Staging Lung Cancer
Metastasis

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KEYWORDS

• Metastasis • TNM-7 • TNM-8 • Oligometastatic disease • PET/CT

KEY POINTS

- In TNM-8, the M descriptor has been changed. Intrathoracic metastatic disease retains the M1a classification. Extrathoracic metastatic disease is subdivided into M1b (single metastasis) and M1c (multiple extrathoracic metastases) descriptors.
- Preoperative staging with PET/computed tomography identifies more patients with mediastinal and extrathoracic disease than with conventional imaging alone, thereby sparing patients from unnecessary surgery.
- Patients with non–small-cell lung cancer with oligometastatic disease and good performance status can benefit from aggressive local therapy to both primary and metastatic sites.

TNM CLASSIFICATION OF MALIGNANT TUMORS, SEVENTH EDITION

The seventh edition of the tumor, node, metastasis (TNM-7) classification of lung cancer, proposed in 2007 and published in 2009, was based on a retrospective analysis of more than 81,000 patients diagnosed with lung cancer between 1990 and 2000.[1] In TNM-7, metastatic disease (M1) was subdivided into M1a and M1b descriptors. The M1a descriptor included separate tumor nodule(s) in a contralateral lobe and tumor with pleural nodule(s) or malignant pleural (or pericardial) effusion; the M1b descriptor included distant metastatic disease; that is, metastatic disease at sites outside of the thorax.[1]

TNM CLASSIFICATION OF MALIGNANT TUMORS, EIGHTH EDITION

To overcome the limitations of the retrospective nature of the TNM-7 database, the International Staging Committee of the International Association for the Study of Lung Cancer (IASLC) proposed the collection of a large prospective international database that would refine future editions of the TNM classification for lung cancer through the validation of all T, N, and M descriptors.[2] Specific primary study objectives in terms of the M component were to assess the prognostic impact of M-status, especially those descriptors included within the M1a category of the seventh edition, and to assess the prognostic impact of a single metastasis in a single organ, multiple metastases in a single organ, and multiple metastases in several organs.[2]

The new IASLC lung cancer database that was used to form the eighth edition of the TNM classification of lung cancer was composed of retrospective and prospective information on 94,708 new patients who were diagnosed with lung cancer between 1999 and 2010.[3] The final analysis was performed on 1059 cases of non–small-cell lung cancer (NSCLC) with nonresected M1 disease.[4]

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Radiol Clin N Am ■ (2018) ■–■
https://doi.org/10.1016/j.rcl.2018.01.009

Analysis of the M1a descriptors used in TNM-7 revealed similar prognosis among the different descriptors: patients with pleural/pericardial nodules, contralateral/bilateral tumor nodules, pleural/pericardial effusions, and multiple M1a descriptors had a median survival of 14.3, 12.0, 11.4, and 8.9 months, respectively.[4] Furthermore, no prognostic effect of single versus multiple M1a descriptors was determined.[4] As a result of these findings, the recommendation was made to maintain the use of the preexisting M1a category (**Figs. 1–3**). In terms of patients with distant (extrathoracic) metastatic disease, the site of metastasis was not prognostic for single or multiple lesions in a single organ.[4] Analysis suggested that the number of metastases may be more prognostic than the number of organs involved.[4] Prognosis in patients with a single extrathoracic metastasis (median survival of 11.4 months) was similar to M1a disease (median survival of 11.5 months) and was much better than prognosis in patients with multiple extrathoracic metastases in one or multiple organs (median survival of 6.3 months).[4] As a result, a single extrathoracic metastasis (eg, in brain, liver, bone, distant lymph node, or peritoneum, skin, adrenal) is now categorized as M1b (**Fig. 4**), whereas multiple metastatic lesions in a single organ and multiple metastatic lesions in multiple organs are categorized as M1c (**Fig. 5**).[4]

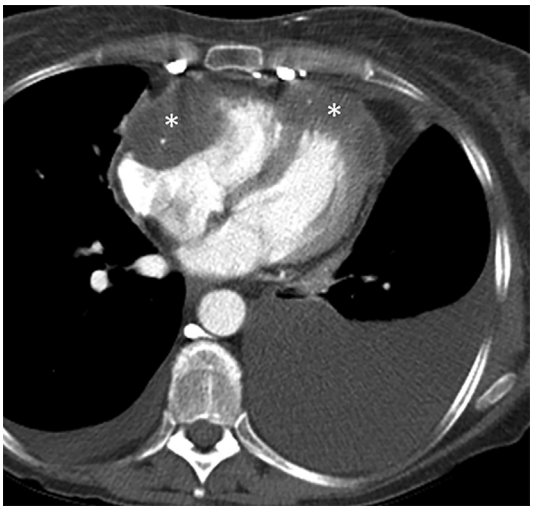

Fig. 1. M1a disease. Chest CT in a patient with NSCLC shows low attenuation metastases involving the myocardium and pericardium (*asterisks*) and a moderate to large left pleural effusion, proven to be malignant. Cases with malignant pleural/pericardial effusions and/or pleural/pericardial metastases, contralateral pulmonary metastases, or a combination of these findings constitute M1a disease.

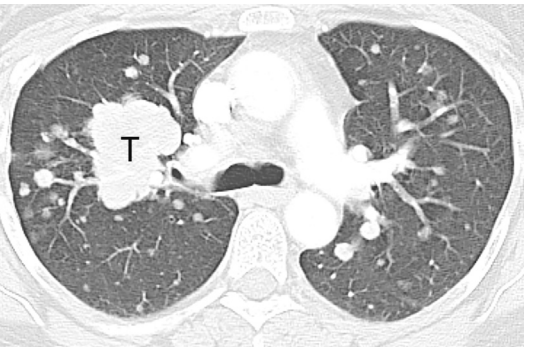

Fig. 2. M1a disease due to contralateral pulmonary metastases. Chest CT shows right upper lobe NSCLC (T) with multiple bilateral discrete lung nodules consistent with hematogenous metastases.

SMALL CELL LUNG CANCER

In 2007, the IASLC, based on analysis of more than 8000 patients in their database who were diagnosed with small cell lung cancer (SCLC) between 1990 and 2000, recommended that the seventh edition of the TNM staging system replace the Veterans Administration Lung Study Group staging system for SCLC.[5] They found that both the T and N descriptors were discriminatory for overall survival in clinically staged patients without hematogenous metastases and overall clinical stage groupings I to IV were also predictive of overall survival.[5,6] Analysis of the new IASLC database (which included more than 5000 patients with SCLC) again confirmed the prognostic value of TNM staging in patients with SCLC and continued usage of the TNM system in SCLC is recommended.[7] In terms of metastatic disease, analysis of

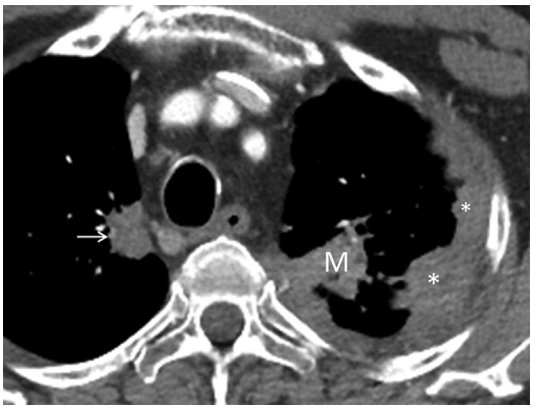

Fig. 3. M1a disease. Chest CT shows the primary tumor in the left upper lobe (M) as well as left pleural lobularity consistent with pleural metastases (*asterisks*) and a right upper lobe metastasis (*arrow*). Intrathoracic metastatic disease is classified as M1a.