

ACR Lung-RADS® v2022

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Chair, ACR Lung-RADS Committee

 @JRadMD

DISCLOSURES

I have the following financial relationships to report with ACCME defined ineligible companies:

Riverain Technologies Advisory Board

Coreline Consultant

I will NOT be discussing unlabeled/investigational uses of medical devices or pharmaceuticals during this presentation.

ACR LUNG-RADS® v2022

- **Evidence-based** approach

Study methods, size, analysis, and strength of conclusions

- **Expert consensus** in the absence of sufficient data

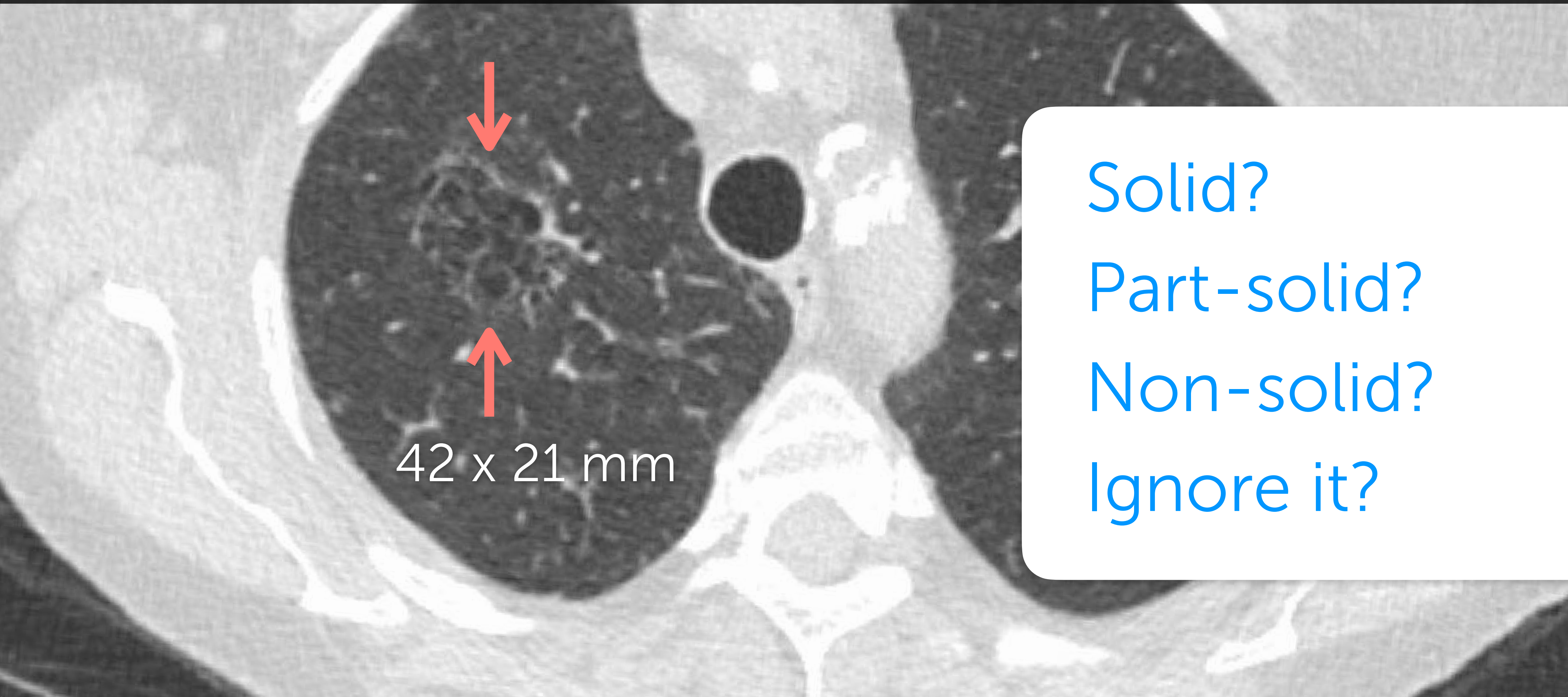
ACR LUNG-RADS® v2022

- 1 Atypical Pulmonary Cysts
- 2 Infectious/Inflammatory Findings
- 3 Airway Nodules
- 4 Juxtapleural Nodules
- 5 Stepped Management



Atypical Pulmonary Cysts

How would you classify this lesion?



42 x 21 mm

Solid?

Part-solid?

Non-solid?

Ignore it?

ATYPICAL PULMONARY CYSTS

- Lung cancers associated with cysts——— **9.3%**
- NELSON missed cancers associated with cysts——— **22.7%**

Mendoza DP et al. AJR. 2021; 216:318–329

Byrne D et al. JTI. 2021; 36:373-381

Farooqi AO et al. AJR 2012; 199: 781-786

Scholten ET et al. Eur Radiol. 2015; 25: 81-88

Thin-walled Cyst

- unilocular
- wall thickness
< 2 mm

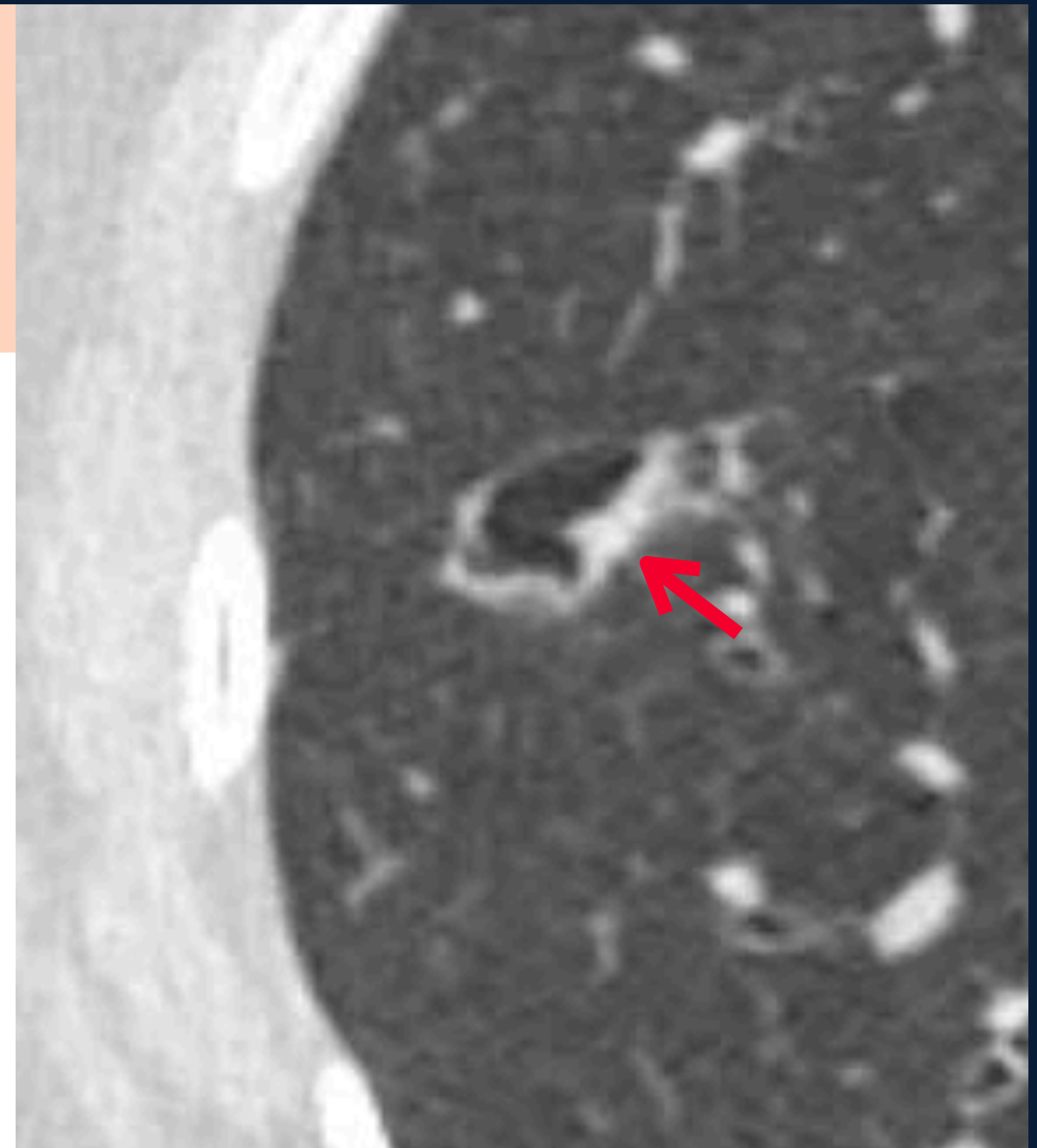


Not classified or managed in Lung-RADS

ATYPICAL PULMONARY CYSTS

Lung- RADS **4A**

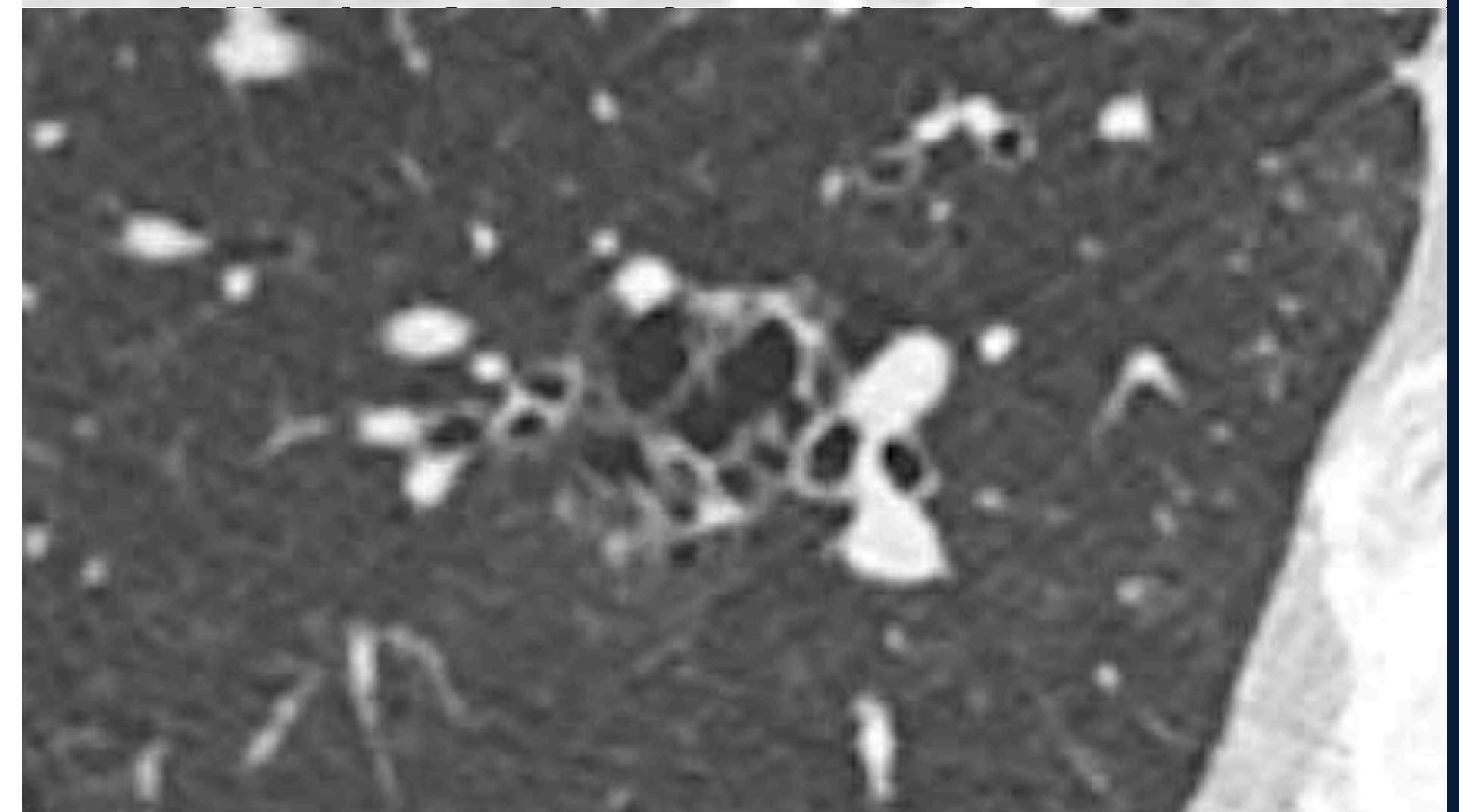
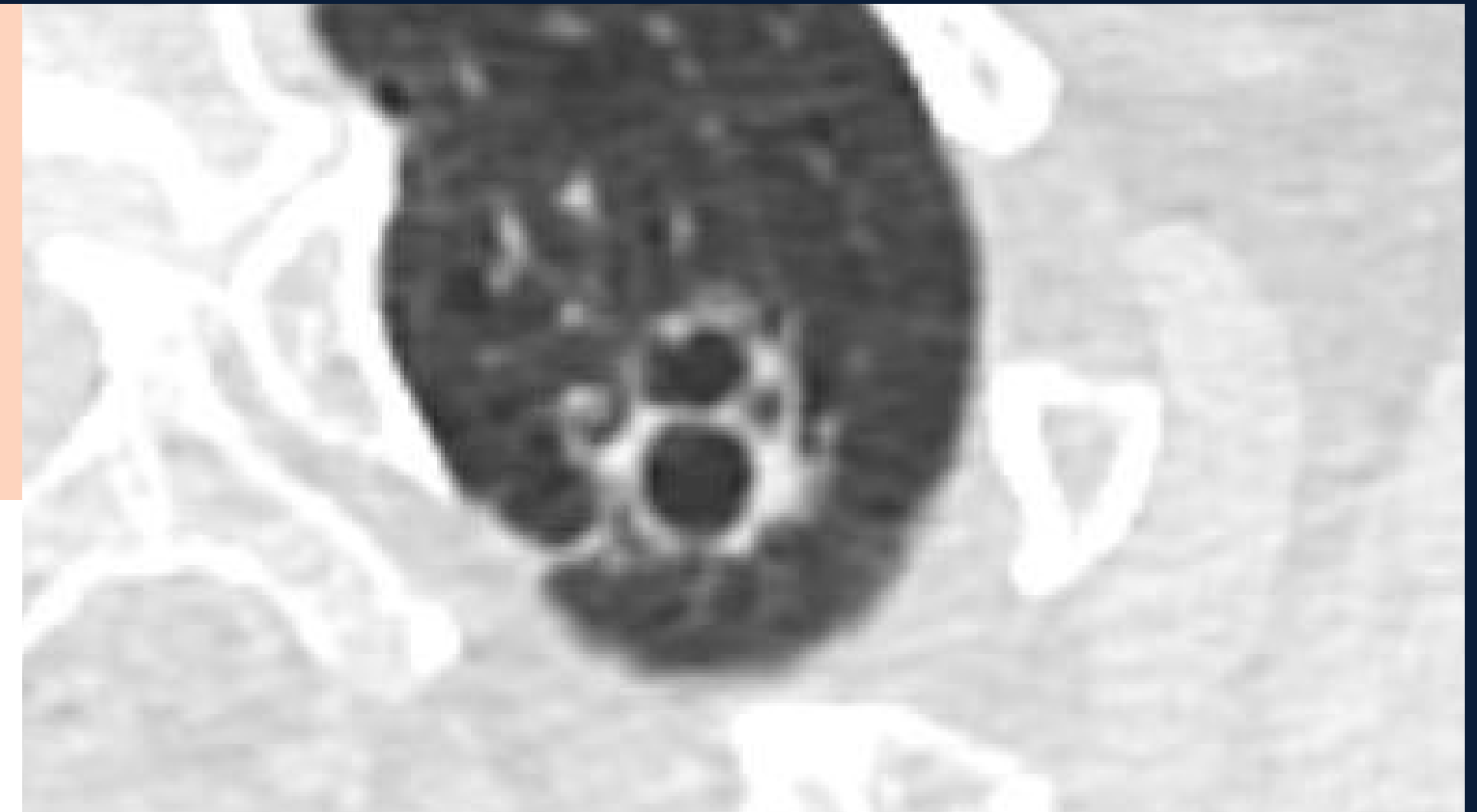
- Thick-walled cyst
 - unilocular
 - wall thickness ≥ 2 mm
 - uniform
 - asymmetric
 - nodular



ATYPICAL PULMONARY CYSTS

Lung- RADS **4A**

- Thick-walled cyst
- Multilocular cyst on baseline screen or thin- or thick-walled cyst that becomes multilocular



ATYPICAL PULMONARY CYSTS

Lung-
RADS **4A**

Management

- Thick-walled cyst
- Multilocular cyst on baseline screen or thin- or thick-walled cyst that becomes multilocular

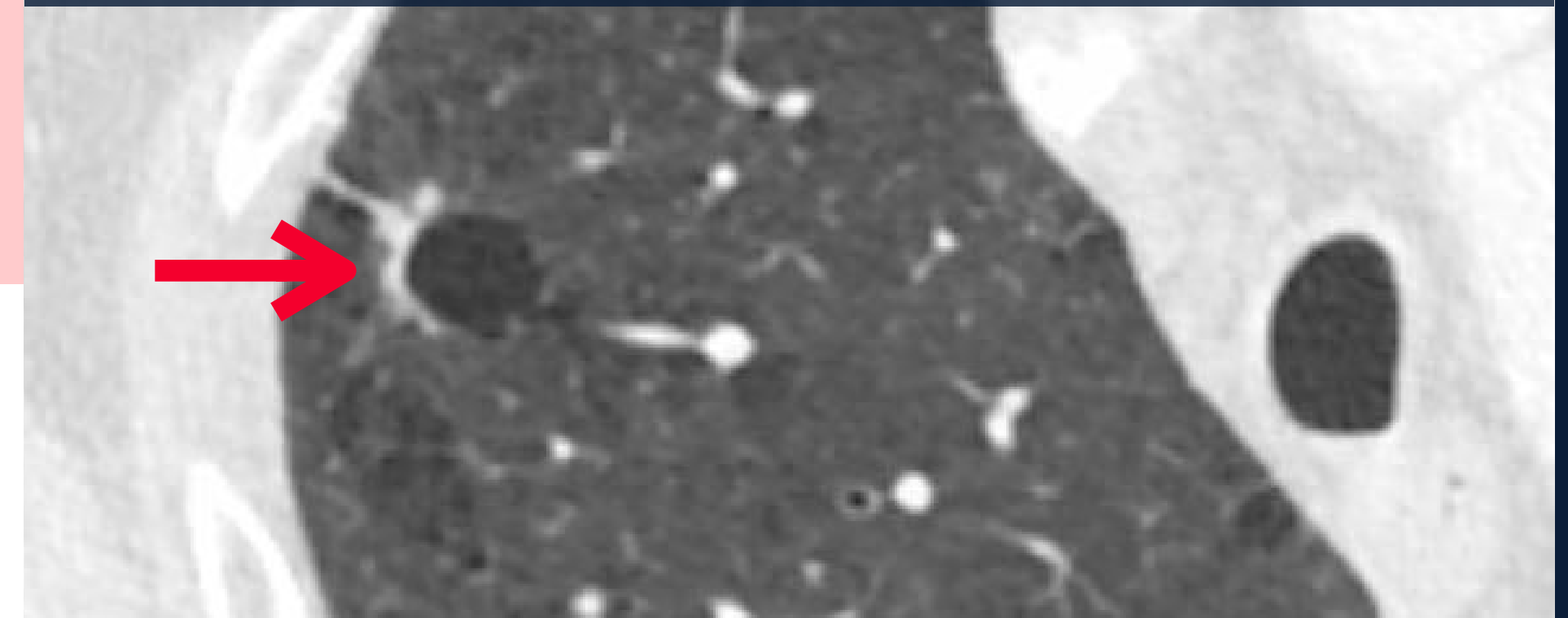
3-month LDCT;
PET-CT if solid
component ≥ 8 mm

ATYPICAL PULMONARY CYSTS

Lung-
RADS **4B**

- Thick-walled cyst with growing wall nodularity/
thickness

Prior



Annual LCS

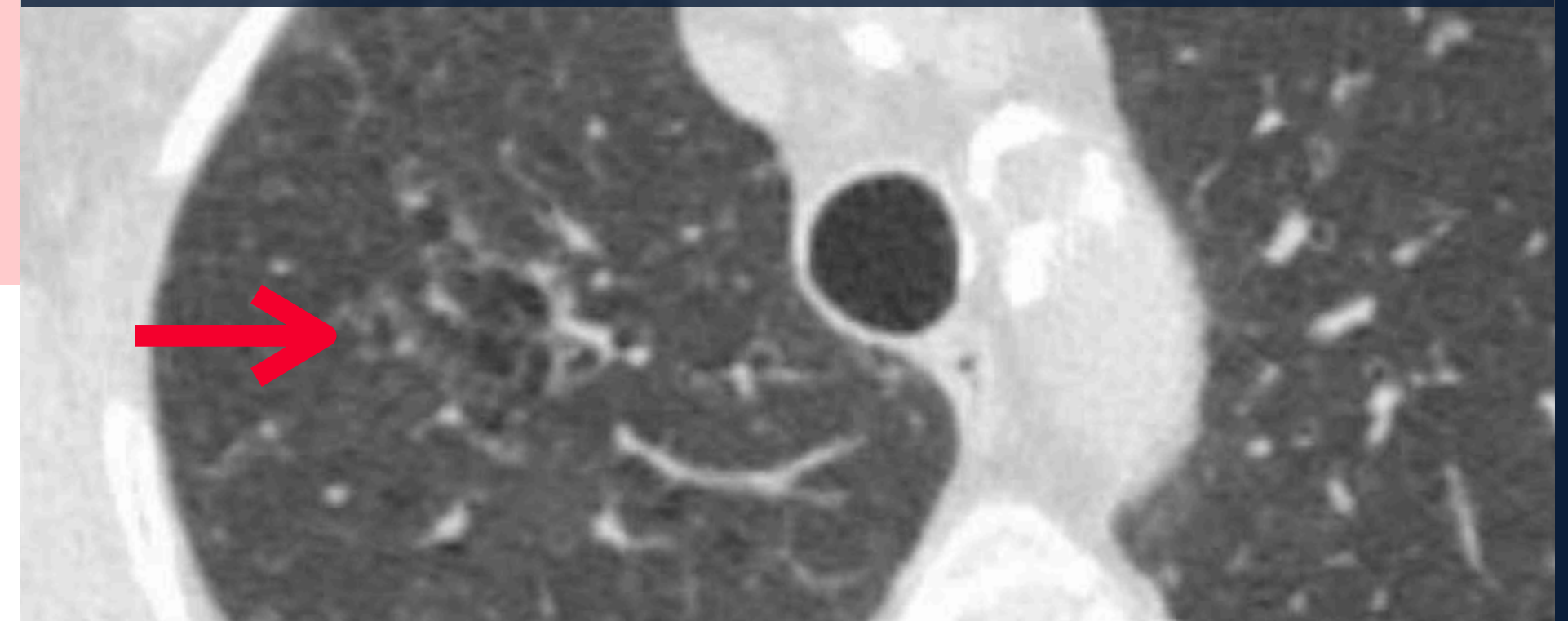


ATYPICAL PULMONARY CYSTS

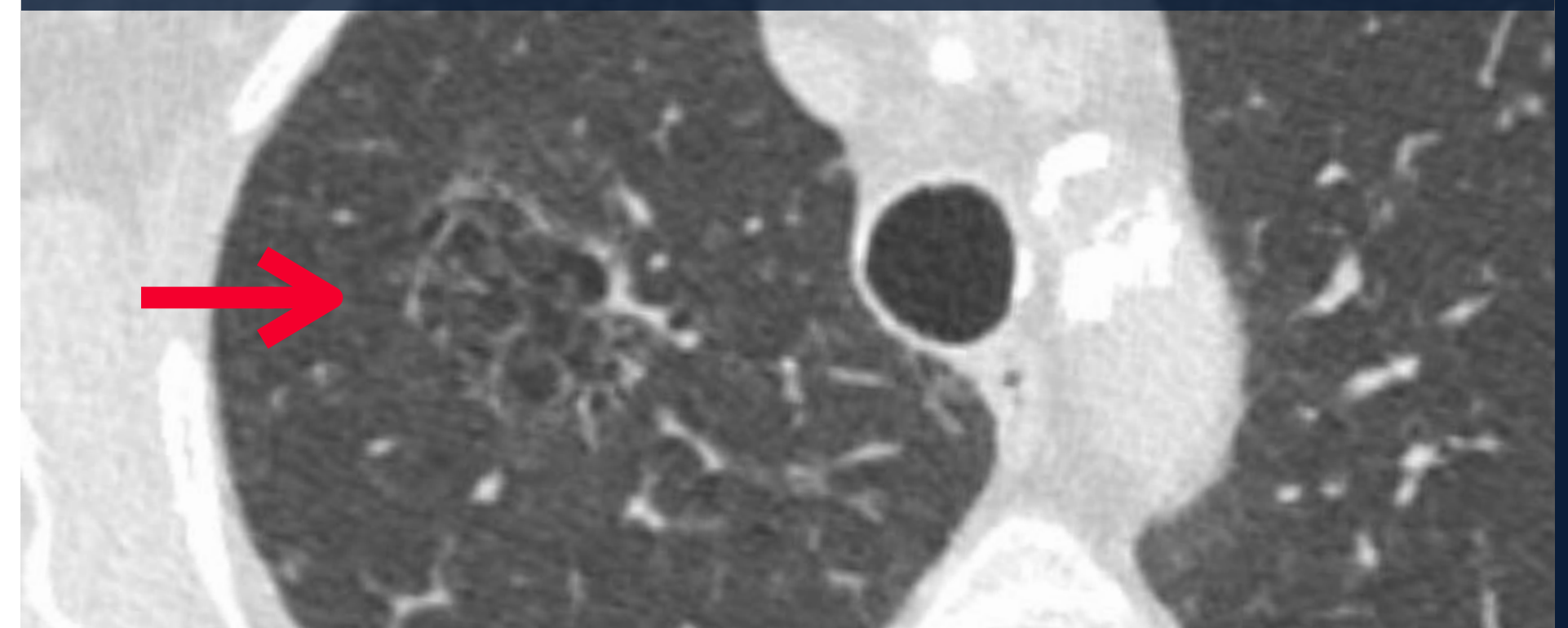
Lung- RADS **4B**

- Thick-walled cyst with growing wall nodularity/thickness
- Growing multilocular cyst (total mean diameter)

23 mm @ Baseline



28 mm @ 12 mths



ATYPICAL PULMONARY CYSTS

Sheard S. et al. RadioGraphics 2018; 38:704–717

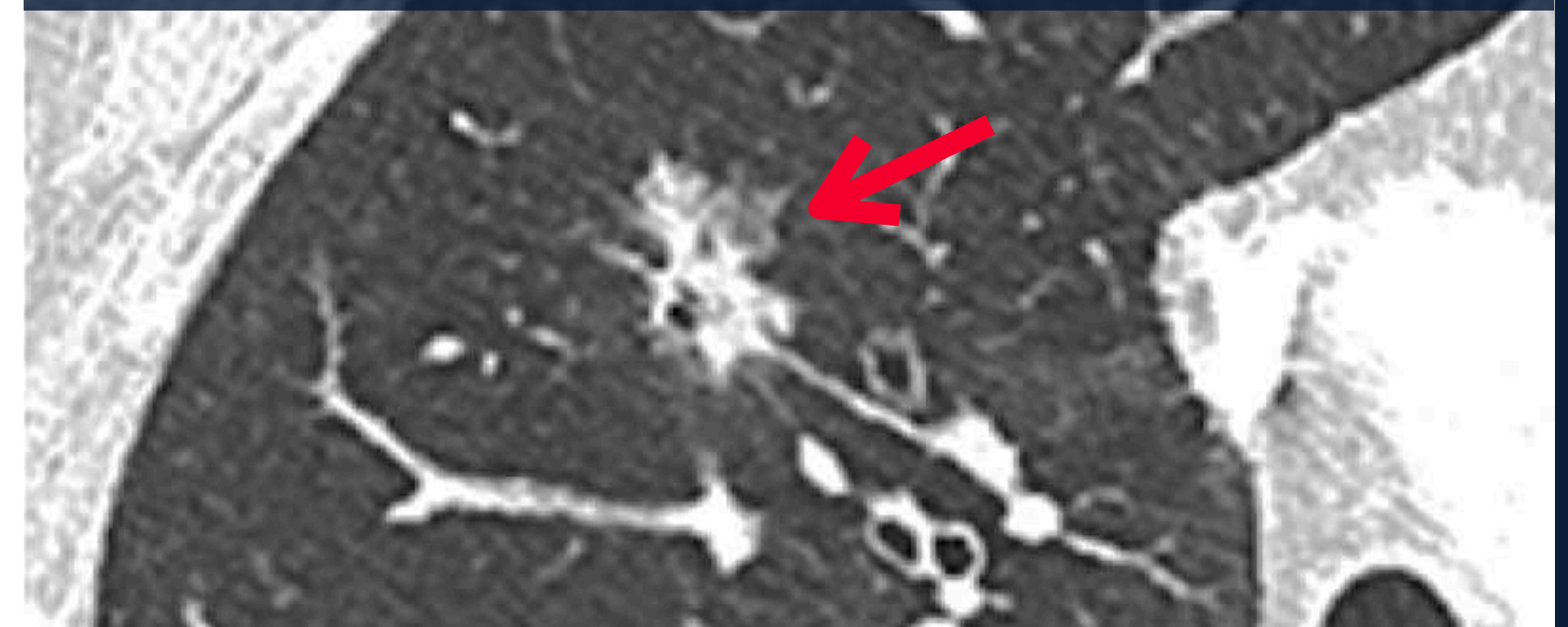
Lung- RADS **4B**

- Thick-walled cyst with growing wall nodularity/thickness
- Growing multilocular cyst (total mean diameter)
- Multilocular cyst with increased loculation or opacity (nodular, ground glass, or consolidation)

@ Baseline



@ 12 mths



ATYPICAL PULMONARY CYSTS

Lung- RADS **4B**

- Thick-walled cyst with growing wall nodularity/thickness
- Growing multilocular cyst (total mean diameter)
- Multilocular cyst with increased loculation or opacity (nodular, ground glass, or consolidation)

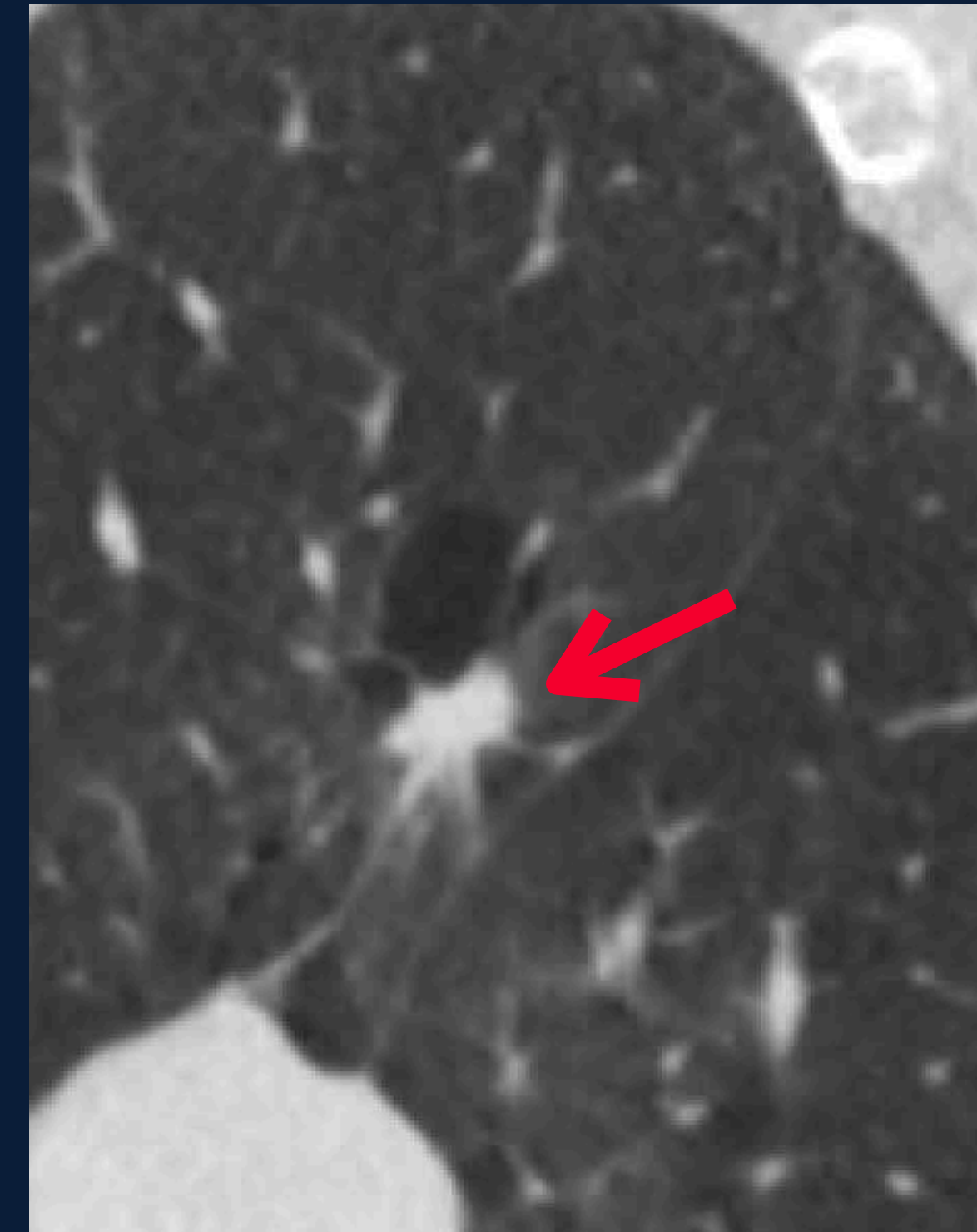
Management

Diagnostic CT,
PET-CT,
tissue sampling, or
referral for further
clinical evaluation

OTHER CONSIDERATIONS

➤ Cysts with associated nodules:

- Solid, part-solid, ground glass
- Internal (endophytic)
- External (exophytic)



Management by the **most concerning feature**

TAKE HOME

- Lung-RADS v2022 adds classification criteria for atypical pulmonary cysts:
 - Thick-walled
 - Multilocular
 - APCs with associated nodules
 - Growth criteria



Infectious/ Inflammatory Findings

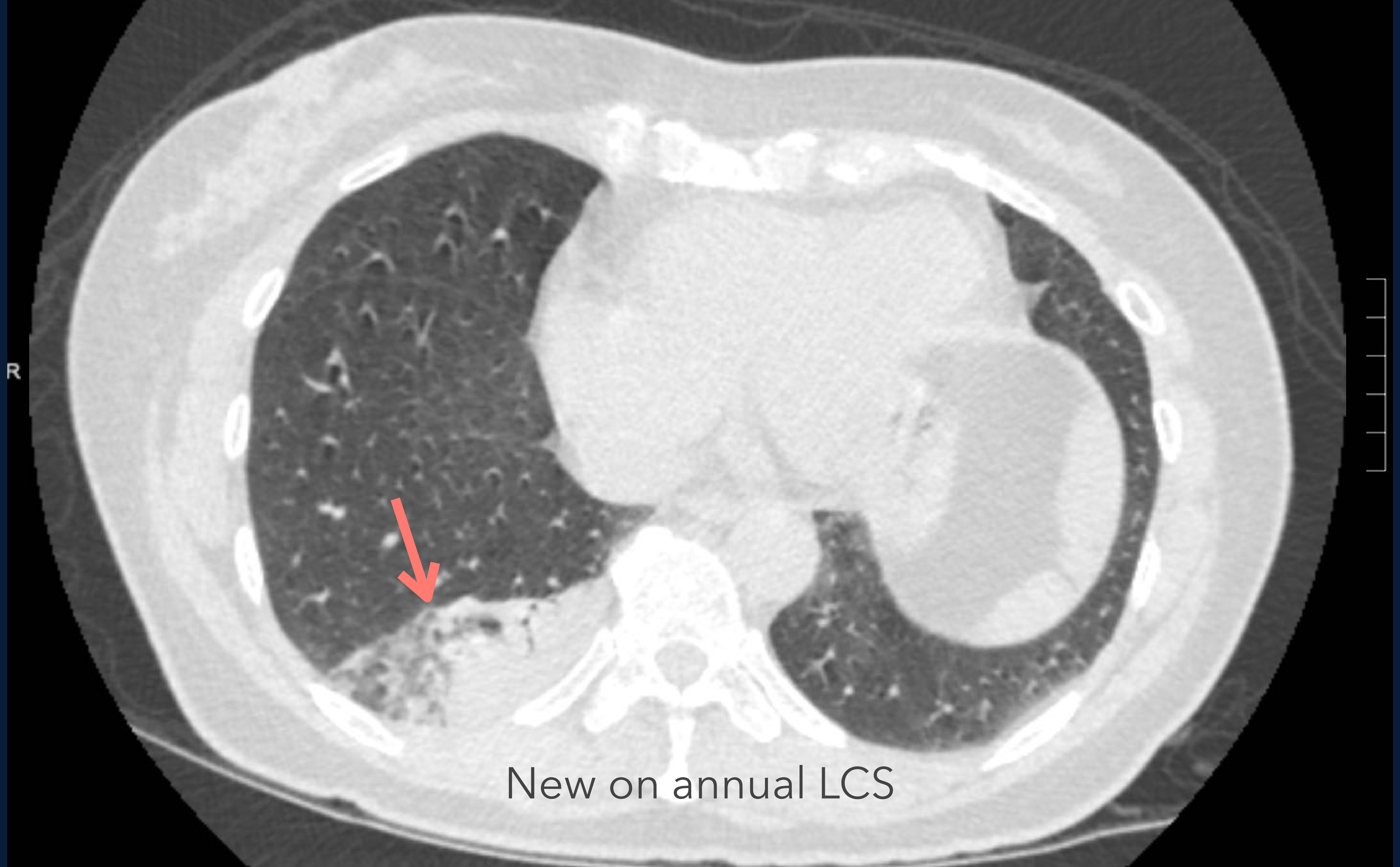
INFLAMMATORY/INFECTIOUS

➤ Lung-RADS v2022:

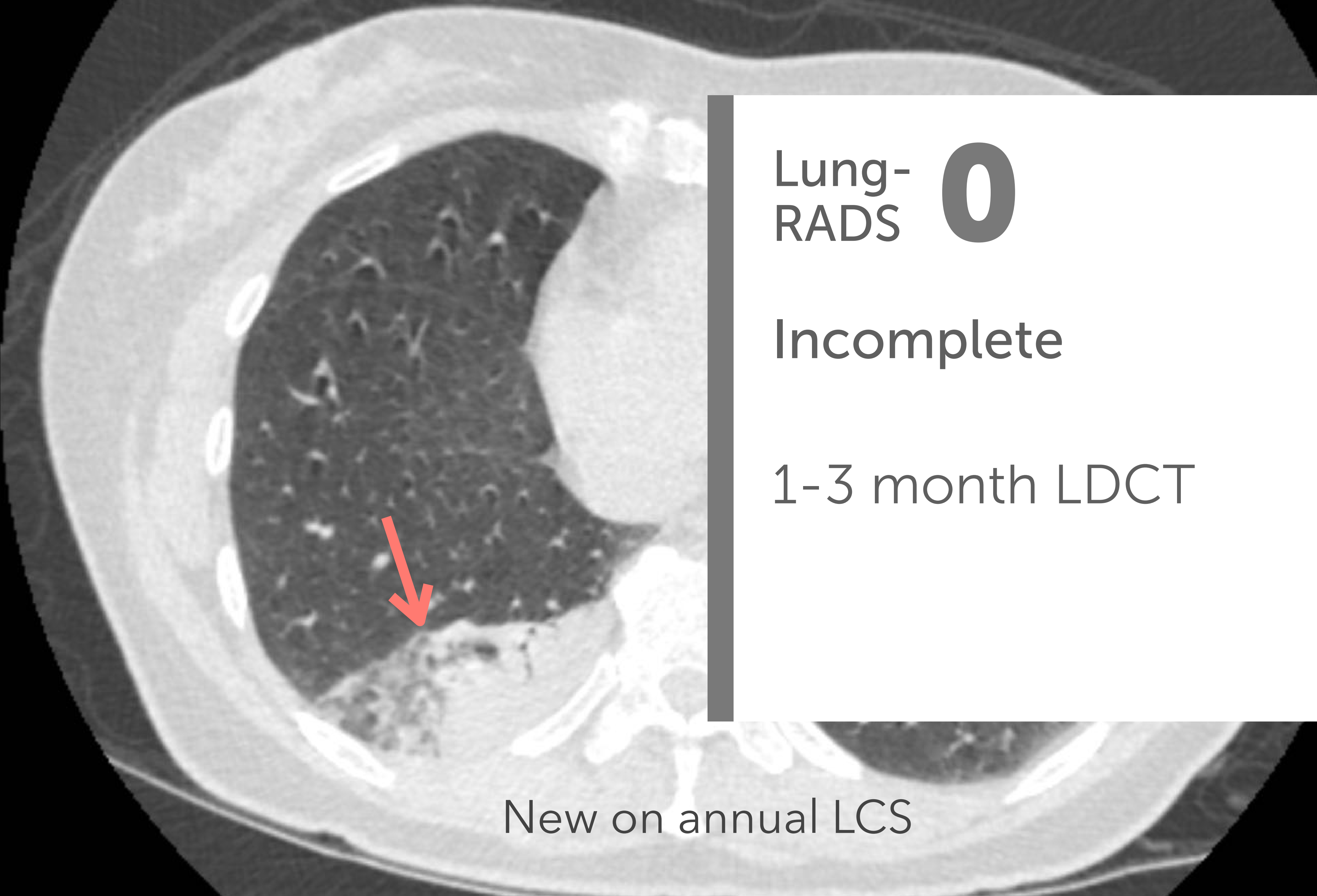
Lung-RADS	0	Incomplete: 1-3 month LDCT
Lung-RADS	2	Benign: 12-month screening LDCT
Lung-RADS		Classified and managed by size and composition criteria.

INFLAMMATORY/INFECTIOUS

- Segmental or lobar consolidation
- Multiple (>6) new nodules
- New large (≥ 8 mm) solid nodules
- New nodules in specific clinical contexts (e.g. immunocompromised pt)



New on annual LCS

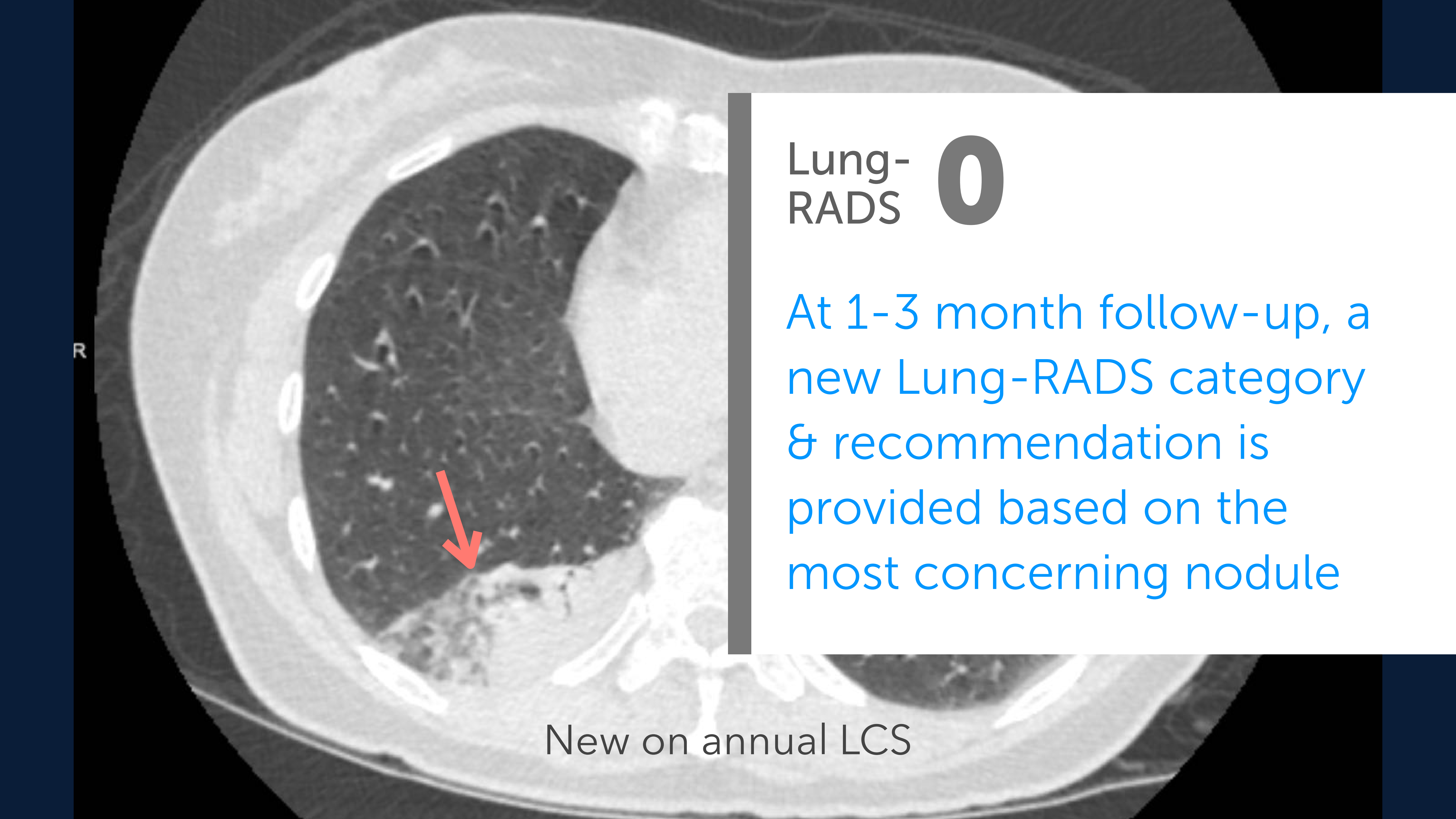


Lung-
RADS **0**

Incomplete

1-3 month LDCT

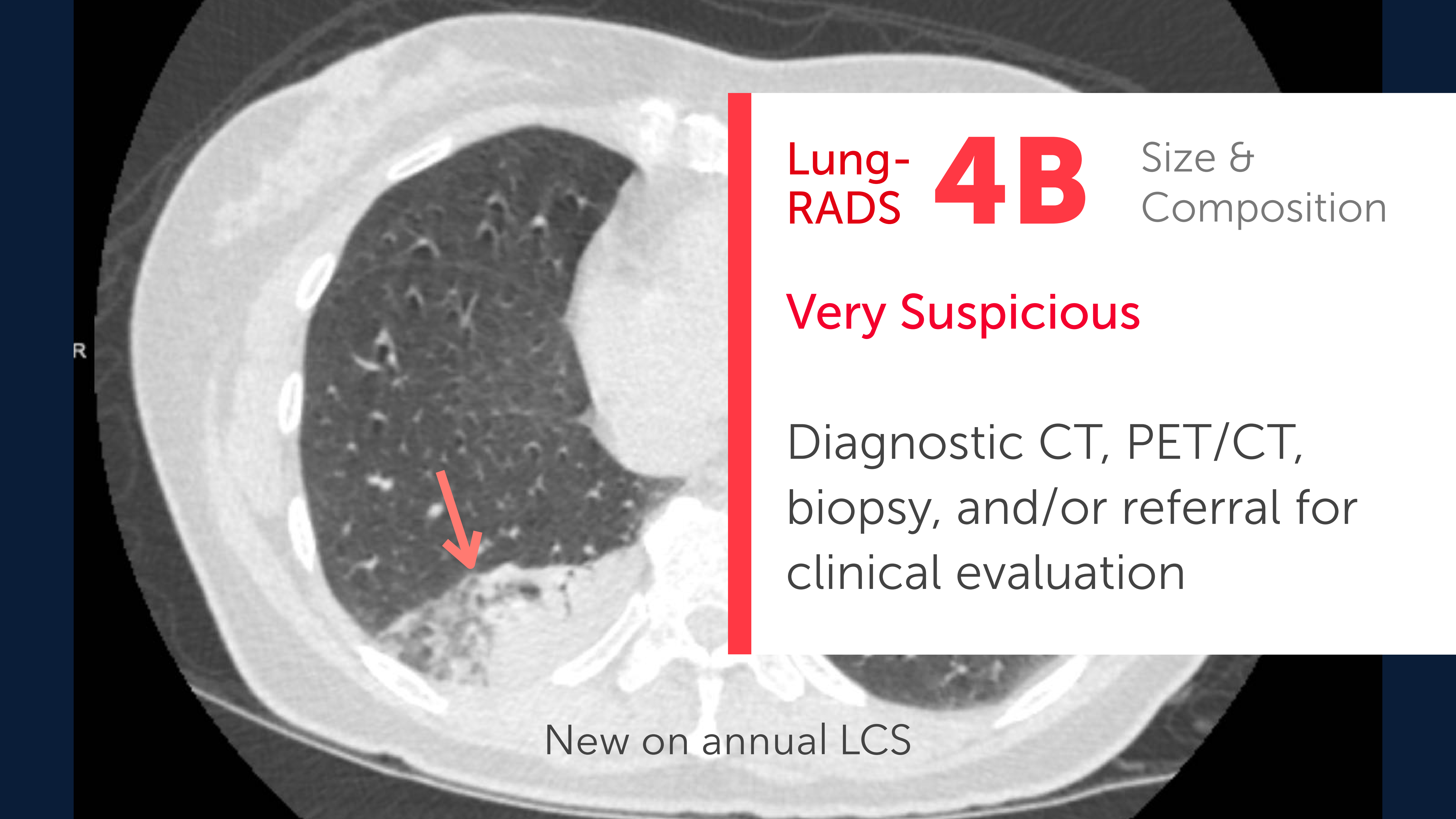
New on annual LCS



Lung-
RADS **0**

At 1-3 month follow-up, a new Lung-RADS category & recommendation is provided based on the most concerning nodule

New on annual LCS



Lung-
RADS

4B

Size &
Composition

Very Suspicious

Diagnostic CT, PET/CT,
biopsy, and/or referral for
clinical evaluation

New on annual LCS

New on annual LCS

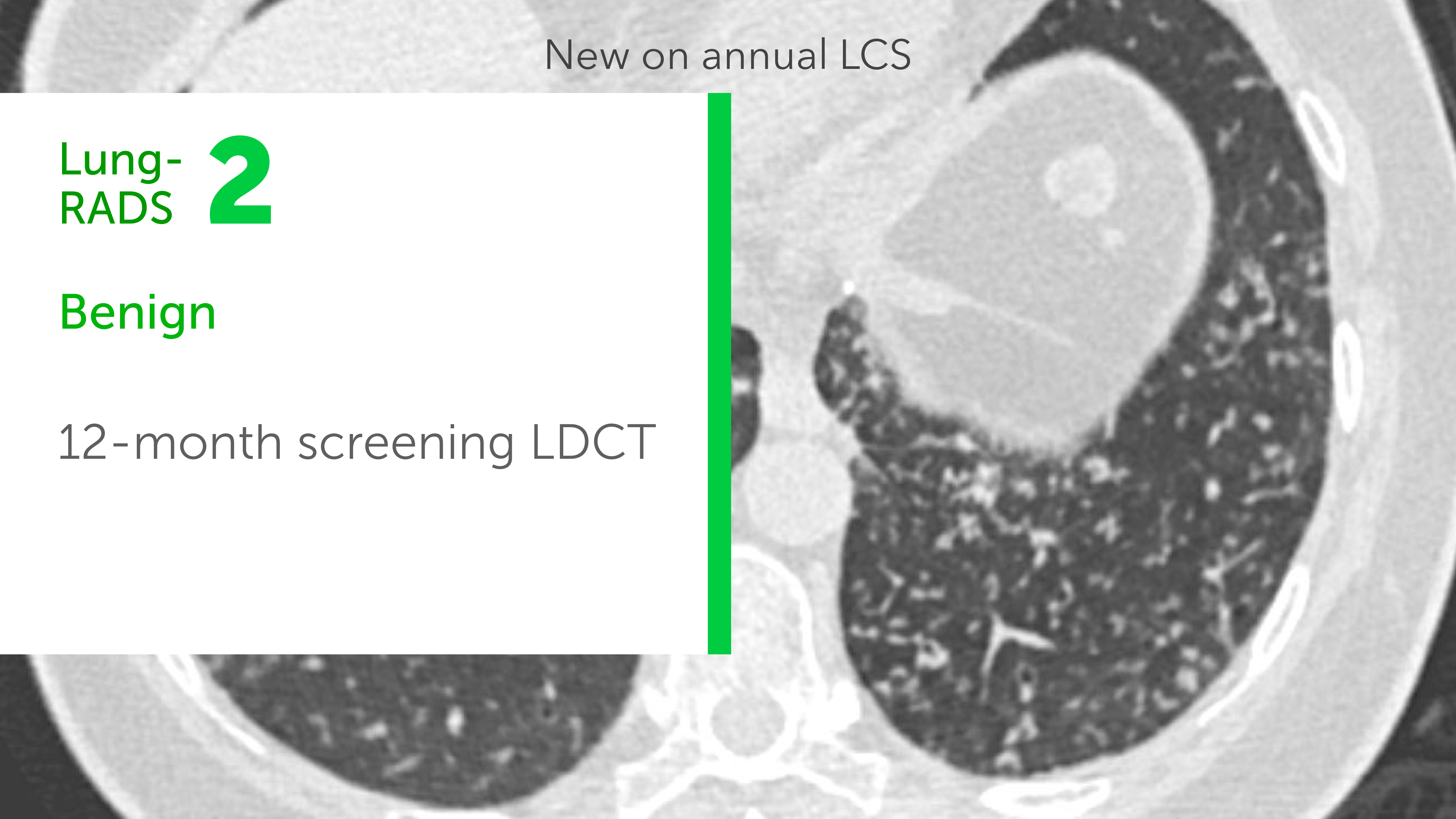


New on annual LCS

Lung-
RADS **2**

Benign

12-month screening LDCT



TAKE HOME

- **Inflammatory or infectious** nodules can be managed in several ways:
 - LR 0
 - LR 2
 - by size & composition criteria



Airway Nodules

AIRWAY NODULES

- Location
- Number
- Morphology
- Persistence

AIRWAY NODULES

➤ Location

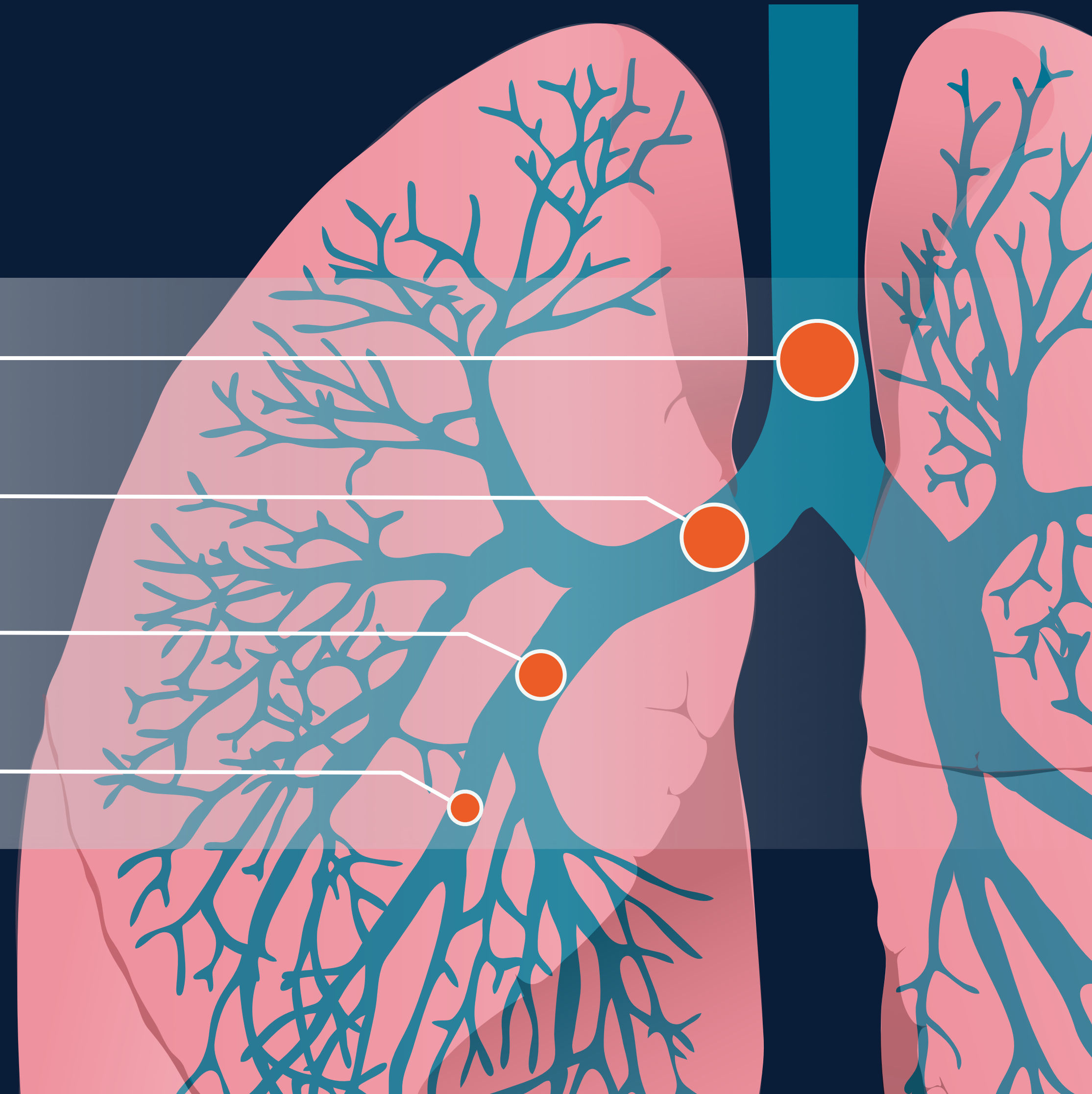
Lung-
RADS **4A**

Trachea

Mainstem

Lobar

Segmental

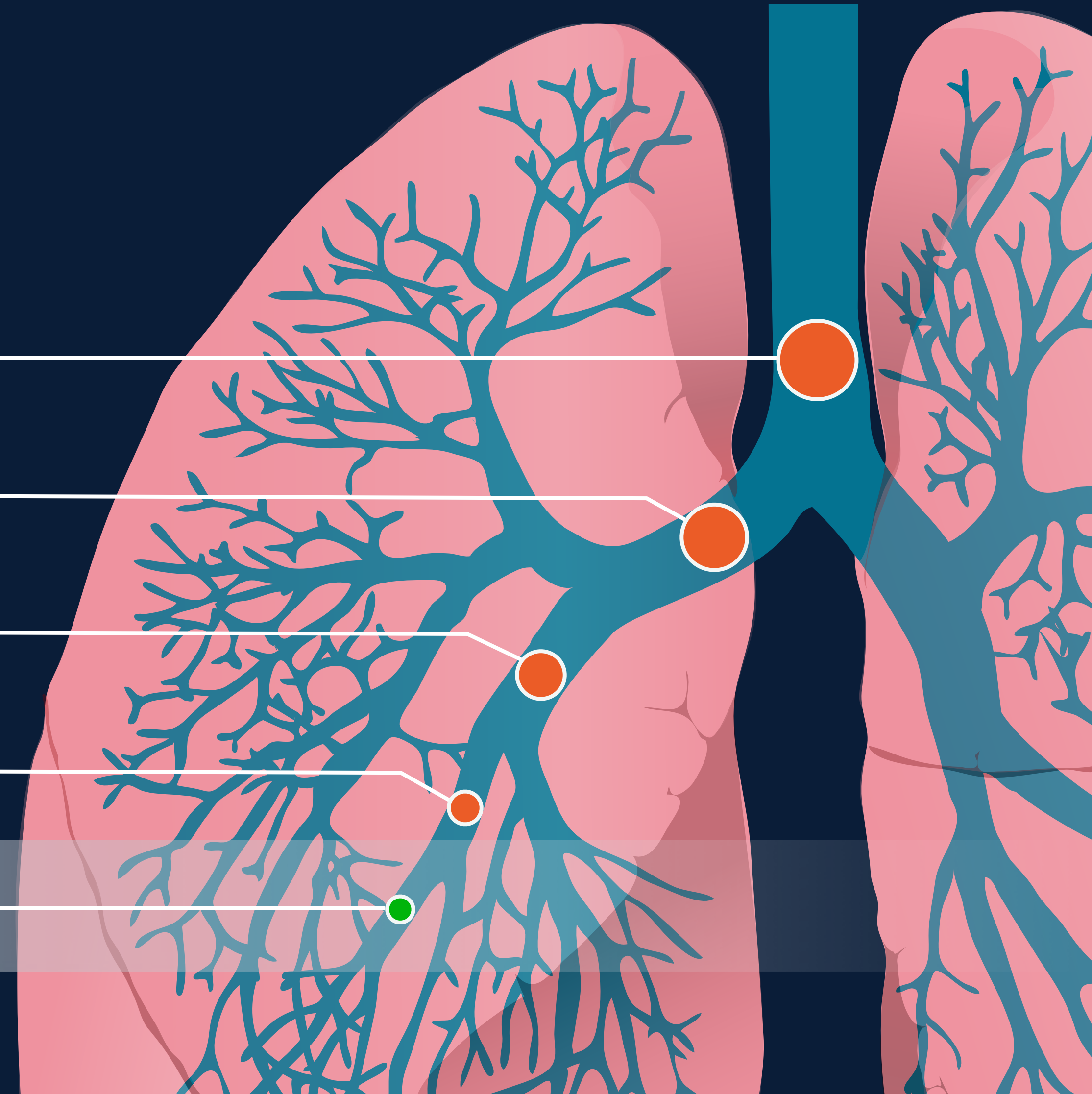


AIRWAY NODULES

➤ Location

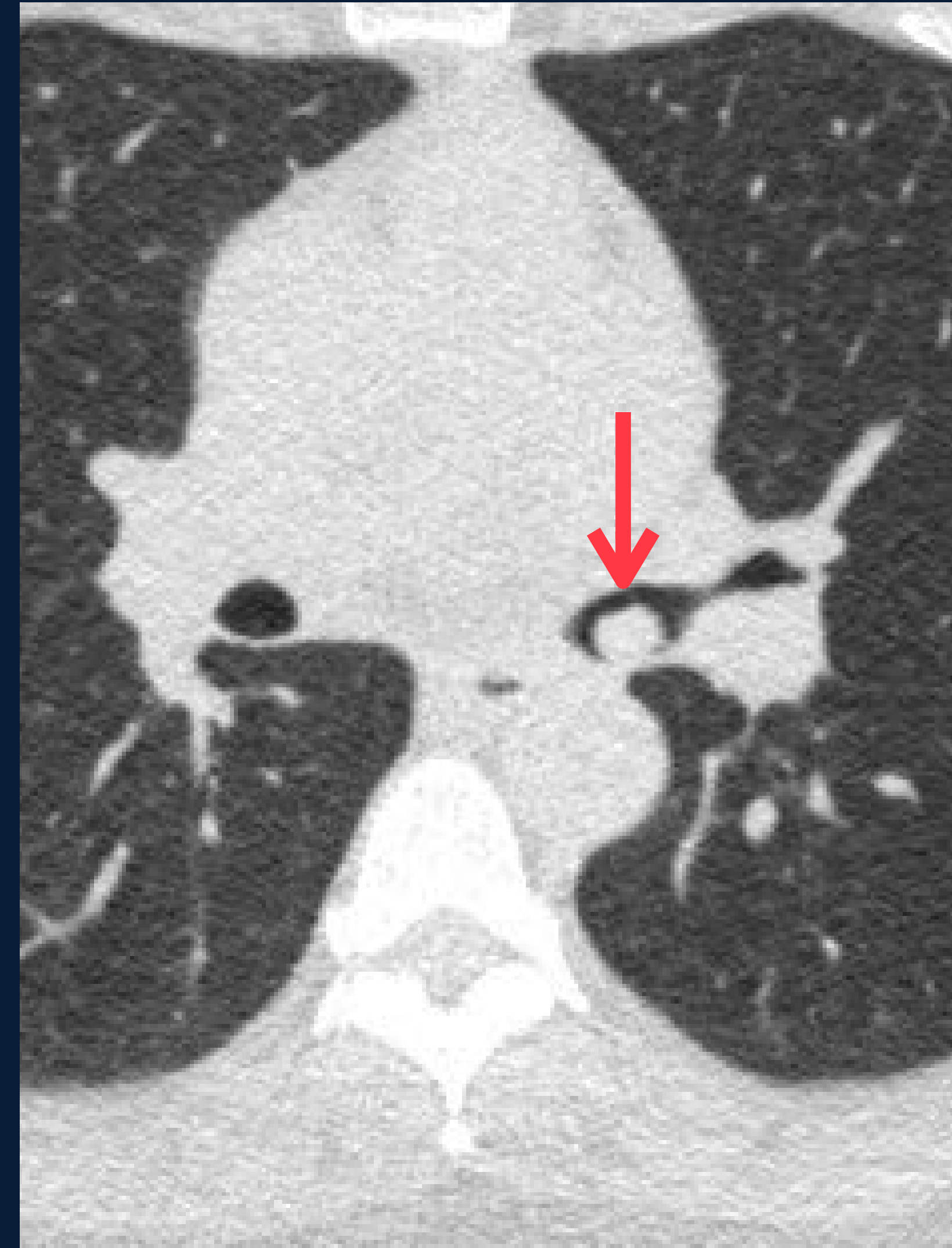
Lung-
RADS **2**

Trachea
Mainstem
Lobar
Segmental
Subsegmental



AIRWAY NODULES

- Location
- Number
 - **Single** – More suspicious



AIRWAY NODULES

- Location
- Number
 - **Single** - More suspicious
 - **Multiple** - Consider other pathology

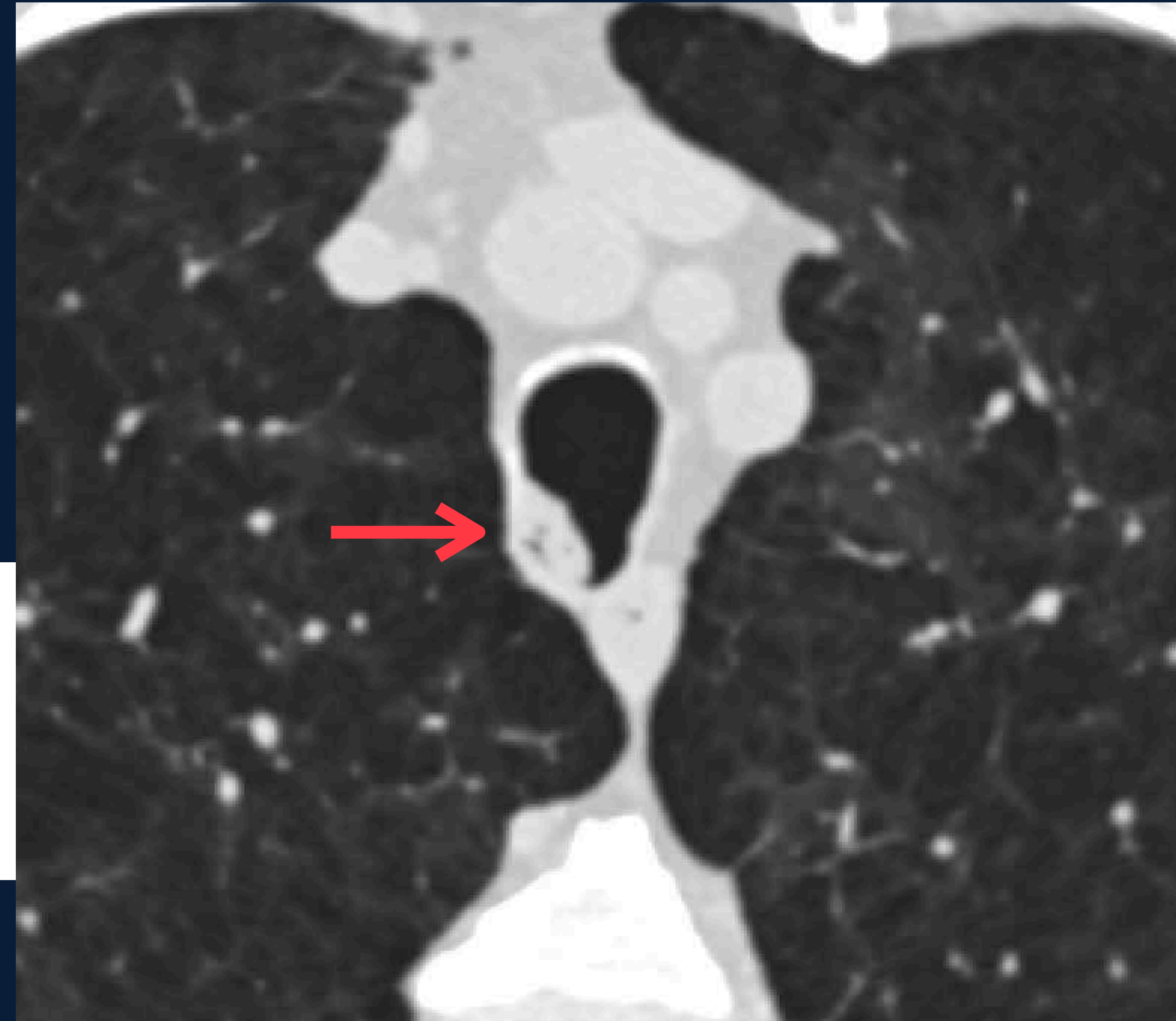


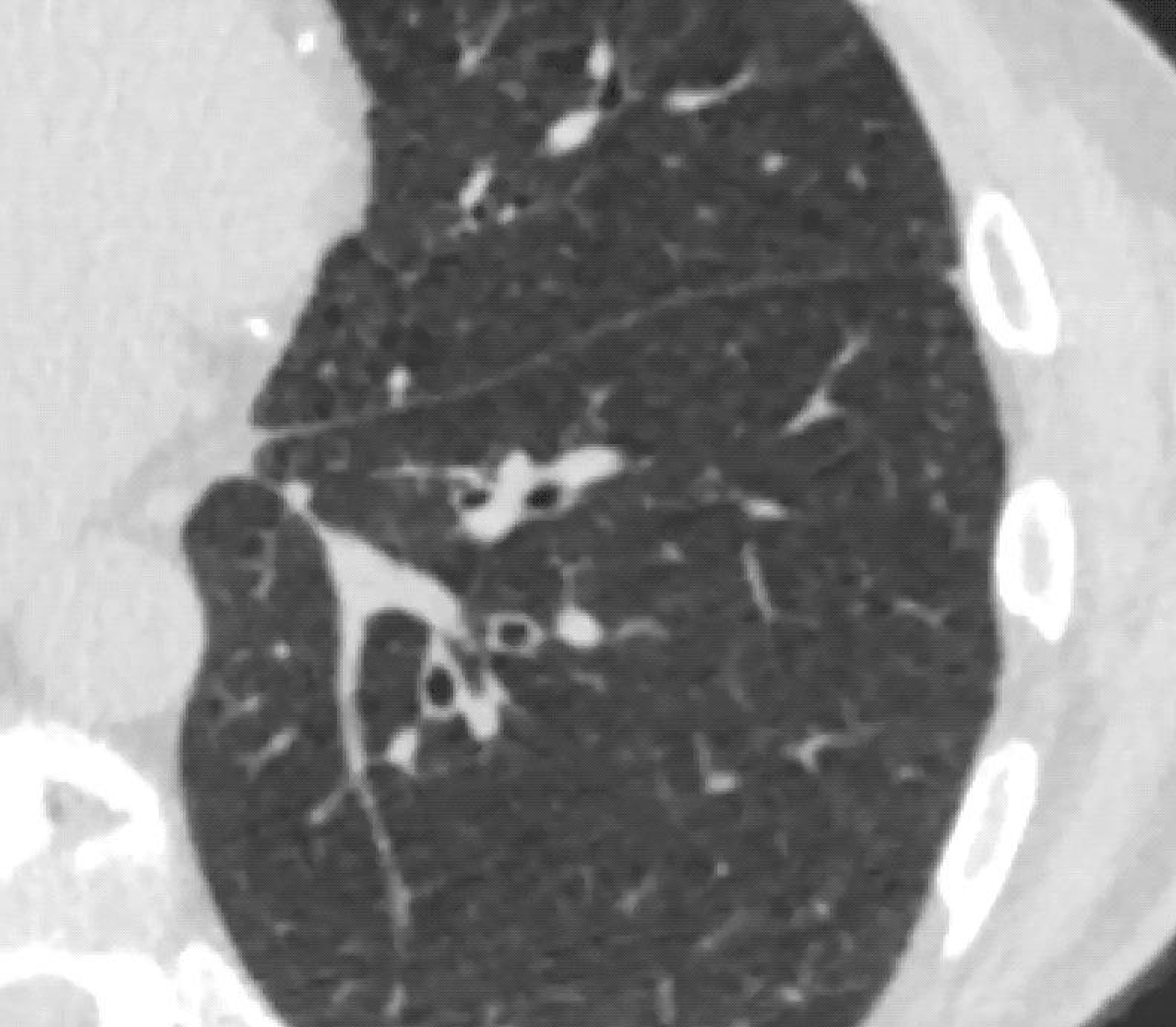
AIRWAY NODULES

- Location
- Number
- Morphology

Lung-
RADS **2**

12-month annual
screening LDCT



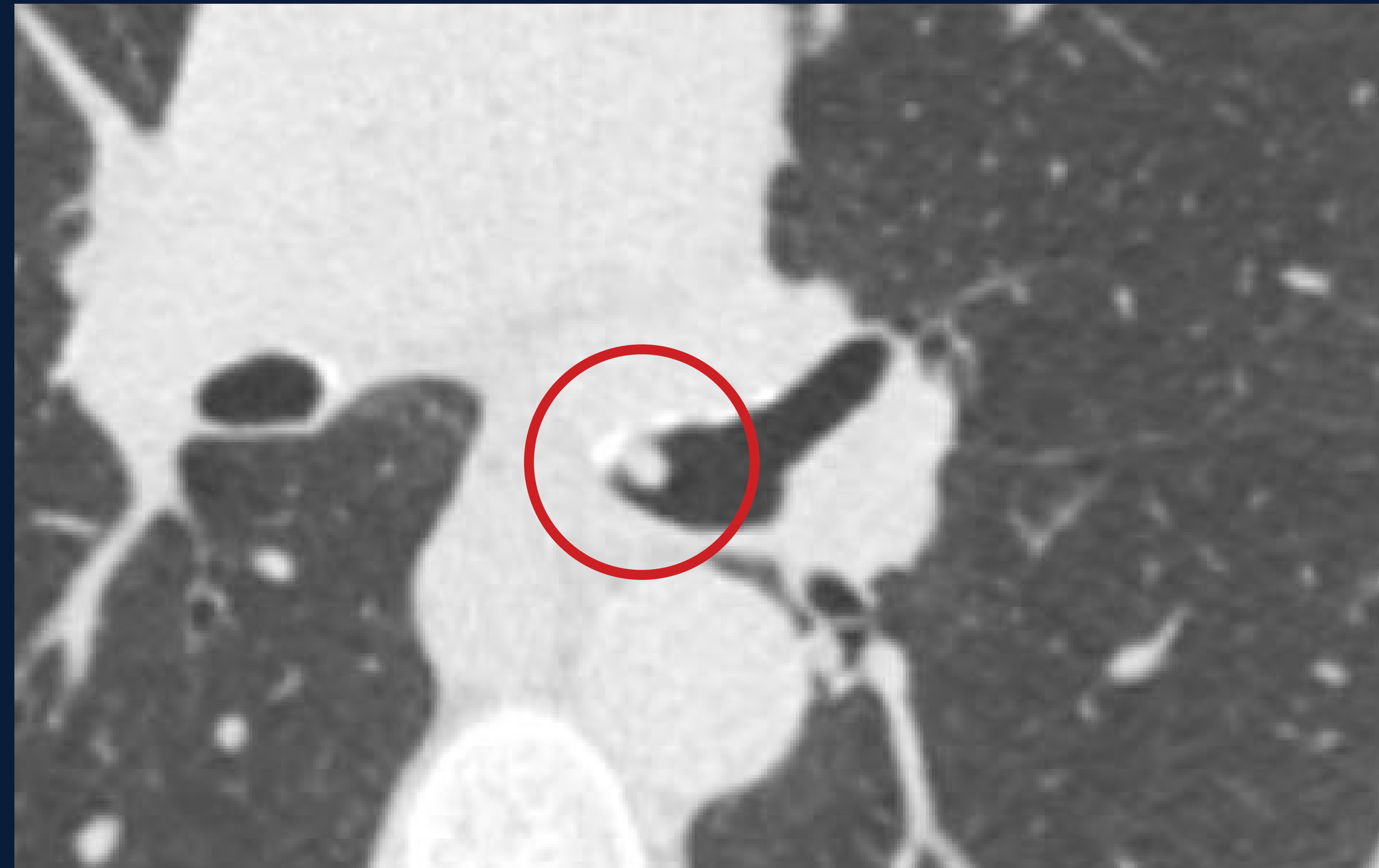


Lung-
RADS **2**

12-month annual
screening LDCT

AIRWAY NODULES

- Location
- Number
- Morphology
- Persistence



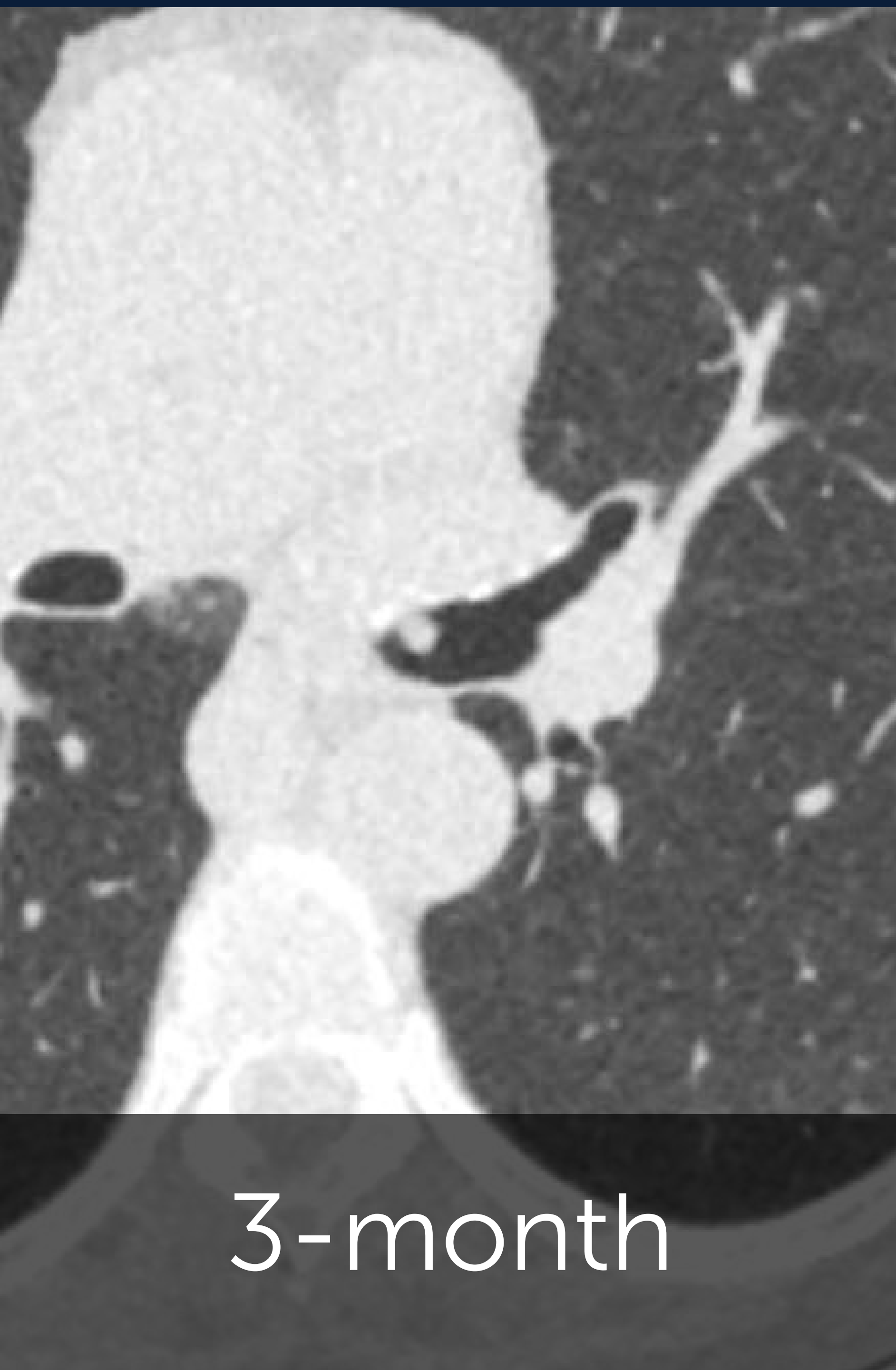
Baseline



Baseline



3-month



Persistent Airway Nodule

- Requires evaluation

Lung-
RADS **4B**

Diagnostic CT,
PET-CT, tissue
sampling, or
referral for further
clinical evaluation

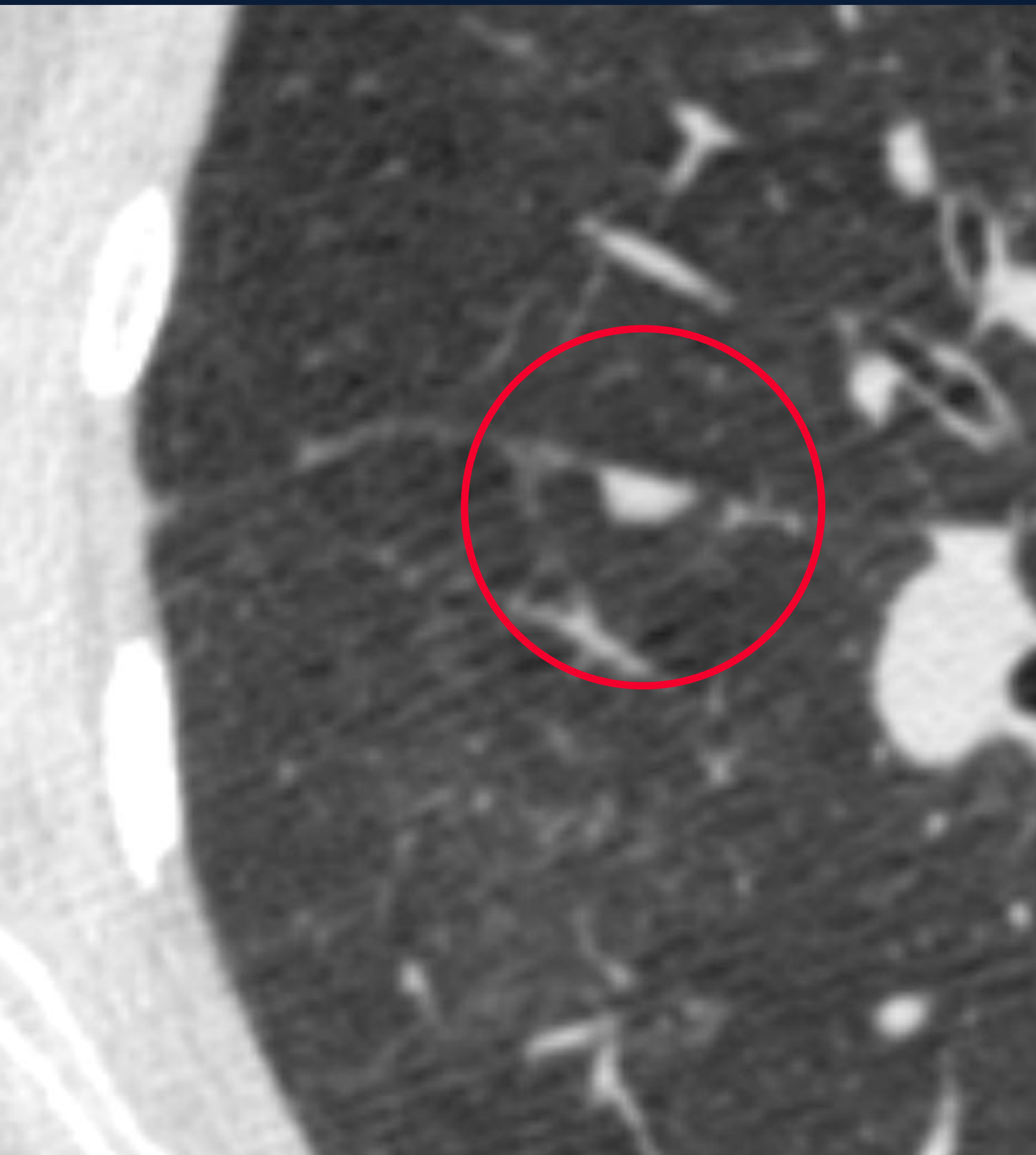
TAKE HOME

- Airway nodules characterized by location, number, shape, and air
- Subsegmental = LR 2
- Segmental or more proximal = LR 4A
- Persistent at follow-up = LR 4B



Juxtapleural Nodules

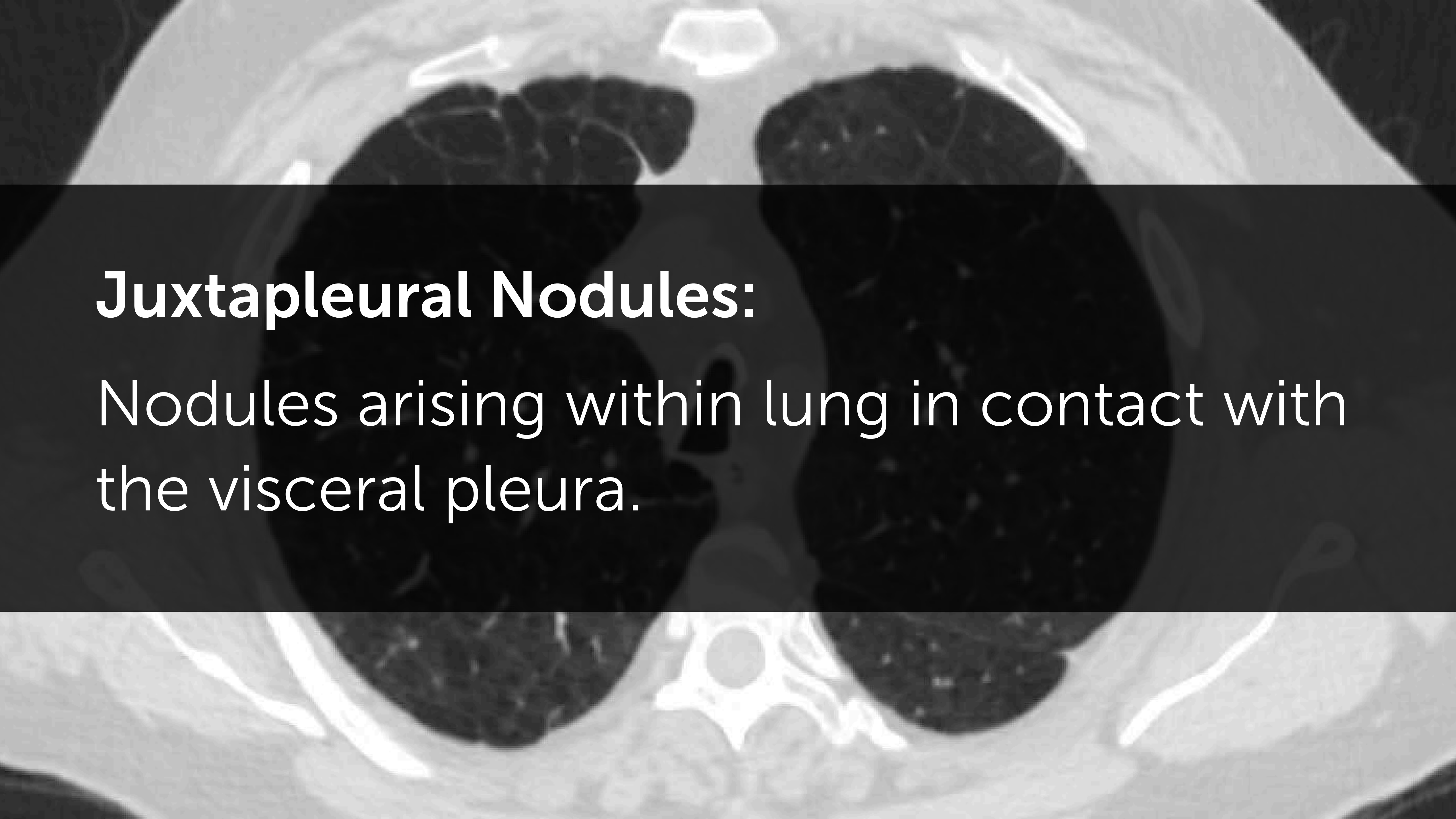
PERIFISSURAL NODULES



- Lentiform, Oval, Triangular, smooth
- **< 10 mm** mean diameter

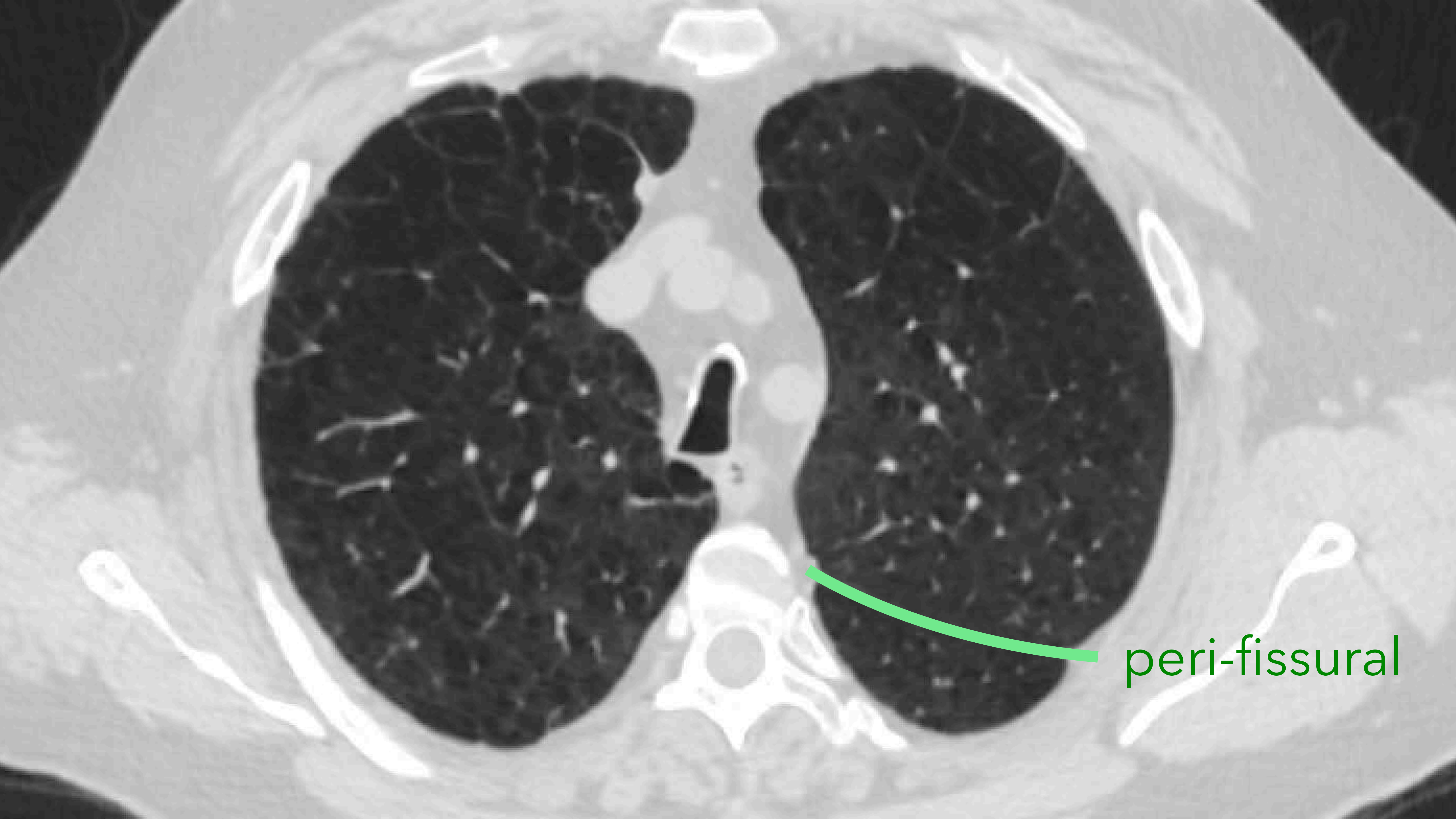
Lung-
RADS **2**

12-month annual
screening LDCT

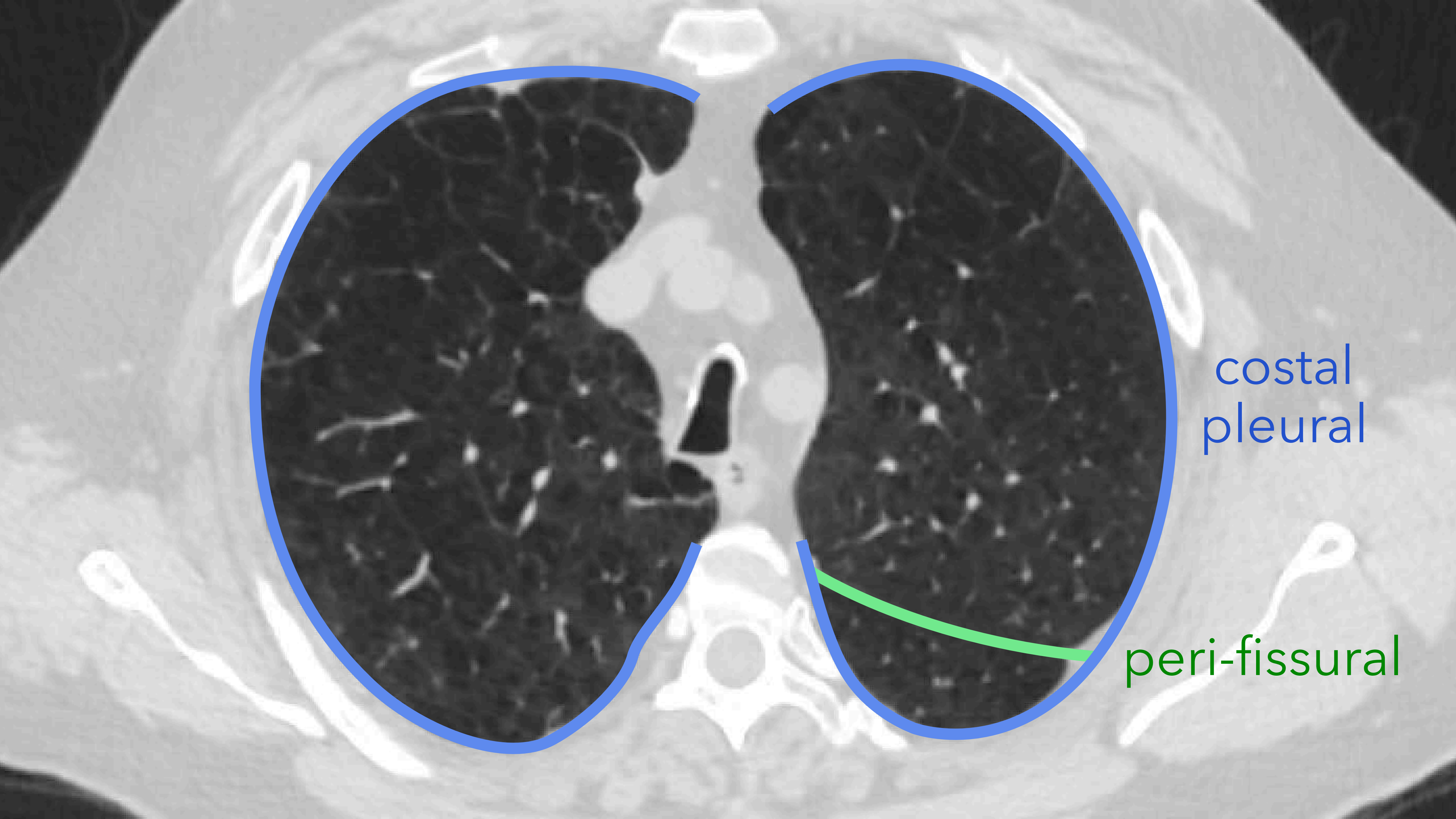
An axial CT scan of the chest at the level of the main bronchi. The lung fields are visible as dark, aerated areas. The mediastinum and spine are seen in the center. The ribs and soft tissue of the chest wall are visible peripherally. Several small, well-defined nodules are visible along the inner surface of the visceral pleura, particularly in the upper lobes. These are juxtapleural nodules.

Juxtapleural Nodules:

Nodules arising within lung in contact with the visceral pleura.

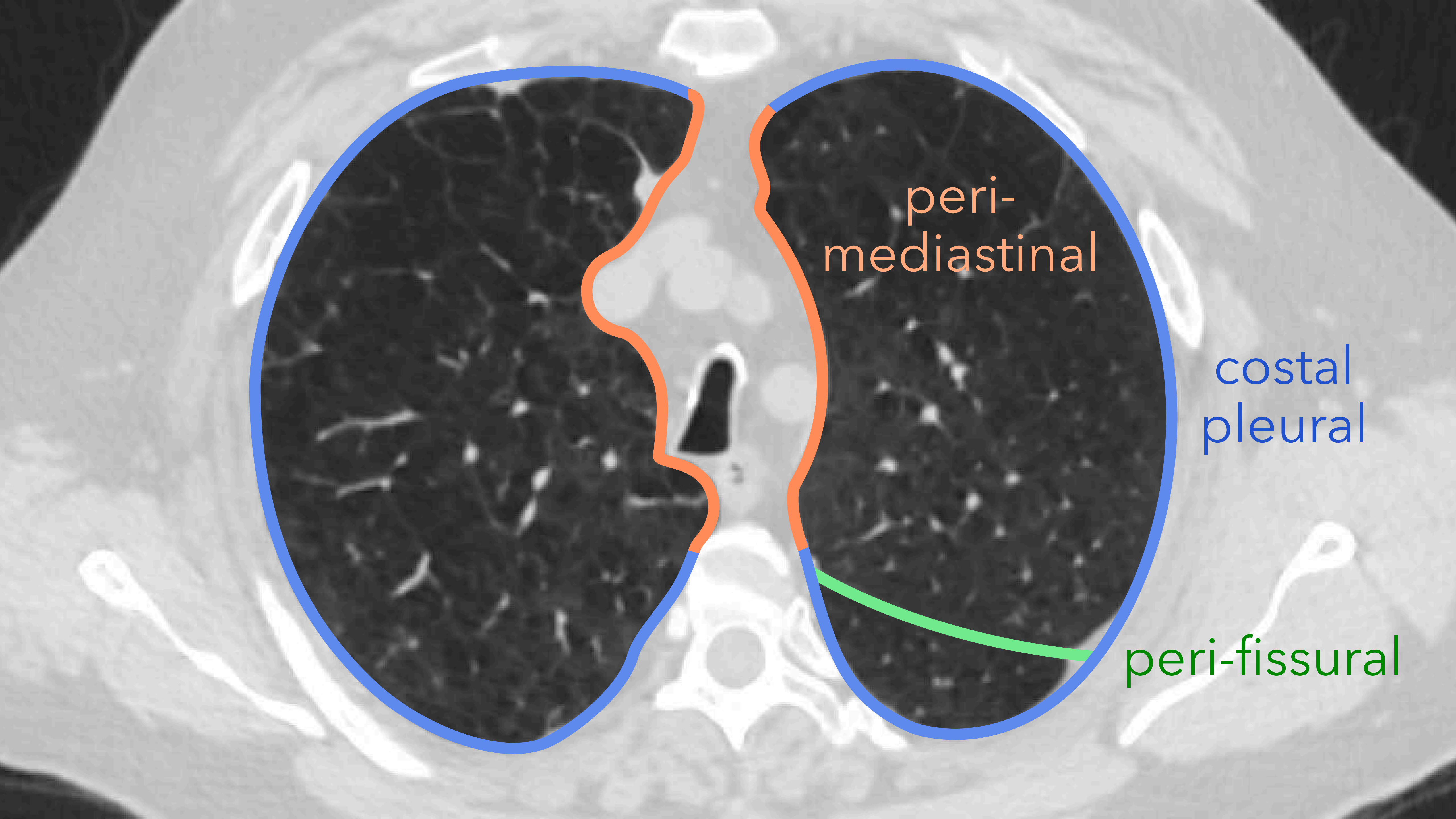


peri-fissural



costal
pleural

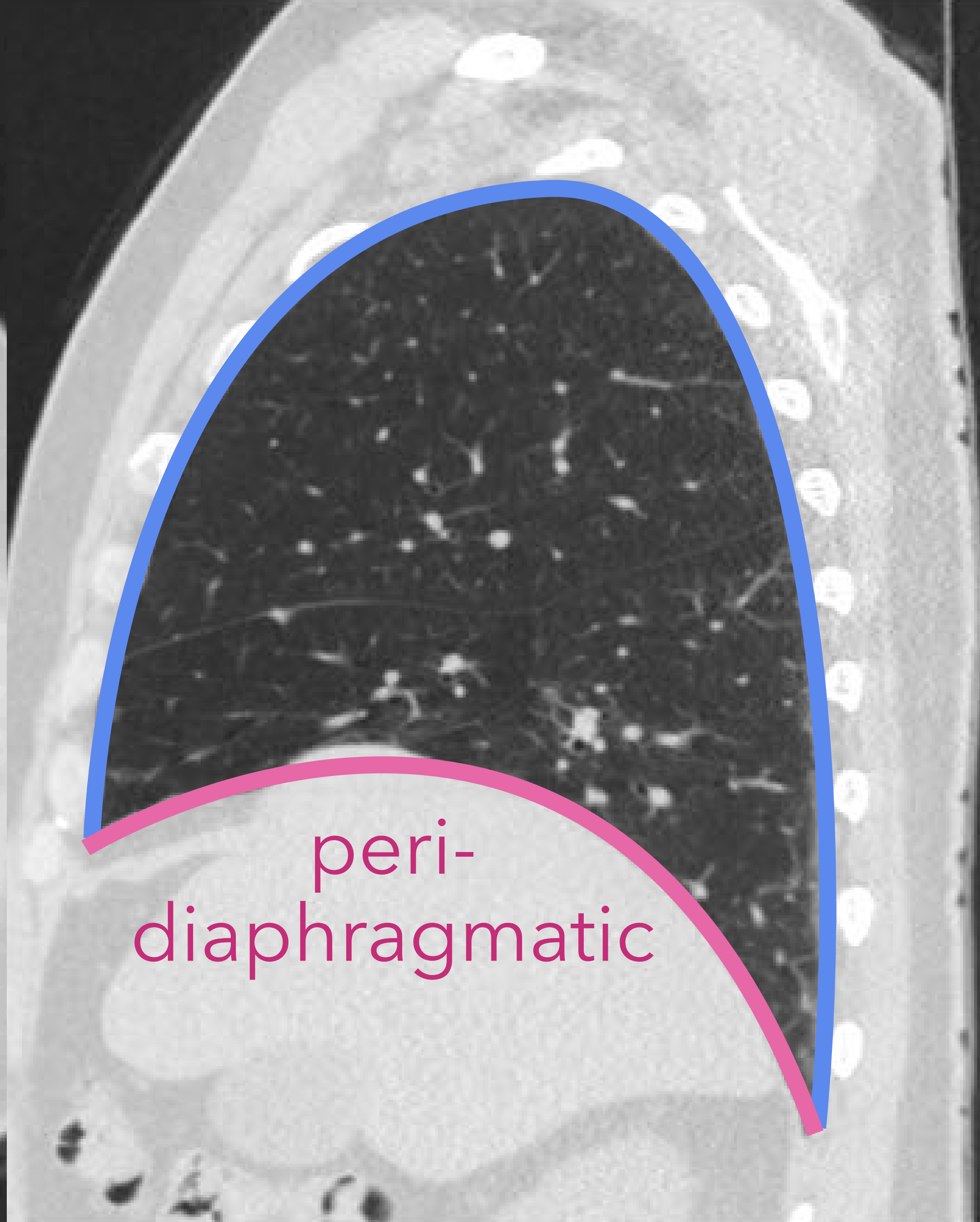
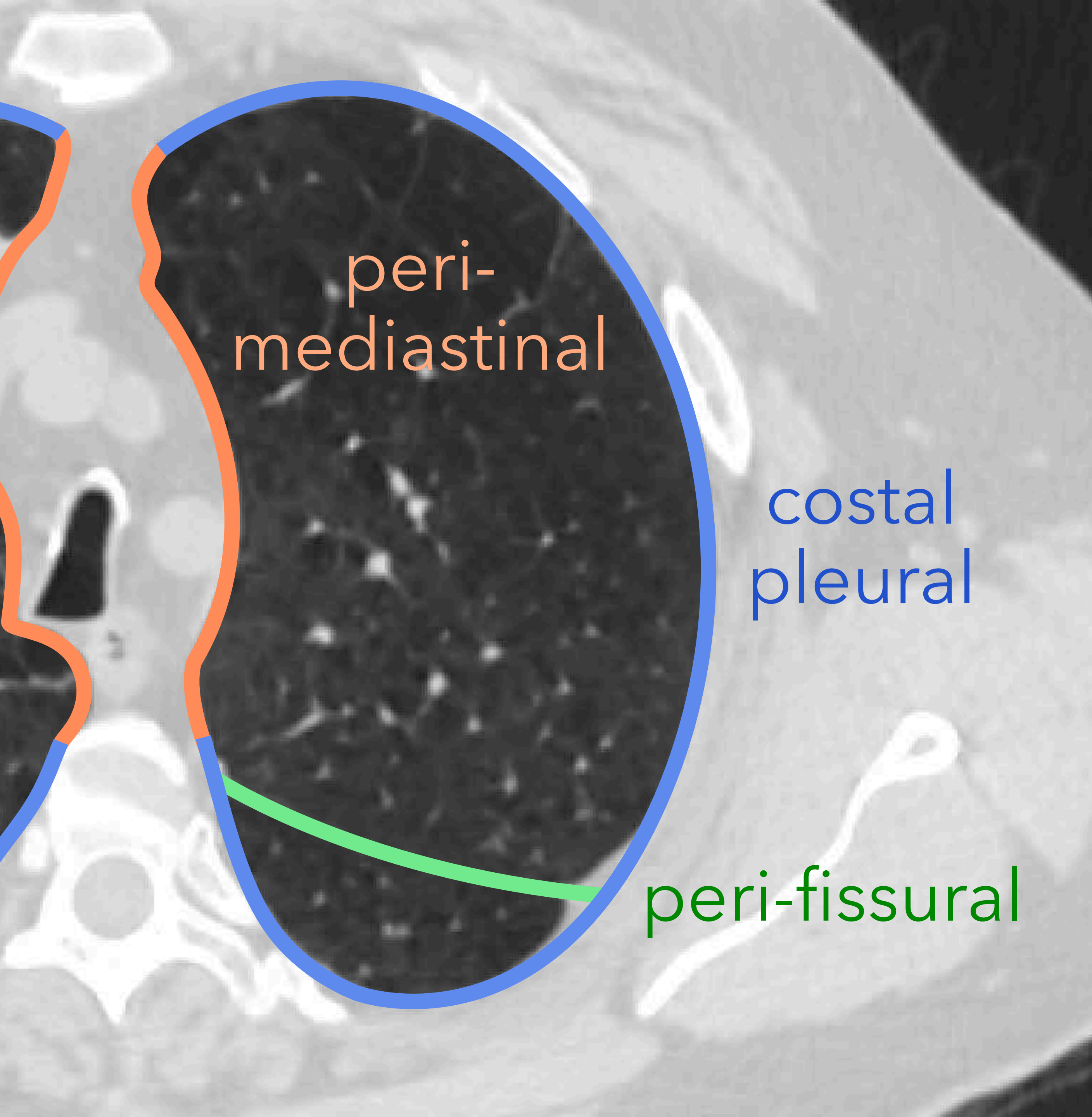
peri-fissural



peri-
mediastinal

costal
pleural

peri-fissural



JUXTAPLEURAL NODULES

Features	Location	Malignancy
• < 10 mm mean diameter • Solid • Smooth margins • Lentiform, Ovoid, Triangular	Peri-fissural	0%
	Costal Pleural	0%
	Peri-mediastinal	0%
	Peri-diaphragmatic	0%

Chelala L et al. RSNA 2021; SSCH08-5

Zhu Y et al. Radiology 2020; 297:710–718

Zhu Y et al. IASLC 2022 abstract

JUXTAPLEURAL NODULES

Lung-RADS 2

- < 10 mm mean diameter at baseline or new **AND**
- Solid; smooth margins **AND**
- Oval, lentiform, or triangular shape

12-month LDCT

Same criteria as
for perifissural
nodules in
Lung-RADS v 1.1

Baseline

→
9 mm
(mean)

How would you classify this nodule?

Baseline

→
9 mm
(mean)

FINDINGS

- 9 mm solid nodule
- Costal pleural
- **Round**

Lung-
RADS **4A**

3-month LDCT; or
PET-CT

TAKE HOME

- **Juxtapleural** solid nodules < 10 mm (mean diameter) with smooth margins & lentiform, ovoid, or triangular shape
 - **0%** risk of malignancy
 - **LR 2**



Stepped Management

PRIOR MANAGEMENT

3

LR3

2

Baseline

6 m

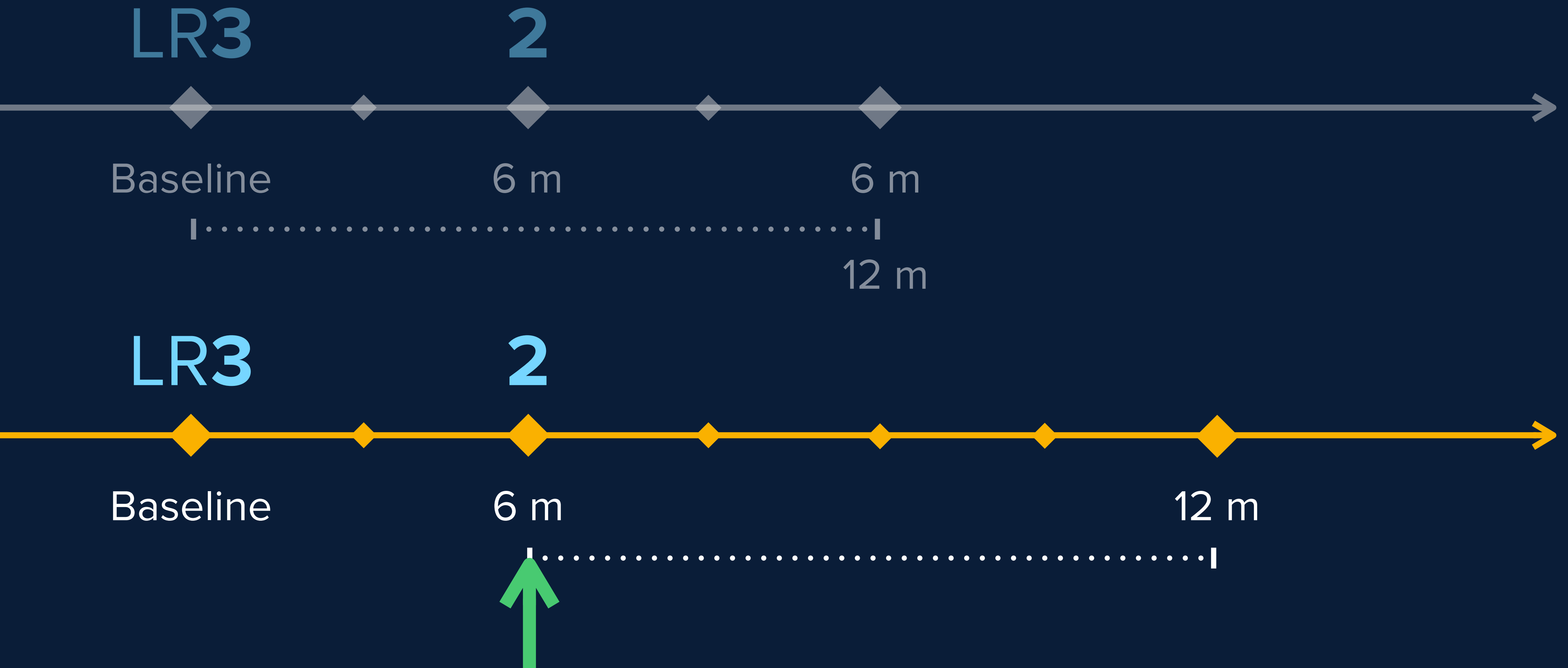
6 m

12 m



STEPPED MANAGEMENT

3



PRIOR MANAGEMENT

4A

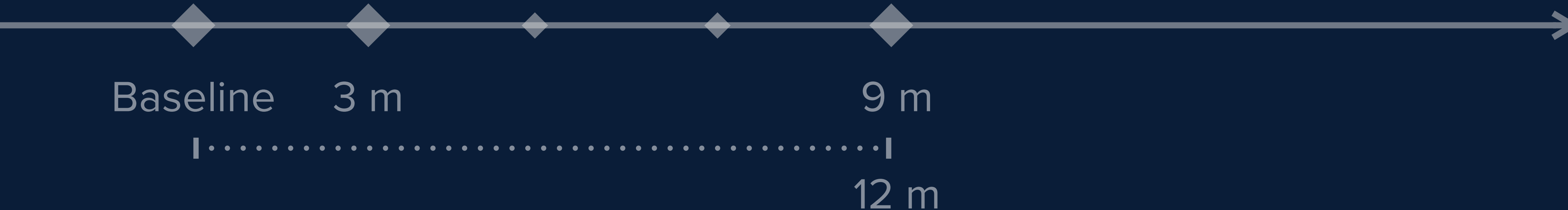
LR4A 2



STEPPED MANAGEMENT

4A

LR4A 2



LR4A 3

2



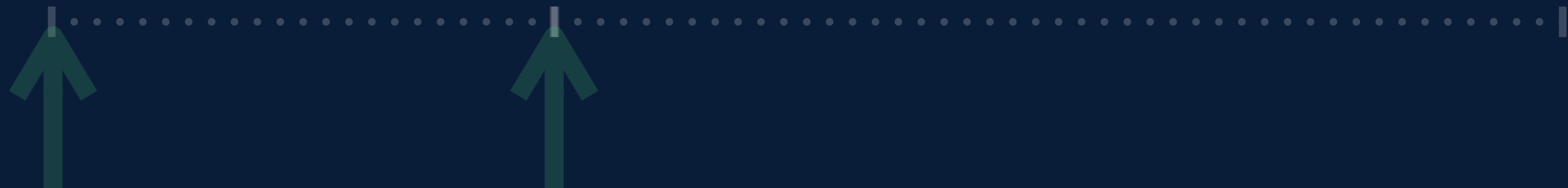
STEPPED MANAGEMENT

4A

LR4A 2

Classify and manage by the
most concerning feature

Baseline 3 m 6 m 12 m



STEPPED MANAGEMENT

Lung-
RADS **3**

Management

- **LR 4A lesions stable or decreased** on 3-month interval follow-up CT

6-month LDCT

from the date of the current exam

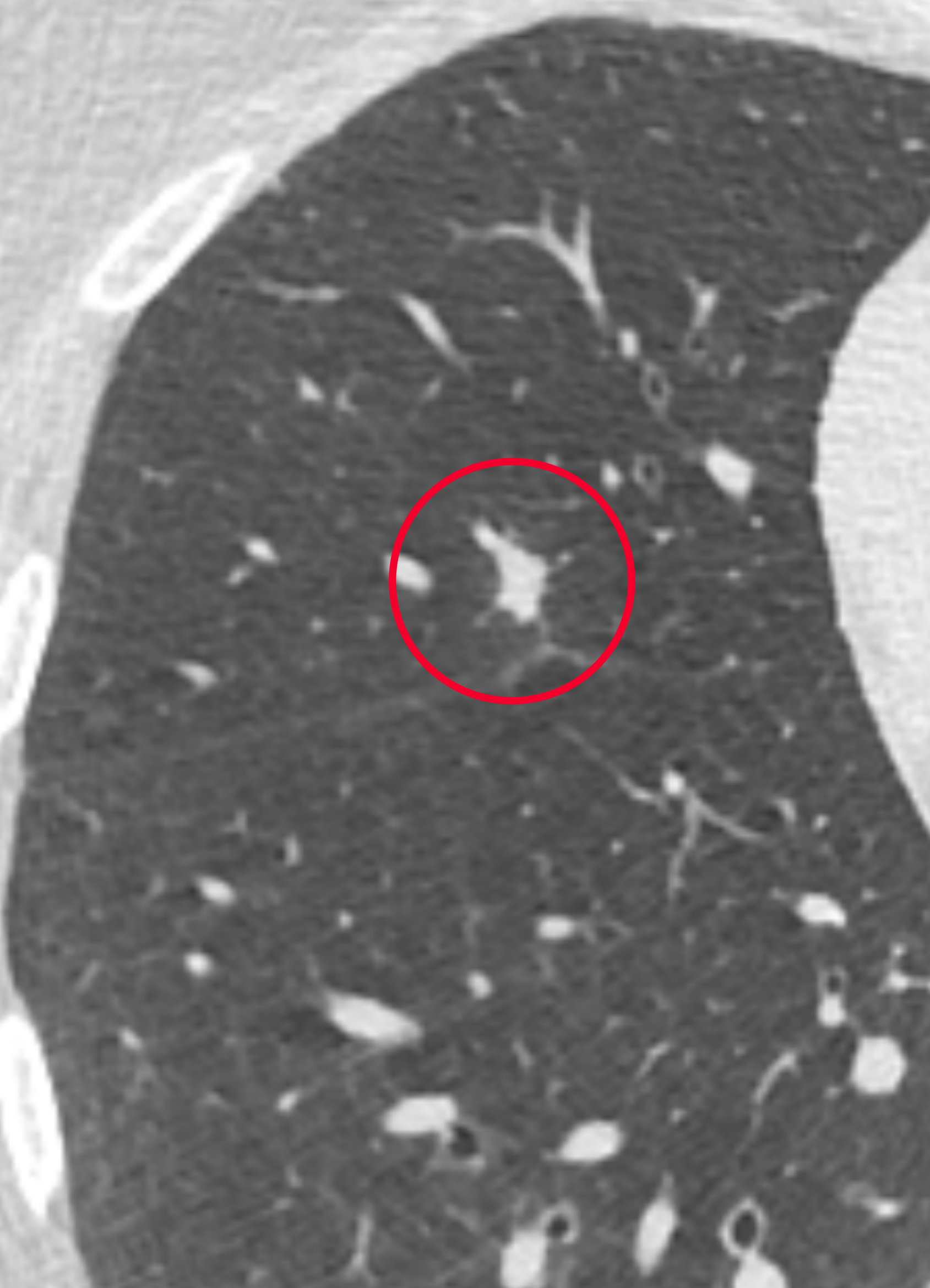
STEPPED MANAGEMENT

Lung- RADS **2**

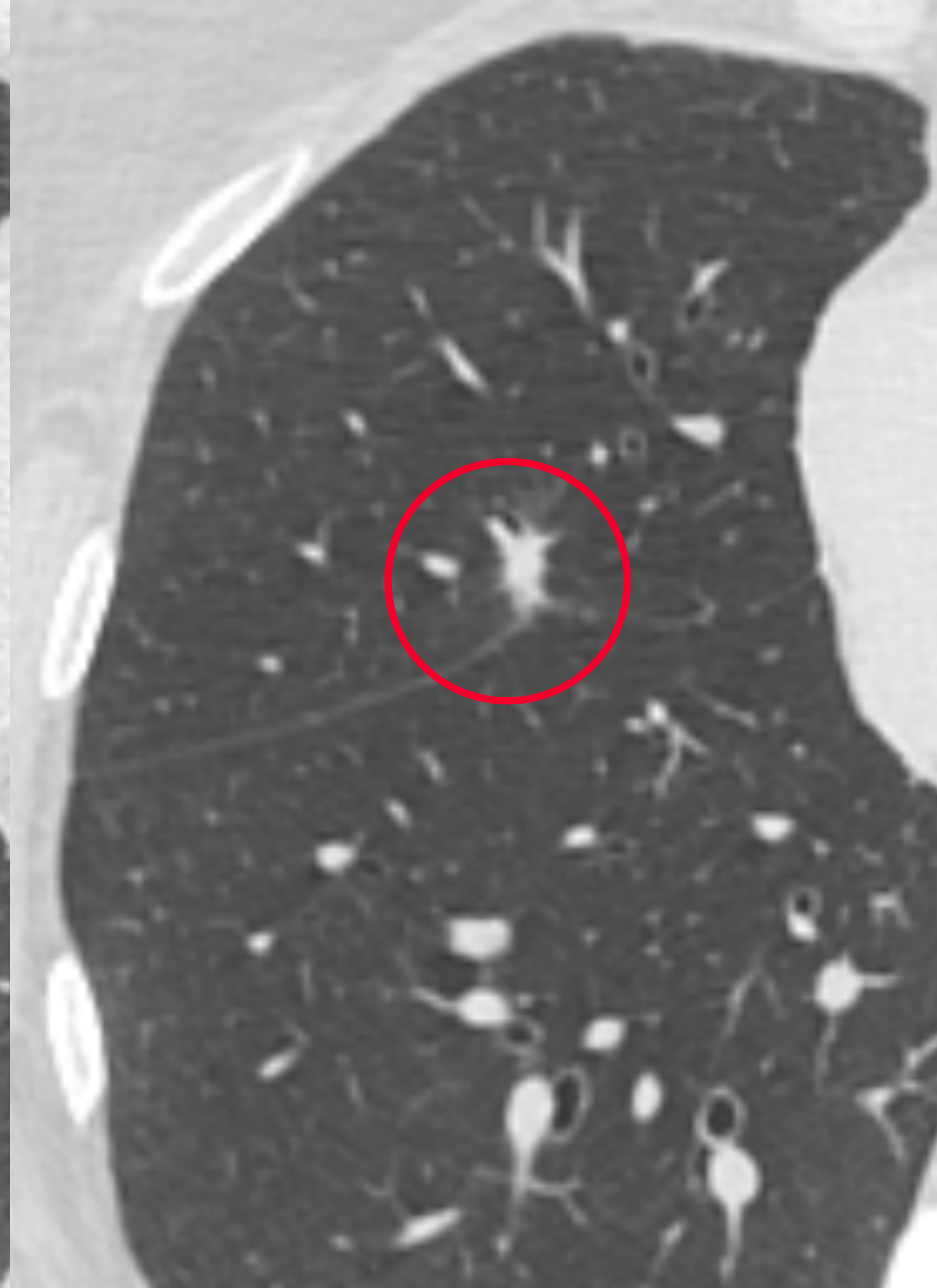
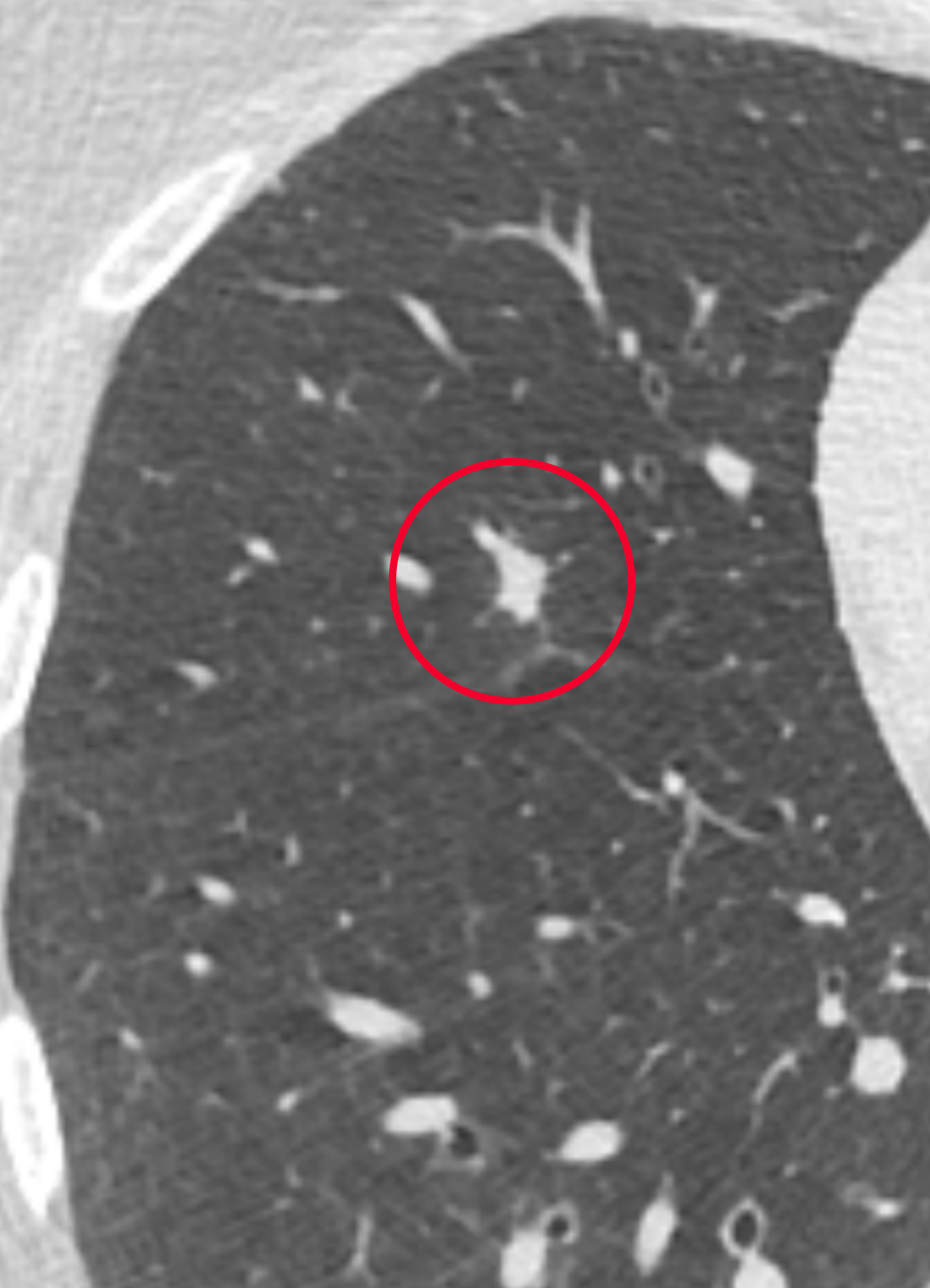
Management

- **LR 3 lesions stable or decreased** on 6-month interval follow-up CT
- **LR 3 or 4A lesions that resolve** on interval follow-up CT
- **LR 4B lesions proven benign after workup or that resolve** on interval follow-up CT

**12-month annual
screening LDCT**
*from the date of the
current exam*

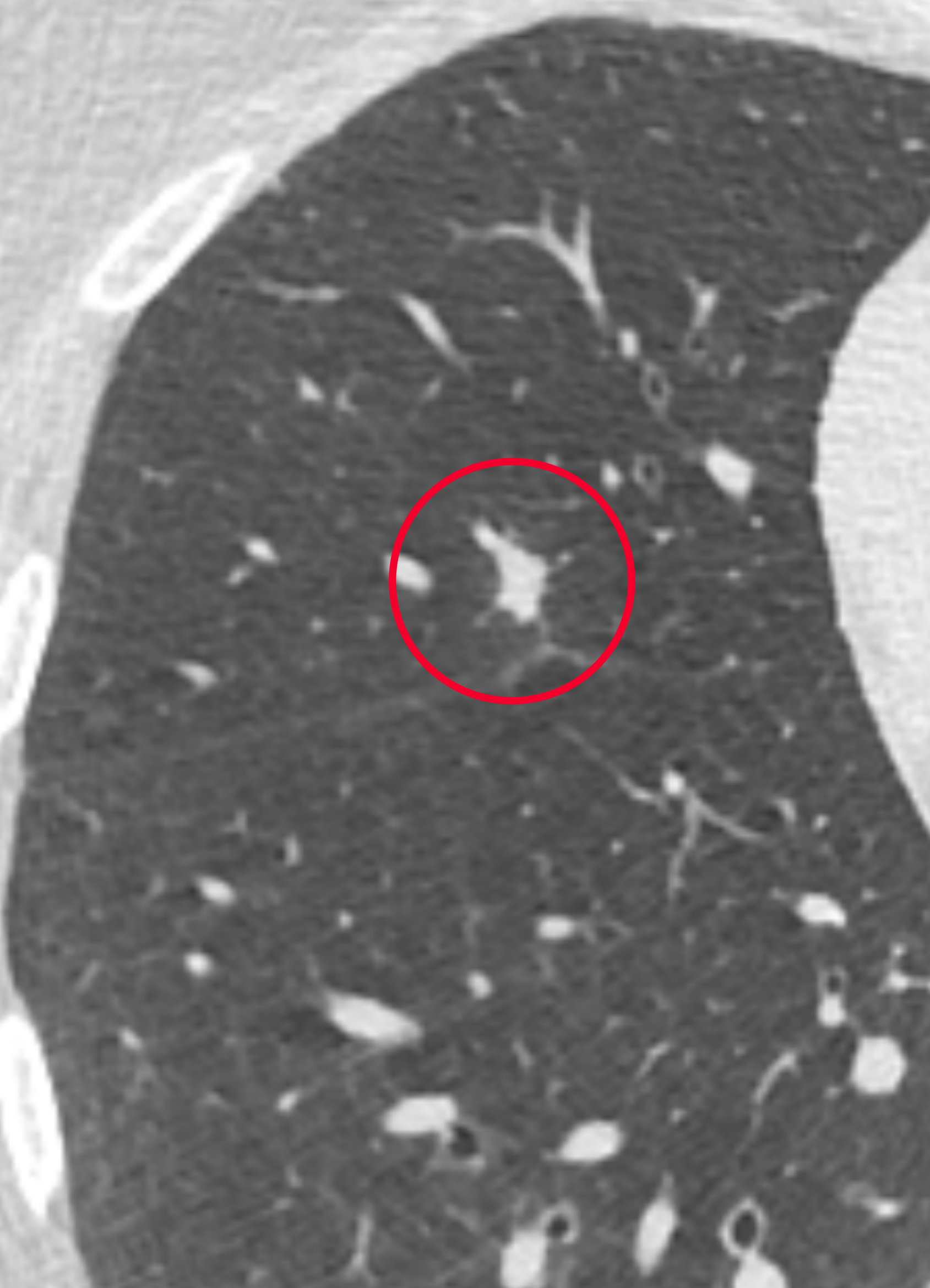


- 11 x 9 mm
(10 mm mean diameter)
- Solid nodule

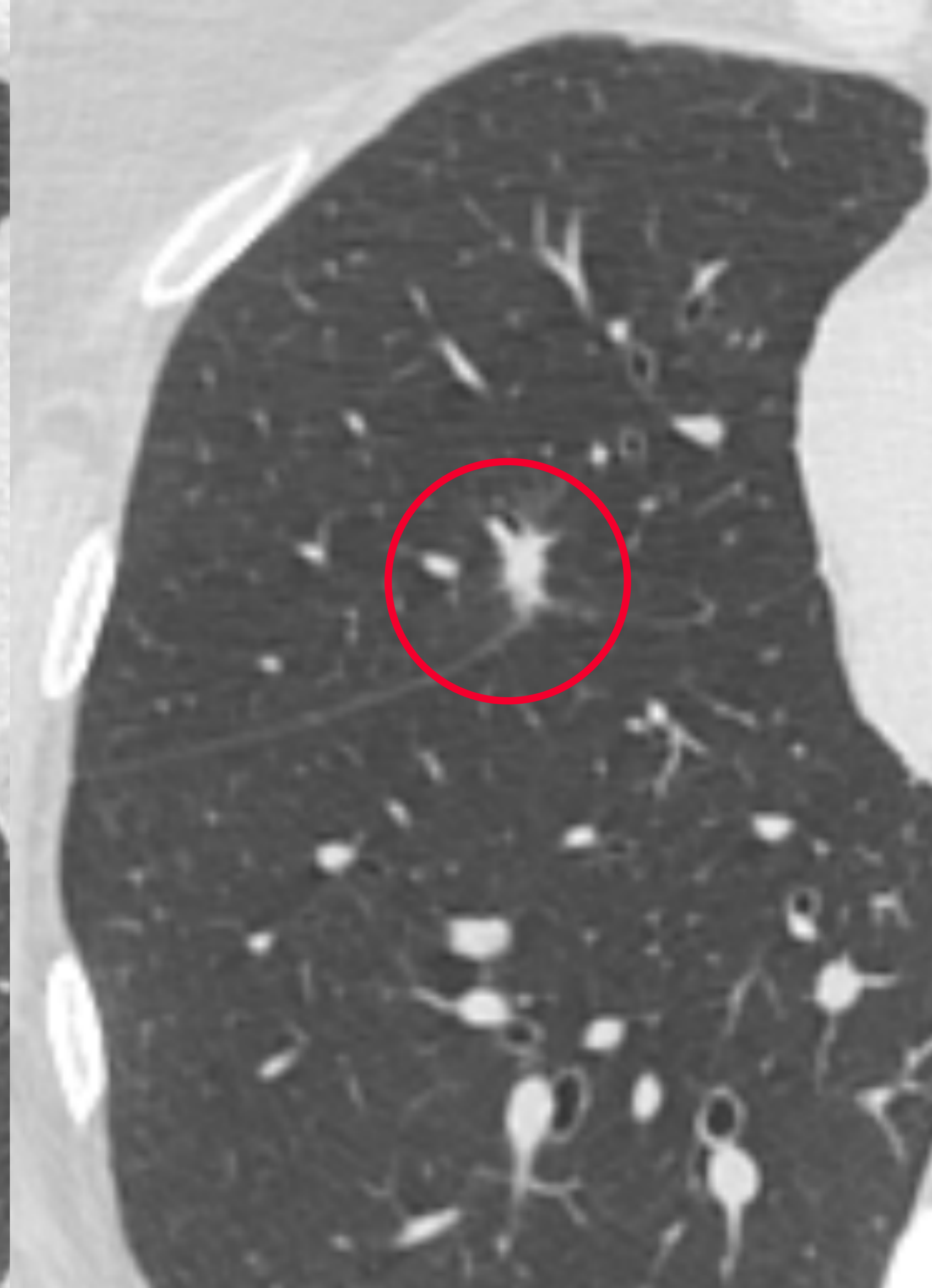


BL **4A** 3-m

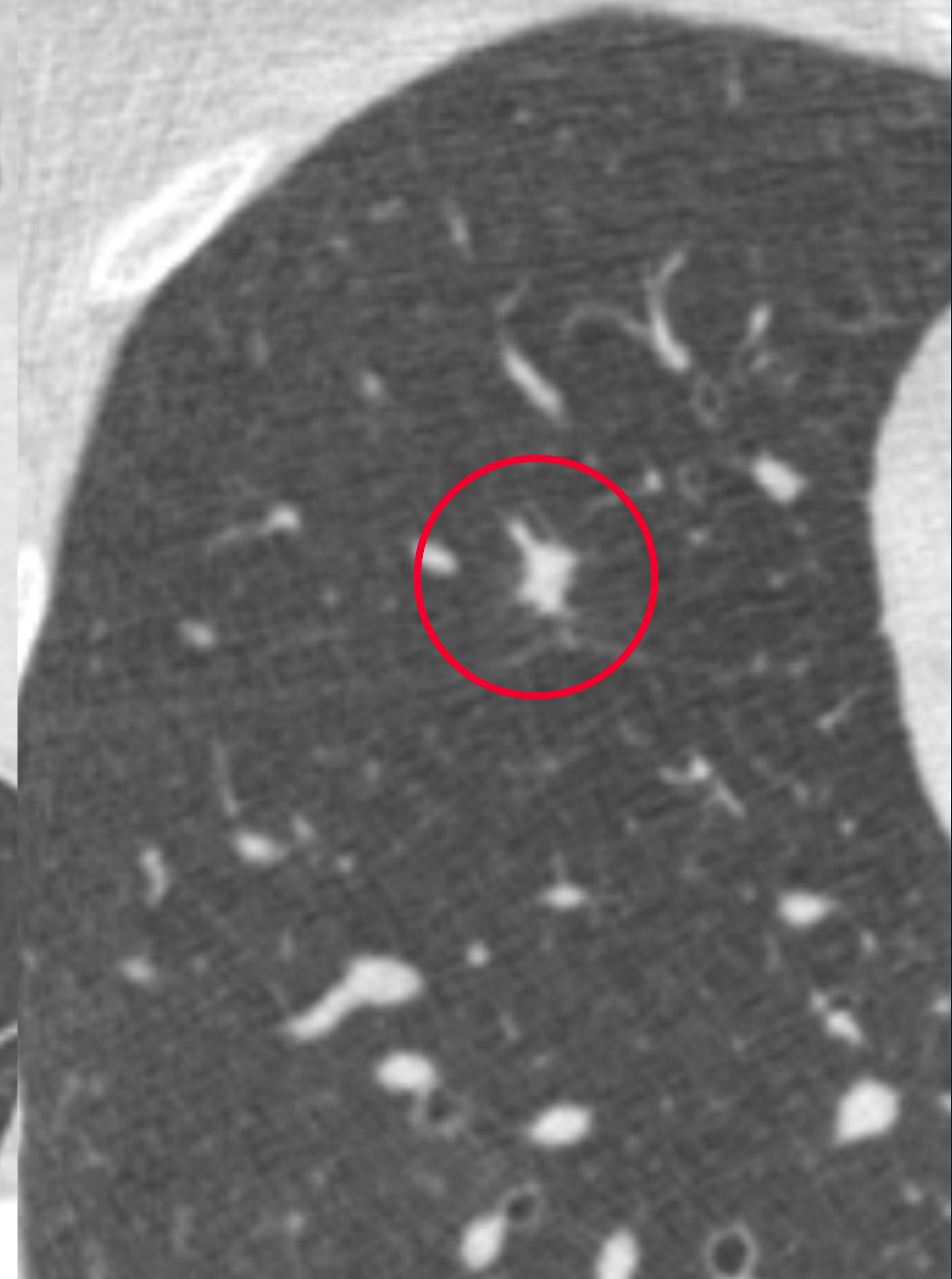
Stable **3** 6-m



BL **4A** 3-m



Stable **3** 6-m



Stable **2** 12-m

TAKE HOMES

- Nodules that are stable or decreased at follow-up can be downgraded to the next lower Lung-RADS category:



TAKE HOMES

- For nodules that completely resolve or proven benign after workup, reclassify based on the **most concerning finding**
- Follow-up recommendations are timed from the **current** exam



Summary

SUMMARY

- Lung-RADS will continue to evolve
 - Evidence-based approach
 - Expert consensus best practices

Data is the limiting factor!



ACR LUNG-RADS® v2022

- Atypical Pulmonary Cysts
- Infectious/Inflammatory
- Airway Nodules
- Juxtapleural Nodules
- Stepped Management
- Interval Diagnostic CTs
- S-Modifier
- Growth
- Volumetrics
- Lung-RADS FAQ
- Lung-RADS Atlas
- ... *and more*

Thank You!

ACR Lung-RADS® v2022

Jared D. Christensen, MD, MBA

Chair, ACR Lung-RADS Committee

 @JRadMD