Metastases in the subaortic lymph node or the ipsilateral mediastinal lymph nodes including the ipsilateral internal mammary and periaphragmatic nodes</td>
</tr>
<tr>
<td>T1b</td>
<td>Tumor also involving the visceral pleura</td>
<td>N2b</td>
<td>Metastasis in contralateral mediastinal, contralateral internal mammary, ipsilateral or contralateral supraclavicular lymph nodes</td>
</tr>
<tr>
<td>T2</td>
<td>Tumor involving the parietal pleura and the parietal mediastinal, diaphragmatic, and visceral pleura with at least one of the following</td>
<td>M0</td>
<td>No distant metastases</td>
</tr>
<tr>
<td>T3</td>
<td>Locally advanced but potentially resectable tumor involving all of the ipsilateral pleural surfaces (parietal, mediastinal, diaphragmatic, and visceral pleura), with at least one of the following</td>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
<tr>
<td>T4</td>
<td>Locally advanced technologically unresectable tumor involving all of the ipsilateral pleural surfaces (parietal, mediastinal, diaphragmatic, and visceral pleura) with at least one of the following</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IA</td>
<td>Direct extension of the tumor to the parietal pleura</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IB</td>
<td>Direct extension of tumor to the mediastinal organs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIA</td>
<td>Direct extension of tumor into the ipsilateral pleura</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIB</td>
<td>Direct extension of tumor into the contralateral pleura</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIA</td>
<td>Direct extension of tumor into the contralateral mediastinal organs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIB</td>
<td>Direct extension of tumor into the sinuses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Direct extension of tumor into the external surface of the pericardium with or without a parietal effusion or tumor involving the myocardium</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Case 1 – Case Vignette

HISTORY: 65 year old black male admitted with chest pain, cough, hoarseness and partial vocal cord paralysis. Hx of 1ppd smoker x 50yrs

CHEST X-RAY: 7.5cm mass noted in right mainstem bronchus

CT CHEST: 7.5cm mass right mainstem bronchus with supraclavicular node.

CT-GUIDED CORE BX RIGHT LUNG TUMOR MASS: Poorly differentiated squamous cell carcinoma. p63 and CK5 positive, Napsin and TTF1 neg - c/w squamous cell carcinoma of lung origin. (positive immunohistochemistry for p63 and CK5 supports the diagnosis of squamous cell carcinoma. Negative immunohistochemistry for Napsin and TTF-1 argues against adenocarcinoma.)

ULTRASOUND-GUIDED CORE BX SUPRACLAVICULAR MASS: positive for metastatic squamous cell carcinoma of pulmonary origin.

FINAL DX: Biopsy-proven unresectable squamous cell carcinoma of right lung with vocal cord paralysis and positive supraclavicular lymph node on FNA.
Case 2 – Case Vignette

HISTORY: 70-year-old female developed right pleural effusion in January of 2015. Thoracentesis with bloody pleural fluid. Cytology showed no tumor cells. Patient was admitted and found to have a right pleural effusion with a pleural based mass and these were biopsied. Preliminary diagnosis between adenocarcinoma or mesothelioma. Pathology will do a TTF-1 and if positive, then more likely this is lung primary. If TTF-1 is negative, then we will have to make sure there is no other primary source of pleural effusion. She is a nonsmoker. Secondary smoke exposure - husband and father.

CT CHEST/ABD/PELVIS: nonspecific hilar and mediastinal lymph nodes. Soft tissue mass in RLL lung size 3.5 x 2.5cm. Extensive abnormal right pleural thickening with large right pleural effusion. Abdomen and pelvis – neg

PROCEDURE: Mini Thoracotomy with VATS wedge resection RLL lung.

RLL LUNG WEDGE RESECTION: moderately differentiated adenocarcinoma typical of lung primary with extensive visceral pleural invasion. TTF1 and CK7 positive and CK20 negative. This type of lung adenocarcinoma is sometimes referred to as “pseudomesotheliomatous” adenocarcinoma.

FINAL DX: Adenocarcinoma of lung, right lower lobe, stage IV.

Case 3 – Case Vignette

HISTORY: 61 yr old Vietnamese man, smoker, with lung mass noted on CT. He has had repeated bouts of bronchopneumonia treated with antibiotics. He complains of shortness of breath, 15 pound weight loss, and mental status change. Admitted for workup and start of treatment.

CT CHEST/ABD/PELVIS: Large mass obstructing right upper lobe lung measuring at least 6cm with large mediastinal mass 5cm x 6cm in size. Large right-sided pleural effusion noted. Multiple cysts noted in liver.

MRI BRAIN: Diffuse 4th ventricle involvement with large cerebellar mass

BRONCHOSCOPY WITH BIOPSY: right upper lobe lung tumor, biopsy with small cell neuroendocrine (oat cell) carcinoma. CK7 +, Chromogranin + with SY38 positive consistent with small cell carcinoma of lung origin.

THORACENTESIS: pleural fluid + for malignant cells
Case 4 – Case Vignette

HISTORY: 55 yr old white female, non-smoker, with lung mass seen on routine chest x-ray. No clinical symptoms or complaints. Admitted for workup and surgical treatment for left upper lobe lung cancer.

CT CHEST: 3cm tumor in left upper lobe lung no lymphadenopathy.

FNA LEFT LUNG TUMOR: non small cell carcinoma, favor adenocarcinoma

VATS WEDGE RESECTION LUL LUNG WITH NODE SAMPLING: moderately differentiated adenocarcinoma 2.5 x 2.8cm in size, wedge resection, with no involvement of surgical margins. 3 hilar lymph nodes sampled, 1 node with micrometastasis noted on IHC.

Case 5 – Case Vignette

HISTORY: 59 year old white male firefighter with recently diagnosed unresectable mesothelioma of lung. Seen in ER then admitted with chest pain and shortness of breath prior to starting chemotherapy. Overall patient status is quite poor. Patient was discharged to hospice.
Wrap Up – Final Q&A