

International Association for the Study of Lung Cancer (IASLC) Lymph Node Map: Radiologic Review with CT Illustration¹

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Abbreviations: IASLC = International Association for the Study of Lung Cancer, SVC = superior vena cava, TNM = tumor, node, metastasis

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SA-CME LEARNING OBJECTIVES

After completing this journal-based SA-CME activity, participants will be able to:

- Discuss the changes made by the IASLC to anatomic definitions for regional lymph nodes that pertain to lung cancer staging.
- Apply the text definitions of the IASLC lymph node map to daily radiologic practice.
- Describe ambiguities in the IASLC lymph node map that may emerge during radiologic practice.

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TEACHING POINTS

See last page

Accurate clinical or pretreatment stage classification of lung cancer leads to optimal treatment outcomes and improved prognostication. Such classification requires an accurate assessment of the clinical extent of regional lymph node metastasis. Consistent and reproducible regional lymph node designations facilitate reliable assessment of the clinical extent of regional lymph node metastasis. Regional lymph node maps, such as the Naruke lymph node map and the Mountain-Dresler modification of the American Thoracic Society lymph node map, were proposed for this purpose in the past. The most recent regional lymph node map to be published is the International Association for the Study of Lung Cancer (IASLC) lymph node map. The IASLC lymph node map supersedes all previous maps and should be used in tandem with the current seventh edition of the tumor, node, metastasis stage classification for lung cancer.

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Introduction

Computed tomography (CT) and positron emission tomography (PET) play important roles in classifying lung cancers according to the tumor, node, metastasis (TNM) system, particularly those in the clinical or pretreatment stage (cTNM) (Table 1) (1,2). For lung cancer, the cTNM stage is determined on the basis of the extent of the cancer before the initiation of primary treatment (ie, definitive surgery, neoadjuvant radiation therapy, neoadjuvant systemic therapy, neoadjuvant radiation and systemic therapy, active surveillance, and palliative care) (1). Accurate cTNM staging for lung cancer allows for optimal treatment planning and improved prognostication (3,4).

Accurate cTNM staging for lung cancer requires accurate assessment of the clinical extent of regional lymph node metastasis. The clinical extent of regional lymph node metastasis, also known as the

Table 1: Stage Classifications of Lung Cancer

Stage Classifications	Definitions
Clinical (cTNM)	Data obtained before definitive treatment as part of primary treatment or within 4 months of diagnosis, whichever is shorter; pretreatment diagnostic data include data obtained from CT, PET, mediastinoscopy, thoracoscopy, endobronchial ultrasonography, endoscopic ultrasonography, and thoracentesis
Pathologic (pTNM)	Data obtained through definitive surgery as part of primary treatment or within 4 months of diagnosis, whichever is longer
Posttherapy (clinical [ycTNM], pathologic [ypTNM])	Data obtained after systemic or radiation therapy, before surgery, or as primary therapy; denoted with a clinical or pathologic prefix
Re-treatment (rTNM)	Data obtained at the time of retreatment for recurrence or progression
Autopsy (aTNM)	Data obtained at autopsy

Source.—Reference 1.

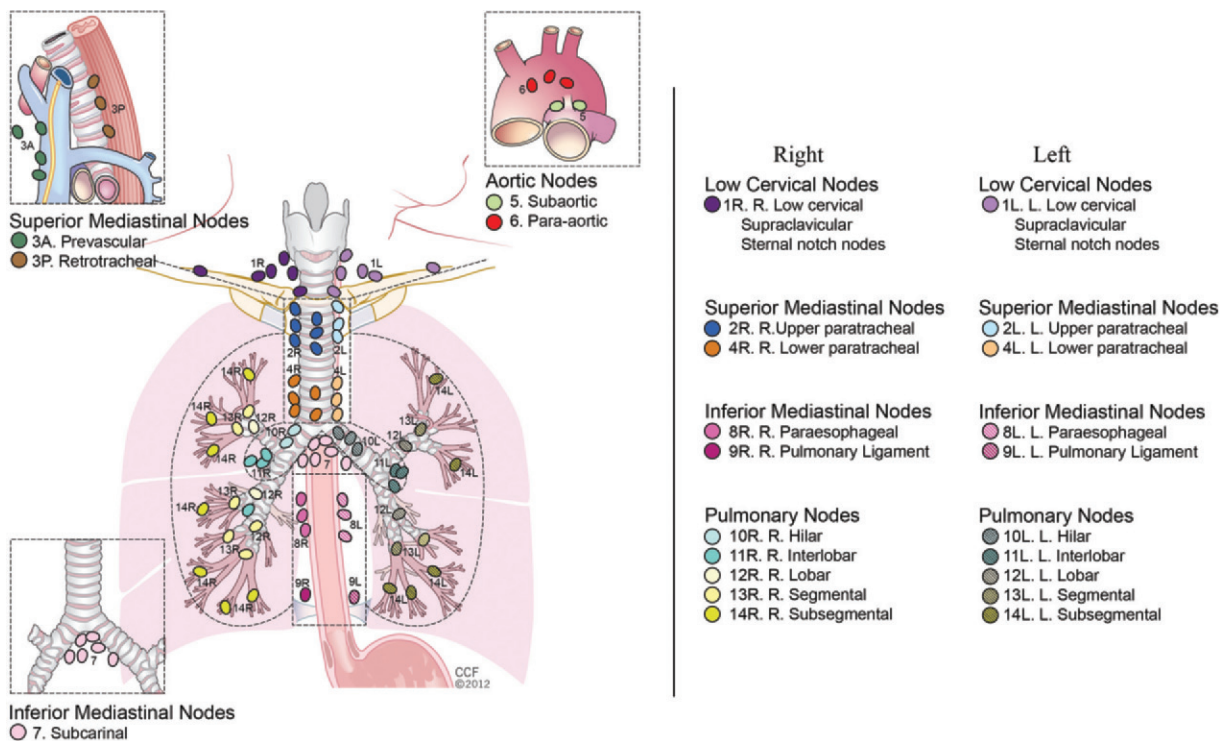


Figure 1. Illustration shows the IASLC lymph node map. *L.* = left, *R.* = right.

clinical regional lymph node classification (cN1, cN2, cN3), depends on consistent and proper labeling of a regional lymph node that is suspected of containing metastasis (a positive regional lymph node [pN]) at CT or combined PET/CT. Proper labeling relies on a system of universally accepted anatomic descriptors and numeric levels (5).

Accordingly, thoracic regional lymph node definition sets, or maps, have been created to encourage the use of standardized, reproducible lymph node labeling (6–9). The most recent regional lymph node map to be published is that of the International Association for the Study of Lung Cancer (IASLC) (5). The IASLC lymph node

map supersedes all previous maps and should be used in tandem with the current seventh edition of the TNM classification for lung cancer. The IASLC lymph node map reconciles discrepancies among older widely used maps (eg, the Naruke lymph node map and the Mountain-Dresler modification of the American Thoracic Society lymph node map) (5). In this article, we review the IASLC lymph node map, address ambiguities in the text definitions of the IASLC lymph node map that may emerge during radiologic practice, and translate the text definitions into a more practical format for radiologists through the use of color-coded CT image maps.

Table 2: Nodal Stations and Zones in the IASLC Lymph Node Map (4)

Supraclavicular zone
Station 1L: right low cervical, supraclavicular, and sternal notch lymph nodes
Station 1L: left low cervical, supraclavicular, and sternal notch lymph nodes
Upper zone (superior mediastinal nodes)
Station 2R: right upper paratracheal lymph node
Station 2L: left upper paratracheal lymph node
Station 3A: prevascular lymph node
Station 3P: retrotracheal lymph node
Station 4R: right lower paratracheal lymph node
Station 4L: left lower paratracheal lymph node
Aortopulmonary zone
Station 5: subaortic lymph node
Station 6: paraaortic lymph node
Subcarinal zone
Station 7: subcarinal lymph node
Lower zone (inferior mediastinal nodes)
Station 8: paraesophageal lymph node
Station 9: pulmonary ligament lymph node
Hilar and Interlobar zone (pulmonary nodes)
Station 10: hilar lymph node
Station 11: interlobar lymph node
Peripheral zone (pulmonary nodes)
Station 12: lobar lymph node
Station 13: segmental lymph node
Station 14: subsegmental lymph node

Source.—Reference 4.

IASLC Lymph Node Classification for Lung Cancer Staging

Regional lymph nodes for lung cancer staging are named according to the structures with which they are most closely related or their general anatomic location (10). The IASLC lymph node map defines 14 different lymph node stations, which may be grouped into seven zones (Table 2) (Fig 1) (5). The practice of assessing lymph nodes by zone rather than station may help resolve dilemmas that arise when contiguous adenopathy involves multiple adjoining stations (5). This initiative has been proposed for the purposes of future survival analyses and is investigational at this time (5).

Anatomic Definitions of the IASLC Lymph Node Stations

Supraclavicular Zone

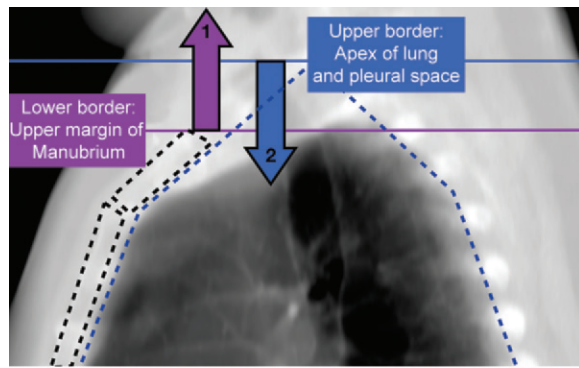
Station 1R: Right Low Cervical, Supraclavicular, and Sternal Notch Lymph Nodes.—The upper border of station 1R is the lower margin of the cricoid cartilage. The lower border of station

1R is the clavicles bilaterally and, in the midline, the upper border of the manubrium. The midline of the trachea serves as the boundary between stations 1R and 1L.

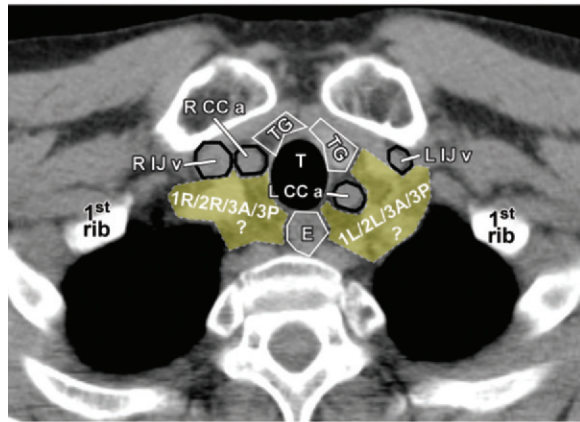
Station 1L: Left Low Cervical, Supraclavicular, and Sternal Notch Lymph Nodes.—The upper border of station 1L is the lower margin of the cricoid cartilage. The lower border of station 1L is the clavicles bilaterally and, in the midline, the upper border of the manubrium. The midline of the trachea serves as the border between stations 1R and 1L.

Upper Zone

Station 2R: Right Upper Paratracheal Lymph Nodes.—The upper border of station 2R is the apex of the right lung and pleural space, and in the midline, the upper border of the manubrium. The lower border of station 2R is the intersection of the caudal margin of the innominate vein with the trachea. **The left lateral wall of the trachea (not the midline) serves as the boundary between stations 2R and 2L.**



a.



b.

Figure 2. Overlap between station 1 and stations 2R, 2L, 3A, and 3P. (a) Sagittal chest radiograph shows the overlap between station 1 (purple arrow) and stations 2R, 2L, 3A, and 3P (blue arrow). (b) Axial CT image, obtained above the level of the superior margin of the manubrium and inferior to the level of the apices of the lung and pleura, shows an ambiguous region (yellow areas) where the distinction between station 1 and stations 2R, 2L, 3A, and 3P is unclear. The medial clavicles and the superior margin of the manubrium (the inferior borders of stations 1R and 1L) are inferior to the apices of the lung and pleura (the superior borders of stations 2R and 2L) and the apex of the chest (the superior border of stations 3A and 3P). As a result, a territory exists on axial CT images where the distinction between low cervical and superior mediastinal lymph nodes is unclear. Distinguishing low cervical lymph nodes (stations 1R and 1L) from superior mediastinal lymph nodes (stations 2R, 2L, 3A, and 3P) is important, because an error may result in misclassification of a stage N2 tumor as stage N3 or vice versa. Black dashed line in a = sternum, E = esophagus, L CC a = left common carotid artery, L IJ v = left internal jugular vein, R CC a = right common carotid artery, R IJ v = right internal jugular vein, T = trachea, TG = thyroid gland.

Station 2L: Left Upper Paratracheal Lymph Nodes.

—The upper border of station 2L is the apex of the left lung and pleural space, and in the midline, the upper border of the manubrium. The lower border of station 2L is the su-

perior border of the aortic arch. The left lateral border of the trachea (not the midline) serves as the boundary between stations 2R and 2L.

Station 3A: Prevascular Nodes.—The upper border of station 3A is the apex of the chest. The lower border of station 3A is the level of the carina. The anterior border of station 3A is the posterior aspect of the sternum. The posterior border of station 3A is the anterior border of the superior vena cava (SVC) on the right and the left carotid artery on the left.

Station 3P: Retrotracheal Lymph Nodes.—Retrotracheal lymph nodes are those located in the retrotracheal region or the area posterior to the trachea. The upper border of station 3P is the apex of the chest. The lower border of station 3P is the carina.

Station 4R: Right Lower Paratracheal Lymph Nodes.—The upper border of station 4R is the intersection of the caudal margin of the innominate vein with the trachea. The lower border of station 4R is the lower border of the azygos vein. **The left lateral wall of the trachea (not the midline) serves as the boundary between stations 4R and 4L.**

Station 4L: Left Lower Paratracheal Lymph Nodes.

—The upper border of station 4L is the upper margin of the aortic arch. The lower border of station 4L is the upper rim of the left main pulmonary artery. The left lateral border of the trachea (not the midline) serves as the boundary between stations 4R and 4L.

Aortopulmonary Zone

Station 5: Subaortic Lymph Nodes.—Subaortic (aortopulmonary window) lymph nodes are those that are lateral to the ligamentum arteriosum. The upper border of station 5 is the lower border of the aortic arch. The lower border of station 5 is the upper rim of the left main pulmonary artery.

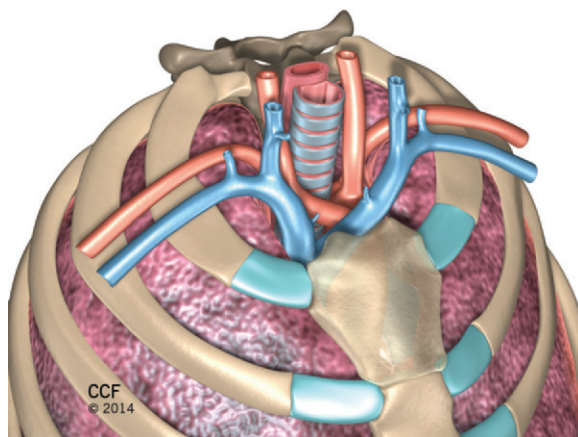
Station 6: Paraortic Lymph Nodes.—Paraortic lymph nodes are those that are anterior and lateral to the ascending aorta and aortic arch. The upper border of station 6 is a line tangential to the upper border of the aortic arch. The lower border of station 6 is the lower border of the aortic arch.

Subcarinal Zone

Station 7: Subcarinal Lymph Nodes.—The upper border of station 7 is the carina of the trachea. The lower border of station 7 is the upper border of the lower lobe bronchus on the left

Teaching
Point

Figure 3. Illustration shows the thoracic inlet, a definitive anatomic boundary that exists between the neck and superior mediastinum. The anatomic landmarks of the thoracic inlet (which is also referred to as the superior thoracic aperture) are the superior margin of the manubrium, the superior margins of the first ribs, and the T1 costovertebral junctions. Because the T1 costovertebral junctions are superior to the superior margin of the manubrium, the thoracic inlet lies along an oblique plane.



and the lower border of the bronchus intermedius on the right.

Lower Zone

Station 8: Paraesophageal Lymph Nodes.—Paraesophageal lymph nodes are those that lie adjacent to the wall of the esophagus and to the right or left of the midline, excluding the subcarinal nodes. The upper border of station 8 is the upper border of the lower lobe bronchus on the left and the lower border of the bronchus intermedius on the right. The lower border of station 8 is the diaphragm.

Station 9: Pulmonary Ligament Lymph Nodes.—Pulmonary ligament lymph nodes are those that lie within the pulmonary ligament. The upper border of station 9 is the inferior pulmonary vein. The lower border of station 9 is the diaphragm.

Hilar and Interlobar Zone

Station 10: Hilar Lymph Nodes.—Hilar lymph nodes are those that are immediately adjacent to the main-stem bronchus and hilar vessels, including the proximal portions of the pulmonary veins and main pulmonary artery, with station 10R on the right and station 10L on the left. The upper border of station 10R is the lower rim of the azygos vein, and the upper border of station 10L is the upper rim of the pulmonary artery on the left. The lower borders of stations 10R and 10L are the interlobar regions bilaterally.

Station 11: Interlobar Lymph Nodes.—Interlobar lymph nodes are those that are between the origin of the lobar bronchi, with station 11R on the right and station 11L on the left. Station 11R is subdivided into stations 11Rs, which refers to

lymph nodes between the right upper lobe bronchus and the bronchus intermedius, and 11Ri, which refers to lymph nodes between the right middle and lower lobe bronchi.

Peripheral Zone

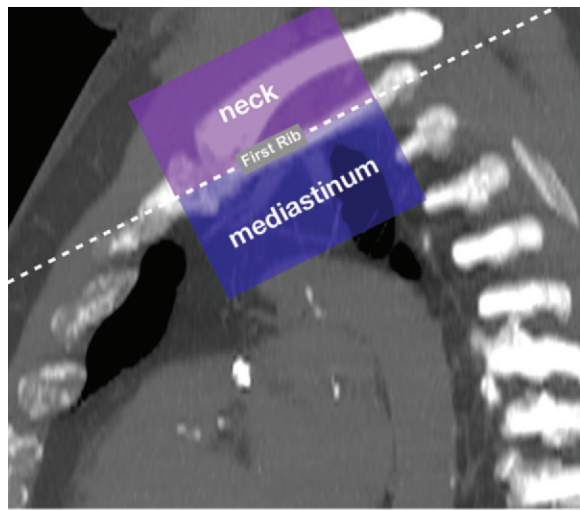
Station 12: Lobar Lymph Nodes.—Lobar lymph nodes are those that are adjacent to the lobar bronchi. Station 12R is on the right, and station 12L is on the left.

Station 13: Segmental Lymph Nodes.—Segmental lymph nodes are those that are adjacent to the segmental bronchi. Station 13R is on the right, and station 13L is on the left.

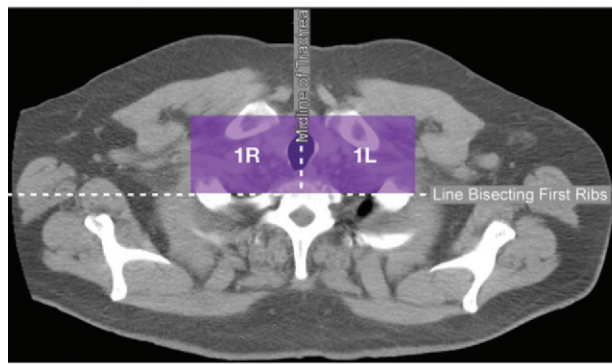
Station 14: Subsegmental Lymph Nodes.—Subsegmental lymph nodes are those that are adjacent to the subsegmental bronchi. Station 14R is on the right, and station 14L is on the left.

IASLC and Regional Lymph Node Classifications

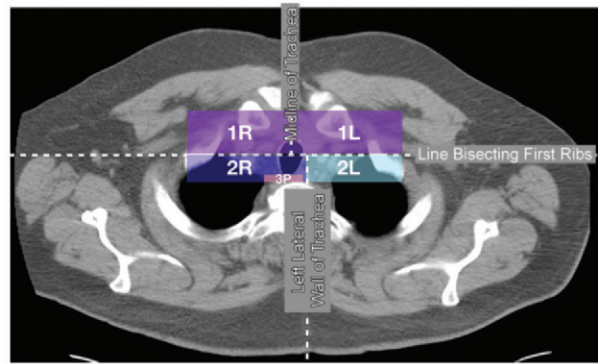
The IASLC lymph node map should be used in tandem with the current seventh edition of the TNM staging system for lung cancer (1). Although anatomic definitions for regional lymph nodes were revised by the IASLC, no changes were proposed to the regional lymph node classification (N) of the TNM staging system for lung cancer (11–13). Therefore, with reference to the primary tumor (T), N1 continues to refer to a lymph node metastasis to an ipsilateral hilar or peribronchial lymph node; N2 continues to refer to a lymph node metastasis to an ipsilateral mediastinal lymph node and/or metastasis to a subcarinal lymph node; and N3 continues to refer to a lymph node metastasis to a contralateral mediastinal, contralateral hilar or peribronchial, or ipsilateral or contralateral low cervical or supraclavicular lymph node.



a.

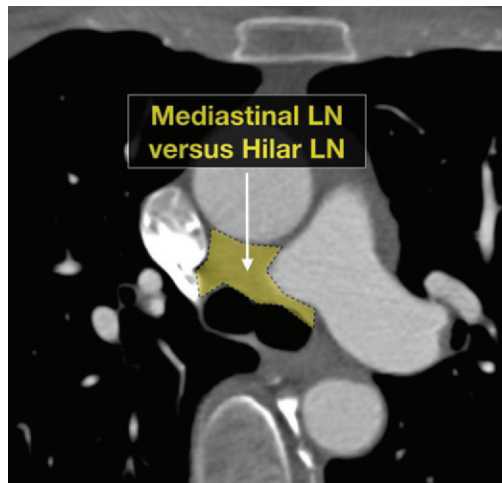


b.

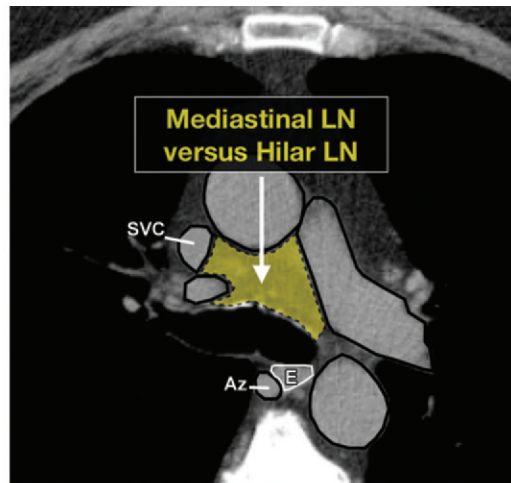


c.

Figure 4. Method for distinguishing low cervical lymph nodes from superior mediastinal lymph nodes. (a) Sagittal reconstructed CT image shows the thoracic inlet (dotted line). (b, c) Axial CT images obtained about the level of the thoracic inlet show a method for distinguishing low cervical lymph nodes from superior mediastinal lymph nodes. As the plane of the thoracic inlet bisects the axial plane, the visible sections of the right and left first ribs serve as reliable landmarks for the thoracic inlet. Consequently, structures anterior to a line bisecting the visible sections of the right and left first ribs lie within the neck, and structures posterior to this line lie within the superior mediastinum.



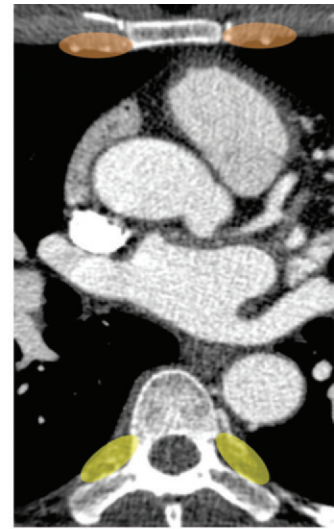
a.



b.

Figure 5. Potential ambiguous space at the tracheal bifurcation at CT. (a) Axial CT image obtained at the levels of the tracheal bifurcation and the SVC–azygos vein junction shows potential ambiguous space (yellow area) at the tracheal bifurcation. (b) Axial CT image obtained at the level of the tracheal bifurcation but below the level of the SVC–azygos vein junction shows the potential ambiguous space (yellow area) at the tracheal bifurcation. The inferior borders of the lower paratracheal lymph nodes (stations 4R and 4L) and the superior borders of the hilar lymph nodes (stations 10R and 10L) are defined as the lower rim of the azygos vein on the right and the upper rim of the left main pulmonary artery on the left. Hilar lymph nodes are further restricted to those that are adjacent to the main-stem bronchi. As a result, a territory exists (the precarinal space) in which the distinction between lower paratracheal lymph nodes and hilar lymph nodes is unclear. *Az* = azygos vein, *E* = esophagus.

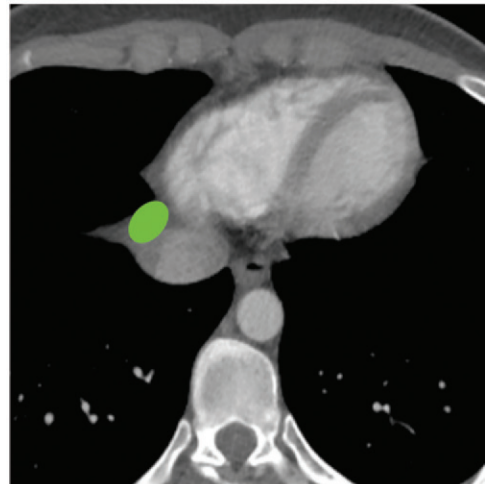
Figure 6. Classification of nonregional thoracic lymph nodes. **(a)** Axial CT image obtained at the level of the left atrial chamber shows internal mammary (orange areas) and intercostal (yellow areas) lymph nodes. **(b)** Axial CT image obtained at the level of the thorax-abdomen interface shows anterior diaphragmatic lymph nodes (red area). **(c)** Axial CT image obtained at the level of the thorax-abdomen interface shows middle diaphragmatic lymph nodes (green area). Although it is uncommon, lymph node metastasis from lung malignancy may occur in nonregional thoracic lymph nodes. The IASLC lymph node map does not define such nodes. In our practices, involved internal mammary, axillary, intercostal, and diaphragmatic lymph nodes are typically classified as distant metastases (stage M1b).



a.

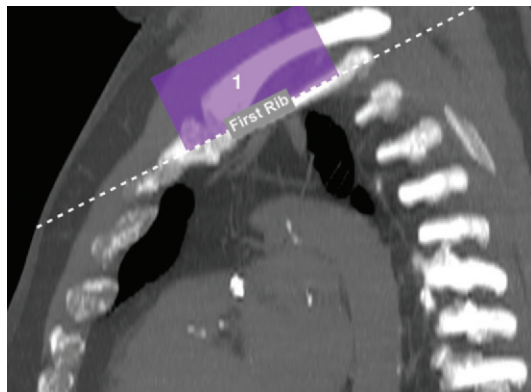


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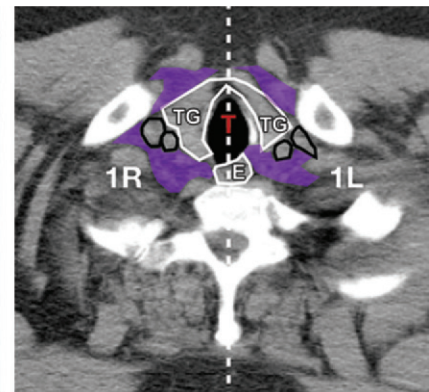


c.

Figure 7. Stations 1R and 1L. **(a)** Sagittal reconstructed CT image shows the borders of stations 1R and 1L (purple area). **(b)** Axial CT image obtained above the level of the thoracic inlet shows stations 1R and 1L (purple area). The upper border of these stations is the lower margin of the cricoid cartilage. In our practices, their lower border is the thoracic inlet, and the midline of the trachea (*T*) serves as the border between them. *E* = esophagus, *TG* = thyroid gland.

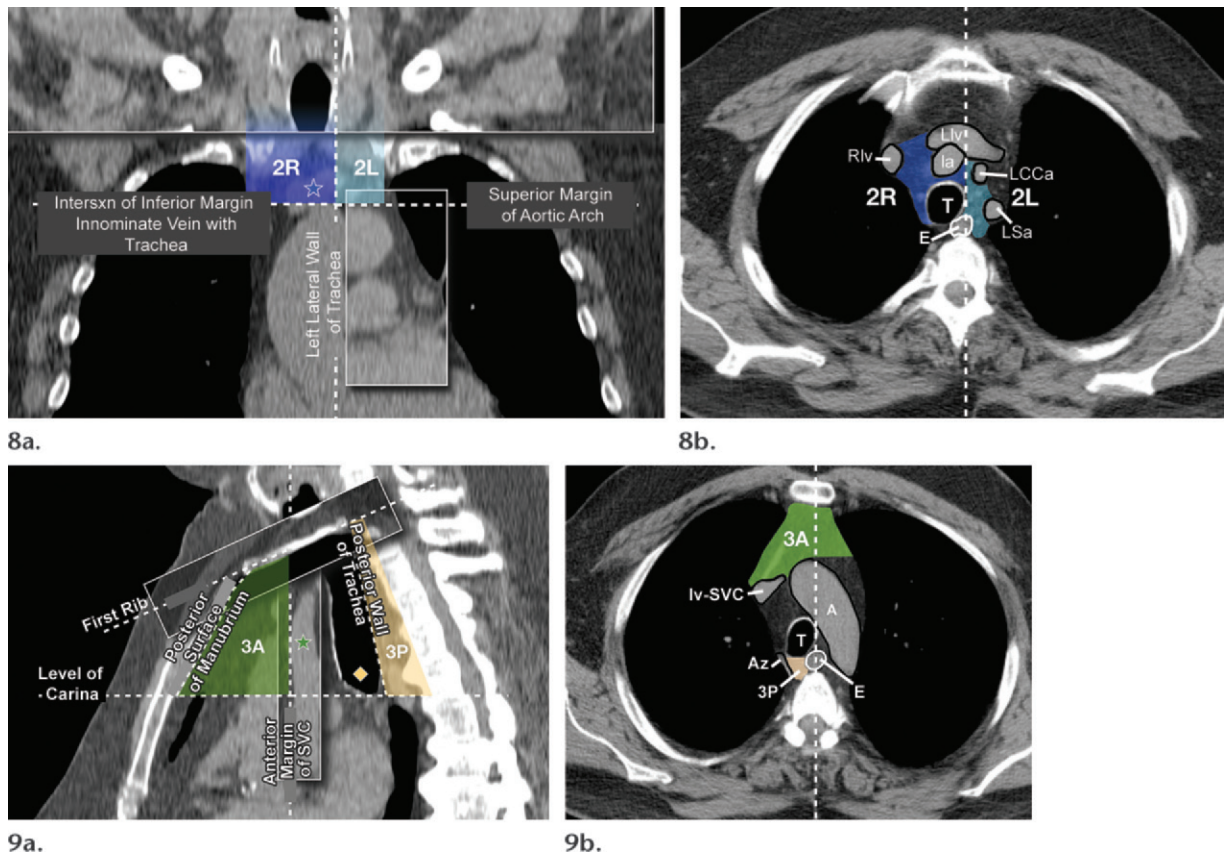


a.



b.

Figures 8, 9. (8) Stations 2R and 2L. (a) Coronal reconstructed CT image shows the borders of stations 2R (dark blue area) and 2L (light blue area). ☆ = left innominate vein. (b) Axial CT image, obtained below the level of the thoracic inlet and above the level of the intersection of the caudal margin of the left innominate vein (*LIV*) and the trachea (*T*), shows stations 2R (dark blue area) and 2L (light blue area). In our practices, the upper border of stations 2R and 2L is the thoracic inlet. The lower border of station 2R is the intersection of the caudal margin of the left innominate vein and the trachea, and the lower border of station 2L is the superior border of the aortic arch. The left lateral border of the trachea (not the midline) serves as the boundary between stations 2R and 2L. *E* = esophagus, *Ia* = innominate artery, *LCCa* = left common carotid artery, *LSa* = left subclavian artery, *RIV* = right innominate vein. (9) Stations 3A and 3P. (a) Sagittal reconstructed CT image shows the borders of stations 3A (green area) and 3P (orange area). ★ = anterior margin of the SVC, ◆ = carina. (b) Axial CT image, obtained below the level of the thoracic inlet and above the level of the carina, shows stations 3A (green area) and 3P (orange area). In our practices, the upper border of station 3A is the thoracic inlet, the lower border is the carina, the anterior border is the posterior surface of the sternum, and the posterior border is the anterior margin of the superior vena cava (☆ in a) on the right and the left carotid artery on the left. In our practices, the midline of the trachea (*T*) serves as the boundary between a right- and left-sided station 3A lymph node; the upper border of station 3P is the thoracic inlet, the lower border is the carina, and the anterior border is the posterior wall of the trachea. *A* = aorta, *Az* = azygos vein and arch, *E* = esophagus, *IV-SVC* = innominate vein–SVC junction.



Ambiguities in the IASLC Lymph Node Map

The IASLC lymph node map reconciles important discrepancies found in earlier lymph node maps. Nevertheless, ambiguities may emerge when the IASLC lymph node map is rigorously applied during radiologic practice, as in the following examples (14).

Distinguishing Low Cervical from Superior Mediastinal Lymph Nodes

Distinguishing low cervical (stations 1R and 1L) from superior mediastinal (stations 2R, 2L, 3A, and 3P) lymph nodes is important, because errors

could cause stage N2 tumors to be misclassified as stage N3 or vice versa. The medial clavicles and the superior margin of the manubrium (inferior borders of stations 1R and 1L) are inferior to the apices of the lung and pleura (the superior borders of stations 2R and 2L) and the apex of the chest (the superior border of stations 3A and 3P). As a result, a territory exists where the distinction between low cervical lymph nodes and superior mediastinal lymph nodes is unclear (Fig 2).

In our practices, the thoracic inlet, which is also referred to as the superior thoracic aperture, represents a more definitive anatomic boundary between the neck and superior mediastinum

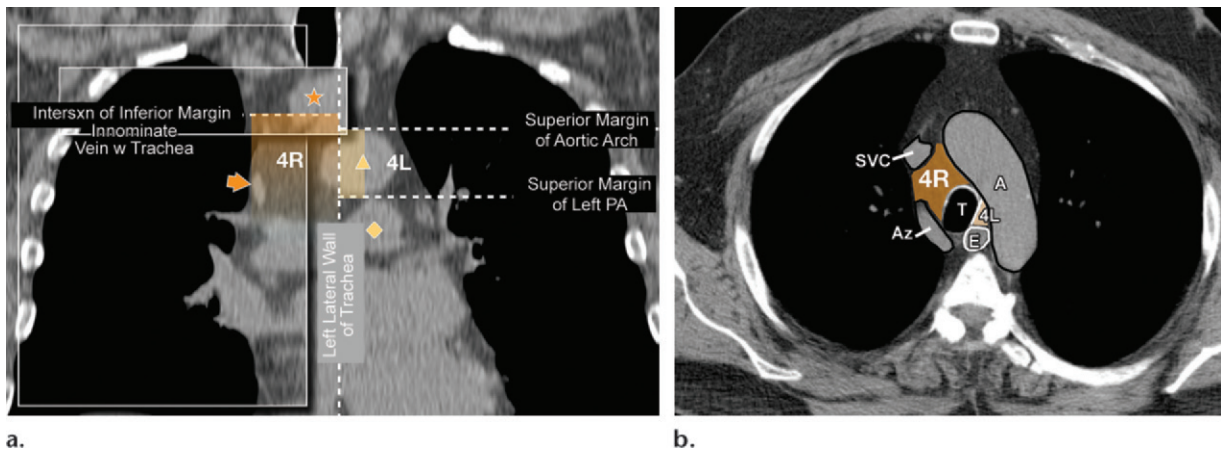


Figure 10. Stations 4R and 4L. **(a)** Coronal reconstructed CT image shows the borders of stations 4R (orange area) and 4L (peach area). ★ = innominate vein, arrow = azygos vein, ▲ = aortic arch, ◆ = left pulmonary artery. **(b)** Axial CT image, obtained below the level of the caudal margin of the left innominate vein and the trachea and above the level of the tracheobronchial angle, shows stations 4R (orange area) and 4L (peach area). The upper border of station 4R is the intersection of the caudal margin of the left innominate vein and the trachea (*T*), and the upper border of station 4L is the superior margin of the aortic arch. In our practices, the lower border of station 4R is the right tracheobronchial angle, and the lower border of station 4L is the left tracheobronchial angle. The left lateral border of the trachea (not the midline) serves as the boundary between stations 4R and 4L. *A* = aorta, *Az* = azygos arch, *E* = esophagus.

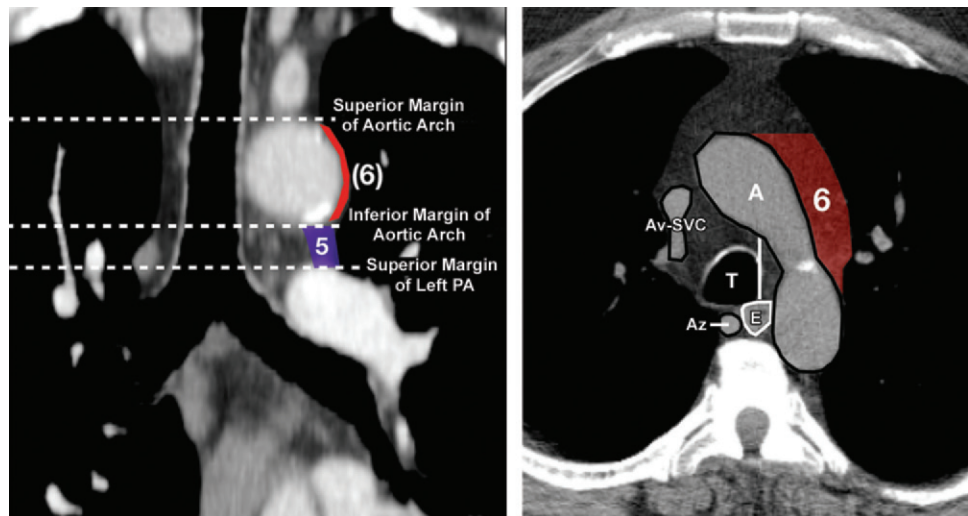
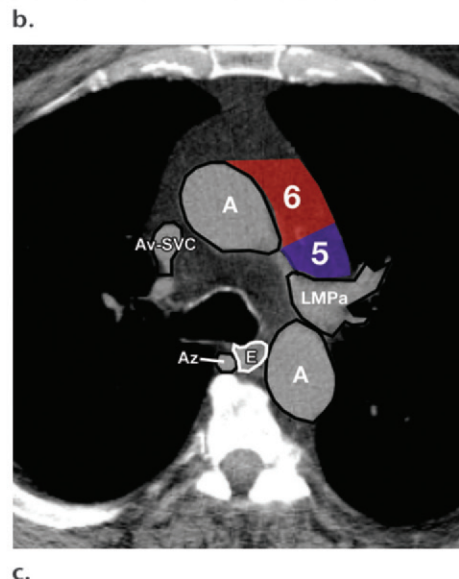


Figure 11. Stations 5 and 6. **(a)** Coronal reconstructed CT image shows the borders of stations 5 (purple area) and 6 (red area). *PA* = pulmonary artery. **(b, c)** Axial CT images obtained above the level of the carina show stations 5 (purple area) and 6 (red area). The upper border of station 5 is the inferior margin of the aortic arch, and the lower border is the superior margin of the left main pulmonary artery (*LMPa*). The upper border of station 6 is a line tangential to the superior margin of the aortic arch, and the lower border is the inferior margin of the aortic arch. *A* = aorta, *Av-SVC* = azygos vein-SVC junction, *Az* = azygos vein, *E* = esophagus, *T* = trachea.



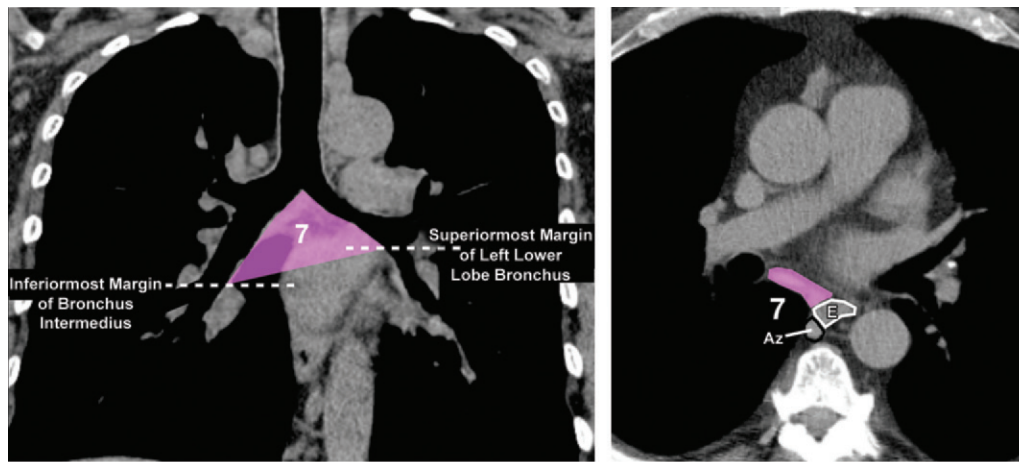


Figure 12. Station 7. **(a)** Coronal reconstructed CT image shows the borders of station 7 (pink area). **(b)** Axial CT image obtained below the level of the carina shows station 7 (pink area). The upper border is the carina of the trachea, and the lower borders are the inferior-most margin of the bronchus intermedius on the right and the superior-most margin of the lower lobe bronchus on the left. *Az* = azygos vein, *E* = esophagus.

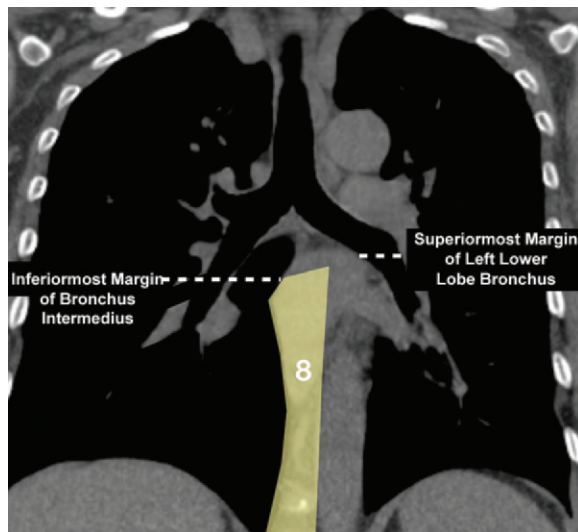


Figure 13. Station 8. Coronal reconstructed CT image shows the borders of station 8 (yellow area). The upper borders are the inferior-most margin of the bronchus intermedius on the right and the superior-most margin of the lower lobe bronchus on the left, and the lower border is the diaphragm. In our practices, the midline of the esophagus serves as the boundary between a right- and left-sided station 8 lymph node.

(Fig 3). The anatomic landmarks of the thoracic inlet are the superior margin of the manubrium, the superior margins of the first ribs, and the T1 costovertebral junctions. Because the T1 costovertebral junctions are superior to the superior margin of the manubrium, the thoracic inlet lies in an oblique plane.

Because the plane of the thoracic inlet bisects the axial plane at conventional thoracic CT, the visible sections of the right and left first

ribs serve as the most reliable landmarks for the thoracic inlet at axial CT (Fig 4). Structures that are anterior to a line bisecting the visible sections of the right and left first ribs lie within the neck. Conversely, structures posterior to this line lie within the superior mediastinum.

Distinguishing Lower Paratracheal from Hilar Lymph Nodes

Distinguishing lower paratracheal (stations 4R and 4L) from hilar (stations 10R and 10L) lymph nodes is important because an error may result in misclassification of a stage N1 tumor as stage N2 or vice versa. The inferior borders of the lower paratracheal lymph nodes (stations 4R and 4L) and the superior borders of the hilar lymph nodes (stations 10R and 10L) are defined as the lower rim of the azygos vein (ie, SVC-azygos junction) on the right and the upper rim of the left main pulmonary artery on the left. Hilar lymph nodes are further restricted to those that are adjacent to the main-stem bronchi. As a result, in some patients, when the aforementioned definitions are strictly applied to CT, a territory exists (the region anterior to the tracheal bifurcation, also known as the precarinal space) in which the distinction between lower paratracheal lymph nodes and hilar lymph nodes is unclear (Fig 5).

Surgical management of lymph nodes anterior to the tracheal bifurcation mirrors that of mediastinal lymph nodes. The region anterior to the tracheal bifurcation is in the mediastinum. In our practices, lymph nodes anterior to the tracheal bifurcation are typically grouped with the lower paratracheal stations at CT.

Teaching
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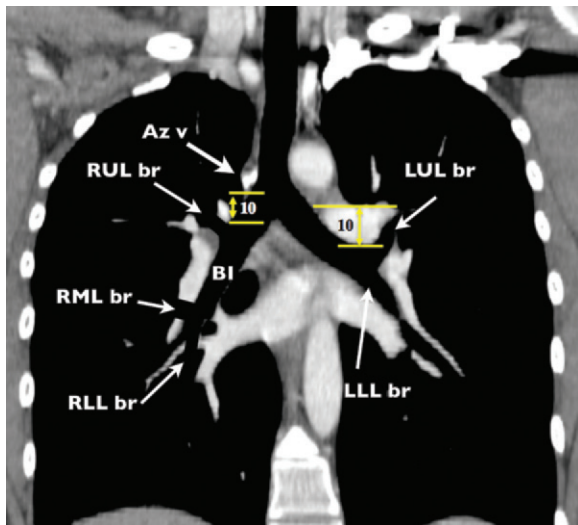


Figure 14. Stations 10R and 10L. Coronal reconstructed CT image shows the borders of stations 10R and 10L, which refer to lymph nodes located along the main-stem bronchi. *Az v* = azygos arch, *BI* = bronchus intermedius, *LLL* = left lower lobe bronchus, *LUL br* = left upper lobe bronchus, *RLL br* = right lower lobe bronchus, *RML br* = right middle lobe bronchus, *RUL br* = right upper lobe bronchus.

Distinguishing Ipsilateral from Contralateral Mediastinal Lymphadenopathy

Whether a positive mediastinal lymph node is right- or left-sided affects the classification of regional lymph nodes (ie, N2 vs N3). For example, a positive right paratracheal lymph node in a patient with a left-sided lung cancer is classified as stage N3, whereas a positive left paratracheal lymph node in a patient with a left-sided lung cancer is classified as stage N2. The IASLC lymph node map defines the boundary between right and left paratracheal lymph nodes as the left lateral wall of the trachea. However, with regard to the sidedness of other mediastinal lymph nodes (eg, prevascular, retrotracheal, and paraesophageal), the IASLC lymph node map does not provide a boundary to distinguish between right- and left-sided lymph nodes, making the distinction between stages N2 and N3 at these stations unclear. For example, should the boundary separating the right and left prevascular lymph nodes be the midline trachea or the left lateral tracheal wall? And should the midline esophagus be used to separate the right and left paraesophageal lymph nodes?

In our practices, we choose the midline of the trachea to separate right and left prevascular lymph nodes and the midline of the esophagus to separate right and left paraesophageal lymph nodes. A retrotracheal lymph node is located posterior to the trachea and, thus, is inherently located to the right side of the left lateral tracheal wall; therefore, a retrotracheal lymph node should

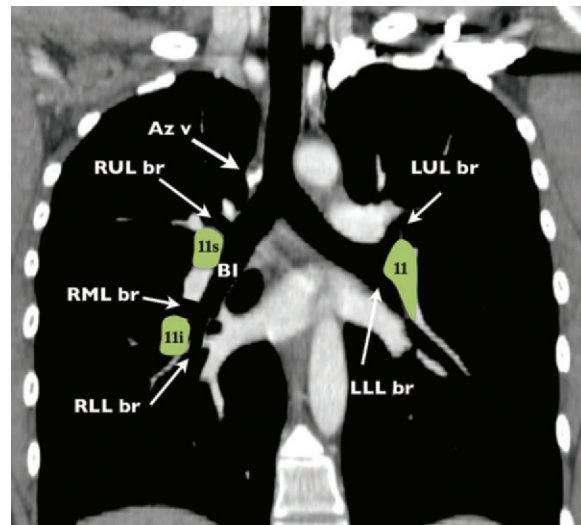


Figure 15. Stations 11R and 11L. Coronal reconstructed CT image shows the borders of stations 11R—which is subdivided into stations 11Rs and 11Ri—and 11L. Station 11Rs refers to lymph nodes located between the right upper lobe bronchus (*RUL br*) and the bronchus intermedius (*BI*), and station 11Ri denotes lymph nodes located between the right middle (*RML br*) and right lower (*RLL br*) lobe bronchi. Station 11L refers to lymph nodes located between the left upper lobe bronchus (*LUL br*) and the left lower lobe bronchus (*LLL br*). *Az v* = azygos arch.

be treated as a right-sided paratracheal node. **In our practices, with regard to the numeric designations of the previously defined lymph node stations, stages N1, N2, and N3 for right- and left-sided lung cancers are typically classified according to the outline in Table 3.**

Teaching Point

Distinguishing among Pulmonary Lymph Nodes

Distinguishing among pulmonary lymph nodes (stations 10–14) may be difficult. Such distinctions may be used when characterizing resected specimens, but they rarely are correctly described or identified in other settings. Although the presence of lymphadenopathy in stations 10–14 is clinically important, differentiating among stations 10–14 is not clinically relevant and is often challenging at imaging.

Classifying Miscellaneous Thoracic Lymph Nodes

Although it is uncommon, lymph node metastasis from lung malignancy may occur within thoracic lymph nodes that are not described in the IASLC lymph node map (eg, internal mammary, axillary, intercostal, and diaphragmatic) (Fig 6). As it is usually reasonable to consider such lymph nodes nonregional, in our practices we typically classify them as distant metastases (stage M1b).

Table 3: N1, N2, and N3 Stage Classifications for Right- and Left-sided Lung Cancers

Side of Cancer and N-Stage	Nodal Stations
Right lung	
N1	10R, 11R, 12R, 13R, 14R
N2	2R, 3A*, 3P, 4R, 7, 8†, 9R
N3	1R, 1L, 2L, 3A‡, 4L, 5, 6, 8§, 9L, 10L, 11L, 12L, 13L, 14L
Left lung	
N1	10L, 11L, 12L, 13L, 14L
N2	2L, 3A‡, 4L, 5, 6, 7, 8§, 9L
N3	1R, 1L, 2R, 3A*, 3P, 4R, 8†, 9R, 10R, 11R, 12R, 13R, 14R

*Right of the midline of the trachea.
†Right of the midline of the esophagus.
‡Left of the midline of the trachea.
§Left of the midline of the esophagus.

Visual Interpretation of the IASLC Lymph Node Map

The IASLC lymph node map provides a reproducible and consistent set of definitions for the discussion of regional lymphadenopathy in patients with lung cancer. However, because of its comprehensiveness and text-based presentation, it may be challenging to grasp, remember, and apply during daily practice. More importantly, ambiguities may emerge when its definitions are rigorously applied during interpretation of CT images. Although these ambiguities may appear trivial on the surface, they can affect management and treatment decisions. Color-coded CT image maps that illustrate the IASLC lymph node map and clarify the aforementioned ambiguities are provided (Figs 7–15).

Conclusions

Accurate and reproducible labeling of regional lymph nodes is crucial for the stage classification of lung cancer. The IASLC lymph node map provides a standardized method to improve communication among radiologists, thoracic surgeons, pulmonologists, and oncologists and facilitates optimal diagnostic evaluation and treatment selection. Because CT and PET/CT play essential roles in the staging of lung cancer, familiarity with this regional lymph node map is important for all who interpret cross-sectional images of the chest.

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International Association for the Study of Lung Cancer (IASLC) Lymph Node Map: Radiologic Review with CT Illustration

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Page 1682

The left lateral wall of the trachea (not the midline) serves as the boundary between stations 2R and 2L.

Page 1683

The left lateral border of the trachea (not the midline) serves as the boundary between stations 4R and 4L.

Page 1689

Because the plane of the thoracic inlet bisects the axial plane at conventional thoracic CT, the visible sections of the right and left first ribs serve as the most reliable landmarks for the thoracic inlet at axial CT (Fig 4).

Page 1689

Surgical management of lymph nodes anterior to the tracheal bifurcation mirrors that of mediastinal lymph nodes. The region anterior to the tracheal bifurcation is in the mediastinum.

Page 1690

In our practices, with regard to the numeric designations of the previously defined lymph node stations, stages N1, N2, and N3 for right- and left-sided lung cancers are typically classified according to the outline in Table 3.