CHEST

The Eighth Edition Lung Cancer Stage Classification

Frank C. Detterbeck, MD, FCCP; Daniel J. Boffa, MD; Anthony W. Kim, MD, FCCP; and Lynn T. Tanoue, MD, FCCP

Stage classification provides a nomenclature about the anatomic extent of a cancer; a consistent language provides the ability to communicate about a specific patient and about cohorts of patients in clinical studies. This paper summarizes the eighth edition of lung cancer stage classification, which is the worldwide standard as of January 1, 2017. This revision is based on a large global database, a sophisticated analysis, extensive internal validation as well as multiple assessments confirming generalizability. Practicing clinicians must be familiar with the stage classification system when managing contemporary patients with lung cancer.

CHEST 2017; 151(1):193-203

KEY WORDS: lung cancer; non-small cell lung cancer; prognosis; stage classification

Classification of tumor stage is a cornerstone of providing care for patients with cancer. The fundamental purpose of stage classification is to provide a nomenclature about the anatomic extent of disease that is used consistently around the world. This enables reliable communication about a particular patient, provides an understanding of the extent of disease among patients in a clinical trial, and thus enhances the ability of clinicians to make judgments about how well particular management strategies and associated results apply to a new patient.

Although it is critical that stage classification represents a stable, consistently used nomenclature, periodic revisions are needed. As technology changes and the ability to define nuances regarding tumor extent progresses, the nomenclature that describes this must evolve. To meet the needs of stability and consistency while allowing for progress, formal periodic revisions are undertaken. The Union Internationale Contre le Cancer (UICC) and American Joint Committee on Cancer (AJCC) serve as the official bodies that define, periodically review and refine the stage classification systems; although separate, these organizations work together to achieve global consistency. In January 2017, the eighth edition of the stage classification takes effect around the world, although implementation is delayed in the United States to ensure that the cancer care community has the necessary infrastructure in place. This paper summarizes the eighth edition AJCC/UICC stage classification for lung cancer.

ABBREVIATIONS: AJCC = American Joint Committee on Cancer; IASLC = International Association for the Study of Lung Cancer; GG/L = ground glass/lepidic; NSCLC = non-small cell lung cancer; SPFC = Staging and Prognostic Factors Committee; UICC = Union Internationale Contre le Cancer

AFFILIATIONS: From the Department of Surgery (Drs Detterback, Boffa, and Kim), Section of Thoracic Surgery, and the Department of Internal Medicine (Dr Tanoue), Section of Pulmonary, Critical Care and Sleep Medicine, Yale University School of Medicine, New Haven, CT.

CORRESPONDENCE TO: Frank C. Detterbeck, MD, FCCP, Yale University School of Medicine, Department of Surgery, Section of Thoracic Surgery, PO Box 208062, New Haven, CT 06520; e-mail: frank.detterbeck@yale.edu

DOI: http://dx.doi.org/10.1016/j.chest.2016.10.010

Patients and Methods

Basic Concepts

The description of the anatomic extent of a tumor consists of three components: T for extent of the primary tumor, N for involvement of lymph nodes, and M for distant metastases. Each T, N, and M component is divided into several categories (eg, T1, T2). Various characteristics, known as descriptors, define what is included within a T, N, or M category. Specific combinations of T, N, and M categories are grouped together into stage groups.

A prefix further specifies the context of the stage classification (Table 1). Clinical stage (c) is determined by all information available before a surgical resection, including symptoms, physical signs, imaging, procedures, and biopsies. Pathologic stage (p) is defined by the results of a surgical resection (or, rarely, an aborted surgical resection) together with all clinical staging information. Thus c and p stage apply to the composite stage group or TNM designation; application of the c or p designation to individual T, N, or M components is confusing and discouraged.[1-4] Resected tumors are further classified by the extent of resection (Table 2). A "certainty factor" (C) can be used to reflect the extent of testing involved in defining the stage (eg, a simple history and physical [C1], imaging and invasive biopsies [C2], surgical biopsy [C3], or surgical resection [C4]).[5]

Process, Analysis, and Validation

The International Association for the Study of Lung Cancer (IASLC), being the largest multidisciplinary global organization involved in lung cancer, began developing infrastructure to inform the AJCC/UICC stage classification revisions in 1996. This initiative led to the revisions of the seventh and now also the eighth editions of the lung cancer stage classification. IASLC appoints an international multispecialty Staging and Prognostic Factors Committee (SPFC). The SPFC for lung was divided into multiple subcommittees which developed proposals that were refined by the entire committee according to a formal process.[6]

For the eighth edition the IASLC SPFC assembled a new global database of 94,708 patients receiving a diagnosis between 1999 and 2010 from 35 sources and 16 countries. Most (85%) of the patients underwent surgery (± other treatments) and came from Europe (49%) and Asia (44%). An extensive statistical analysis of the database was conducted by the Cancer Research and Biostatistics group according to a set of guiding principles.[6] Outcomes within the database varied by region and type of source data; therefore, proposals for stage classification were made on the basis of the presence (or absence) of *differences in prognosis* between (heterogeneity) and within (homogeneity) categories and stage groupings that were *consistent across multiple comparisons* (clinical, pathologic, R0, R-any, N0, N-any, within a geographic region, histologic type, database type, etc.). An understanding of the nature and limitations of the available data influenced how heavily particular analyses were weighed; this was supplemented by clinical and historic considerations in arriving at the final classification proposals.

It is essential that a classification system is broadly applicable; therefore the SPFC conducted analyses that demonstrated geographic, historic, methodologic, spectrum, and follow-up transportability.[6] External validation was demonstrated using the US-based National Cancer Database. Further external validation within local or regional databases is encouraged; to be useful, this should evaluate discriminatory ability (not prognostic prediction) and be conducted in a scientifically robust manner.[6]

Results

T Component

The T component analysis was on the basis of 10,230 c-stage and 22,257 p-stage tumors with sufficient detailed information.[7] The impact of size was analyzed using a running log rank statistic (initially in a p-stage N0 M0 R0 non-small cell lung cancer [NSCLC] cohort, but then substantiated in multiple others).[7] This confirmed previous size cutpoints and suggested further cutpoints in 1-cm increments. Non-size T descriptors were examined using multivariate Cox regression analysis that adjusted for age, sex, histologic type, and geographic region, again in multiple cohorts. Tumors with one vs more than one positive descriptor within a T category were considered, but this was not incorporated into the classification because of inconsistent differences.[6,7]

The T component is divided into five T categories that are defined by various T descriptors, as summarized in Table 3.[7] Size plays a prominent role in defining the T

TABLE 1] Types of Staging Assessments

Prefix	Name	Definition
c	Clinical	Before initiation of any treatment, using any and all information available (eg, including mediastinoscopy)
p	Pathologic	After resection, made on the basis of pathologic assessment
y	Restaging	After part or all of the treatment has been given
r	Recurrence	Stage at time of a recurrence
a	Autopsy	Stage as determined by autopsy

TABLE 2] Residual Tumor After Treatment

Symbol	Name	Definition
R0	No residual	No identifiable tumor remaining, negative surgical margins
R1	Microscopic residual	Microscopically positive margins but no visible tumor remaining
R2	Gross residual	Gross (visible or palpable) tumor remaining

TABLE 3] Definitions for T, N, and M Descriptors

T (Primary Tumor)		Label
T0	No primary tumor	
Tis	Carcinoma in situ (Squamous or Adenocarcinoma)	Tis
T1	Tumor ≤3 cm,	
T1a(mi)	Minimally Invasive Adenocarcinoma	T1a*(mi)*
T1a	Superficial spreading tumor in central airways[a]	T1a *SS*
T1a	Tumor ≤1 cm	T1a *≤1*
T1b	Tumor >1 but ≤2 cm	T1b *>1-2*
T1c	Tumor >2 but ≤3 cm	T1c *>2-3*
T2	Tumor >3 but ≤5 cm or tumor involving:	
	visceral pleura[b],	T2 *Visc Pl*
	main bronchus (not carina), atelectasis to hilum[b]	T2 *Centr*
T2a	Tumor >3 but ≤4 cm	T2a *>3-4*
T2b	Tumor >4 but ≤5 cm	T2b *>4-5*
T3	Tumor >5 but ≤7 cm	T3 *>5--7*
	or invading chest wall, pericardium, phrenic nerve	T3 *Inv*
	or separate tumor nodule(s) in the same lobe	T3 *Satell*
T4	Tumor >7 cm	T4 *>7*
	or tumor invading: mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, carina, trachea, esophagus, spine;	T4 *Inv*
	or tumor nodule(s) in a different ipsilateral lobe	T4 *Ipsi Nod*
N (Regional Lymph Nodes)		
N0	No regional node metastasis	
N1	Metastasis in ipsilateral pulmonary or hilar nodes	
N2	Metastasis in ipsilateral mediastinal/subcarinal nodes	
N3	Metastasis in contralateral mediastinal/hilar, or supraclavicular nodes	
M (Distant Metastasis)		
M0	No distant metastasis	
M1a	Malignant pleural/pericardial effusion[c] or pleural /pericardial nodules	M1a *Pl Dissem*
	or separate tumor nodule(s) in a contralateral lobe;	M1a *Contr Nod*
M1b	Single extrathoracic metastasis	M1b *Single*
M1c	Multiple extrathoracic metastases (1 or >1 organ)	M1c *Multi*

TX, NX: T or N status not able to be assessed

[a] Superficial spreading tumor of any size but confined to the tracheal or bronchial wall
[b] such tumors are classified as T2a if >3≤4 cm, T2b if >4≤5 cm.
[c] Pleural effusions are excluded that are cytologically negative, non-bloody, transudative, and clinically judged not to be due to cancer.

category. In addition, the T category is determined by invasion into adjacent central/mediastinal or peripheral structures. Finally, when an additional tumor nodule is present, the location of this relative to the primary tumor determines the T category.

Invasion of a main bronchus is classified as T2a regardless of the distance from the carina; similarly, atelectasis extending to the hilum is designated as T2a, regardless of whether it involves a lobe or an entire lung (different from the seventh edition classification). Involvement of the diaphragm is classified as T4 (different from the seventh edition classification). Involvement of a T structure by tumor that is extending from a nodal metastasis (eg, left recurrent nerve involvement by an aortopulmonary window node metastasis) is not counted as T involvement.

Involvement of hilar fat is classified as T2a and involvement of mediastinal fat as T4. The mediastinal pleura has been omitted as a T descriptor; the results were inconsistent, and specific (isolated) mediastinal pleural involvement was rare. Involvement of the parietal pericardium is classified as T3 (this means that

the fat overlying the pericardium should probably not be counted as T4). Involvement of the visceral pericardium is designated as T4. A Pancoast tumor is classified as T4 if there is clear involvement of C8 or higher nerve roots, cords of the brachial plexus, subclavian vessels, vertebral bodies, lamina, or spinal canal. A tumor is classified as T3 if it involves thoracic nerve roots only (ie, T1 or T2 nerve roots).

When multiple T descriptors are applicable to a tumor, the highest T category should be chosen. In other words, a small tumor with a higher T category by invasion should be classified by the invasion (eg, a 1.5-cm tumor with visceral pleural involvement would be T2a), and a large tumor with a lower degree of invasion should be classified according to the size (eg, a 5.5-cm tumor involving the main bronchus would be classified as T3).

How size should be measured is specifically addressed.[8] The maximum dimension of the solid component (on imaging, c-stage) or the invasive component (on microscopy, p stage) is used to assign the T category; however, the maximum dimension of the ground glass or lepidic component should also be recorded. Further details of how this should be measured on imaging were also addressed by the SPFC subcommittee. Slice thickness, window settings, degree of inspiration, and scanner parameters can affect the observed size[8]; in addition, there is significant inter- and intraobserver variability in size measurement with smaller lesions.[9,10]

There are several special situations. A superficial spreading tumor in the central airways is classified as T1a, regardless of location. Carcinoma in situ is classified as Tis; note that this now applies to both squamous carcinoma and adenocarcinoma.[8] Minimally invasive adenocarcinoma is classified as T1a(mi). A minimally invasive adenocarcinoma has an invasive component of $\leq$ 5 mm and a lepidic (noninvasive) component of $\leq$ 3 cm.[11] (Note that these diagnoses can are only be made in resected tumors.)

N Component

The N component analysis was made on the basis of 38,910 c-stage and 31,426 p-stage tumors with sufficient detailed information. The discrimination of the N categories was first demonstrated in c-stage T-any M0 NSCLC cases, then confirmed in each T category and in p-stage cases (ie, T-any M0 R-any and T-any M0 R0). Patients with sufficient detail to be evaluable for the N component analysis were largely contributed from Japan. However, geographic applicability of the N categories was demonstrated in separate comparisons within geographic regions (Asia, North/South America, Europe, and Australia).[12]

The four N categories remain the same in the eighth edition as in the seventh edition (Table 3).[12] The category is determined by the location of involved nodes. Figure 1 and e-Table 1 provide a description and diagram of the node map.[13] Direct extension of the primary tumor into an adjacent node is counted as nodal involvement.

The SPFC considered further subdivisions that included the number of involved node stations (Table 4). These analyses showed differences between p-stage tumors with single vs multiple N1 or N2 station involvement, but no difference between multiple N1 stations and a single N2 skip metastasis (no N1 involvement). This subgrouping was not included in the stage classification, however, primarily because it could not be assessed in c-stage tumors.

The AJCC, UICC, and IASLC recommend that at least six nodes are removed during surgical resection, three from N1 and three from N2 stations (ie, a representative node from each station) for accurate staging.[12] There are differences of opinion whether N0 status should be recognized if more limited sampling has occurred and is negative; some would classify this as pN0, whereas others suggest the designation pN0(un) to show that there is a degree of uncertainty.

M Component

The M component analysis included 1,059 nonsurgically managed NSCLC M1 tumors.[14] This cohort was drawn from a detailed "electronic data capture" portion of the database; most other submitted nonsurgically managed M1 tumors lacked sufficient detail. The M categories and descriptors are summarized in Table 3. Pleural/pericardial nodules, pleural/pericardial effusion, and contralateral/bilateral pulmonary nodules are classified as M1a. M1b denotes tumors with a single distant (extrathoracic) metastasis. There was no consistent difference with respect to the site of metastasis among tumors with a single distant metastatic focus. M1c includes tumors with multiple metastases, either multiple metastases in a single organ or multiple metastases in multiple organs.

Stage Groups

For the stage group analysis, 17,477 c-stage tumors (16,595 T-any N-any M0 and 882 T-any N-any M1)

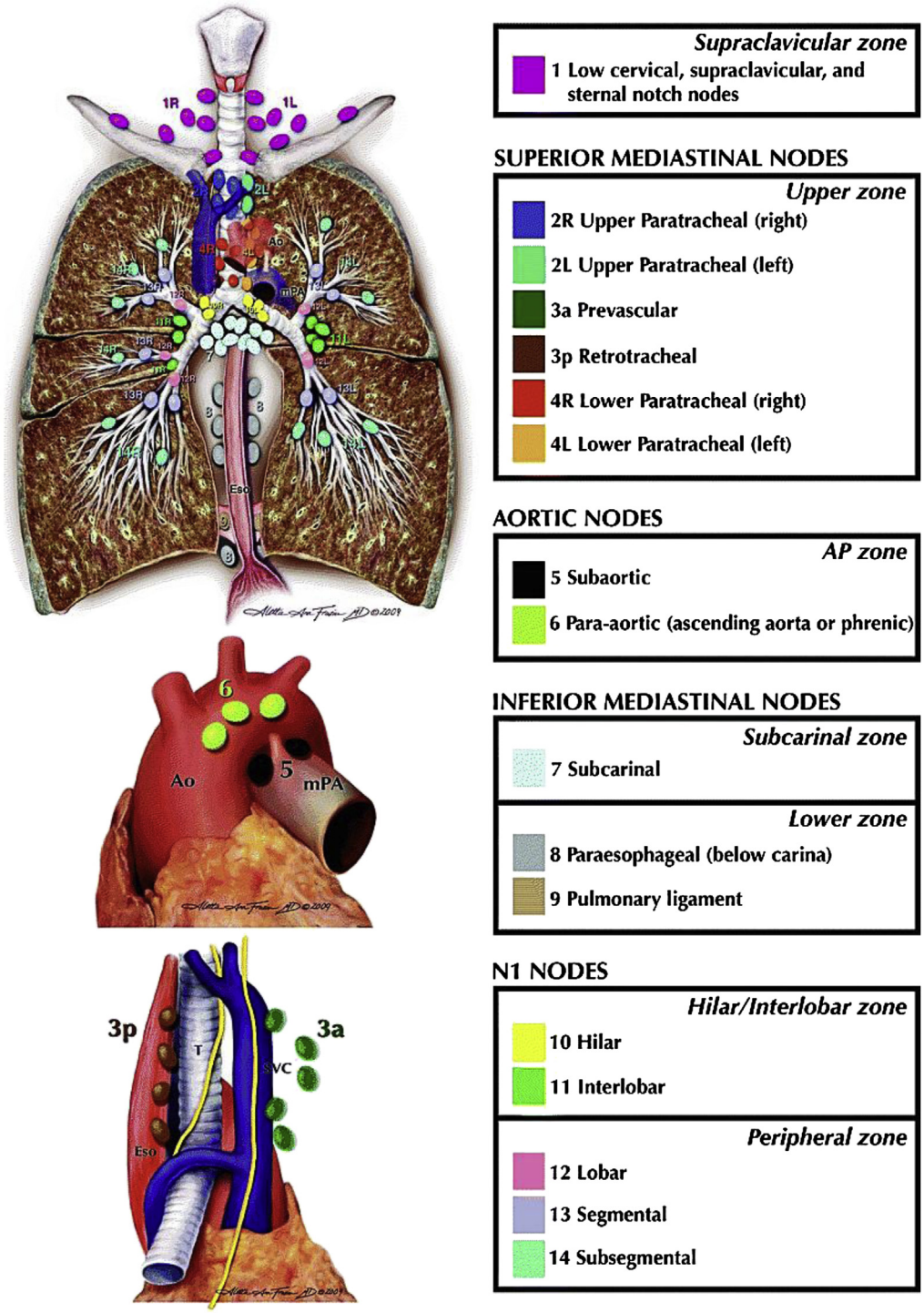

Figure 1 – *The International Association for the Study of Lung Cancer node map for lung cancer. With permission from Rusch et al.*[13]

and 31,936 p-stage tumors (all T-any N-any M0) were available. Candidate stage grouping schemes were developed beginning with M0 tumors and best stage, using a recursive partitioning and amalgamation algorithm made on the basis of survival in a training set, stratified by type of data submission and time period of case entry. After extensive testing in multiple subgroups, adjusted Cox regression analyses, validation set analyses, and considerations regarding practicality and clinical relevance, the stage grouping shown in Table 5 and Figures 2, 3, and 4 was selected.

TABLE 4] N Subclassification

Category	Subclass	Description
Nx		Regional lymph nodes cannot be assessed
N0		No regional lymph node involvement
N1	N1a	Single-station N1 involvement
	N1b	Multiple-station N1 involvement
N2	N2a1	Single-station N2 without N1 involvement (skip)
	N2a2	Single-station N2 with N1 involvement
	N2b	Multiple-station N2 involvement
N3		N3 lymph node involvement

TABLE 5] Lung Cancer Stage Grouping (Eighth Edition)

T/M	Label	N0	N1	N2	N3
T1	T1a *≤1*	IA1	IIB	IIIA	IIIB
	T1b *>1-2*	IA2	IIB	IIIA	IIIB
	T1c *>2-3*	IA3	IIB	IIIA	IIIB
T2	T2a *Cent, Visc Pl*	IB	IIB	IIIA	IIIB
	T2a *>3-4*	IB	IIB	IIIA	IIIB
	T2b *>4-5*	IIA	IIB	IIIA	IIIB
T3	T3 *>5-7*	IIB	IIIA	IIIB	IIIC
	T3 *Inv*	IIB	IIIA	IIIB	IIIC
	T3 *Satell*	IIB	IIIA	IIIB	IIIC
T4	T4 *>7*	IIIA	IIIA	IIIB	IIIC
	T4 *Inv*	IIIA	IIIA	IIIB	IIIC
	T4 *Ipsi Nod*	IIIA	IIIA	IIIB	IIIC
M1	M1a *Contr Nod*	IVA	IVA	IVA	IVA
	M1a *Pl Dissem*	IVA	IVA	IVA	IVA
	M1b *Single*	IVA	IVA	IVA	IVA
	M1c *Multi*	IVB	IVB	IVB	IVB

See Table 3 text and legend for expansion of abbreviations.

Stage I involves T1/T2a N0 M0 tumors; stage II involves either T2b/T3 N0 M0 tumors or T1/T2 N1 M0 tumors. Stage III is now divided into three subgroups. Stage IIIA includes T4 N0 M0 and T3/4 N1 M0 tumors as well as T1/T2 N2 M0 tumors. Stage IIIB tumors are either T3/T4 N2 M0 or T1/T2 N3 M0. Stage IIIC involves T3/T4 N3 M0 tumors. Stage IV is divided into two subgroups. Stage IVA includes all M1a and M1b tumors, regardless of T or N classification. Stage IVB involves all M1c tumors.

Multiple Pulmonary Sites of Lung Cancer

Patients with multiple pulmonary sites of lung cancer are seen with increasing frequency. There has been significant variability in how TNM classification has

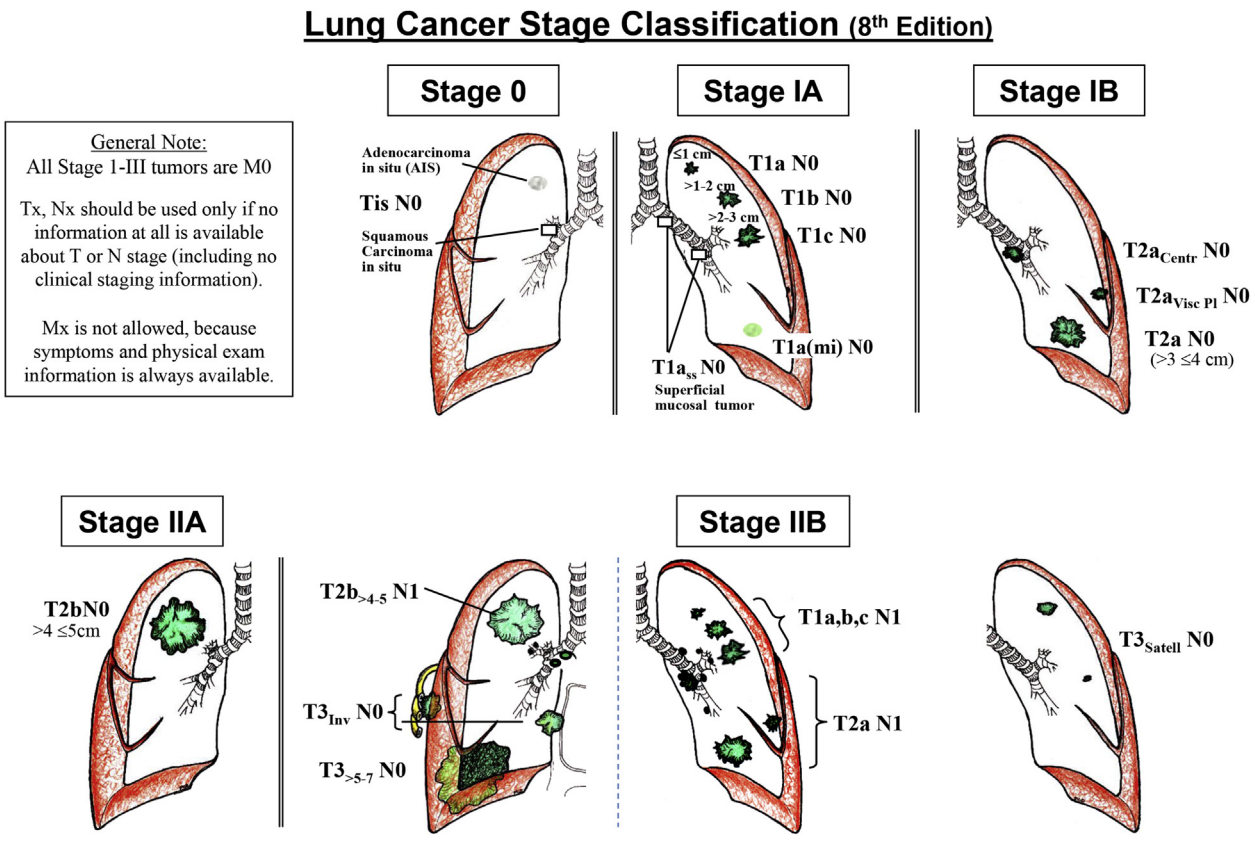

Figure 2 – *Graphic illustration of stages 0, I, and II.*

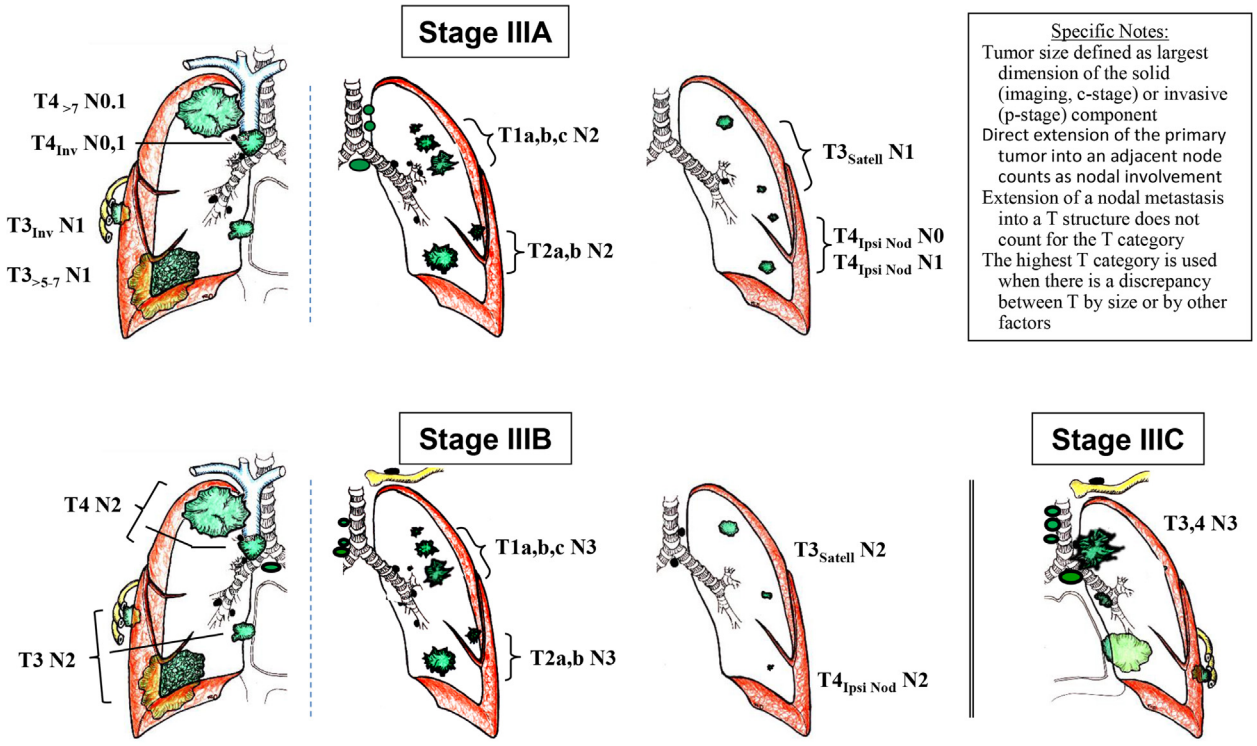

Figure 3 – *Graphic illustration of stage III.*

been applied to these tumors.[15] An SPFC subcommittee proposed definitions and a schema for stage classification of such tumors.[16-19] Four patterns of disease are distinguished (Table 6); the clinical presentation, pathologic correlates, and biologic behavior of these suggest specific applications of TNM classification rules. The subcommittee developed a series of criteria to define these four patterns of disease (summarized in e-Tables 2-5).[16]

First, patients can present with second primary lung cancers. The demographic characteristics, outcomes, and recurrence patterns for each tumor are similar to that of single "typical" lung cancers according to the stage and histologic type.[18] Note that most second primary lung cancers have the same histotype, and that there is substantial variability in biomarker patterns (ie, either different in clearly related metastases or the same in clearly different tumors). This means histologic type of biomarker patterns alone are not entirely reliable to classify two tumors as separate primaries or related tumors; classification should take into account all available information or involve a comprehensive histologic assessment.[18] Second primary lung cancers should be designated with a T, N, and M category for each tumor.

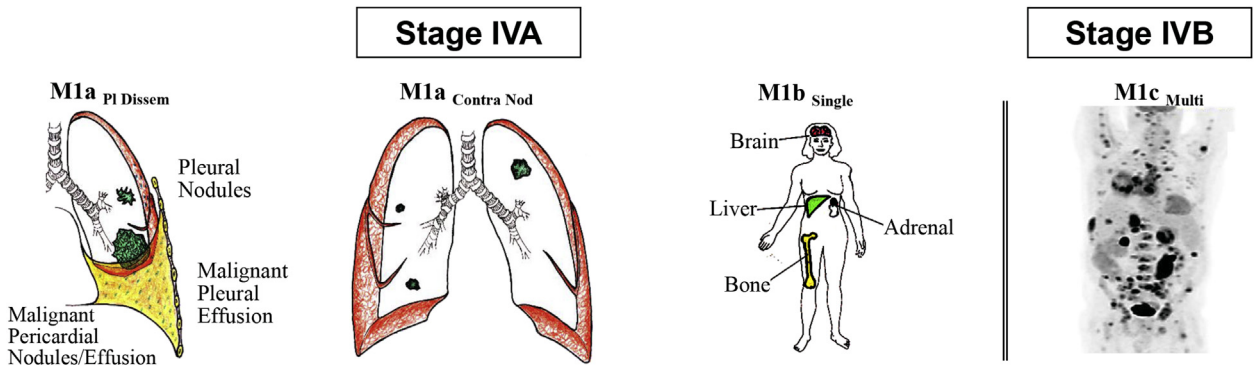

Figure 4 – *Graphic illustration of stage IV.*

TABLE 6] Schematic Summary of Patterns of Disease and TNM Classification of Patients With Lung Cancer With Multiple Pulmonary Sites of Involvement

	Second Primary Lung Cancer	Multifocal GG/L Nodules	Pneumonic-Type of Adenocarcinoma	Separate Tumor Nodule
Imaging Features	Two or more distinct masses with imaging characteristic of lung cancer (eg, spiculated)	Multiple ground glass or part-solid nodules	Patchy areas of ground glass and consolidation	Typical lung cancer (eg, solid, spiculated) with separate solid nodule
Pathologic Features	Different histotype or different morphology by comprehensive histologic assessment	Adenocarcinomas with prominent lepidic component (typically varying degrees of AIS, MIA, LPA)	Same histology throughout (most often invasive mucinous adenocarcinoma)	Distinct masses with the same morphology by comprehensive histologic assessment
TNM Classification	Separate cTNM and pTNM for each cancer	T based on highest T lesion with (#/m) indicating multiplicity; single N and M	T based on size or T3 if in single lobe, T4 or M1a if in different ipsi- or contralateral lobes; single N and M	Location of separate nodule relative to primary site determines if T3, T4 or M1a; single N and M
Conceptual View	Unrelated tumors	Separate tumors, albeit with similarities	Single tumor, diffuse pulmonary involvement	Single tumor, with intrapulmonary metastasis

AIS = adenocarcinoma in situ; GG/L = ground glass/lepidic; LPA = lepidic predominant adenocarcinoma; MIA = minimally invasive adenocarcinoma. Reprinted with permission from Detterbeck et al.[16]

Second, some patients with a solid primary lung cancer have one or more separate solid tumor nodule(s) of the same histologic type (referred to as "intrapulmonary metastasis" in the pathology community). The behavior of these tumors is similar to that of a similar solitary tumor; outcomes are slightly inferior and affected by how they are treated.[17] These tumors should be classified according to the location of the separate nodule relative to the index tumor—T3 for a same-lobe, T4 for a same-side (different lobe), and M1a for an other-side location—with a single N and M category.

A third pattern of disease involves patients presenting with multiple lung cancer nodules with prominent ground glass or lepidic (GG/L) features. This group has different demographic characteristics, excellent outcomes, and infrequent recurrences outside the lung parenchyma.[19] These GG/L tumors should be designated by the T category of the highest T lesion, the number or "m" in parentheses (#/m) to indicate the multiplicity, and a collective N and M category for all. A comprehensive histologic assessment of each GG/L tumor nodule is not required.

A fourth pattern of disease involves a form of lung cancer that is radiologically similar to pneumonia (so-called "pneumonic-type" of lung cancer). Extrathoracic and nodal involvement is infrequent, but prognosis is distinctly worse than for patients with multiple GG/L nodules.[19] Diffuse pneumonic-type lung cancers are designated by size (or T3 if size cannot be determined) if in one lobe, T4 if involving multiple same-side lobes, and M1a if involving both lungs—with a single N and M category for all areas of involvement.

Discussion

Definition of stage classification of lung cancer has undergone a transformative change with the engagement of the IASLC SPFC. The size of the database, the sophistication of the analysis, and the extent of internal and external validation are unprecedented among solid tumors. A debt is owed by the world to the many contributors who committed the time to provide the worldwide data that make this possible; nevertheless, there are surely aspects of the stage classification that can be improved. A different type of engagement is now needed: investigators are encouraged to test the system and expose areas needing further refinement. To be useful, an analysis must be scientifically rigorous and robust. Proposed metrics for such analyses have been outlined.[6]

The development of lung cancer stage classification rests on an unprecedented scientific foundation; nevertheless, limitations exist. Although the database is large and has global representation, it is still essentially a convenience sample of available data. Regions other than Asia and Europe are underrepresented. Nonsurgically managed patients are underrepresented in the IASLC database; however, internal validation demonstrated geographic, spectrum, and methodologic transportability. Furthermore, the eighth edition stage classification has

been externally validated against the US-based National Cancer Database (publication underway) which consists largely of nonsurgically managed patients; therefore, this external validation demonstrates excellent discriminatory validity of the eighth edition stage classification in the United States and in nonsurgical cohorts.

It is important to understand the relationship between stage classification and prognosis. Differences in prognosis that were consistent across multiple subgroups and adjusted multivariate regression analyses were used prominently (but not exclusively) to decide how to classify tumors in groups that are sufficiently internally homogeneous but also distinct from one another. Additionally, although there is no question that the anatomic extent of disease has an impact on prognosis, prognosis is also affected by a multitude of other patient-related (eg, performance status, age, comorbidities, competing causes of death), tumor-related (eg, histologic subtype, grade, PET intensity, genomics), environment-related (eg, access to care, quality of care), and treatment-related factors (eg, which treatment is chosen, treatment response). The variability within the IASLC database and the need for careful adjusted analyses underscores this. Finally, stage classification is a nomenclature and therefore must inherently remain relatively static and universally applicable, whereas prognosis is fluid, constantly changing, and specific to an individual patient, clinical setting, and point in time.[20]

There is a strong temptation to focus on the outcomes of the patients in the IASLC database (Table 7). These outcomes represent an average of patients from various parts of the world, diagnosed between 1999 and 2010 and treated in many different ways. How applicable this is to patients diagnosed today in a specific locale and treated in a specific way is highly questionable. This is underscored by the variability in outcomes by regions and type of source data in the IASLC database.[6] Furthermore, outcomes are substantially better in the 1999 through 2010 database than the IASLC 1990 through 1999 database (approximately 30% better but variable by stage).[6] Outcomes have presumably improved further in the current period, but this is not defined.

There is a strong need for a prognostic prediction model. To be clinically useful, this should be current (applicable to patients managed today), specific for an individual patient, and be accurate and validated. Each of these aspects is inherently problematic. We must use data from the past (with known outcomes), yet apply it to the future in a rapidly changing field. It must be flexible to accommodate new prognostic factors, but robust model development requires sufficient follow-up and a large database that includes *all* potential factors. Validation also requires follow-up and sufficiently large cohorts—how can this be accomplished in a manner that is personalized for countless individual patients around the world? The SPFC is working to address these challenges. In the meantime, we must recognize that a clinician's ability to integrate complex information for an individual patient is what we have and is probably reasonably accurate. We should use the information regarding the prognostic impact of the anatomic disease burden (ie, the outcomes noted for the stage groups), but we must account for the changing environment and additional factors affecting prognosis in making a prediction for a particular patient.

Stage classification is not a treatment guideline. Treatment recommendations stem from the data we have regarding outcomes of patients managed according to a specific treatment strategy. Whatever name we put on tumors (ie, a seventh edition or an eighth edition name) does not alter the data we have regarding specific treatment outcomes. The stage classification nomenclature is used simply as a tool for communication among clinical trials and clinical guidelines, which is what one has to look to for treatment recommendations.

TABLE 7] 5-Year Survival (%)

Type	IA1	IA2	IA3	IB	IIA	IIB	IIIA	IIIB	IIIC	IVA	IVB
Clinical	92	83	77	68	60	53	36	26	13	10	0
Pathologic	90	85	80	73	65	56	41	24	12	-	-

Average overall survival in the International Association for the Study of Lung Cancer global database of patients receiving a diagnosis between 1999 and 2010. Data from Goldstraw et al.[21]

It is transiently of interest to consider what has changed between the seventh and eighth edition stage classifications. In short, the T categories have been broken down further by size (in 1-cm increments up to 5 cm). Tumors that are > 5 to 7 cm are now T3 and T4 if > 7 cm. Central tumors involving a main bronchus or causing obstructive atelectasis are all classified as T2a regardless of the distance to the carina or if the lung is partially or completely atelectatic. Tumors involving the diaphragms are classified as T4. There are no changes in the N categories. The M category now distinguishes tumors with a solitary distant metastasis from multiple metastases. However, the relevance of comparing the seventh and eighth editions will greatly diminish after a brief transition period. Besides, it is more complicated to focus on the changes than to simply learn the new classification system, especially when considering the stage groups. Therefore we have focused primarily on explanations that will facilitate implementation of the new system.

Although the AJCC and UICC are almost completely aligned regarding stage classification and definitions, there is a slight discrepancy of terms with the eighth edition. The AJCC eighth edition uses the singular term "prognostic stage groups" to describe the grouping system, regardless of whether if it is solely anatomic or also includes nonanatomic factors in the classification. The UICC uses the term "stage groups" to refer to stage classification based strictly on anatomic factors and "prognostic stage groups" for a separate classification that includes nonanatomic factors. This is a minor point for lung cancer, because there is no prognostic grouping incorporating nonanatomic factors.

Conclusion

The eighth edition of TNM classification of lung cancer is the worldwide standard as of January 1, 2017. An extensive and multifaceted analysis served as the foundation for this revision. The T component is subdivided by primary tumor size in 1-cm increments as well as other descriptors of invasion into adjacent structures. The N component is determined by the location of involved lymph nodes. The M component is subdivided into intrathoracic dissemination, a single extrathoracic metastasis, and multiple metastases. These are coalesced into stage groups. It is essential that those caring for these patients are familiar with this system because it provides a universal language to describe the anatomic extent of disease.

Acknowledgments

Financial/nonfinancial disclosures: None declared.

Additional information: The e-Tables can be found in the Supplemental Materials section of the online article.

References

1. Detterbeck F, Boffa DJ, Tanoue L, Wilson L. Details, difficulties and dilemmas regarding the new lung cancer staging system. *Chest*. 2010;137(5):1172-1180.
2. UICC. *TNM Classification of Malignant Tumours*. 8th ed. Hoboken, NJ: Wiley-Blackwell; 2016.
3. AJCC. *AJCC Cancer Staging Manual*. 8th ed. New York: Springer; 2016.
4. Rami-Porta R. *International Association for the Study of Lung Cancer (IASLC). IASLC Staging Manual in Thoracic Oncology*. North Fort Meyers, FL: Editorial Rx Press; 2016.
5. Detterbeck F, Tanoue L, Boffa DJ. The new lung cancer staging system. *Chest*. 2009;136(1):260-271.
6. Detterbeck F, Chansky K, Groome P, et al. The IASLC Lung Cancer Staging Project: methodology and validation used in the development of proposals for revision of the stage classification of non-small cell lung cancer in the forthcoming (8th) edition of the TNM Classification of Lung Cancer. *J Thor Oncol*. 2016;11(9):1433-1446.
7. Rami-Porta R, Bolejack V, Crowley J, et al. The IASLC Lung Cancer Staging Project: proposals for the revisions of the T descriptors in the forthcoming eighth edition of the TNM Classification for Lung Cancer. *J Thorac Oncol*. 2015;10(7):990-1003.
8. Travis D, Asamura H, Bankier AA, et al. The IASLC Lung Cancer Staging Project: proposals for coding T categories for subsolid nodules and assessment of tumor size in part solid tumors in the forthcoming eighth edition of the TNM Classification of Lung Cancer. *J Thorac Oncol*. 2016;11(8):1204-1223.
9. Kim H, Park CM, Woo S, et al. Pure and part-solid pulmonary ground-glass nodules: measurement variability of volume and mass in nodules with a solid portion less than or equal to 5 mm. *Radiology*. 2013;269(2):585-593.
10. Nietert PJ, Ravenel JG, Leue WM, et al. Imprecision in automated volume measurements of pulmonary nodules and its effect on the level of uncertainty in volume doubling time estimation. *Chest*. 2009;135(6):1580-1587.
11. Travis W, Brambilla E, Burke A, Marx A, Nicholson A. *WHO Classification of Tumours of the Lung, Pleura, Thymus and Heart*. 4th ed. Lyon, France: International Agency for Research on Cancer (IARC); 2015.
12. Asamura H, Chansky K, Crowley J, et al. The IASLC Lung Cancer Staging project: proposals for the revision of the N descriptors in the forthcoming eighth edition of the TNM Classification for Lung Cancer. *J Thorac Oncol*. 2015;10(12):1675-1684.
13. Rusch V, Asamura H, Watanabe H, et al. The IASLC Lung Cancer Staging Project: a proposal for a new international lymph node map in the forthcoming 7th edition of the TNM classification for lung cancer. *J Thorac Oncol*. 2009;4(5):568-577.
14. Eberhardt W, Mitchell J, Crowley J, et al. The IASLC Lung Cancer Staging Project: proposals for the revision of the M descriptors in the forthcoming (8th) edition of the TNM Classification of Lung Cancer. *J Thorac Oncol*. 2015;10(11):1515-1522.
15. Fonseca A, Detterbeck FC. How many names for a rose: inconsistent classification of multiple foci of lung cancer due to ambiguous rules. *Lung Cancer*. 2014;85(1):7-11.
16. Detterbeck F, Nicholson F, Franklin W, et al. The IASLC Lung Cancer Staging Project:summary of proposal revisions of the classification of lung cancers with multiple pulmonary sites of involvement in the forthcoming eighth edition of the TNM Classification. *J Thorac Oncol*. 2016;11(5):639-650.
17. Detterbeck F, Bolejack V, Arenberg D, et al. The IASLC Lung Cancer Staging Project: background data and proposals for the classification of lung cancer with separate tumor nodules in the forthcoming

eighth edition of the TNM Classification for Lung Cancer. *J Thorac Oncol*. 2016;11(5):681-692.

18. Detterbeck F, Arenberg D, Asamura H, et al. The IASLC Lung Cancer Staging Project: background data and proposed criteria to distinguish separate primary lung cancers from metastatic foci in patients with two lung tumors in the rothcoming eight edition of the TNM Classification for Lung Cancer. *J Thorac Oncol*. 2016;11(5):651-665.
19. Detterbeck F, Arenberg D, Asamura H, et al. The IASLC Lung Cancer Staging Project: background data and proposals for the application of TNM Staging rules to lung cancer presenting as multiple nodules with ground glass or lepidic features or a pneumonic-type of involvement in the forthcoming eight edition of the TNM classification. *J Thorac Oncol*. 2016;11(5):666-680.
20. Detterbeck FC. Stage classification and prediction of prognosis: the difference between accountants and speculators. *J Thorac Oncol*. 2013;8(7):820-822.
21. Goldstraw P, Chansky K, Crowley J, et al. The IASLC Lung Cancer Staging Project: Proposals for Revision of the TNM Stage Groupings in the Forthcoming (Eighth) Edition of the TNM Classification for Lung Cancer. *J Thorac Oncol*. 2016;11(1):39-51.