4th World Congress of Thoracic Imaging, Boston
Educational Exhibit: 17-EE-1462-WCTI

Illustrated Guide for the 8th Edition of the Lung Cancer TNM Staging Criteria

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Relevant Disclosures

- The authors have no relevant financial or commercial relationships to this exhibit
- The authors want to thank Erin Moore, MA for creating the illustrations in this presentation

Introduction

- Lung cancer is a common worldwide cause of cancer death
- The Tumor−Node−Metastasis (TNM) staging system predicts disease prognosis and guides treatment
- This system has been recently revised, and the updated chapter introduces few yet important evidence-based changes
- This exhibit illustrates the new TNM system and highlights the changes with relevance to radiology

8th TNM Edition: Quick Facts

- 8th TNM edition in numbers:
  - ✓Validated in 94,708 new cases of lung cancer
  - ✓From 35 institutions in 16 countries
  - ✓Data collected between 1999 and 2010
- A single set of TNM descriptors covers:
  - ✓Non-small Cell Lung Cancer
  - ✓Small Cell Lung Cancer
  - ✓Carcinoid Tumors
- Effective date:
  - ✓8th TNM edition release: January 2017
  - ✓Cancer data collection per AJCC: January 2018

Highlights: New T Descriptors

7th versus 8th Edition:

Increased number of categories: 6 → 7

New T1a(mi) category: "minimally invasive"

T1 **subdivided at 1-cm intervals**:

- T1a → ≤ 1 cm
- T1b → > 1 cm and ≤ 2 cm
- T1c → > 2 cm and ≤ 3 cm

Reduction in T2 upper size: 7 cm → 5 cm

- T2a → > 3 and ≤ 4 cm
- T2b → > 4 cm and ≤ 5 cm

Highlights: New T Descriptors

7th versus 8th Edition:

Involvement of main bronchus < 2 cm from the carina:
- **Downstaged**: T3 → T2

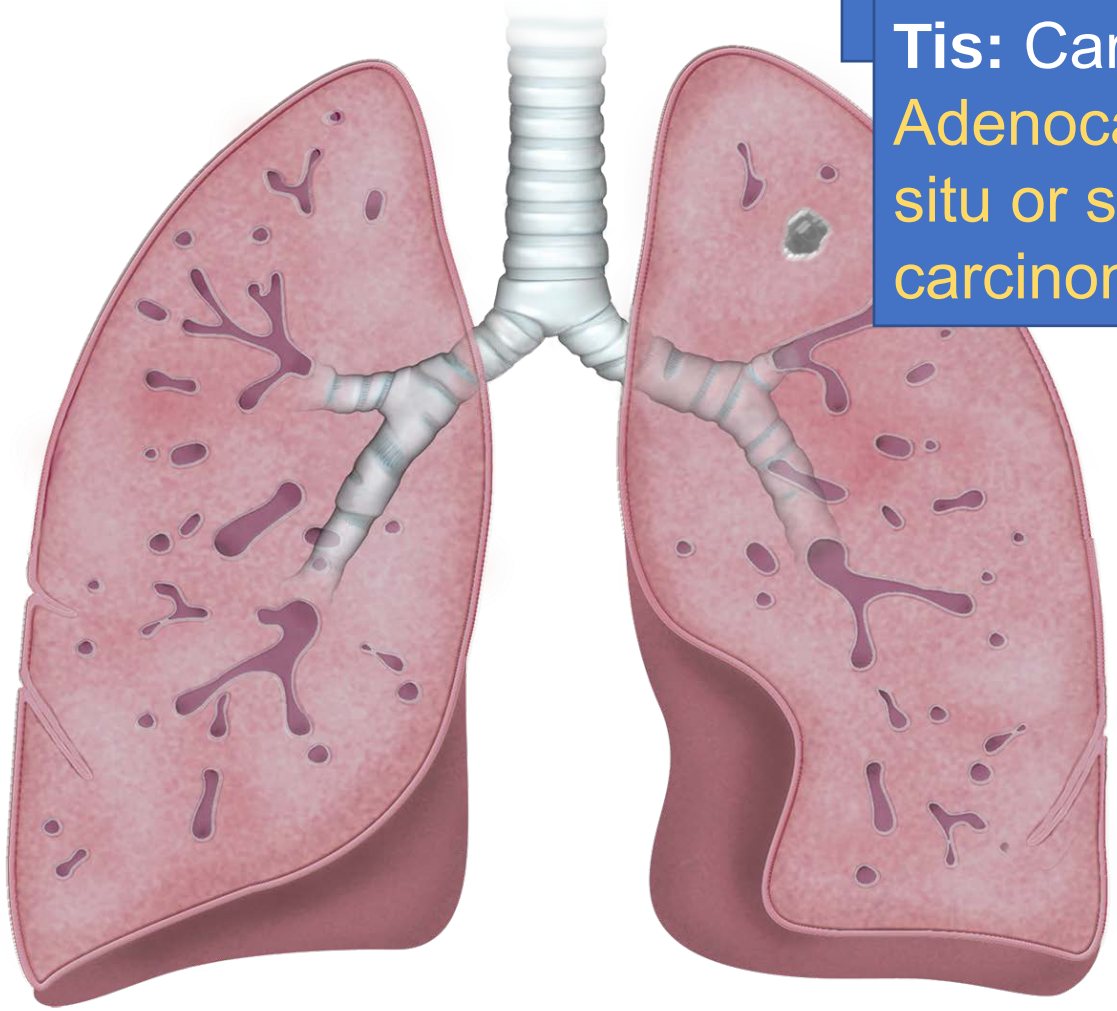
Atelectasis/obstructive pneumonitis of an entire lobe:
- **Downstaged: T3 → T2**

Reduction of T3 size limits:
- > 7 cm → > 5 cm and ≤ 7 cm

Diaphragmatic invasion:
- **Upstaged: T3 → T4**

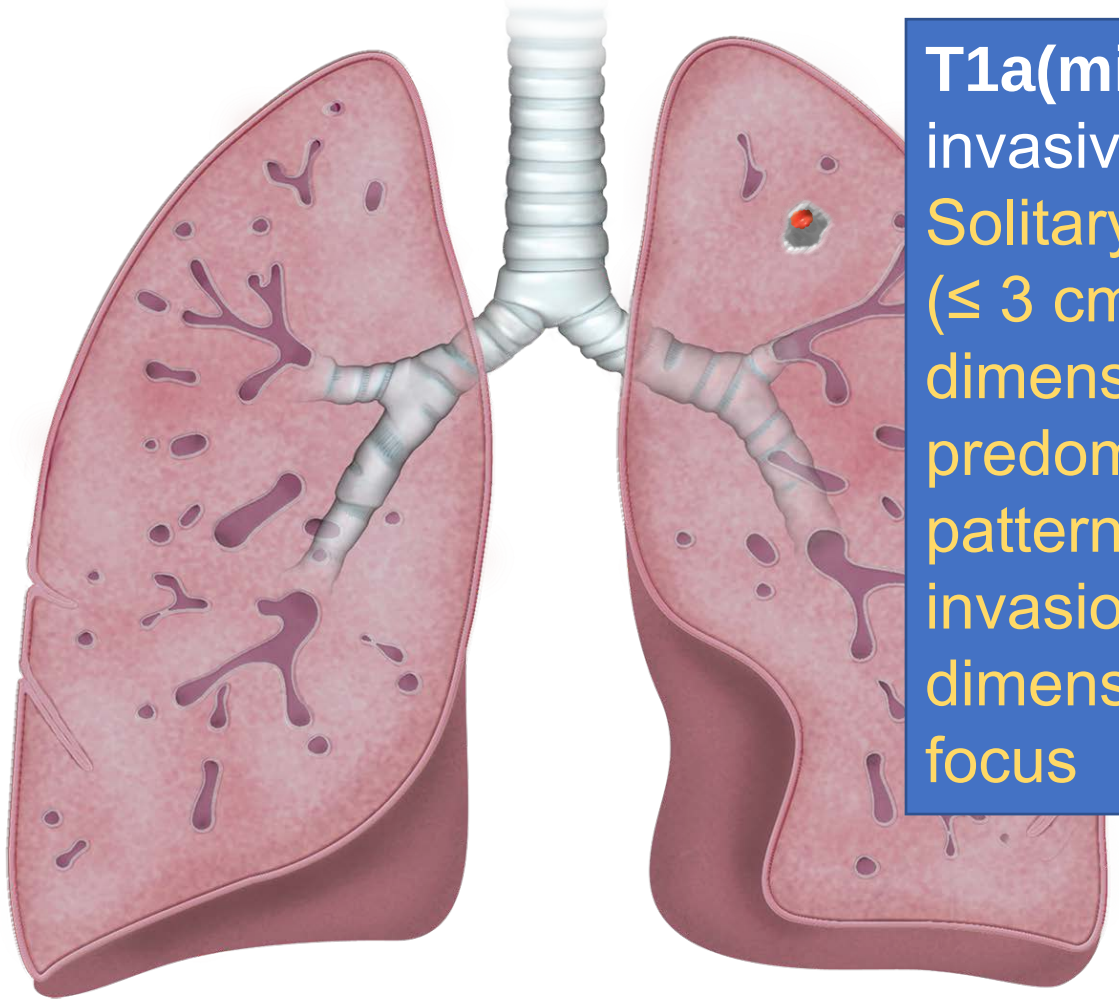
Mediastinal pleura invasion: **dropped** as descriptor

T1 Descriptors



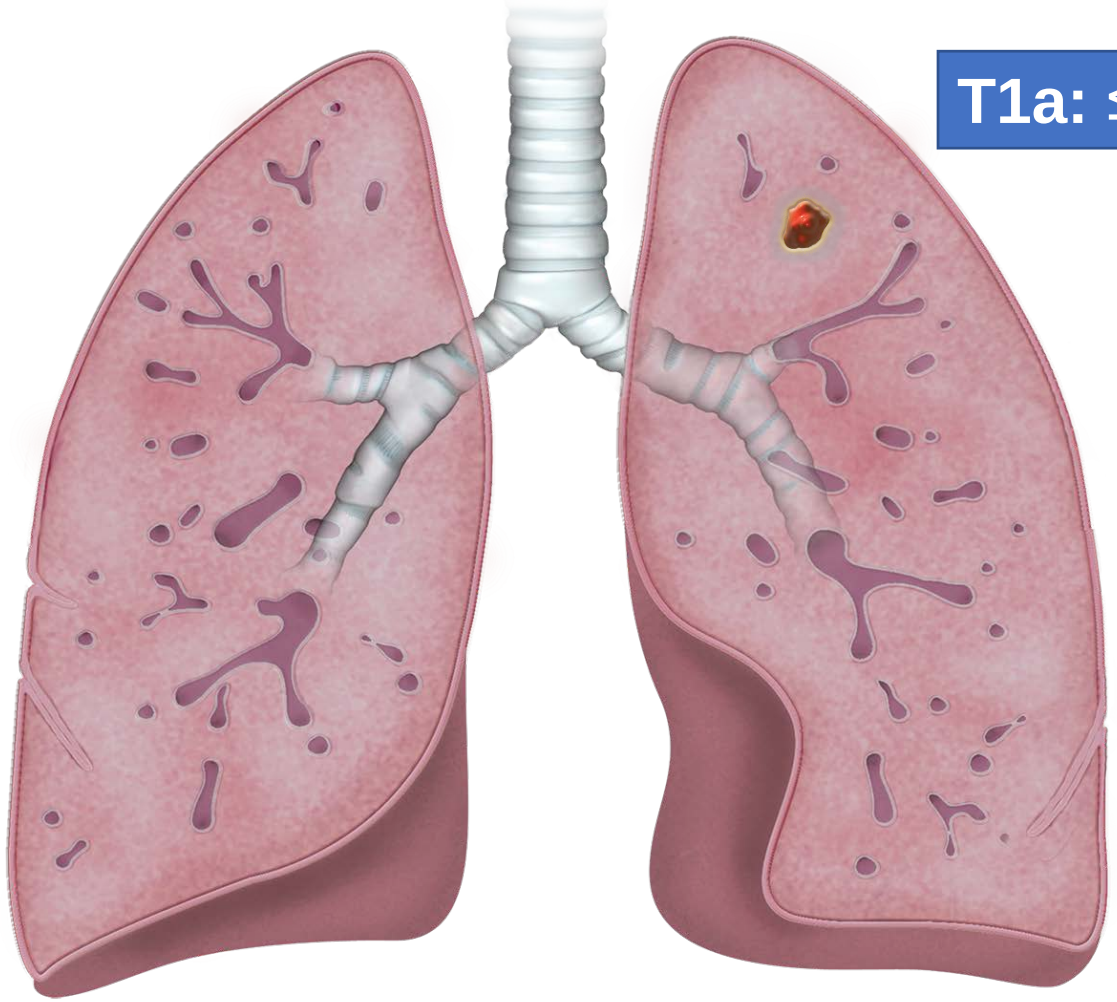
Tis: Carcinoma in situ
Adenocarcinoma in situ or squamous carcinoma in situ

T1 Descriptors



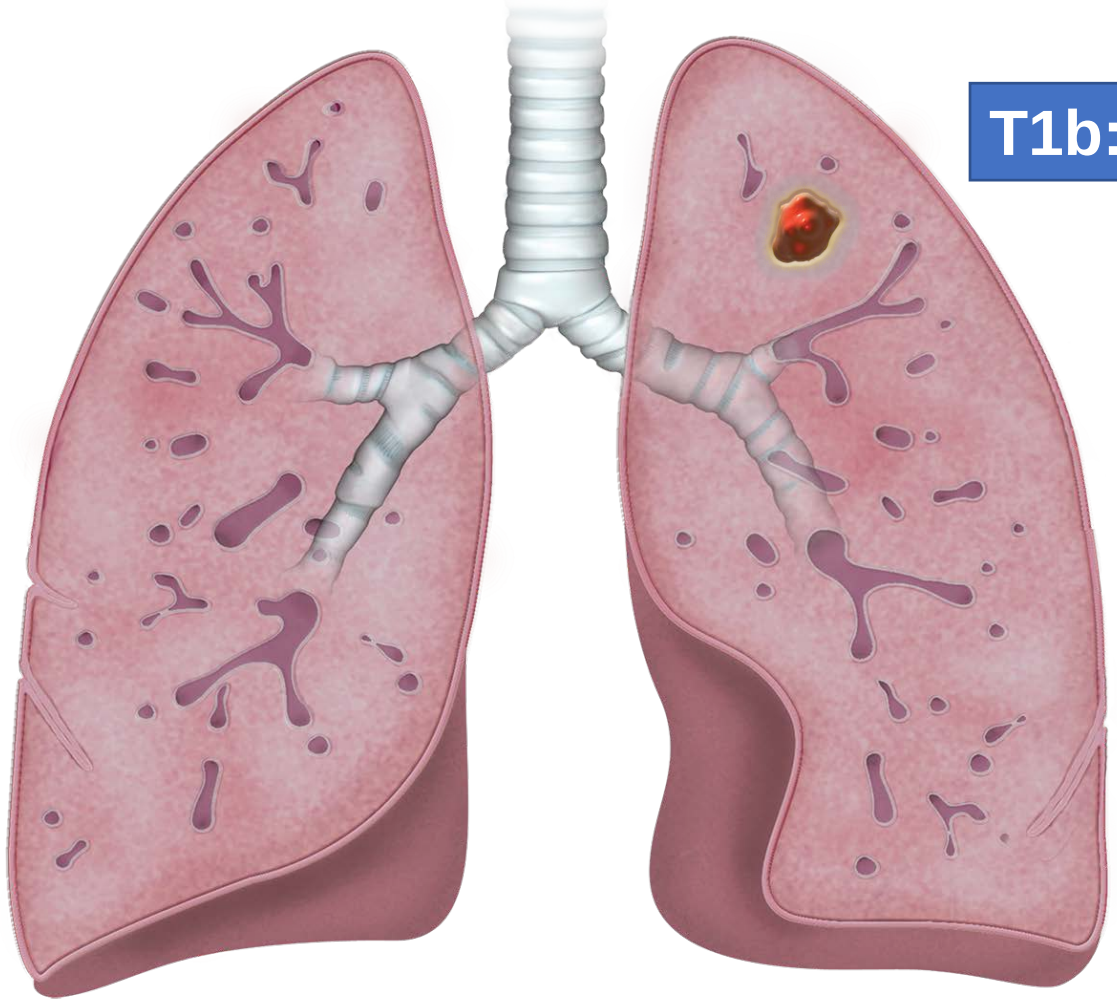
T1a(mi): Minimally invasive adenocarcinoma
Solitary adenocarcinoma (≤ 3 cm in greatest dimension), with a predominantly lepidic pattern and ≤ 5 mm invasion in greatest dimension in any one focus

T1 Descriptors



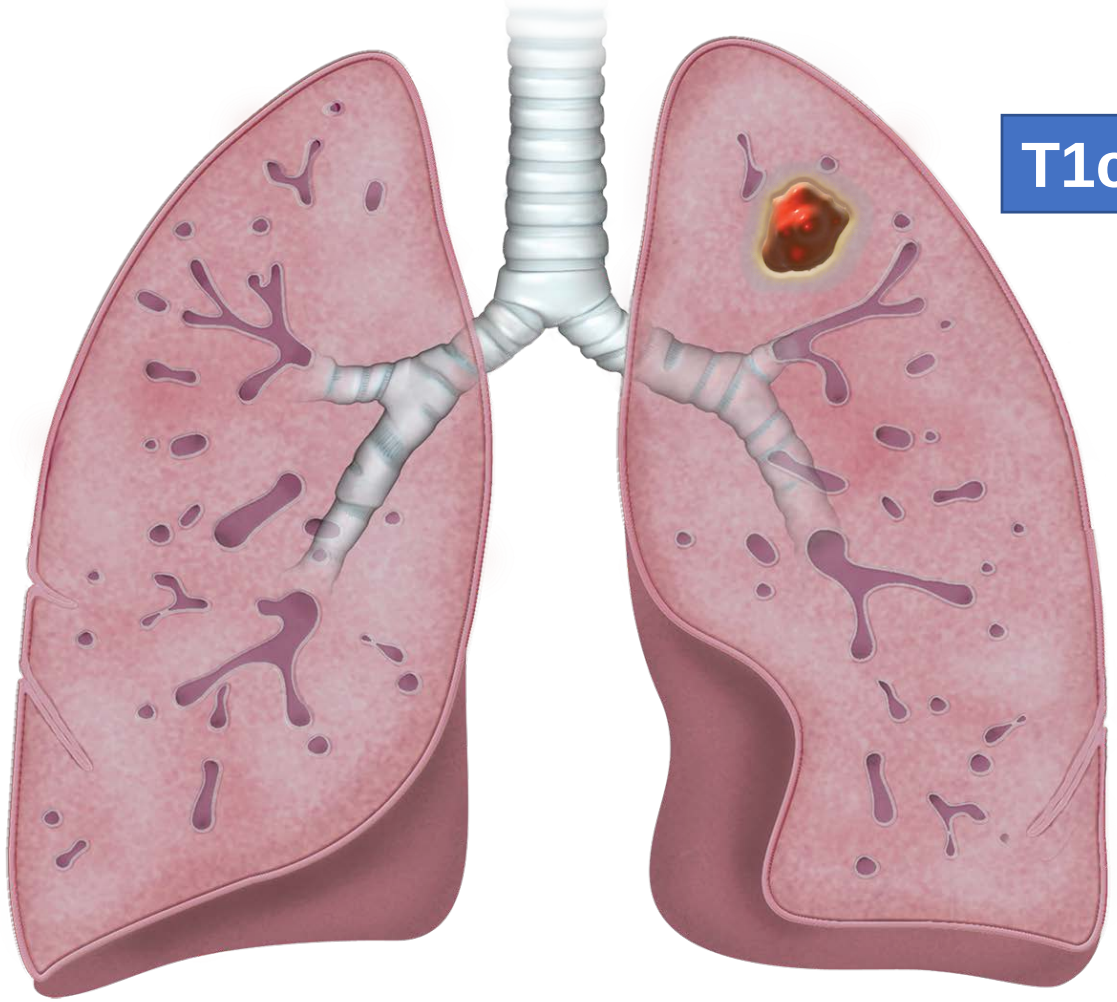
T1a: ≤ 1 cm

T1 Descriptors



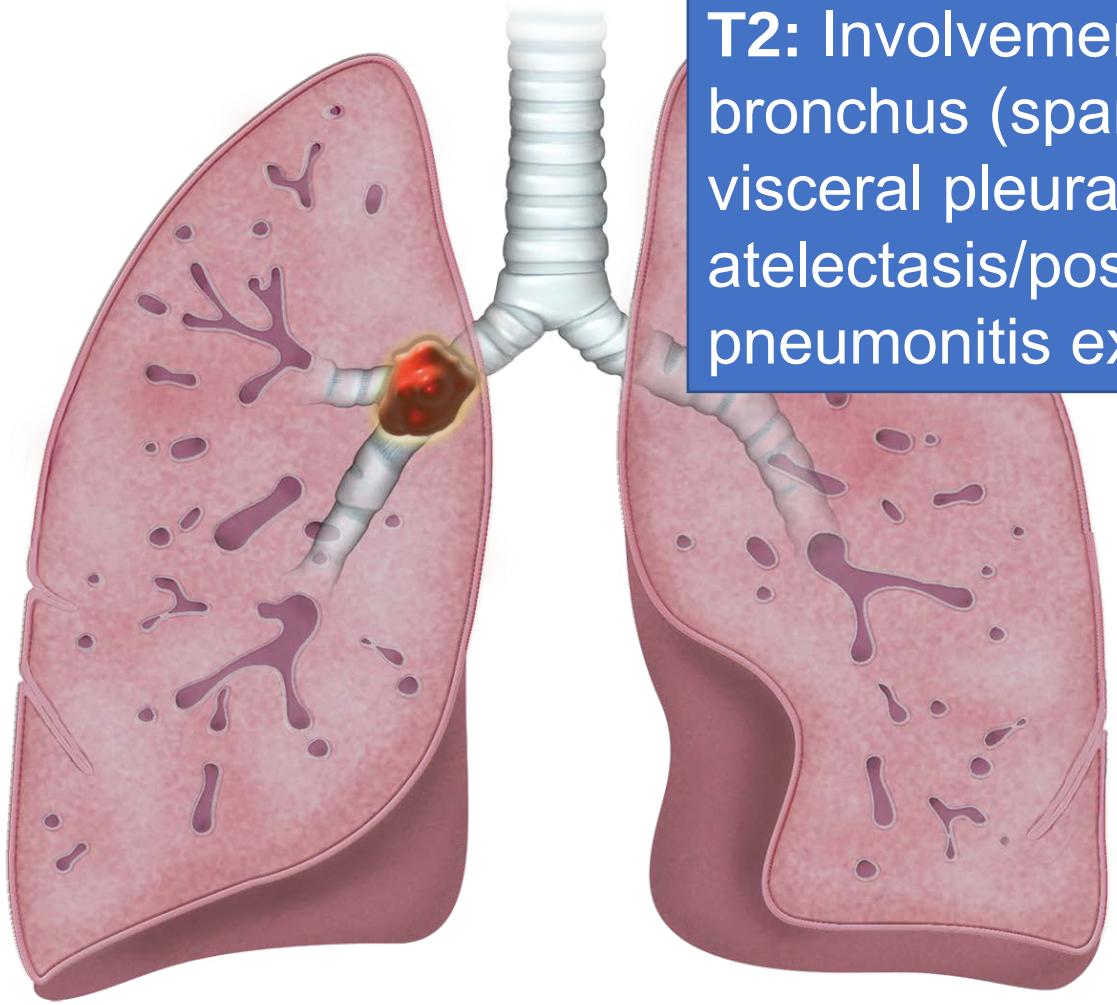
T1b: > 1 cm and ≤ 2 cm

T1 Descriptors



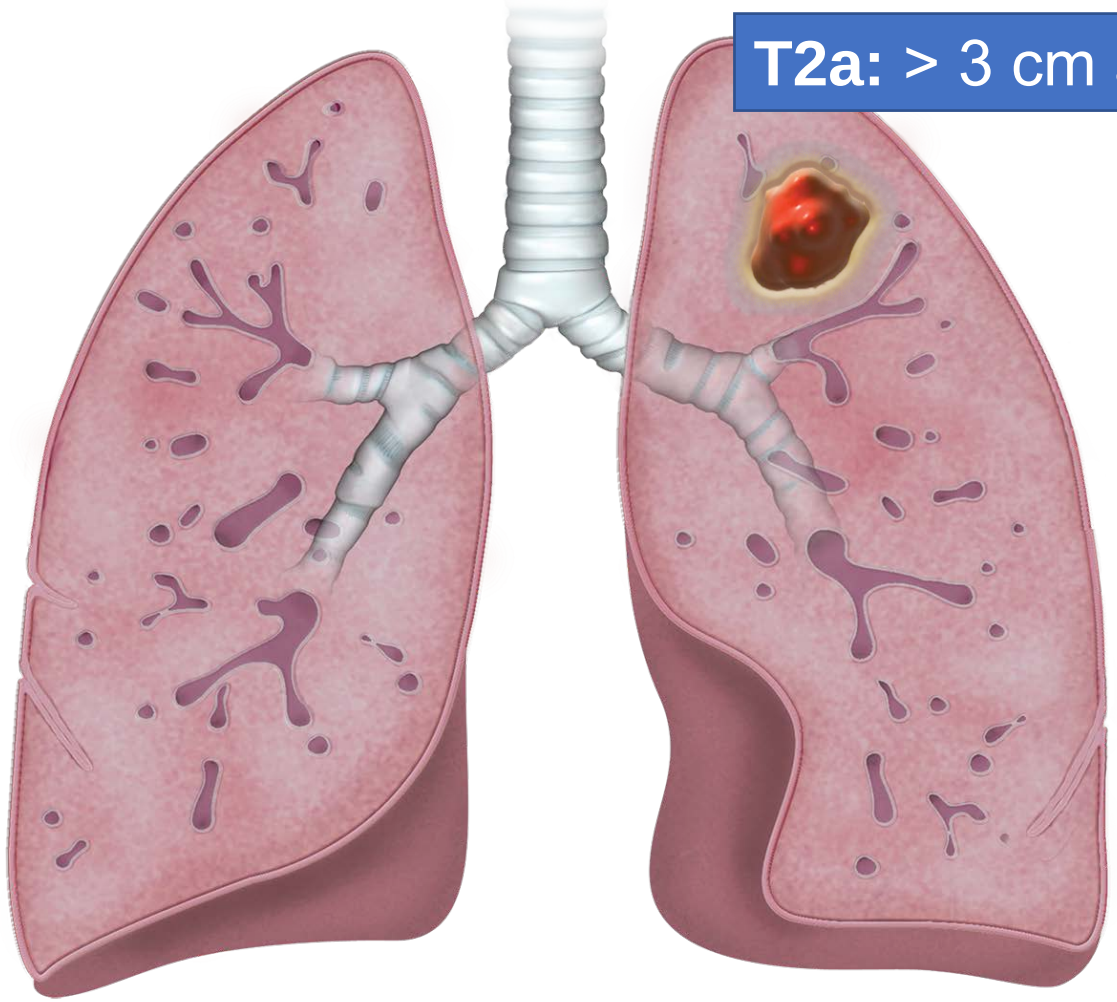
T1c: > 2 cm and ≤ 3 cm

T2 Descriptors



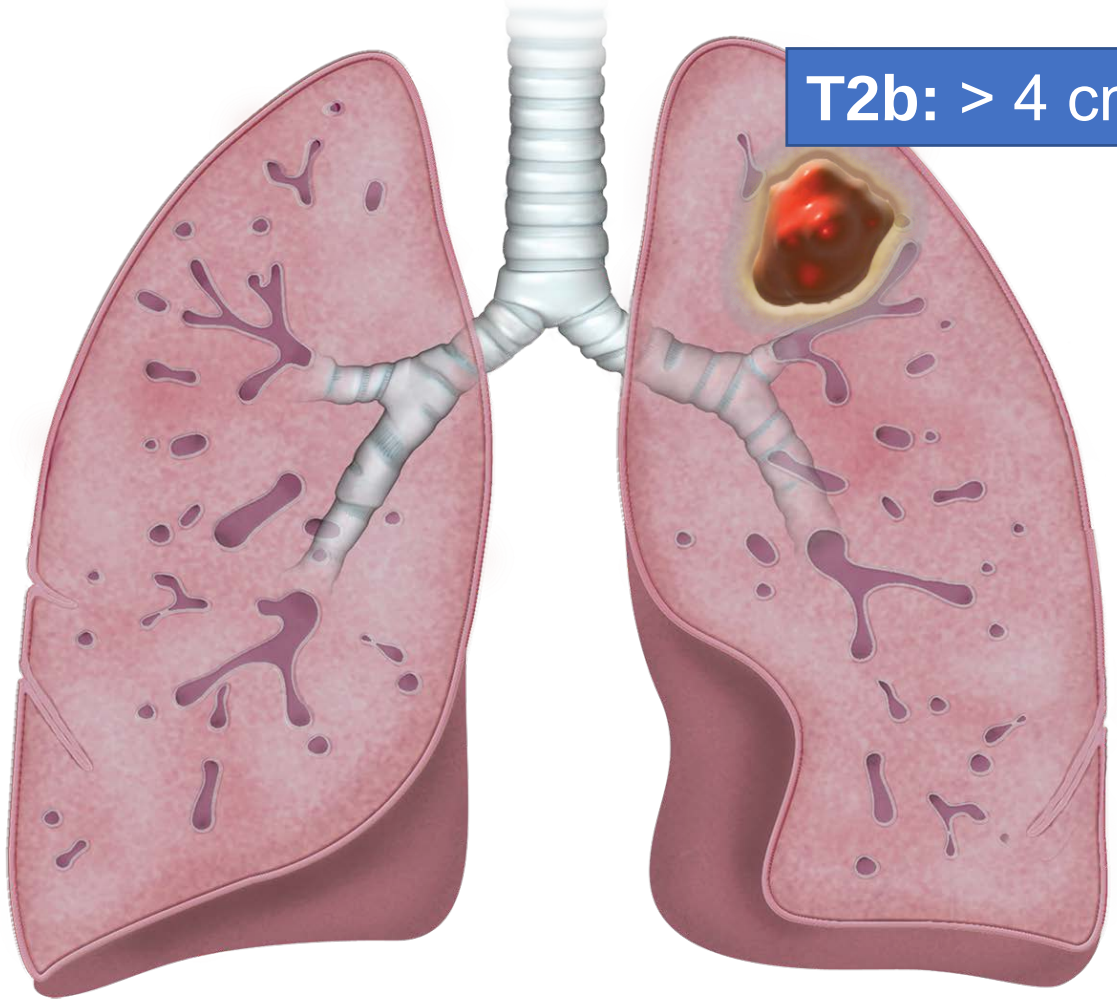
T2: Involvement of the main bronchus (sparing the carina), *or* visceral pleural invasion, *or* atelectasis/post obstructive pneumonitis extending to hilum

T2 Descriptors



T2a: > 3 cm and ≤ 4 cm

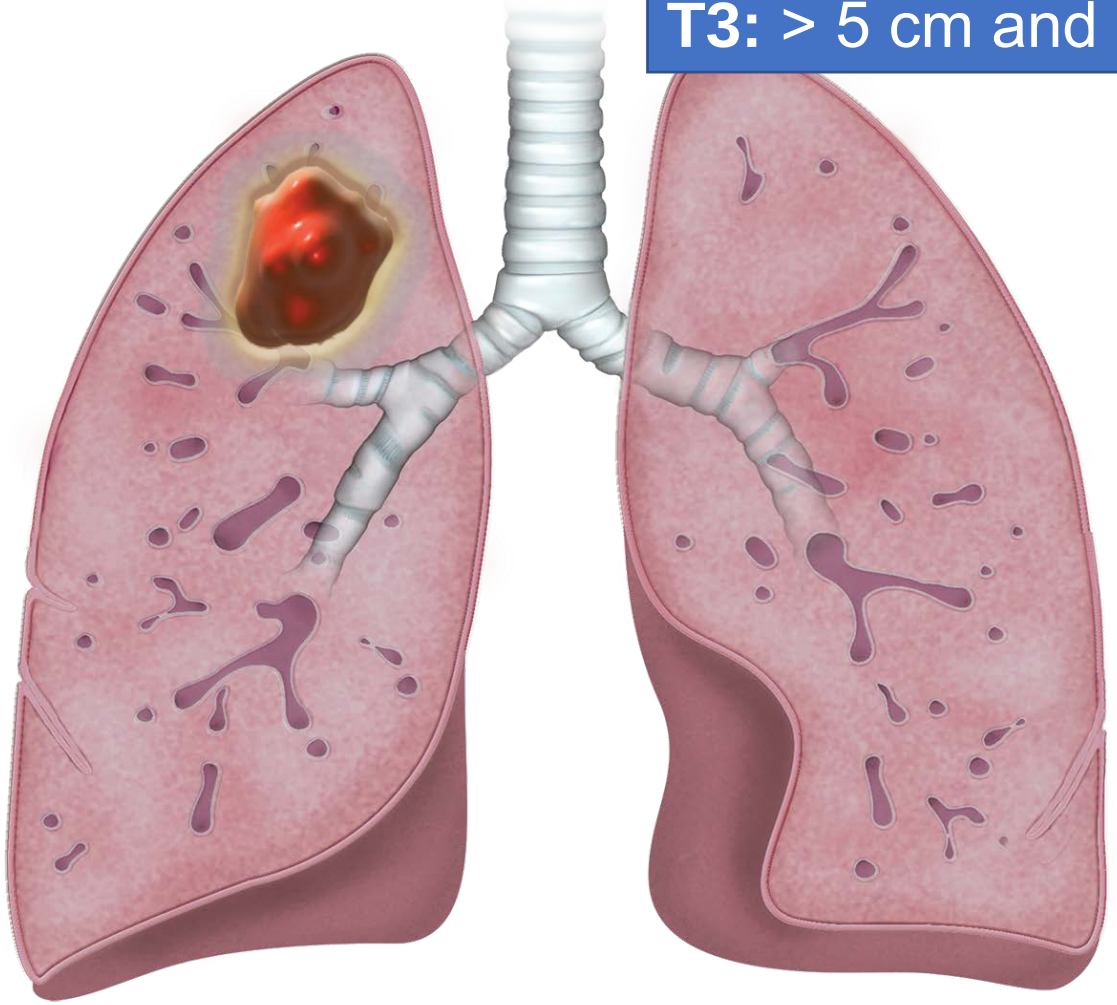
T2 Descriptors



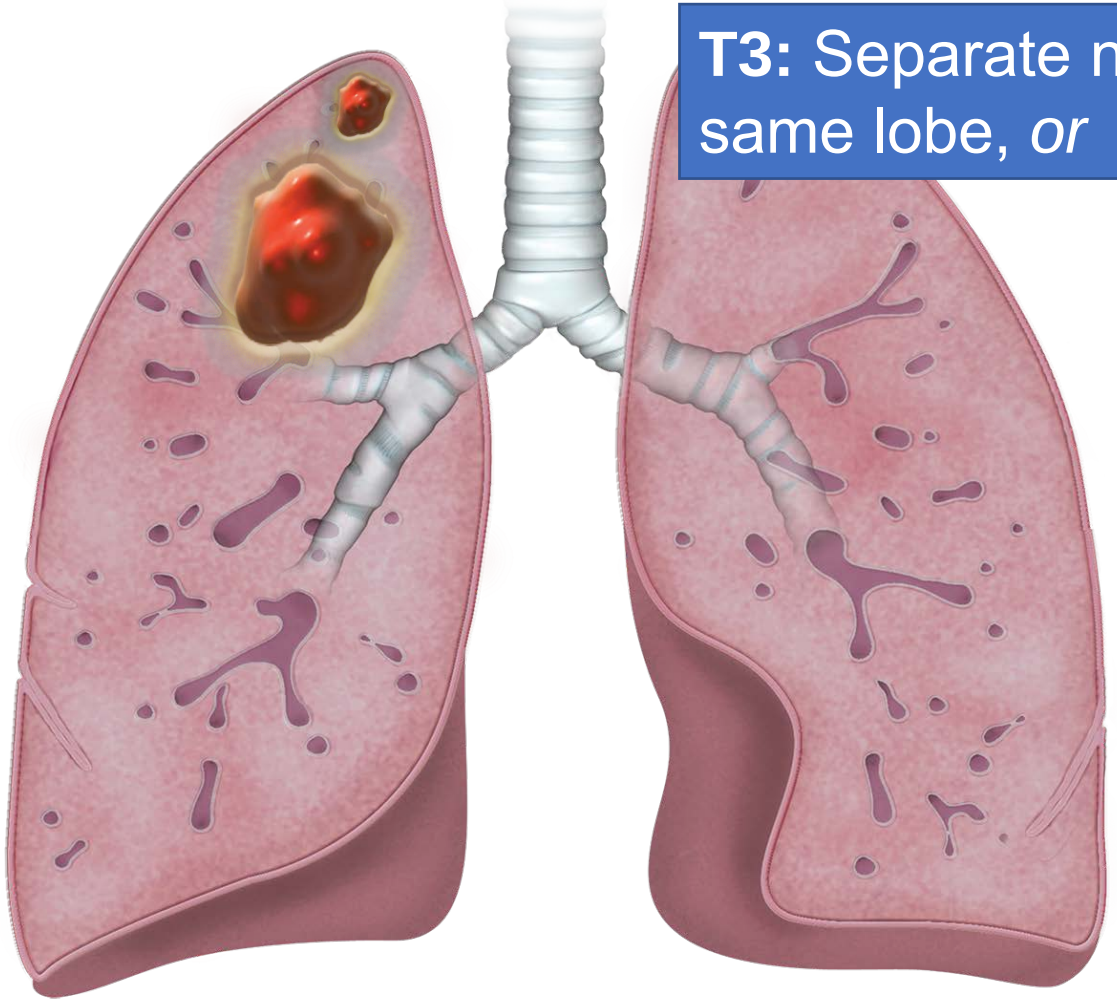
T2b: > 4 cm and ≤ 5 cm

T3 Descriptors

T3: > 5 cm and ≤ 7 cm, *or*

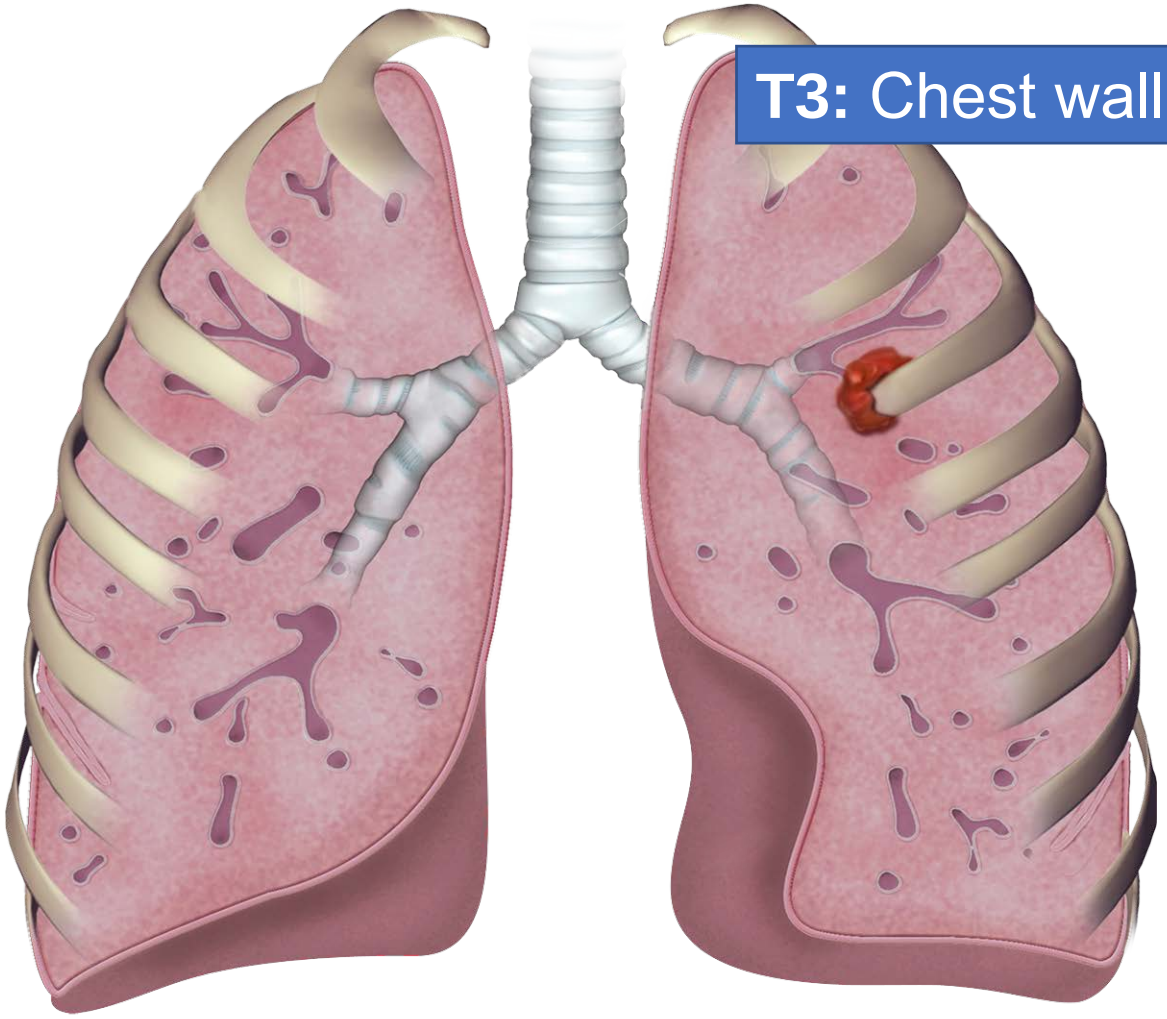


T3 Descriptors



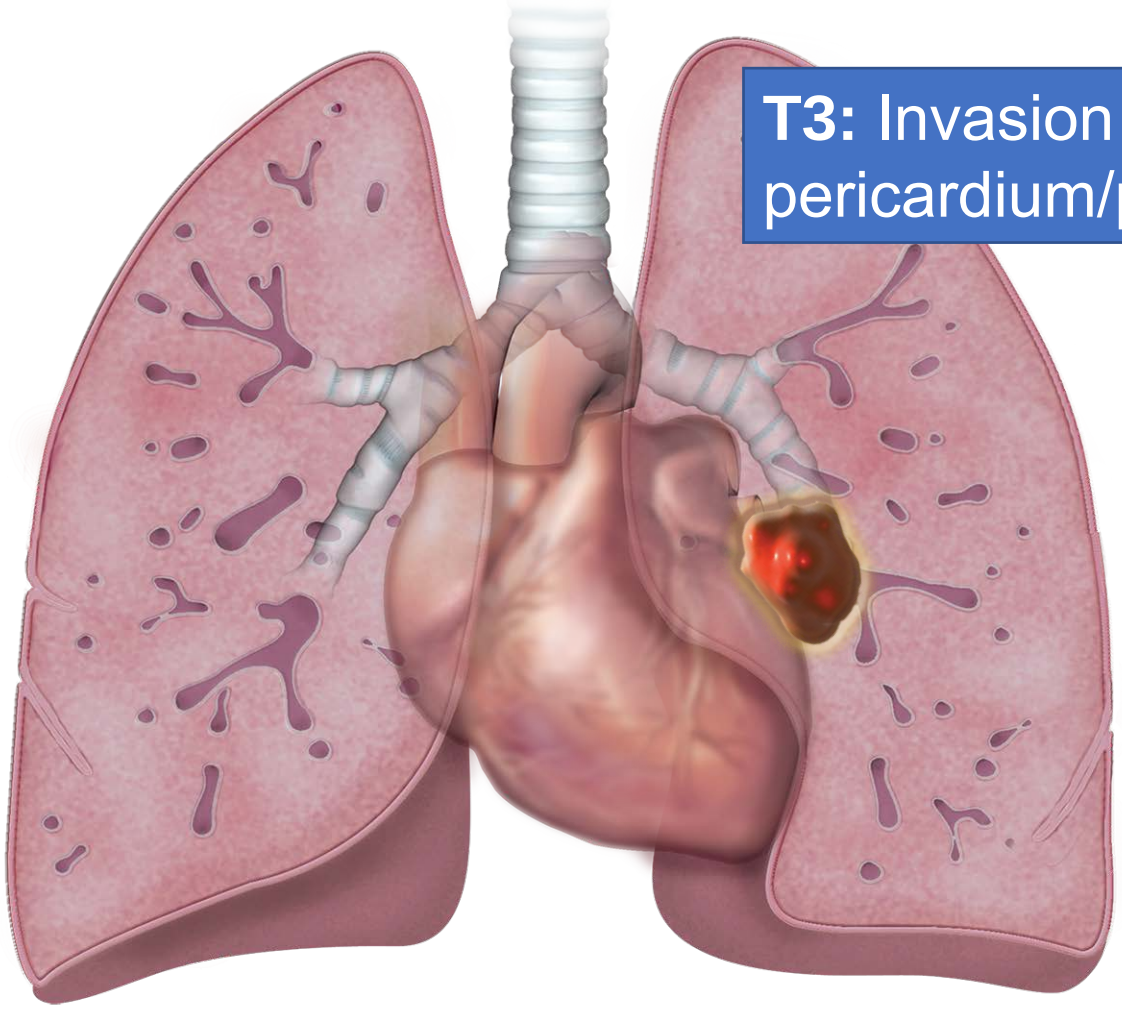
T3: Separate nodule in the same lobe, *or*

T3 Descriptors



T3: Chest wall invasion, *or*

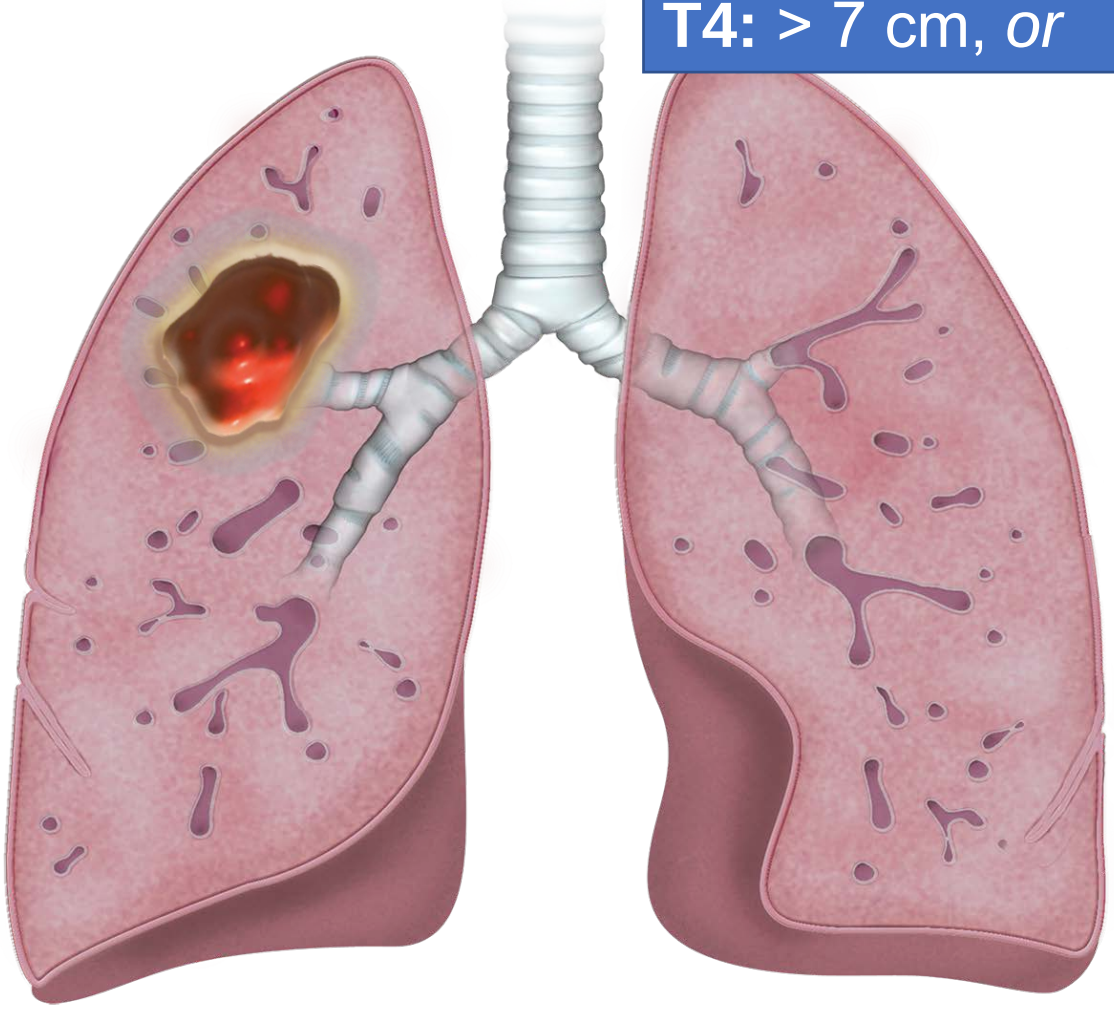
T3 Descriptors



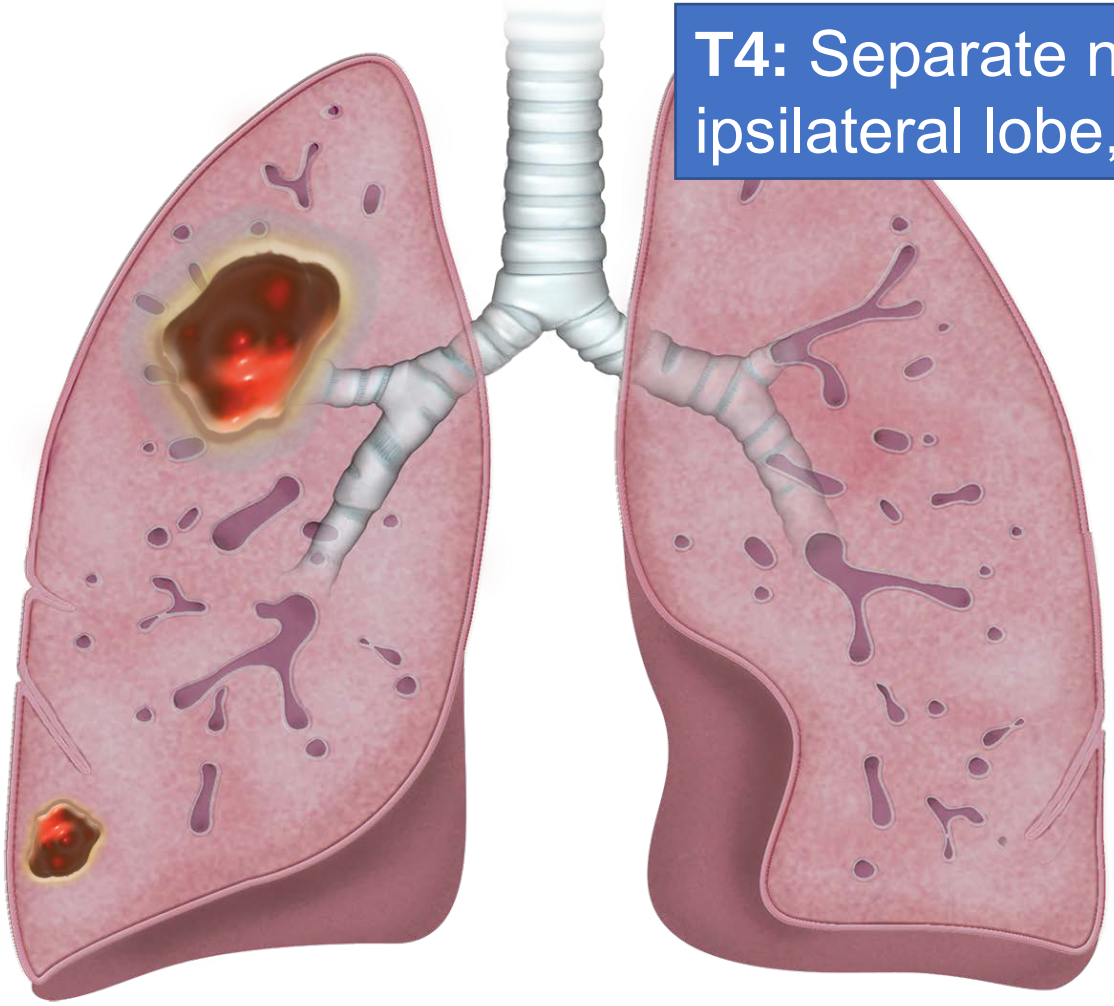
T3: Invasion of parietal pericardium/phrenic nerve

T4 Descriptors

T4: > 7 cm, *or*

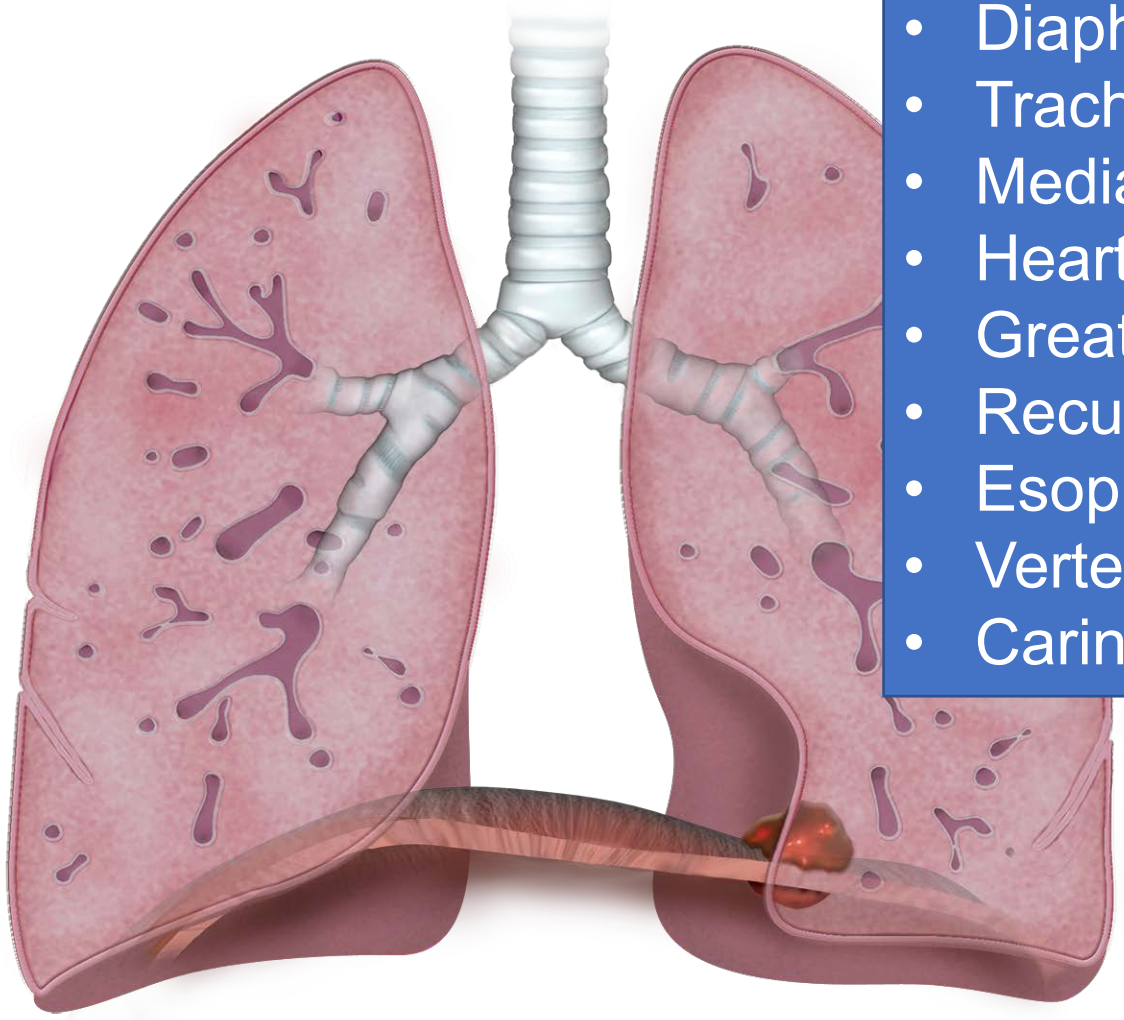


T4 Descriptors



T4: Separate nodule(s) in an ipsilateral lobe, *or*

T4 Descriptors



Invasion of (at least one):

- Diaphragm
- Trachea
- Mediastinum
- Heart
- Great vessels
- Recurrent laryngeal nerve
- Esophagus
- Vertebral body
- Carina

Highlights: New N Descriptors

7th versus 8th Edition:

General descriptors **maintained**:

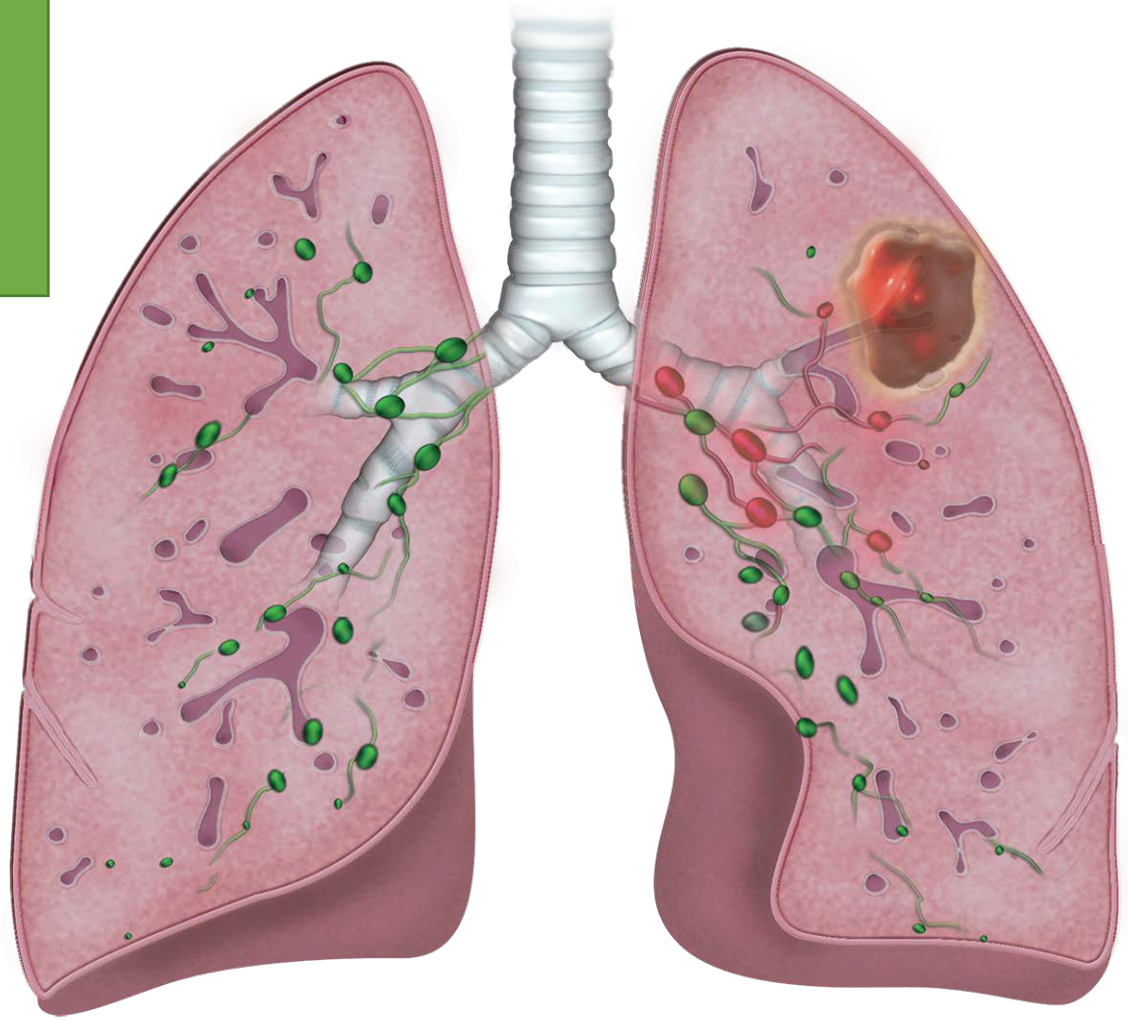
- N0 → No evidence of nodal metastasis
- N1 → Ipsilateral hilar nodal metastasis
- N2 → Ipsilateral mediastinal nodal metastasis
- N3 → Contralateral hilar or mediastinal nodal metastasis or supraclavicular metastasis

Number of involved lymph nodes may have prognostic information:

- Recommendations to **score** the **number** of involved lymph nodes **only on pathologic staging**

N1 Descriptors

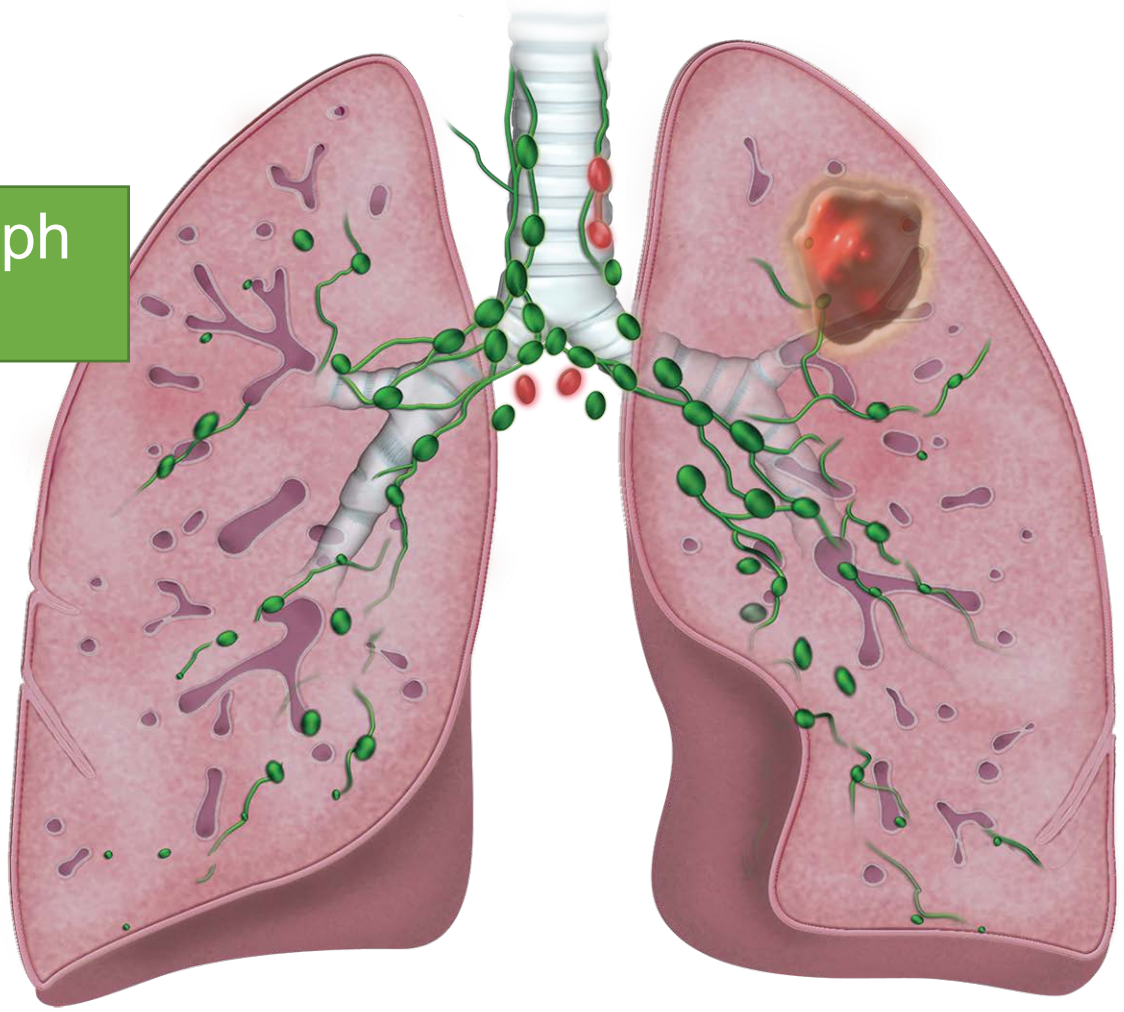
N1: Ipsilateral intrapulmonary, peribronchial, and hilar lymph nodes



N2 Descriptors

N2: Ipsilateral mediastinal

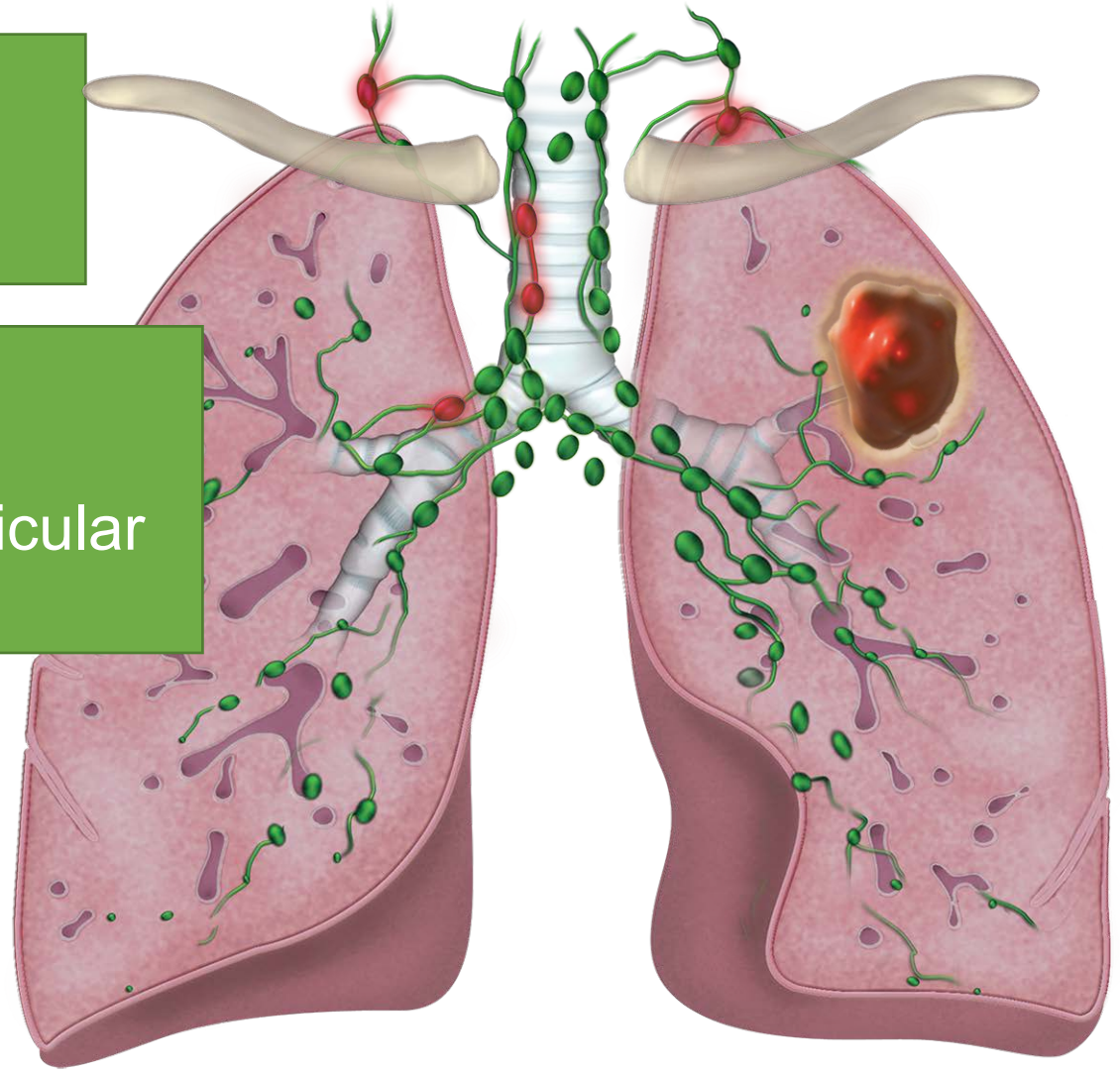
or subcarinal lymph node(s)



N3 Descriptors

N3: Contralateral hilar *or* mediastinal lymph nodes

ipsilateral *or* contralateral scalene/supraclavicular lymph node(s)



Highlights: New M Descriptors

7th versus 8th Edition:

Increased number of categories: 3 → 4

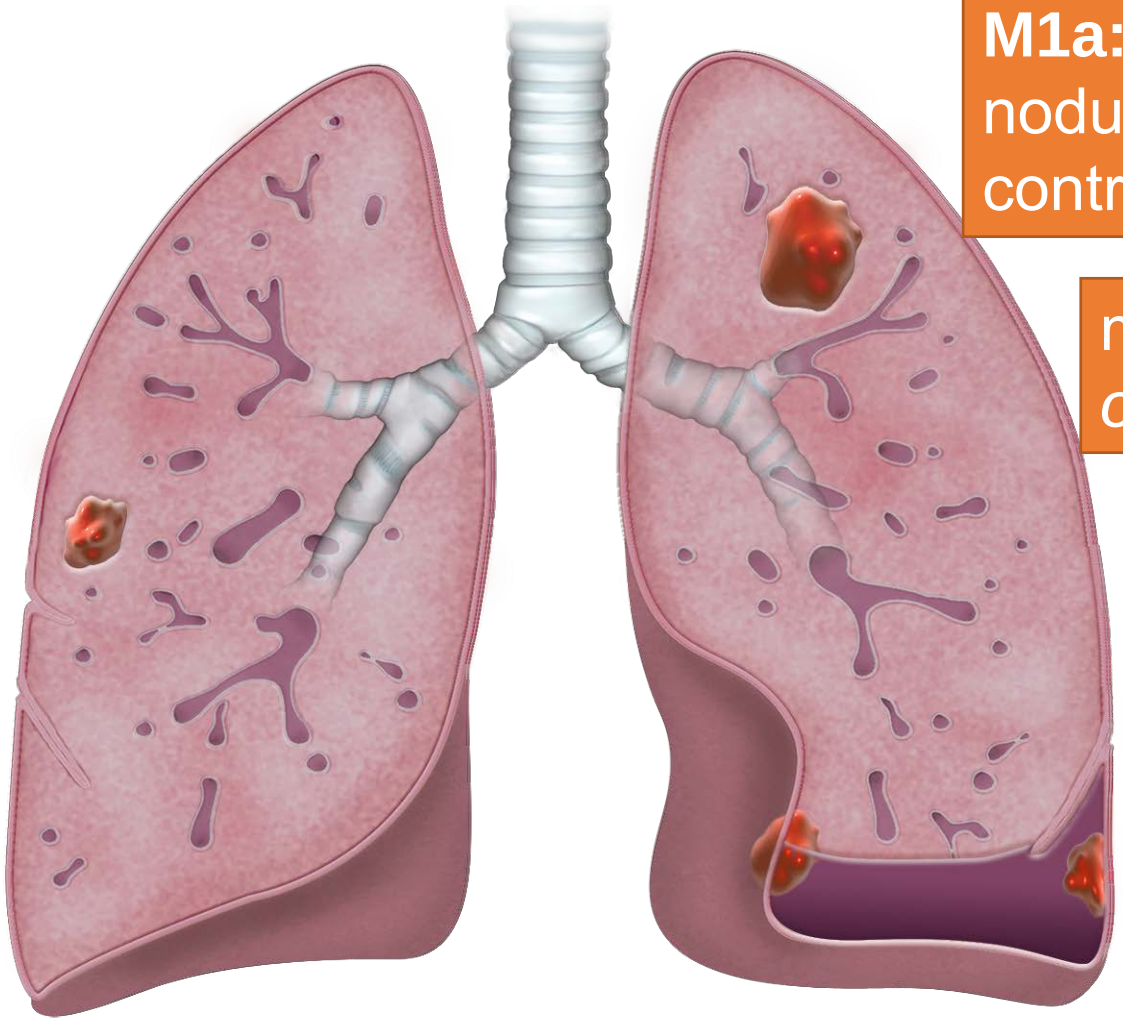
Intrathoracic metastases classification **maintained**:

- M1a

Extrathoracic metastases **split** into:

- Single: M1b
- Multiple: M1c

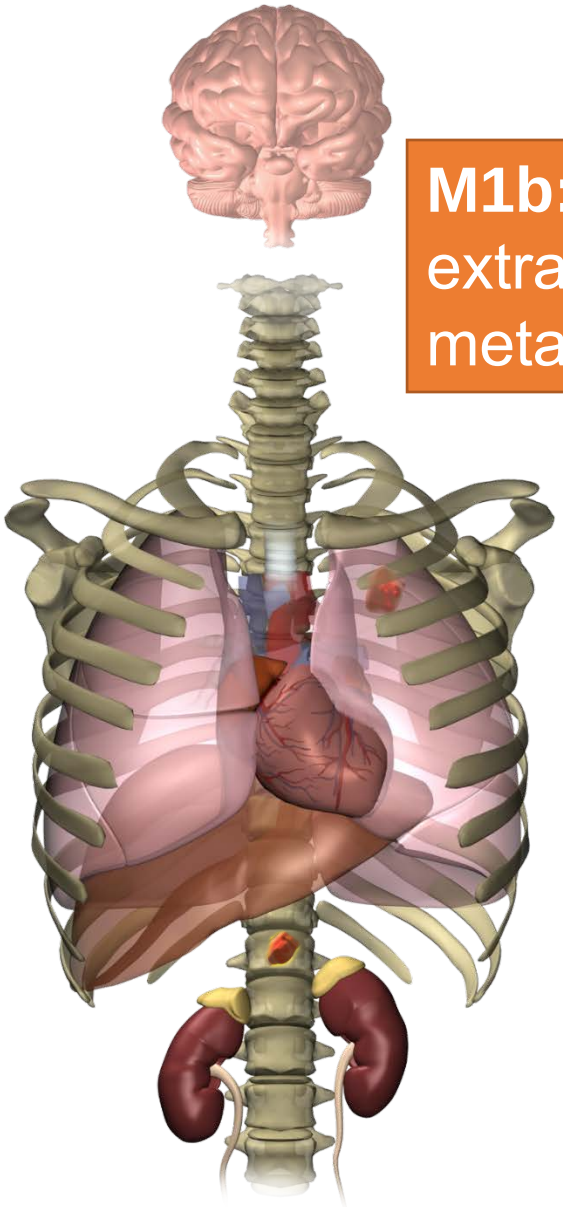
M1 Descriptors



M1a: Separate tumor nodule(s) in a contralateral lobe, *or*

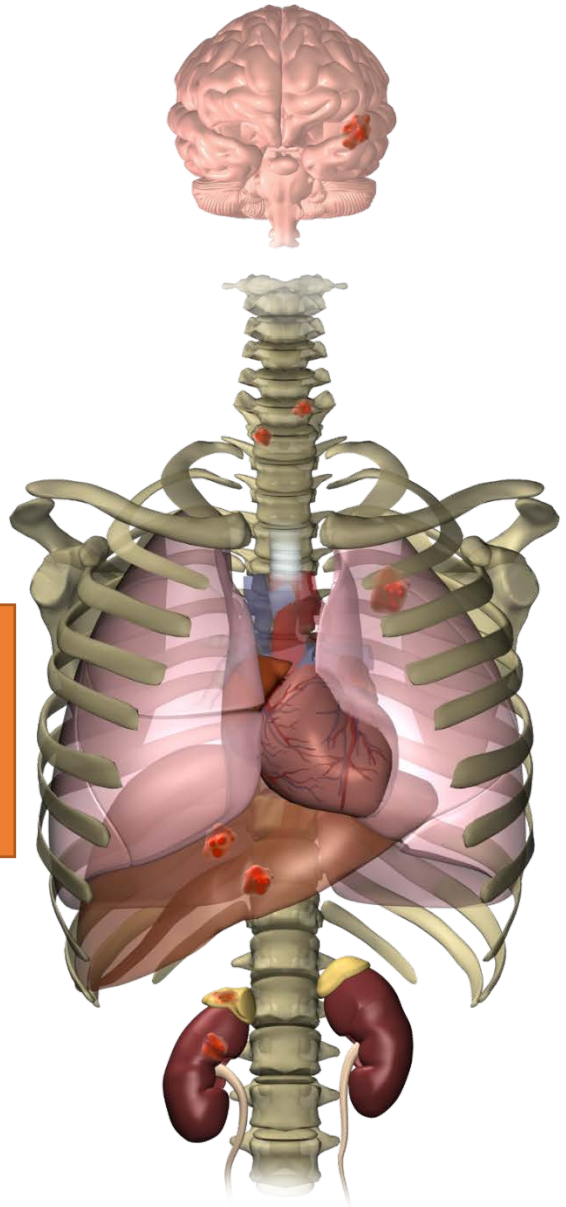
malignant pleural *or* pericardial effusion

M1 Descriptors



M1b: Single extrathoracic metastasis

M1c: Multiple extrathoracic metastases



8th TNM Edition Stage Groups

		N0	N1	N2	N3
T1 M0	T1a	IA1	IIB	IIIA	IIIB
	T1b	IA2	IIB	IIIA	IIIB
	T1c	IA3	IIB	IIIA	IIIB
T2 M0	T2a	IB	IIB	IIIA	IIIB
	T2b	IIA	IIB	IIIA	IIIB
T3 M0		IIB	IIIA	IIIB	IIIC
T4 M0		IIIA	IIIA	IIIB	IIIC
TX M1	M1a	IVA	IVA	IVA	IVA
	M1b	IVA	IVA	IVA	IVA
	M1c	IVB	IVB	IVB	IVB

Test your Knowledge…

29-yo female status post resection of poorly differentiated lung adenocarcinoma (FDG-PET/CT images shown) measuring 4.5 cm, infiltrating only the visceral pleura, negative nodes and no evidence for distant metastasis

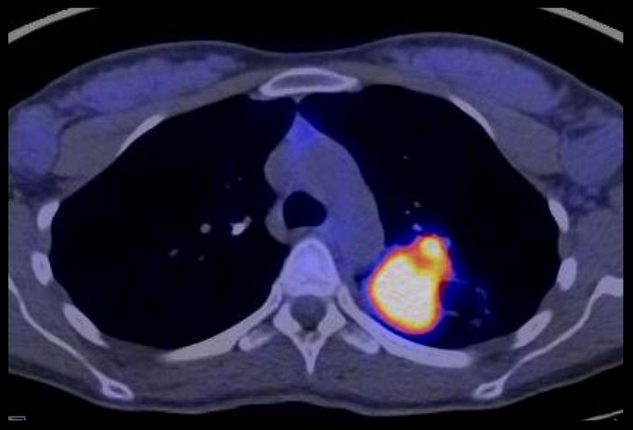
What is the 8-TNM stage?

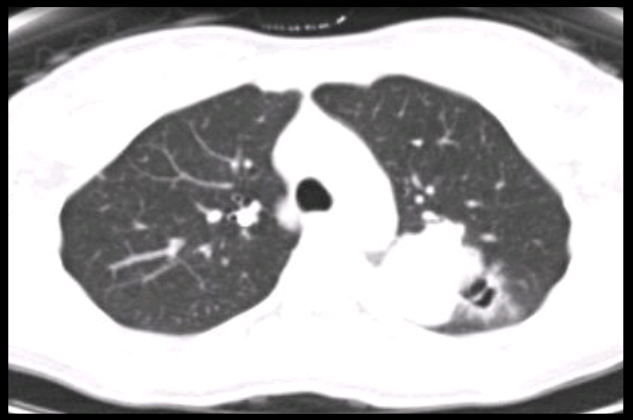
a) pT2a pN0 cM0

b) pT2b pN0 cM0

c) pT3 pN0 cM0

d) pT4 pN0 cM0





Answer…

29-yo female status post resection of poorly differentiated lung adenocarcinoma (FDG-PET/CT images shown) measuring 4.5 cm, infiltrating only the visceral pleura, negative nodes and no evidence for distant metastasis

What is the 8-TNM stage?

a) pT2a pN0 cM0

b) pT2b pN0 cM0

c) pT3 pN0 cM0

d) pT4 pN0 cM0

T2	>3 to ≤ 5 cm or any one of the features: ▪ Involves main bronchus without involving carina ▪ Visceral pleural invasion ▪ Atelectasis/post obstructive pneumonitis extending to hilum
T2a	If any feature above is present and size is ≤ 4 cm or cannot be assessed
T2b	If any feature above is present and size is > 4 to ≤ 5 cm

Test your Knowledge…

57-yo male with a left hilar mass infiltrating the phrenic and recurrent laryngeal nerve, with ipsilateral hilar and mediastinal lymphadenopathy, and a single extrathoracic hypermetabolic lesion shown on the FDG-PET/CT images below

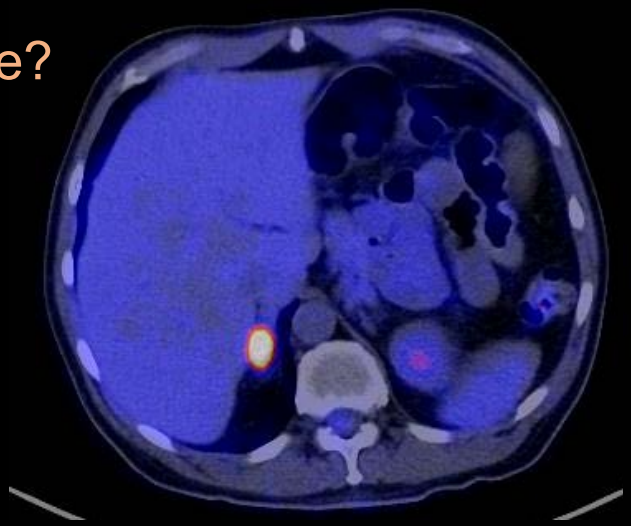
What is the 8-TNM stage?

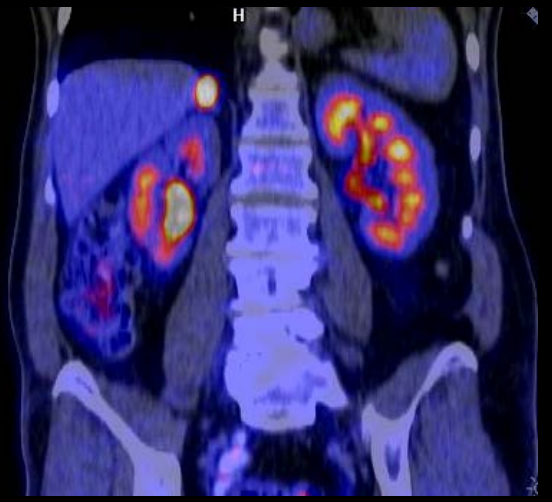
a) cT4 N2 M0

b) cT4 N2 M1a

c) cT4 N2 M1b

d) cT4 N2 M1c





Answer…

57-yo male with a left hilar mass infiltrating the phrenic and recurrent laryngeal nerve, with ipsilateral hilar and mediastinal lymphadenopathy, and a single extrathoracic hypermetabolic lesion shown on the FDG-PET/CT images below

What is the 8-TNM stage?

a) cT4 cN2 cM0

b) cT4 cN2 cM1a

c) cT4 cN2 cM1b

d) cT4 cN2 cM1c

Distant Metastasis	
M0	No distant metastasis
M1	Distant metastasis is present
M1a	Tumor(s) in contralateral lung; pleural/pericardial nodule/malignant effusion
M1b	Single extrathoracic metastasis
M1c	Multiple extrathoracic metastases, in one/more organs

Conclusions

- The 8th edition of the TNM system for lung cancer staging consolidates and expands the base of evidence currently used for predicting prognosis and guiding patient treatment
- It is of utmost importance that radiologists familiarize with the new system for accurate communication with referring physicians

Suggested Readings

- The Eighth Edition Lung Cancer Stage Classification. Detterbeck FC, Boffa DJ, Kim AW, Tanoue LT. Chest. 2017 Jan;151(1):193-203
- Current Controversies in Lung Cancer Staging. Carter BW, Godoy MC, Wu CC, Erasmus JJ, Truong MT. J Thorac Imaging. 2016 Jul;31(4):201-14
- The IASLC lung cancer staging project: the new database to inform the eighth edition of the TNM classification of lung cancer. Rami-Porta R, Bolejack V, Giroux DJ, Chansky K, Crowley J, Asamura H, et al. J Thorac Oncol. 2014;9(11):1618-24

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