Application of the revised lung cancer staging system (IASLC Staging Project) to a cancer center population

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Objective: The International Association for the Study of Lung Cancer (IASLC) proposed a revision to the Union Internationale Contre le Cancer (UICC-6) staging system for non–small cell lung cancer. The goal of our study was to compare these systems in patients undergoing surgery for non–small cell lung cancer to determine whether one system is superior in staging operable disease.

Methods: Pathologic stages in 1154 patients undergoing complete resection over a 9-year period were analyzed. Patients were assigned a stage based on both IASLC and UICC-6 systems. We tested for statistically meaningful differences between the two staging systems using the Wilcoxon signed rank test and the permutation test.

Results: The IASLC system is more effective than the UICC-6 system at ordering and differentiating patients ($P = .009$). Application of the IASLC system resulted in 202 (17.5%) patients being reassigned to a different stage ($P = .012$), with the most common shifts occurring from IB to IIA and IIIB to IIIA. The 5-year and median survivals of the IASLC IIIA patients including those shifted from the UICC-6 IIIB were 37% and 35 months, respectively. Reclassifying UICC-6 IIIB to IASLC IIIA did not reduce survival for the newly characterized IIIA cohort.

Conclusion: Our data confirm that the proposed IASLC staging system is more effective at differentiating stage than the UICC-6 system. Reclassifying patients from UICC-6 IIIB to IASLC IIIA will shift some patients from a stage previously considered unresectable to a stage frequently offered surgical resection. Further study and validation of the IASLC system are warranted.

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Supplemental material is available online.

Despite the overall poor prognosis of patients with lung cancer, there are subsets of patients who benefit from treatment.[1-4] Effective staging systems stratify patient survival and can be used to assess outcome of defined patient subgroups after treatment. The sixth edition of the Union Internationale Contre le Cancer (UICC-6) and the American Joint Committee on Cancer (AJCC) has served as the current tumor, node, metastases (TNM) staging system for non–small cell lung cancer (NSCLC) since 2002.[5] The UICC-6 system is derived from the 1997 staging system proposed by Mountain.[6] This staging system was based on 5319 patients treated for primary lung cancer at The University of Texas—M. D. Anderson Cancer Center (UTMDACC) (4351 patients) from 1975 to 1988 or by the National Cancer Institute Cooperative Lung Cancer Study Group (968 patients) from 1977 to 1982. This represents primarily a single-institution experience from a single country. The current staging system has considerable intrastage heterogeneity with groups within a stage varying widely in prognosis.

In 1998 the International Association for the Study of Lung Cancer (IASLC) staging project was initiated to develop the next revision of the current UICC-6 system.[7-11] The proposed revision represents data collected from 100,869 patients from Europe, Australia, Asia, and North America. The data were analyzed by Cancer Research and Biostatistics and the IASLC International Staging Committee. The revised system proposes changes to the T and M classifications (Table 1) and overall stage groupings (Table 2). The revised TNM staging has been submitted for approval to the UICC. The IASLC system has yet to be independently evaluated.

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Abbreviations and Abstracts

AJCC = American Joint Committee on Cancer
IASLC = International Association for the Study of Lung Cancer
NSCLC = non–small cell lung cancer
TNM = tumor, node, metastasis
UICC = Union Internationale Contre le Cancer
UTMDACC = University of Texas M. D. Anderson Cancer Center

The goal of our study was to apply the proposed changes to the current UICC-6 staging system to a cancer center population undergoing surgery for NSCLC and to directly compare the proposed IASLC and UICC-6 staging systems with respect to discrimination, monotonicity and intrastage heterogeneity.

PATIENTS AND METHODS

Population

This study analyzed data from a prospectively collected database of 1154 patients who underwent an R0 surgical resection for NSCLC at UTMDACC between 1998 and 2006. UTMDACC was a contributor of patient data for the IASLC study. Less than 5% of the patients in our study were the same

TABLE 1. Comparison of T and M stage of UICC-6 and IASLC staging systems

A. UICC-6 staging system

Tx: Primary tumor cannot be assessed, *or* tumor proven by the 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 evidence of invasion more proximal than the lobar bronchus
T2: Tumor more than 3 cm in diameter; or tumor with *any* of the following features:
- Involves main bronchus, 2 cm or more distal to the carina
- Invades visceral pleura
- Associated with atelectasis or obstructive pneumonitis that extends to the hilar region but does not involve the entire lung

T3: Tumor more than 7 cm or
- Direct invasion any of the following: chest wall (including superior sulcus tumours), diaphragm, phrenic nerve, mediastinal pleura, parietal pericardium
- Tumor in the main bronchus less than 2 cm distal to the carina without carinal invasion
- 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, recurrent laryngeal nerve, esophagus, vertebral body or carina
- Separate tumor nodule(s) in the ipsilateral primary lobe
- Malignant pleural effusion

M1: Distant metastases

B. IASLC staging system

Tx: Primary tumor cannot be assessed, *or* tumor proven by the 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 evidence of invasion more proximal than the lobar bronchus
T1a: Tumor 2 cm or less in greatest dimension
T1b: Tumor more than 2 cm but not more than 3 cm in greatest dimension
T2: Tumor more than 3 cm but not more than 7 cm or tumor with *any* of the following features:
- Involves main bronchus, 2 cm or more distal to the carina
- Invades visceral pleura
- Associated with atelectasis or obstructive pneumonitis that extends to the hilar region but does not involve the entire lung

T2a: Tumor more than 3 cm but not more than 5 cm in greatest dimension
T2b: Tumor more than 5 cm but not more than 7 cm in greatest dimension
T3: Tumor more than 7 cm or
- Direct invasion any of the following: chest wall (including superior sulcus tumours), diaphragm, phrenic nerve, mediastinal pleura, parietal pericardium
- Tumor in the main bronchus less than 2 cm distal to the carina
- Associated atelectasis or obstructive pneumonitis of the entire lung
- Separate tumor nodule(s) in the same lobe

T4: Tumor of any size that invades any of the following: mediastinum, heart, great vessels, trachea, recurrent laryngeal nerve, esophagus, vertebral body or carina
Separate tumor nodule(s) in a different ipsilateral lobe
M1a: Tumor nodule in contralateral lung, tumor with pleural nodules, malignant effusion
M1b: Distant metastases

UICC, Union Internationale Contre le Cancer; *IASLC,* International Association for the Study of Lung Cancer.