

# Lung

## **Protocol applies to all invasive carcinomas of the lung.**

*Based on AJCC/UICC TNM, 6th edition  
Protocol revision date: January 2004*

### **Procedures**

- Biopsy
- Resection

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**Surgical Pathology Cancer Case Summary (Checklist)**

*Protocol revision date: January 2004  
 Applies to invasive carcinomas only  
 Based on AJCC/UICC TNM, 6<sup>th</sup> edition*

**\*LUNG: Biopsy**

**(Note: Use of checklist for biopsy specimens is optional)**

\*Patient name:

\*Surgical pathology number:

**Note: Check 1 response unless otherwise indicated.**

**\*MACROSCOPIC**

**\*Specimen Type**

- \*  Fiberoptic bronchoscopic biopsy
- \*  Transbronchial biopsy
- \*  Mediastinoscopic biopsy
- \*  Computed tomography-guided needle biopsy
- \*  Wedge biopsy
- \*  Other (specify): \_\_\_\_\_
- \*  Not specified

**\*Laterality**

- \*  Right
- \*  Left
- \*  Not specified

**\*Tumor Site**

- \*  Upper lobe
- \*  Middle lobe
- \*  Lower lobe
- \*  Other (specify): \_\_\_\_\_
- \*  Not specified

2                   \* Data elements **with asterisks** are **not required** for accreditation purposes for the Commission on Cancer. These elements may be clinically important, but are not yet validated or regularly used in patient management. Alternatively, the necessary data may not be available to the pathologist at the time of pathologic assessment of this specimen.

**\*MICROSCOPIC****\*Histologic Type**

- \*  Carcinoma, non-small cell type
- \*  Small cell carcinoma
- \*  Squamous cell carcinoma
- \*  Squamous cell carcinoma, variant (specify): \_\_\_\_\_
- \*  Combined small cell carcinoma (small cell carcinoma and non-small cell component)
- \*  Adenocarcinoma, not otherwise characterized
- \*  Bronchioloalveolar carcinoma
- \*  Bronchioloalveolar carcinoma variant (specify): \_\_\_\_\_
- \*  Adenocarcinoma, other variant (specify): \_\_\_\_\_
- \*  Large cell undifferentiated carcinoma
- \*  Large cell neuroendocrine carcinoma
- \*  Large cell carcinoma, other variant (specify): \_\_\_\_\_
- \*  Basaloid carcinoma
- \*  Adenosquamous carcinoma
- \*  Typical carcinoid tumor
- \*  Atypical carcinoid tumor
- \*  Adenoid cystic carcinoma
- \*  Mucoepidermoid carcinoma
- \*  Other tumor of salivary gland type (specify): \_\_\_\_\_
- \*  Carcinoma with pleomorphic, sarcomatoid, or sarcomatous elements (specify variant): \_\_\_\_\_
- \*  Other (specify): \_\_\_\_\_
- \*  Carcinoma, type cannot be determined

**\*Histologic Grade**

- \*  Not applicable
- \*  GX: Cannot be assessed
- \*  G1: Well differentiated
- \*  G2: Moderately differentiated
- \*  G3: Poorly differentiated
- \*  G4: Undifferentiated
- \*  Other (specify): \_\_\_\_\_

**\*Visceral Pleura Invasion (document if identified)**

- \*  Not applicable
- \*  Absent
- \*  Present
- \*  Indeterminate

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**\*Venous (Large Vessel) Invasion (V) (document if identified)**

- \*  Absent
- \*  Present
- \*  Indeterminate

**\*Lymphatic (Small Vessel) Invasion (L)**

- \*  Absent
- \*  Present
- \*  Indeterminate

**\*Additional Pathologic Findings (check all that apply)**

- \*  None identified
- \*  Metaplasia (specify type): \_\_\_\_\_
- \*  Squamous cell carcinoma in situ
- \*  Inflammation (specify type): \_\_\_\_\_
- \*  Other (specify): \_\_\_\_\_

**\*Comment(s)**

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**Surgical Pathology Cancer Case Summary (Checklist)**

*Protocol revision date: January 2004  
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**LUNG: Resection**

Patient name:

Surgical pathology number:

<b>Note: Check 1 response unless otherwise indicated.</b>
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**MACROSCOPIC****Specimen Type**

- Major airway resection  
 Wedge resection  
 Segmentectomy  
 Lobectomy  
 Pneumonectomy  
 Other (specify): \_\_\_\_\_  
 Not specified

**Laterality**

- Right  
 Left  
 Not specified

**Tumor Site**

- Upper lobe  
 Middle lobe  
 Lower lobe  
 Other(s) (specify): \_\_\_\_\_  
 Not specified

**Tumor Size**

Greatest dimension: \_\_\_\_ cm

\*Additional dimensions: \_\_\_\_ x \_\_\_\_ cm

 Cannot be determined (see Comment)

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**MICROSCOPIC**

**Histologic Type**

- Squamous cell carcinoma
- Squamous cell carcinoma, variant (specify): \_\_\_\_\_
- Small cell carcinoma
- Combined small cell carcinoma (small cell carcinoma and non-small cell component)
- Adenocarcinoma, not otherwise characterized
- Bronchioloalveolar carcinoma
- Bronchioloalveolar carcinoma variant (specify): \_\_\_\_\_
- Adenocarcinoma, other variant (specify): \_\_\_\_\_
- Large cell undifferentiated carcinoma
- Large cell neuroendocrine carcinoma
- Large cell carcinoma, other variant (specify): \_\_\_\_\_
- Basaloid carcinoma
- Adenosquamous carcinoma
- Typical carcinoid tumor
- Atypical carcinoid tumor
- Adenoid cystic carcinoma
- Mucoepidermoid carcinoma
- Other tumor of salivary gland type (specify): \_\_\_\_\_
- Carcinoma with pleomorphic, sarcomatoid, or sarcomatous elements (specify variant): \_\_\_\_\_
- Other (specify): \_\_\_\_\_
- Carcinoma, type cannot be determined

**Histologic Grade**

- Not applicable
- GX: Cannot be assessed
- G1: Well differentiated
- G2: Moderately differentiated
- G3: Poorly differentiated
- G4: Undifferentiated
- Other (specify): \_\_\_\_\_

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**Pathologic Staging (pTNM)**Primary Tumor (pT)

- \_\_\_ pTX: Cannot be assessed, or tumor proven by presence of malignant cells in sputum or bronchial washings but not visualized by imaging or bronchoscopy
- \_\_\_ pT0: No evidence of primary tumor
- \_\_\_ pTis: Carcinoma in situ
- \_\_\_ pT1: Tumor 3 cm or less in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus (ie, not in the main bronchus)
- \_\_\_ pT2: Tumor with any of the following features of size or extent: greater than 3 cm in greatest dimension; involves main bronchus, 2 cm or more distal to the carina; invades the visceral pleura; associated with atelectasis or obstructive pneumonitis that extends to the hilar region but does not involve the entire lung
- \_\_\_ pT3: Tumor of any size that directly invades any of the following: chest wall (including superior sulcus tumors), diaphragm, mediastinal pleura, parietal pericardium; or  
Tumor of any size in the main bronchus less than 2 cm distal to the carina but without involvement of the carina; or  
Tumor of any size associated atelectasis or obstructive pneumonitis of the entire lung
- \_\_\_ pT4: Tumor of any size that invades any of the following: mediastinum, heart, great vessels, trachea, esophagus, vertebral body, carina; or  
Tumor of any size with separate tumor nodule(s) in same lobe; or  
Tumor of any size with a malignant pleural effusion

Regional Lymph Nodes (pN)

- \_\_\_ pNX: Cannot be assessed
- \_\_\_ pN0: No regional lymph node metastasis
- \_\_\_ pN1: Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes, including intrapulmonary nodes involved by direct extension of the primary tumor
- \_\_\_ pN2: Metastasis in ipsilateral mediastinal and/or subcarinal lymph node(s)
- \_\_\_ pN3: Metastasis in contralateral mediastinal, contralateral hilar, ipsilateral or contralateral scalene, or supraclavicular lymph node(s)
- Specify: Number examined: \_\_\_  
Number involved: \_\_\_

Distant Metastasis (pM)

- \_\_\_ pMX: Cannot be assessed
- \_\_\_ pM1: Distant metastasis; includes separate tumor nodule(s) in a different lobe (ipsilateral or contralateral)  
\*Specify site(s), if known: \_\_\_\_\_

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**Margins (check all that apply)**

- Cannot be assessed
- Margins uninvolved by invasive carcinoma
  - Distance of invasive carcinoma from closest margin: \_\_\_\_ mm
  - Specify margin: \_\_\_\_\_
- Squamous cell carcinoma in situ present at bronchial margin
- Margin(s) involved by invasive carcinoma
  - Bronchial margin
  - Vascular margin
  - Parenchymal margin
  - Parietal pleural margin
  - Chest wall margin
  - Other attached tissue margin (specify): \_\_\_\_\_

**Direct Extension of Tumor (check all that apply)**

- None identified
- Chest wall (including superior sulcus tumors)
- Diaphragm
- Mediastinal pleura
- Visceral pleura
- Parietal pericardium
- Tumor in the main bronchus less than 2 cm distal to the carina
- Tumor-associated atelectasis or obstructive pneumonitis of the entire lung
- Mediastinum
- Heart
- Great vessels
- Other (specify): \_\_\_\_\_

**Venous (Large Vessel) Invasion (V)**

- Absent
- Present
- Indeterminate

**Arterial (Large Vessel) Invasion**

- Absent
- Present
- Indeterminate

**\*Lymphatic (Small Vessel) Invasion (L)**

- \*  Absent
- \*  Present
- \*  Indeterminate

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**\*Additional Pathologic Findings (check all that apply)**

\*  None identified

\*  Metaplasia (specify type): \_\_\_\_\_

\*  Inflammation (specify type): \_\_\_\_\_

\*  Other (specify): \_\_\_\_\_

**\*Comment(s)**

\* Data elements **with asterisks** are **not required** for accreditation purposes for the Commission on Cancer. These elements may be clinically important, but are not yet validated or regularly used in patient management. Alternatively, the necessary data may not be available to the pathologist at the time of pathologic assessment of this specimen.

## Background Documentation

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*Protocol revision date: January 2004*

### **I. Biopsy**

#### **A. Clinical Information**

1. Patient identification
  - a. Name
  - b. Identification number
  - c. Age (birth date)
  - d. Sex
2. Responsible physician(s)
3. Date of procedure
4. Date of specimen receipt in pathology laboratory
5. Previous/concurrent cytology or biopsy specimen
6. Other clinical information
  - a. Relevant history (eg, smoking, previous diagnosis, treatment)
  - b. Relevant findings (eg, imaging, positron emission tomography [PET] scan, operative)
  - c. Clinical diagnosis
  - d. Anticipated clinical stage per imaging studies
  - e. Procedure (bronchial biopsy, transbronchial biopsy, mediastinoscopic biopsy)
  - f. Findings at bronchoscopy/mediastinoscopy
  - g. Anatomic site(s) of specimen(s) (eg, left upper lobe)

#### **B. Macroscopic Examination**

1. Specimen
  - a. Unfixed/fixed (specify fixative)
  - b. Size (3 dimensions)
  - c. Descriptive features
2. Tissue submitted for microscopic evaluation
  - a. Submit entire specimen
  - b. Frozen section tissue fragment(s) (unless saved for special studies)
3. Special studies (specify)

#### **C. Microscopic Evaluation**

1. Tumor, if present
  - a. Histologic type (Note **A**)
  - b. Histologic grade (Note **B**)
  - c. Extent of invasion, as appropriate (Note **C**)
  - d. Bronchus, in situ versus invasive
  - e. Vascular invasion
  - f. Lymphatic vessel invasion (Note **D**)
  - g. Mediastinal lymph node metastasis (if present, note extracapsular extension) (Note **D**)
  - h. Pleural invasion
  - i. Other (specify)
2. Additional pathologic findings, if present
3. Status/results of special studies (specify)
4. Comment

- a. Correlation with intraoperative consultation, as appropriate
- b. Correlation with other specimens, as appropriate
- c. Correlation with clinical information, as appropriate

## II. Resection

### A. Clinical Information

1. Patient identification
  - a. Name
  - b. Identification number
  - c. Age (birth date)
  - d. Sex
2. Responsible physician(s)
3. Date of procedure
4. Date of specimen receipt in pathology laboratory
5. Previous/concurrent cytology or biopsy specimen
6. Previous chemotherapy, radiotherapy, photodynamic therapy
7. Other clinical information
  - a. Relevant history (eg, smoking, previous diagnosis, treatment)
  - b. Relevant findings (eg, imaging, PET scan, operative)
  - c. Clinical diagnosis
  - d. Anticipated clinical stage per imaging studies
  - e. Procedure
    - (1) major airway resection (eg, trachea, carina, main bronchus)
    - (2) video-assisted thoracoscopic surgery (VATS)
    - (3) wedge resection (subsegmentectomy)
    - (4) segmentectomy
      - i. standard segmentectomy
      - ii. en bloc with chest wall or other parietal tissue (eg, diaphragm/pericardium)
    - (5) lobectomy/bilobectomy
      - i. sleeve lobectomy
      - ii. en bloc with chest wall or other parietal tissue (eg, diaphragm/pericardium)
    - (6) pneumonectomy
      - i. standard pneumonectomy
      - ii. pneumonectomy with tracheal and carinal resection
      - iii. complex pneumonectomy (eg, pleuropneumonectomy, extrapleural pneumonectomy including en bloc resection)
  - f. Operative findings
  - g. Anatomic site(s) of specimen(s) (eg, upper lobe of left lung)

### B. Macroscopic Examination

1. Specimen
  - a. Organs/tissues received (documentation of extent of resection)
  - b. Unfixed/fixative (specify fixative)
  - c. Size of entire specimen (3 dimensions)
  - d. Weight
  - e. External aspect
    - (1) visceral pleura (eg, puckering, pleuritis)

- (2) attached tissue (eg, parietal pleura, pericardium, diaphragm, chest wall with or without ribs, other)
- f. Documentation of areas marked by surgeon
- g. Results of intraoperative consultation

2. Tumor
  - a. Location
    - (1) bronchial
      - i. main
      - ii. lobar
      - iii. segmental
    - (2) peripheral
    - (3) pleural
  - b. Size (Note **E**)
  - c. Descriptive features
    - (1) color
    - (2) shape
    - (3) circumscription
    - (4) cavitation
    - (5) other (eg, necrosis, hemorrhage)
  - d. Extent of invasion
    - (1) bronchial involvement
    - (2) visceral pleural invasion
    - (3) interlobar fissure extension, as appropriate
    - (4) attached tissues (depth of invasion, as appropriate)
    - (5) invasion of pulmonary artery
3. Additional tumors, if present
  - a. Describe each possible primary tumor as listed in “2. Tumor” (Note **F**)
  - b. Multiple nodules not regarded as primaries (Note **F**)
    - (1) size (range)
    - (2) number
    - (3) location
4. Margins (specify distance from closest approach of tumor)
  - a. Bronchial
  - b. Vascular (pulmonary artery and vein)
  - c. Parietal pleura, if present
  - d. Resected parenchymal surfaces
  - e. Attached tissues
5. Additional pathologic findings, if present
6. Regional lymph nodes in specimen (all nodes included in specimen are designated N1 unless otherwise specified by surgeon) (Note **G**)
7. Separately submitted N1 or N2 nodes (report each node station separately, as specified by surgeon) (Note **G**)
8. Sections of tissue for microscopic evaluation, as appropriate
  - a. Tumor
  - b. Tumor and adjacent lung
  - c. Tumor and wall of bronchus (if arising in bronchus)
  - d. Bronchial mucosa proximal to tumor
  - e. Tumor relation to pleura
  - f. Required margins
    - (1) bronchial
    - (2) vascular (pulmonary artery and vein)
    - (3) pleura
    - (4) parenchymal margin (VATS, wedge, segmentectomy)

- g. Additional margins/samples, if needed
    - (1) attached tissue
    - (2) areas marked by surgeon
  - h. Non-neoplastic lung
    - (1) normal
    - (2) abnormal
  - i. All lymph nodes
  - j. Frozen section tissue fragment(s) (unless saved for special studies)
9. Special studies (specify)
10. Photography

**C. Microscopic Evaluation**

- 1. Tumor
  - a. Histologic type (Note **A**)
  - b. Histologic grade (Note **B**)
  - c. Site
    - (1) bronchus
    - (2) peripheral lung
    - (3) pleura
    - (4) areas marked by surgeon
  - d. Extent of invasion (Note **C**)
    - (1) bronchial involvement
    - (2) visceral pleural invasion
    - (3) attached tissues
  - e. Vascular invasion (arteriolar or venous) (Note **D**)
  - f. Lymphatic invasion (Note **D**)
  - g. Perineural invasion
- 2. Margins
  - a. Bronchial
  - b. Vascular
    - (1) pulmonary artery
    - (2) pulmonary vein
  - c. Parenchymal
  - d. Pleural/extrapleural (Note **C**)
    - (1) the visceral pleura is free of involvement
    - (2) the tumor invades into the visceral pleura but not through it
    - (3) the tumor invades through the visceral pleura
    - (4) the tumor is in subpleural lymphatics
    - (5) multifocal pleural involvement
    - (6) the tumor extends into superficial or deep chest wall
  - e. Other (eg, attached ribs)
- 3. Regional lymph nodes included in main specimen (N1) (Notes **E** and **F**)
  - a. Total number examined
  - b. Number involved by tumor
  - c. Size of the largest metastasis
  - d. Extracapsular extension present or absent (Note **D**)
- 4. Separately submitted N1 or N2 lymph nodes (report each node station separately, as specified) (Note **G**)
  - a. Total number examined
  - b. Number involved by tumor

- c. Size of the largest metastasis
- d. Extracapsular extension present or absent (Note D)
- 5. Additional pathologic findings, if present
- 6. Results of special studies (specify)
- 7. Comments
  - a. Correlation with intraoperative consultation, as appropriate
  - b. Correlation with other specimens, as appropriate
  - c. Correlation with clinical information, as appropriate

## Explanatory Notes

### A. Histologic Type

For consistency in reporting, the histologic classification published by the World Health Organization (WHO) for carcinomas of the lung is recommended.<sup>1</sup> This protocol does not preclude the use of other systems of classification of histologic types.<sup>2</sup>

### World Health Organization (WHO) Classification of Lung Neoplasms

Epithelial tumors  
 Soft tissue tumors  
 Mesothelial tumors  
 Miscellaneous tumors  
 Lymphoproliferative diseases  
 Secondary tumors (metastatic)  
 Unclassified tumors  
 Tumor-like lesions

Each category of lung neoplasms includes a variety of benign and malignant tumors. A detailed list of all these neoplasms is beyond the scope of this protocol. Most lung neoplasms are malignant epithelial tumors.

#### Preinvasive lesions include:

Squamous dysplasia  
     Carcinoma in situ  
 Atypical adenomatous hyperplasia  
 Diffuse idiopathic pulmonary neuroendocrine cell hyperplasia

#### Malignant epithelial tumors of the lung include:

Squamous cell carcinoma  
     Papillary  
     Clear cell  
     Small cell  
     Basaloid  
 Small cell carcinoma  
     Variant  
         Combined small cell carcinoma (small cell carcinoma and non-small cell component)

Adenocarcinoma

- Acinar
- Papillary
- Bronchiolo-alveolar carcinoma
  - Nonmucinous
  - Mucinous
  - Mixed mucinous and nonmucinous type
- Solid adenocarcinoma with mucin
- Adenocarcinoma with mixed subtypes
- Variants
  - Well-differentiated fetal adenocarcinoma
  - Mucinous (“colloid”) adenocarcinoma
  - Mucinous cystadenocarcinoma
  - Signet-ring adenocarcinoma
  - Clear cell adenocarcinoma

Large cell carcinoma

- Variants
  - Large cell neuroendocrine carcinoma
  - Combined large cell neuroendocrine carcinoma
  - Basaloid carcinoma
  - Lymphoepithelioma-like carcinoma
  - Clear cell carcinoma
  - Large cell carcinoma with rhabdoid phenotype

Adenosquamous carcinoma

Carcinomas with pleomorphic, sarcomatoid, or sarcomatous elements

- Carcinomas with spindle and/or giant cells
- Spindle cell carcinoma
- Giant cell carcinoma
- Carcinosarcoma
- Pulmonary blastoma

Carcinoid tumor

- Typical carcinoid
- Atypical carcinoid

Carcinomas of salivary-gland type

- Mucoepidermoid carcinoma
- Adenoid cystic carcinoma
- Others

Unclassified carcinoma

**B. Histopathologic Grade (G)**

To standardize histologic grading, the following grading system is recommended.<sup>3</sup>

- Grade X (GX): Cannot be assessed
- Grade 1 (G1): Well differentiated
- Grade 2 (G2): Moderately differentiated
- Grade 3 (G3): Poorly differentiated
- Grade 4 (G4): Undifferentiated



Undifferentiated (grade 4) is reserved for carcinomas that show minimal or no specific differentiation in routine histologic preparations. According to the definition of grading, a squamous cell carcinoma or an adenocarcinoma arising in the lung can be classified only as grade 1, grade 2, or grade 3, since by definition these tumors show squamous or glandular differentiation, respectively. If there are variations in the differentiation of a tumor, the least favorable variation is recorded as the grade, using grades 1 through 3. By definition, small cell and large cell carcinomas of the lung are assigned grade 4, as they are high-grade tumors with poor prognosis.

### C. Visceral Pleural Invasion

The presence of visceral pleural invasion in tumors smaller than 3 cm will change the stage from T1 to T2 and increase stage IA to IB or stage IIA to IIB.<sup>4</sup> There are situations in which pleural invasion is difficult to assess, and evaluation of elastic stains may provide useful information.<sup>4,5</sup> Visceral pleural invasion may not, by itself, be an independent prognostic factor.<sup>6</sup>

### D. Venous/Lymphatic Vessel Invasion, Extracapsular Extension

Although the presence or absence of venous/lymphatic vessel invasion by the tumor<sup>7,8</sup> and extracapsular extension of a positive mediastinal lymph node<sup>9-12</sup> may represent unfavorable prognostic findings, they do not change the pT and pN classifications, respectively, or the TNM stage grouping (see Note E).<sup>13</sup> Nonetheless, this information is considered important by some clinicians and may influence their selection of therapy.

### E. TNM and Stage Grouping

The TNM Staging System for carcinoma of the lung of the American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (UICC) is recommended and is shown below.<sup>3,14</sup>

By AJCC/UICC convention, the designation “T” refers to a primary tumor that has not been previously treated. The symbol “p” refers to the pathologic classification of the TNM, as opposed to the clinical classification, and is based on gross and microscopic examination. pT entails a resection of the primary tumor or biopsy adequate to evaluate the highest pT category, pN entails removal of nodes adequate to validate lymph node metastasis, and pM implies microscopic examination of distant lesions. Clinical classification (cTNM) is usually carried out by the referring physician before treatment during initial evaluation of the patient or when pathologic classification is not possible.

Pathologic staging is usually performed after surgical resection of the primary tumor. Pathologic staging depends on pathologic documentation of the anatomic extent of disease, whether or not the primary tumor has been completely removed. If a biopsied tumor is not resected for any reason (eg, when technically unfeasible) 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.

### Primary Tumor (T)

TX Primary tumor cannot be assessed, or tumor proven by presence of malignant cells in sputum or bronchial washings but not visualized by imaging or bronchoscopy

- T0 No evidence of primary tumor
- Tis Carcinoma in situ
- T1 Tumor 3 cm or less in greatest dimension, surrounded by lung or visceral pleura, without bronchoscopic evidence of invasion more proximal than the lobar bronchus<sup>#</sup> (ie, not in the main bronchus)
- T2 Tumor with any of the following features of size or extent:
- more than 3 cm in greatest dimension
  - involves main bronchus, 2 cm or more distal to the carina
  - invades the visceral pleura
  - associated with atelectasis or obstructive pneumonitis that extends to the hilar region but does not involve the entire lung
- T3 Tumor of any size that directly invades any of the following:
- chest wall (including superior sulcus tumors)
  - diaphragm
  - mediastinal pleura
  - parietal pericardium
- or
- Tumor of any size in the main bronchus less than 2 cm distal to the carina but without involvement of the carina
- or
- Tumor of any size associated atelectasis or obstructive pneumonitis of the entire lung
- T4 Tumor of any size that invades any of the following:
- mediastinum
  - heart
  - great vessels
  - trachea
  - esophagus
  - vertebral body
  - carina
- or
- Tumor of any size with separate tumor nodule(s) in same lobe
- or
- Tumor of any size with a malignant pleural effusion<sup>##</sup>

<sup>#</sup> The uncommon superficial spreading tumor of any size with its invasive component limited to the bronchial wall, which may extend proximal to the main bronchus is also classified as T1.

<sup>##</sup> Most pleural effusions with lung cancer are due to tumor. However, in a few patients, multiple cytopathologic examinations of pleural fluid are negative for tumor, the fluid is nonbloody and is not an exudate. Where these elements and clinical judgment dictate that the effusion is not related to the tumor, the effusion should be excluded as a staging element, and the tumor should be classified as T1, T2, or T3.

### Regional Lymph Nodes (N)

- NX Regional lymph nodes cannot be assessed
- N0 No regional lymph node metastasis

- N1 Metastasis in ipsilateral peribronchial and/or ipsilateral hilar lymph nodes, including intrapulmonary nodes involved by direct extension of the primary tumor
- 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)

**Distant Metastasis (M)**

- MX Distant metastasis cannot be assessed
- M0 No distant metastasis
- M1 Distant metastasis; includes separate tumor nodule(s) in a different lobe (ipsilateral or contralateral)

**TNM Stage Groupings**

Occult	T0	N0	M0
Stage 0	Tis	N0	M0
Stage IA	T1	N0	M0
Stage IB	T2	N0	M0
Stage IIA	T1	N1	M0
Stage IIB	T2	N1	M0
	T3	N0	M0
Stage IIIA	T1	N2	M0
	T2	N2	M0
	T3	N1	M0
	T3	N2	M0
Stage IIIB	Any T	N3	M0
	T4	Any N	M0
Stage IV	Any T	Any N	M1

**TNM Descriptors**

For identification of special cases of TNM or pTNM classifications, the “m” suffix and “y,” “r,” and “a” prefixes are used. Although they do not affect the stage grouping, they indicate cases needing separate analysis.

The “m” suffix indicates the presence of multiple primary tumors in a single site and is recorded in parentheses: pT(m)NM.

The “y” prefix indicates those cases in which classification is performed during or following initial multimodality therapy (ie, neoadjuvant chemotherapy, radiation therapy, or both chemotherapy and radiation therapy). The cTNM or pTNM category is identified by a “y” prefix. The ycTNM or ypTNM categorizes the extent of tumor actually present at the time of that examination. The “y” categorization is not an estimate of tumor prior to multimodality therapy (ie, before initiation of neoadjuvant therapy).

The “r” prefix indicates a recurrent tumor when staged after a documented disease-free interval, and is identified by the “r” prefix: rTNM.

The “a” prefix designates the stage determined at autopsy: aTNM.

**Additional Descriptors**Residual Tumor (R)

Tumor remaining in a patient after therapy with curative intent (eg, surgical resection for cure) is categorized by a system known as R classification, as shown below.

RX	Presence of residual tumor cannot be assessed
R0	No residual tumor
R1	Microscopic residual tumor
R2	Macroscopic residual tumor

For the surgeon, the R classification may be useful to indicate the known or assumed status of the completeness of a surgical excision. For the pathologist, the R classification is relevant to the status of the margins of a surgical resection specimen. That is, tumor involving the resection margin on pathologic examination may be assumed to correspond to residual tumor in the patient and may be classified as macroscopic or microscopic according to the findings at the specimen margin(s).

**Vessel Invasion**

By AJCC/UICC convention, vessel invasion (lymphatic or venous) does not affect the T category indicating local extent of tumor unless specifically included in the definition of a T category. In all other cases, lymphatic and venous invasion by tumor are coded separately as follows.

Lymphatic Vessel Invasion (L)

LX	Lymphatic vessel invasion cannot be assessed
L0	No lymphatic vessel invasion
L1	Lymphatic vessel invasion

Venous Invasion (V)

VX	Venous invasion cannot be assessed
V0	No venous invasion
V1	Microscopic venous invasion
V2	Macroscopic venous invasion

**F. Synchronous Carcinomas**

Synchronous primary carcinomas of the lung of different histologic types are generally considered separate primaries, and they are staged independently.<sup>15-18</sup> Recommendations for staging of multiple pulmonary tumor masses of similar histology are provided in Note **E** (such as in tumor of any size with separate tumor nodule[s] in same lobe and would be considered as T4).

**G. Regional Lymph Node Classification by Anatomic Site**

The anatomic classification of regional lymph nodes adopted by the AJCC and UICC<sup>18</sup> is shown below.

**N2 Nodes**

All N2 nodes lie within the mediastinal pleural envelope.

Superior Mediastinal Nodes

1. Highest mediastinal nodes: Nodes lying above a horizontal line at the upper rim of the brachiocephalic (left innominate) vein where it ascends to the left, crossing in front of the trachea at its midline.
2. Upper paratracheal nodes: Nodes lying above a horizontal line drawn tangential to the upper margin of the aortic arch and below the inferior boundary of No. 1 nodes.
3. Prevascular and retrotracheal nodes: Prevascular and retrotracheal nodes may be designated 3A and 3P; midline nodes are considered to be ipsilateral.
4. Lower paratracheal nodes: The lower paratracheal nodes on the right lie to the right of the midline of the trachea between a horizontal line drawn tangential to the upper margin of the aortic arch and a line extending across the right main bronchus at the upper margin of the upper lobe bronchus, contained within the mediastinal pleural envelope. The lower paratracheal nodes on the left lie to the left of the midline of the trachea between a horizontal line drawn tangential to the upper margin of the aortic arch and a line extending across the left main bronchus at the level of the upper margin of the left upper lobe bronchus, medial to the ligamentum arteriosum and contained within the mediastinal pleural envelope. Researchers may wish to designate the lower paratracheal nodes as No. 4s (superior) and No. 4i (inferior) subsets for study purposes; the No. 4s nodes may be defined by a horizontal line extending across the trachea and drawn tangential to the cephalic border of the azygos vein; the No. 4i nodes may be defined by the lower boundary of No. 4s and the lower boundary of No. 4, as described above.

Aortic Nodes

5. Subaortic nodes (aorto-pulmonary window): Subaortic nodes are lateral to the ligamentum arteriosum or the aorta or left pulmonary artery and proximal to the first branch of the left pulmonary artery and lie within the mediastinal pleural envelope.
6. Para-aortic nodes (ascending aorta or phrenic): Nodes lying anterior and lateral to the ascending aorta and the aortic arch or the innominate artery, beneath a line tangential to the upper margin of the aortic arch.

Inferior Mediastinal Nodes

7. Subcarinal nodes: Nodes lying caudal to the carina of the trachea, but not associated with the lower lobe bronchi or arteries within the lung.
8. Paraesophageal nodes (below carina): Nodes lying adjacent to the wall of the esophagus and to the right or left of the midline, excluding subcarinal nodes.
9. Pulmonary ligament nodes: Nodes lying within the pulmonary ligament, including those in the posterior wall and lower part of the inferior pulmonary vein.

**N1 Nodes**

All N1 nodes lie distal to the mediastinal pleural reflection and within the visceral pleura.

10. Hilar nodes: The proximal lobar nodes, distal to the mediastinal pleural reflection and the nodes adjacent to the bronchus intermedius on the right; radiographically, the hilar shadow may be created by enlargement of both hilar and interlobar nodes.

11. Interlobar nodes: Nodes lying between the lobar bronchi.
12. Lobar nodes: Nodes adjacent to the distal lobar bronchi.
13. Segmental nodes: Nodes adjacent to the segmental bronchi.
14. Subsegmental nodes: Nodes around the subsegmental bronchi.

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