

# Nodules And Masses

中山附醫 胸腔腫瘤科

陳焜結 醫師

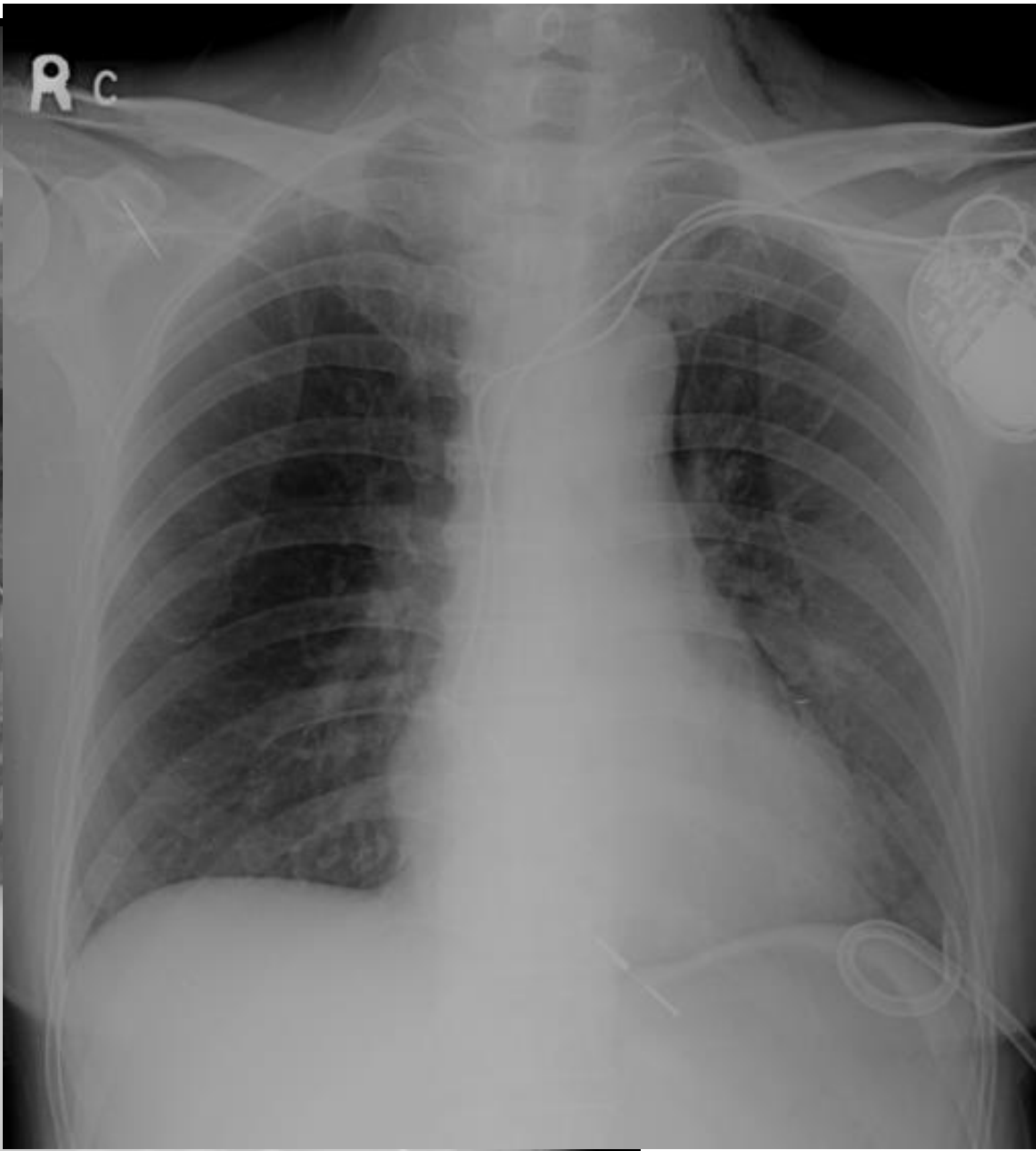
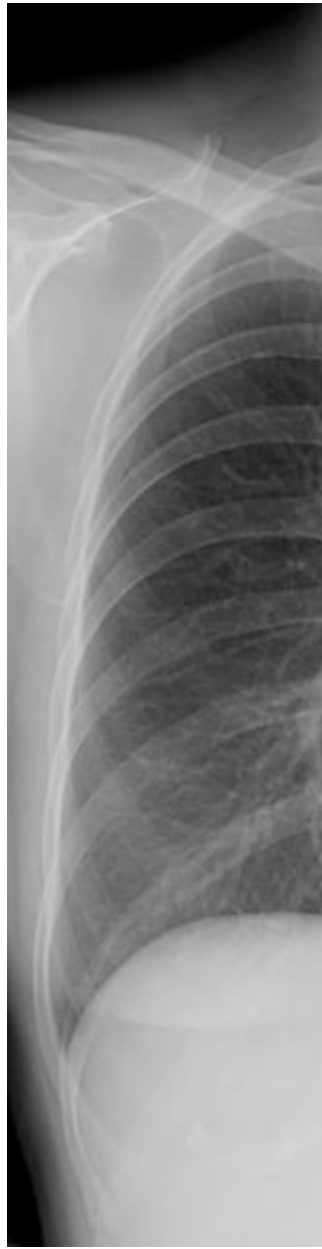
- Mimics pulmonary nodules
- Solitary Pulmonary Nodules
- Multiple Pulmonary Opacities

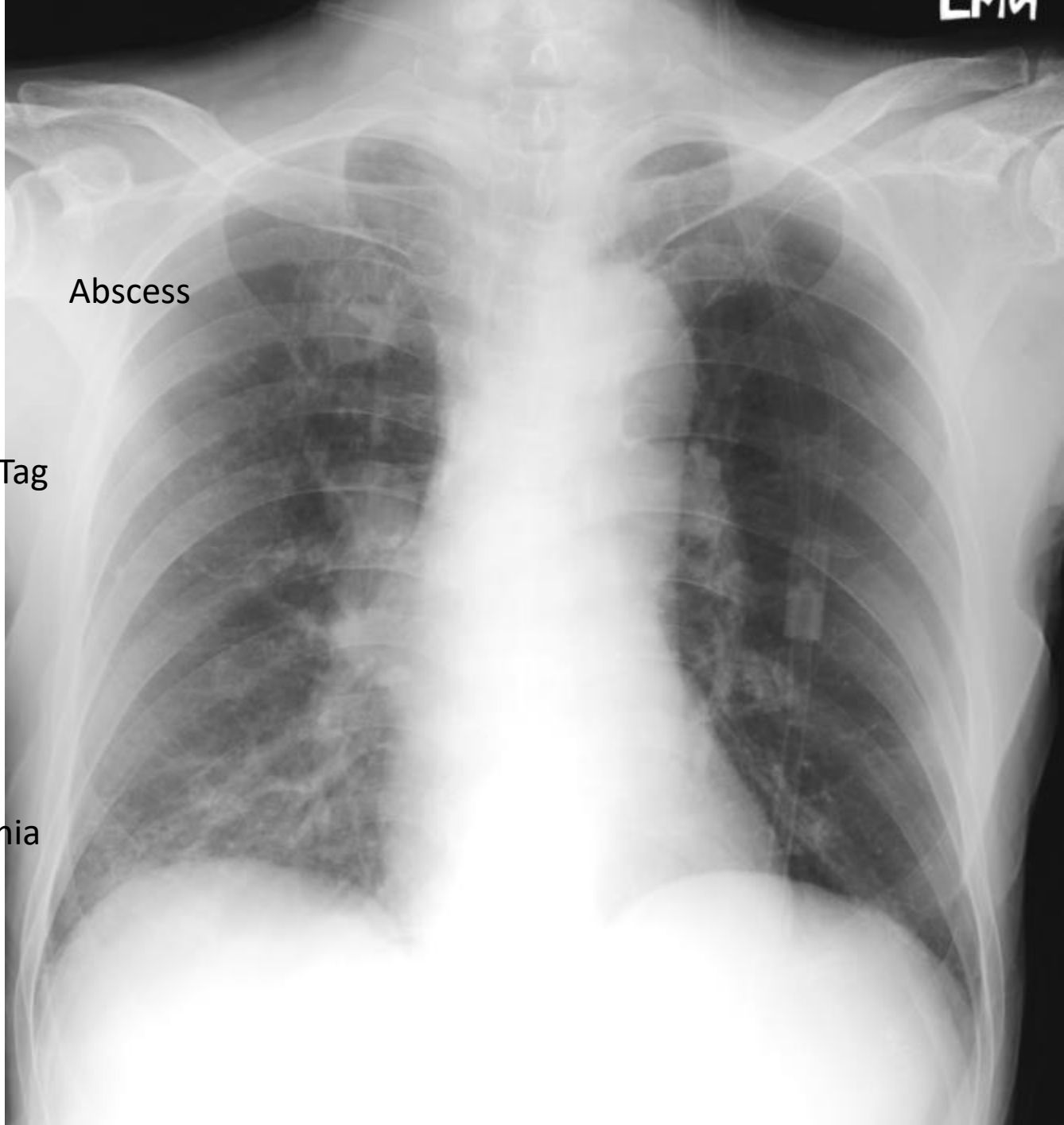
Mimics Pulmonary Nodules?



Buttom



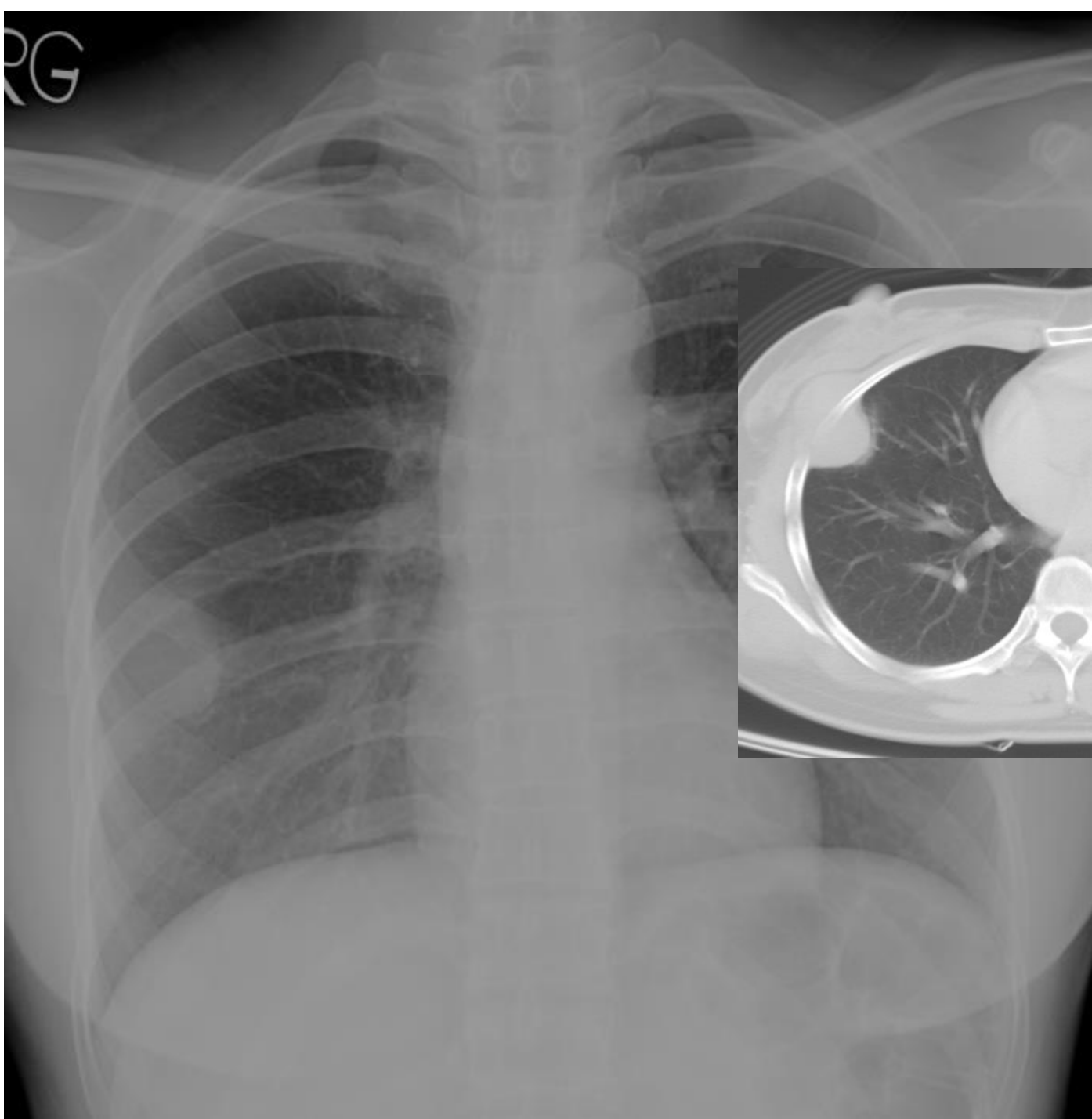




Abscess

Skin Tag

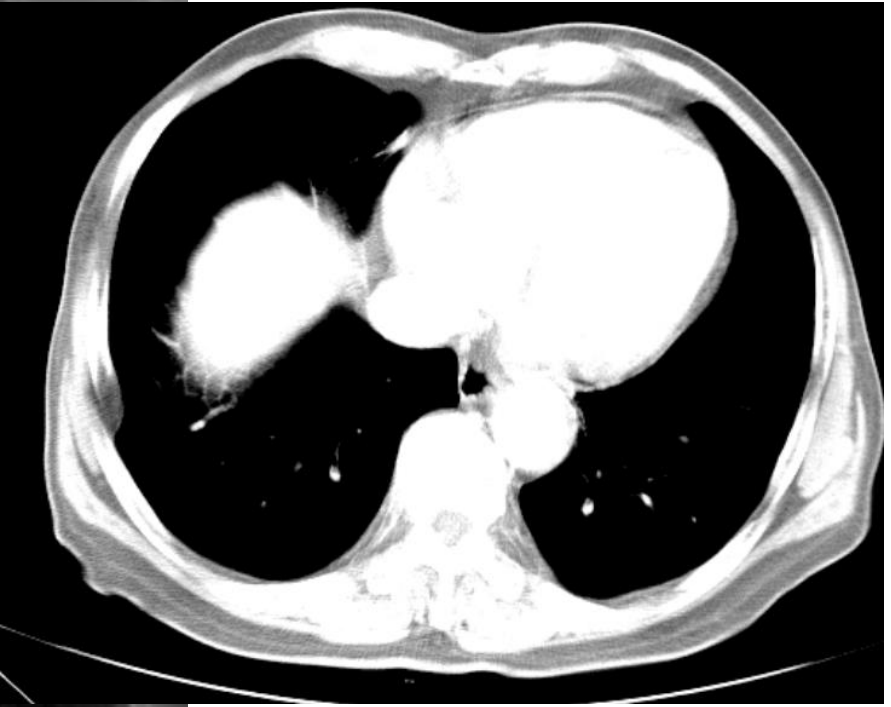
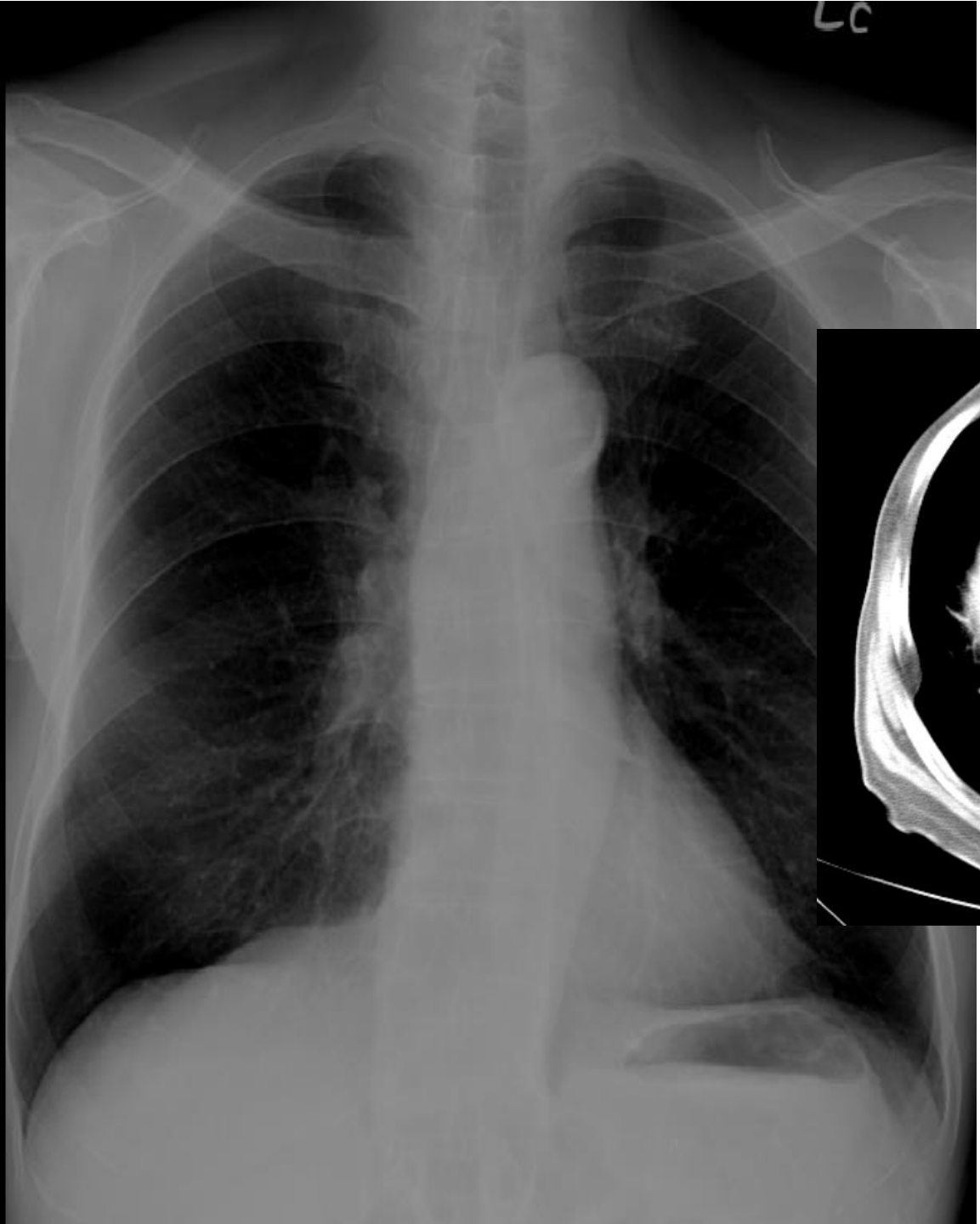
Pneumonia



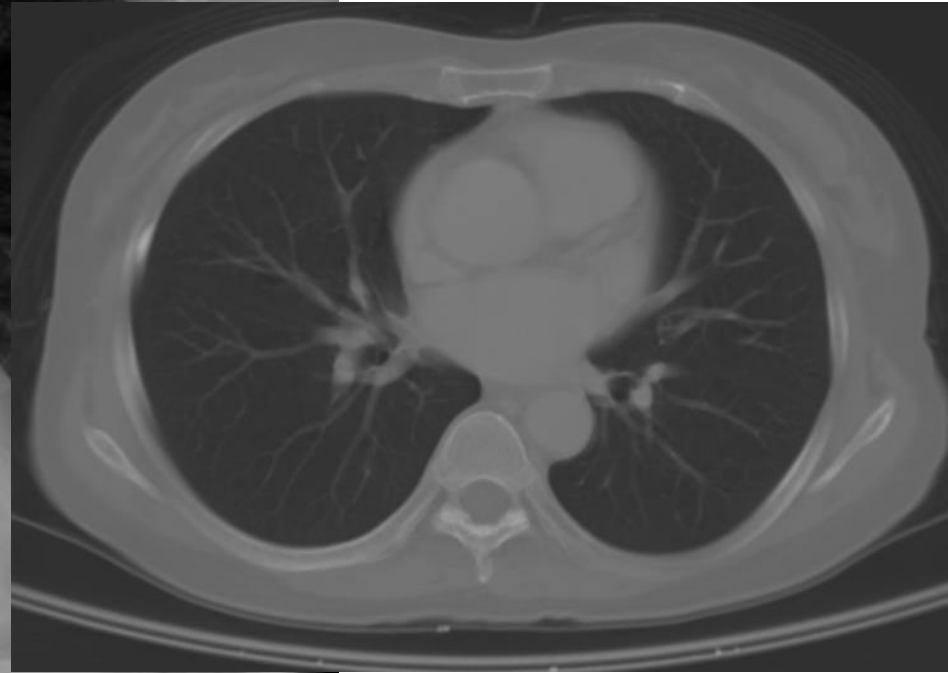
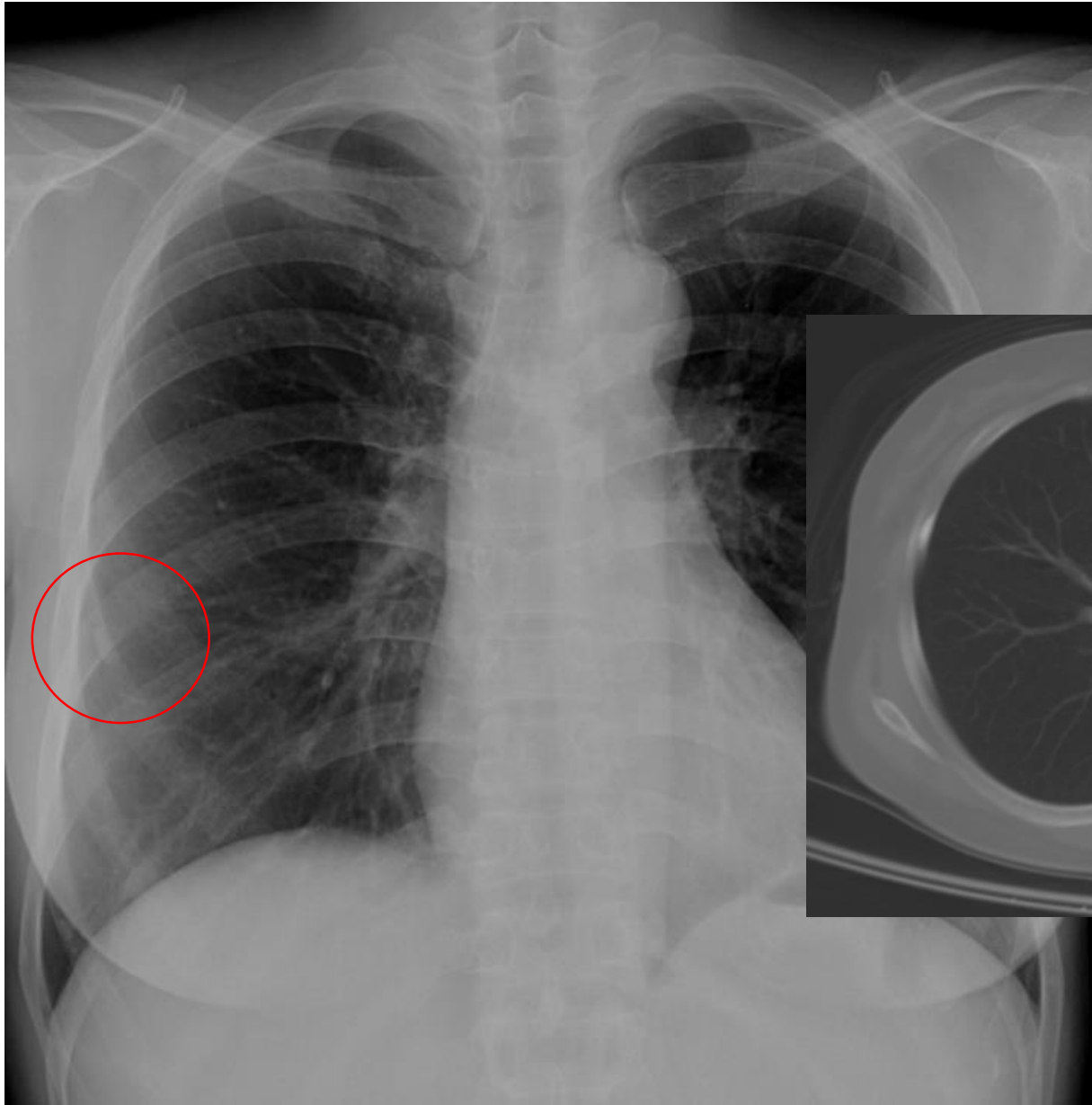
Solitary Fibrous Tumor



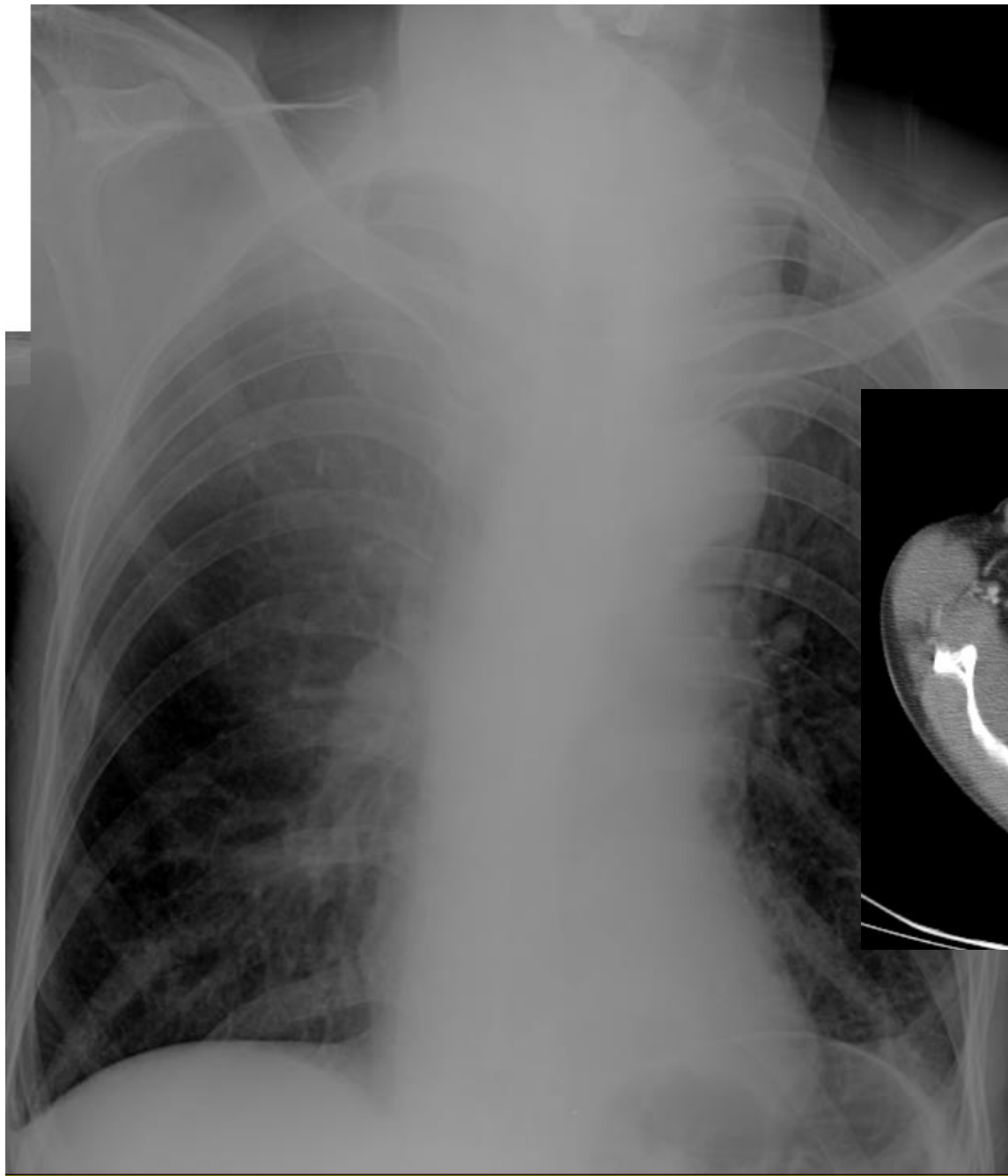




Lipoma



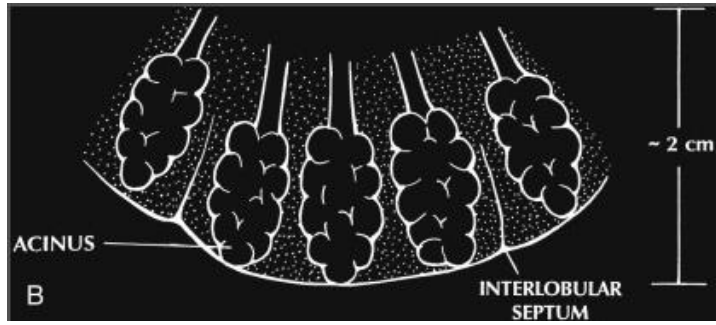
Bone Island



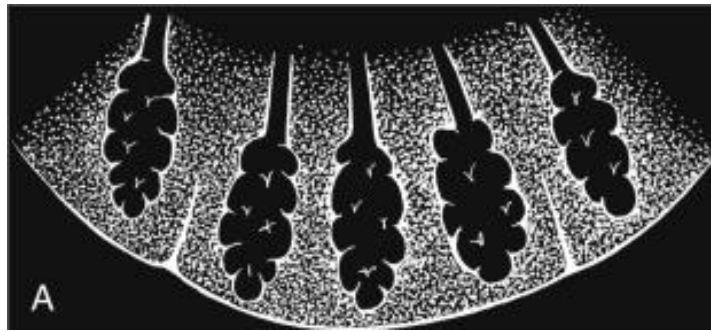
Fibromatosis

# Solitary Pulmonary nodules

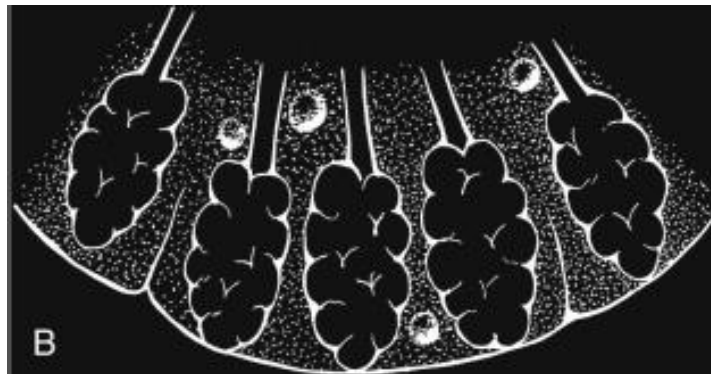
- Nodules <3cm
- Masses >3cm



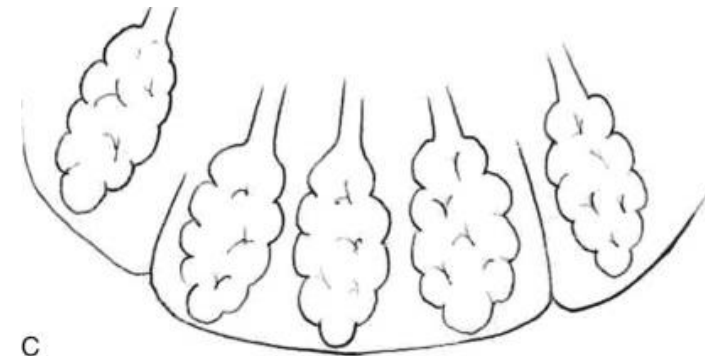
Normal



Linear Interstitial Thickening (Reticular)



Nodular Interstitial Thickening



Alveolar Filling Disease

# Pulmonary Opacities

## **Nodules** or **Acinar nodules** (air space nodules)

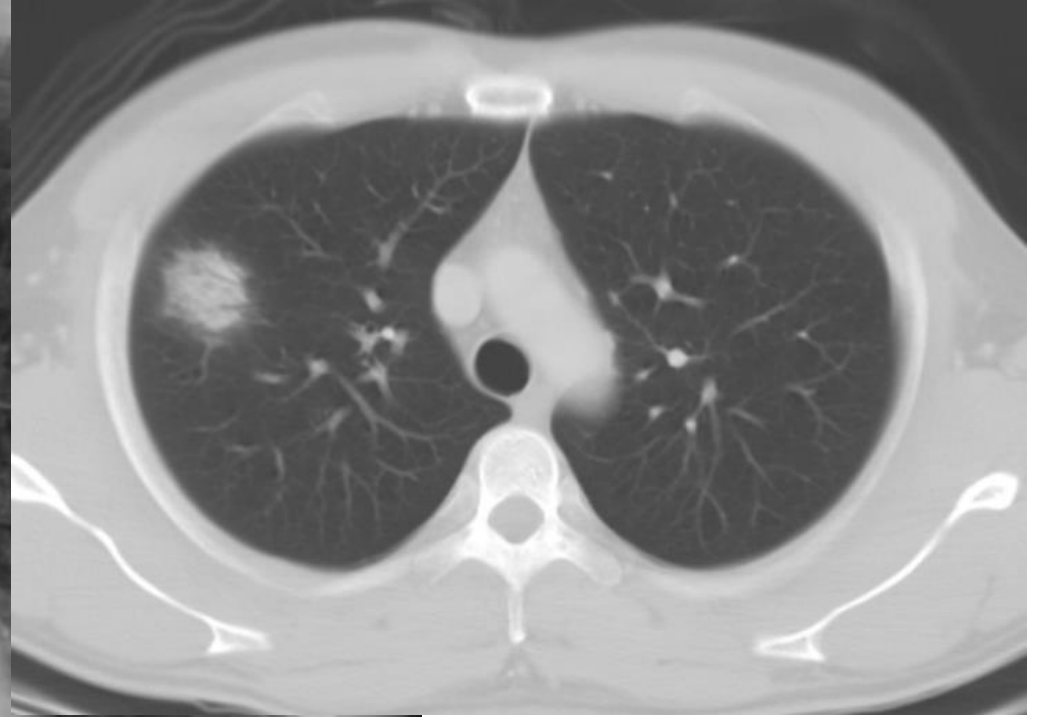
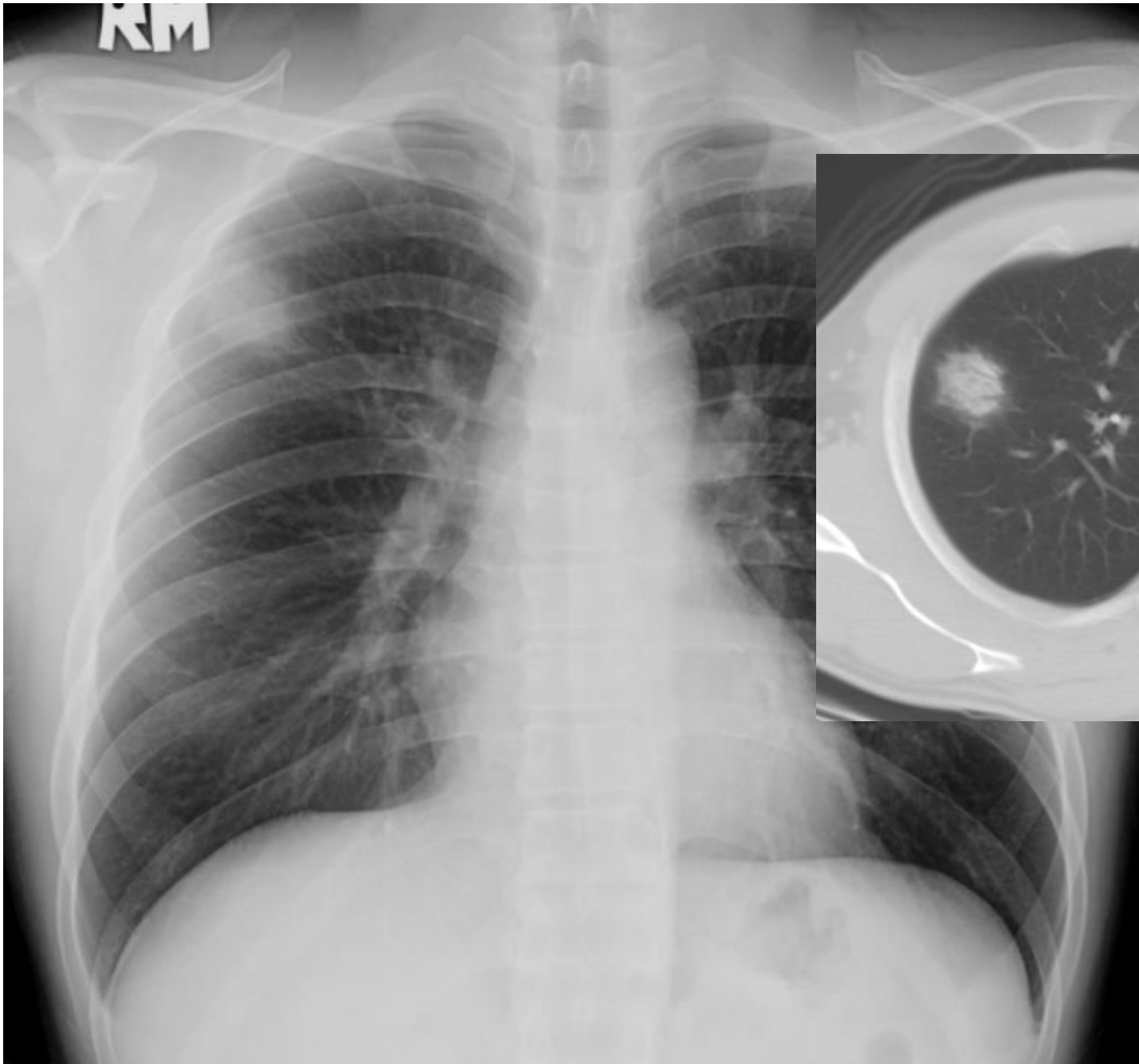
- Border
- Solid or aerated alveoli and air bronchograms
- Perception of nodules



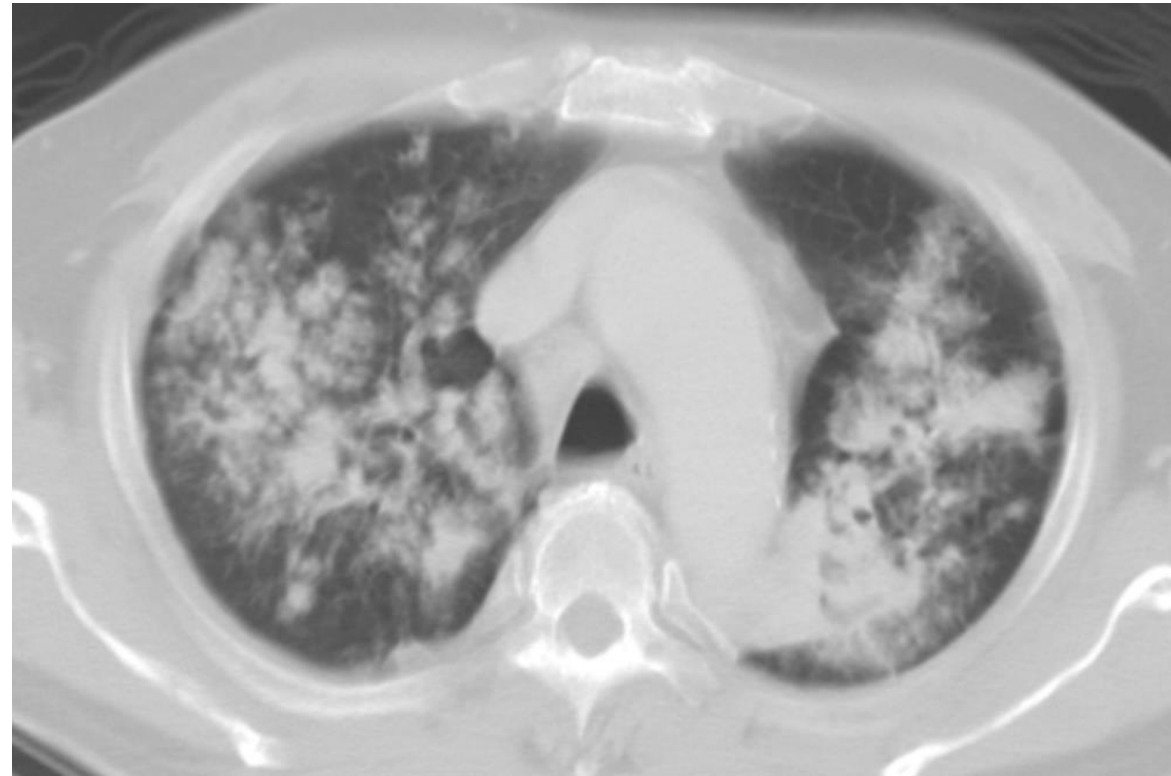
71 y/o Male

Pulmonary TB





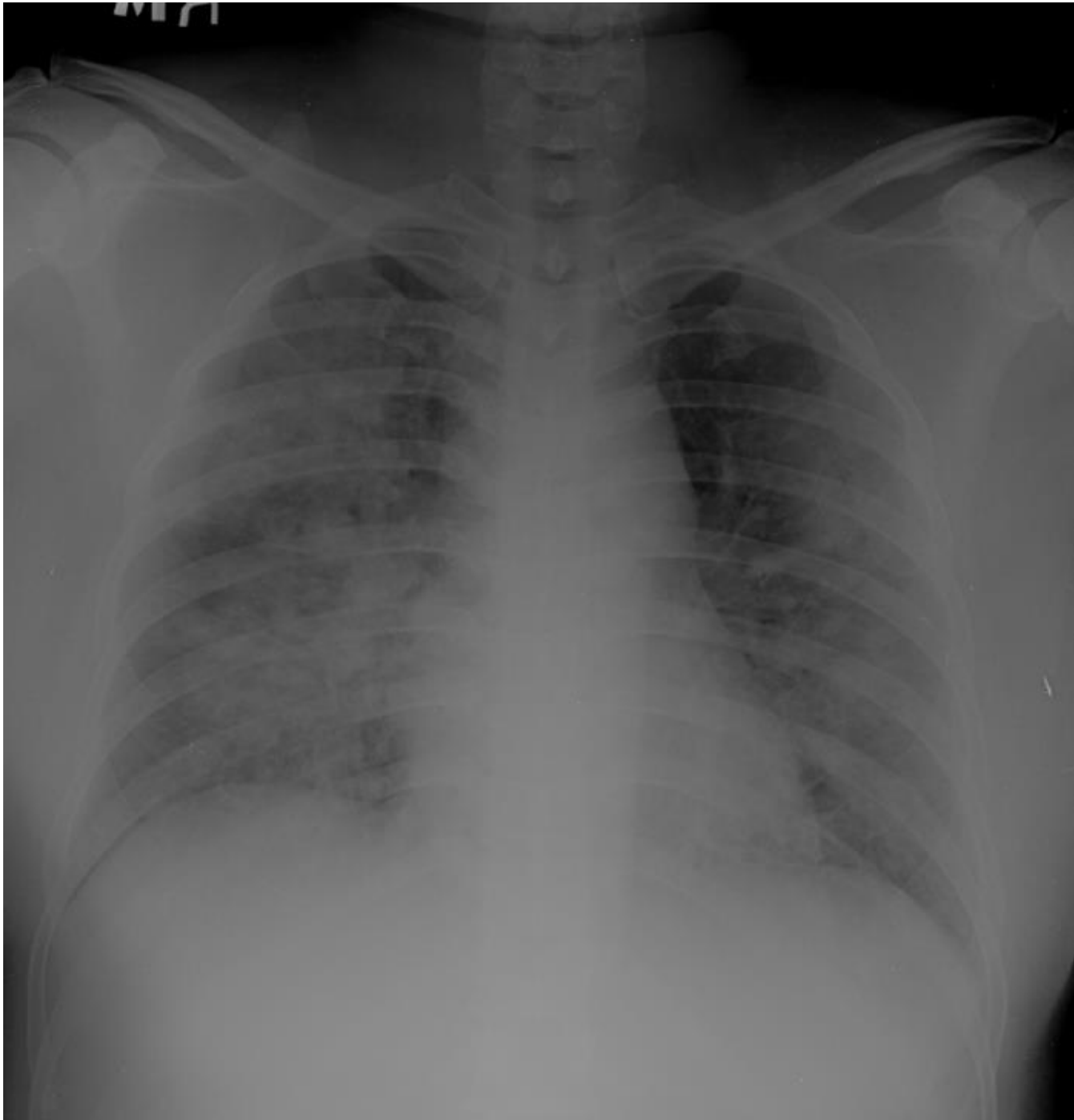
Pulmonary Cryptococcus



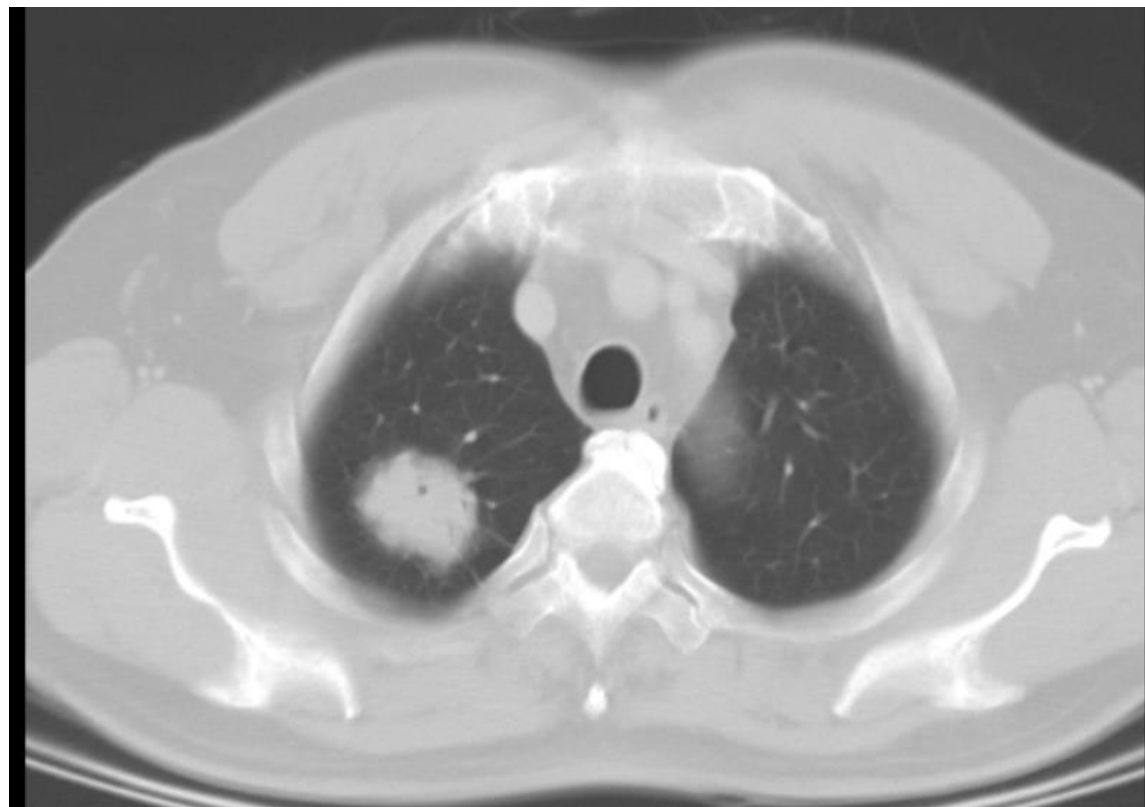
Pulmonary TB



Toxic inhalation



Near drowning



Lung cancer

# Solitary Pulmonary Nodules

## Table 1. Etiologies of Solitary Pulmonary Nodules

### Benign

Infectious granuloma (80%)

Atypical mycobacteria

Coccidioidomycosis

Histoplasmosis

Tuberculosis

Hamartoma (10%)

Arteriovenous malformation (rare)

Intrapulmonary lymph node (rare)

Sarcoidosis (rare)

### Malignant

Adenocarcinoma (60%)

Squamous cell carcinoma (20%)

Solitary metastasis (10%)

Breast

Colon

Kidney

Small cell carcinoma (4%)

Carcinoid tumor (rare)

Extranodal lymphoma (rare)

### Table 3. Radiologic Features Suggestive of Benign or Malignant Solitary Pulmonary Nodules

| <i>Radiologic feature</i> | <i>Suggests benign nodule</i>                | <i>Suggests malignant nodule</i>                     |
|---------------------------|----------------------------------------------|------------------------------------------------------|
| Border                    | Smooth                                       | Irregular or spiculated                              |
| Calcification             | Concentric, central,<br>or popcorn pattern   | Typically noncalcified or<br>eccentric calcification |
| Density                   | Solid                                        | Nonsolid, ground-glass                               |
| Doubling time             | Less than one month<br>or more than one year | One month to one year                                |
| Size                      | < 5 mm                                       | > 10 mm                                              |



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*Risk factor**Odds ratio*

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**Veterans Affairs model (for nodules > 7 mm in diameter)**

|                                                     |     |
|-----------------------------------------------------|-----|
| Current or past smoking                             | 7.9 |
| Patient age (per 10-year increment)                 | 2.2 |
| Nodule diameter (per mm)                            | 1.1 |
| Time since quitting smoking (per 10-year increment) | 0.6 |

**Mayo Clinic model (for nodules > 4 mm in diameter)**

|                                 |     |
|---------------------------------|-----|
| History of extrathoracic cancer | 3.8 |
| Spiculated morphology           | 2.8 |
| Current or past smoking         | 2.2 |
| Upper lung location             | 2.2 |
| Nodule diameter (per mm)        | 1.1 |
| Patient age (years)             | 1.0 |

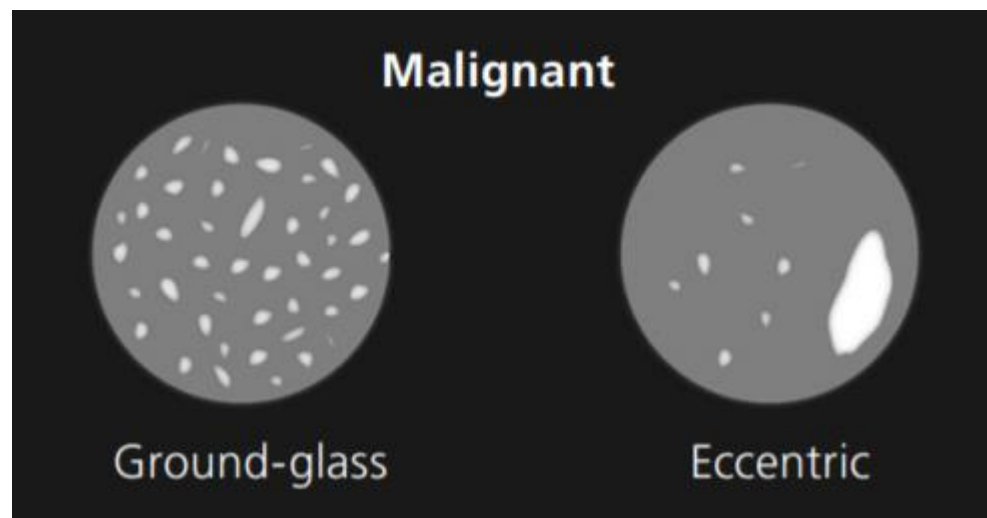
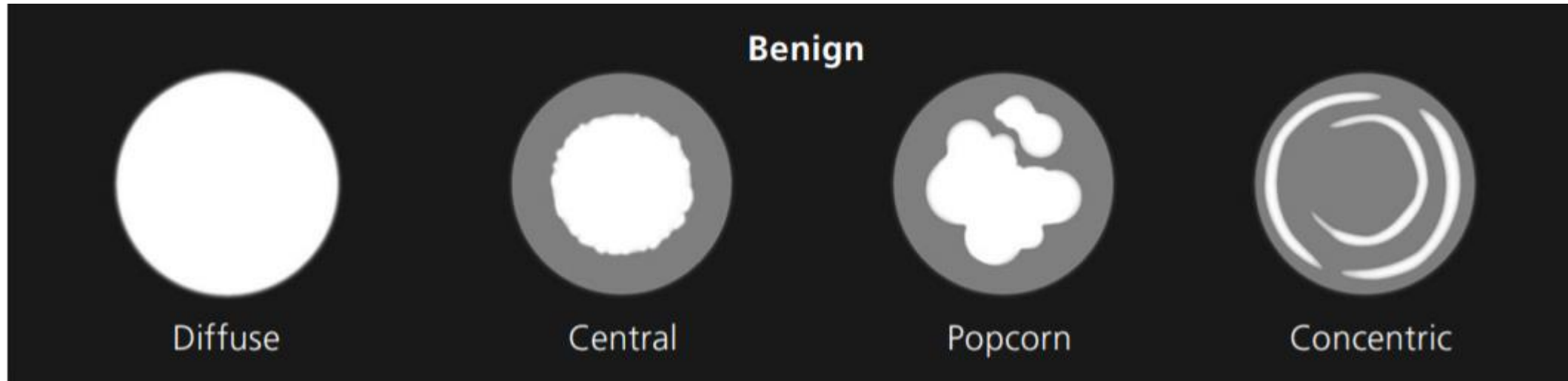
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# Solitary Pulmonary Nodules

## *Benign vs. Malignancy*

- Calcification: eccentric
- Contour: Spiculation, lobulation, corona radiata
- Size
- Growth Rate
- Cavitation
- Density
- Air bronchogram
- Accompanying Sign

# Patterns of calcification that suggest benign or malignant pulmonary nodules

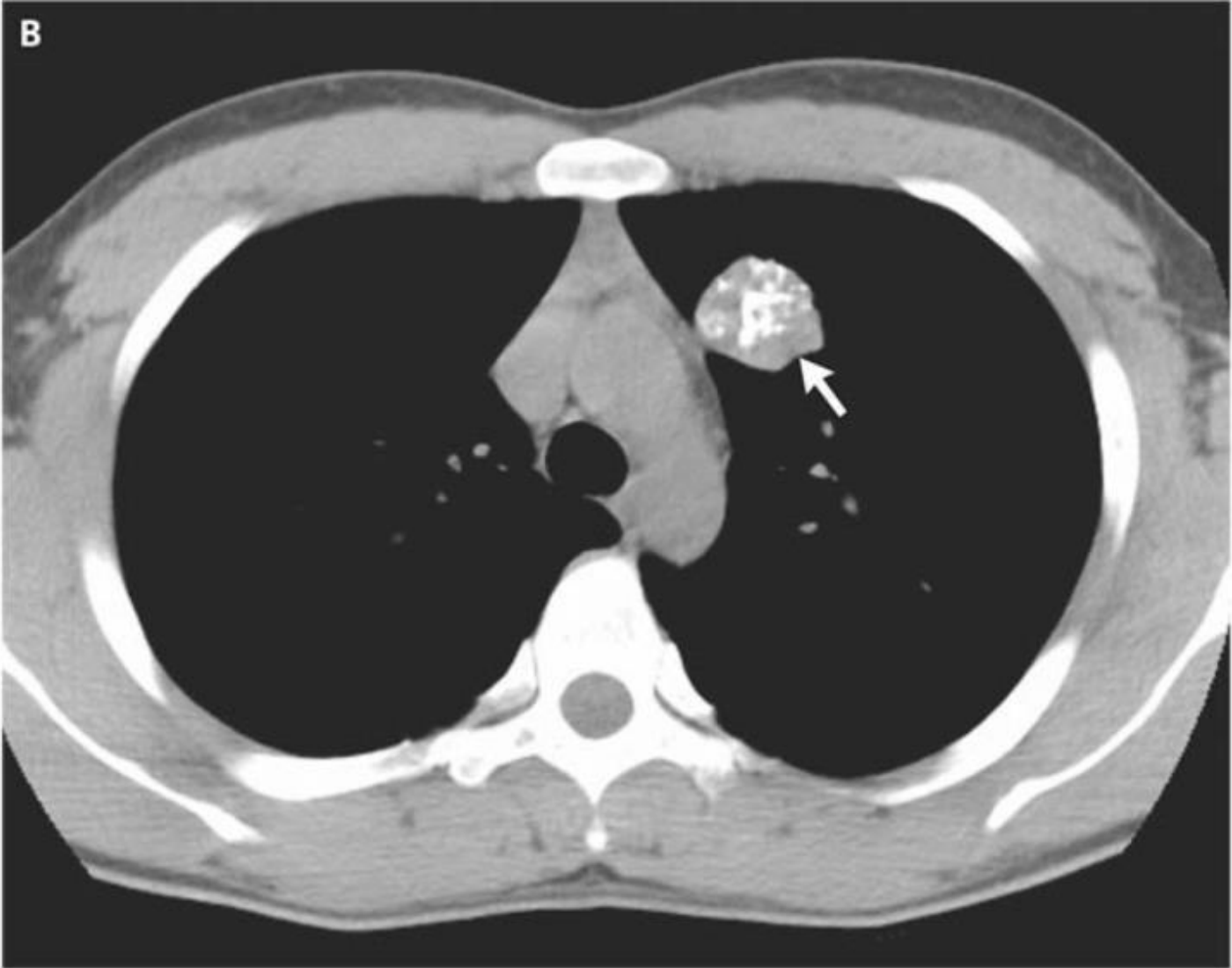
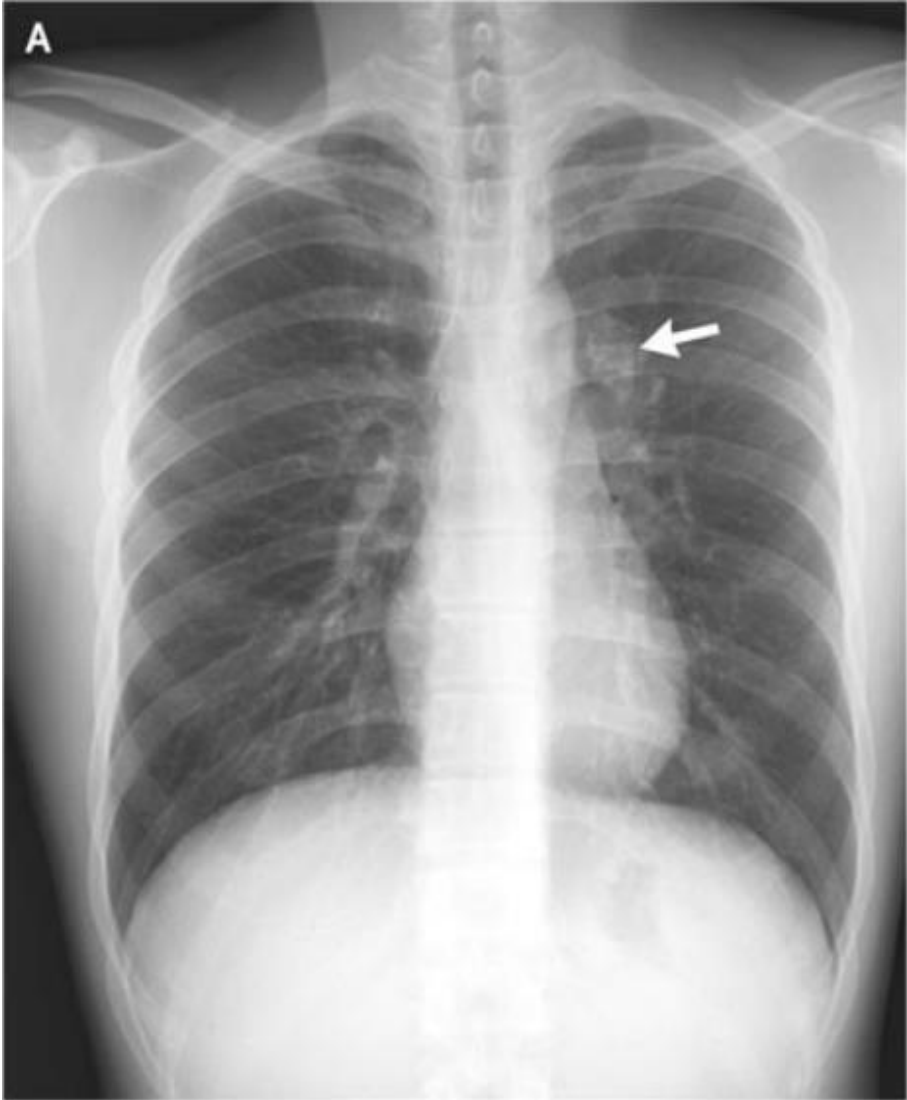


Central  
Calcification



Tuberculoma, central calcification

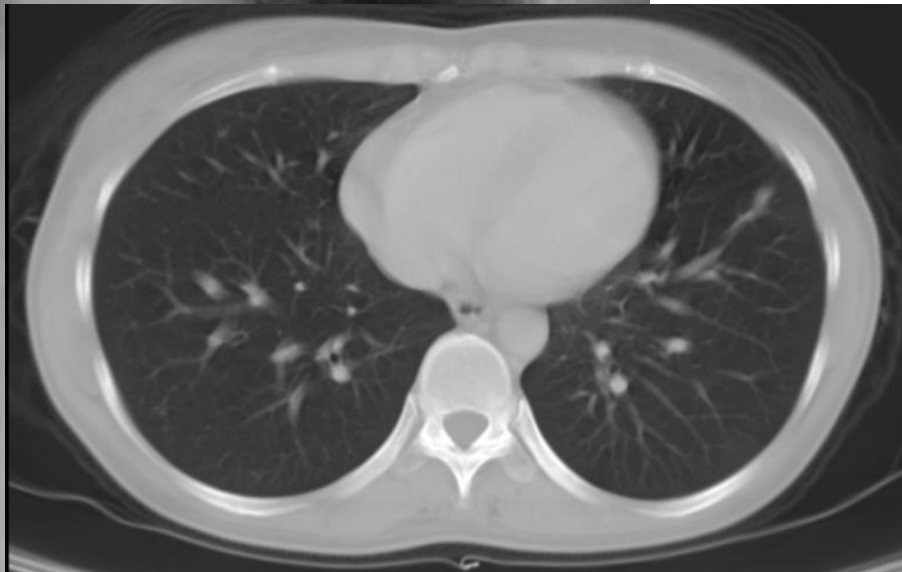
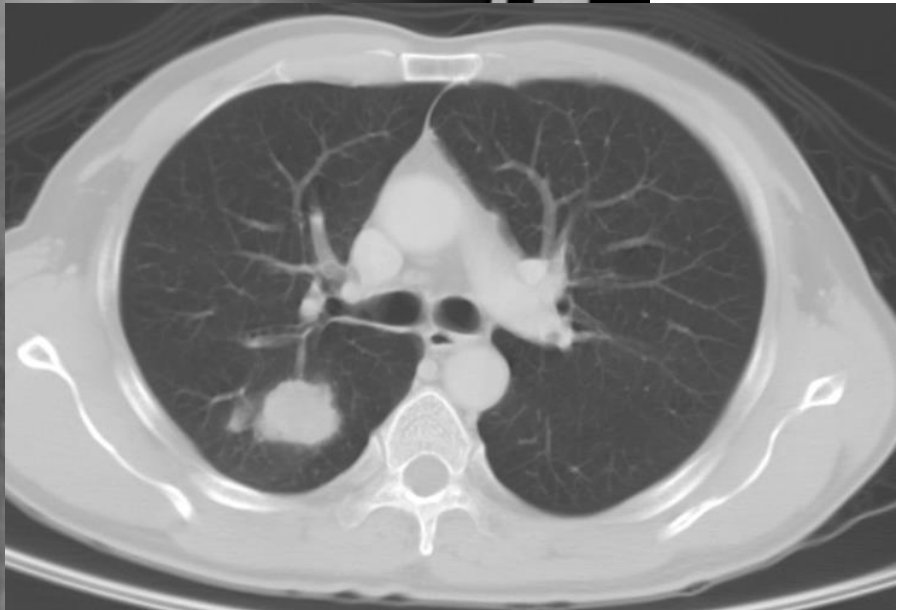
Popcorn Calcification



pulmonary chondroid hamartoma

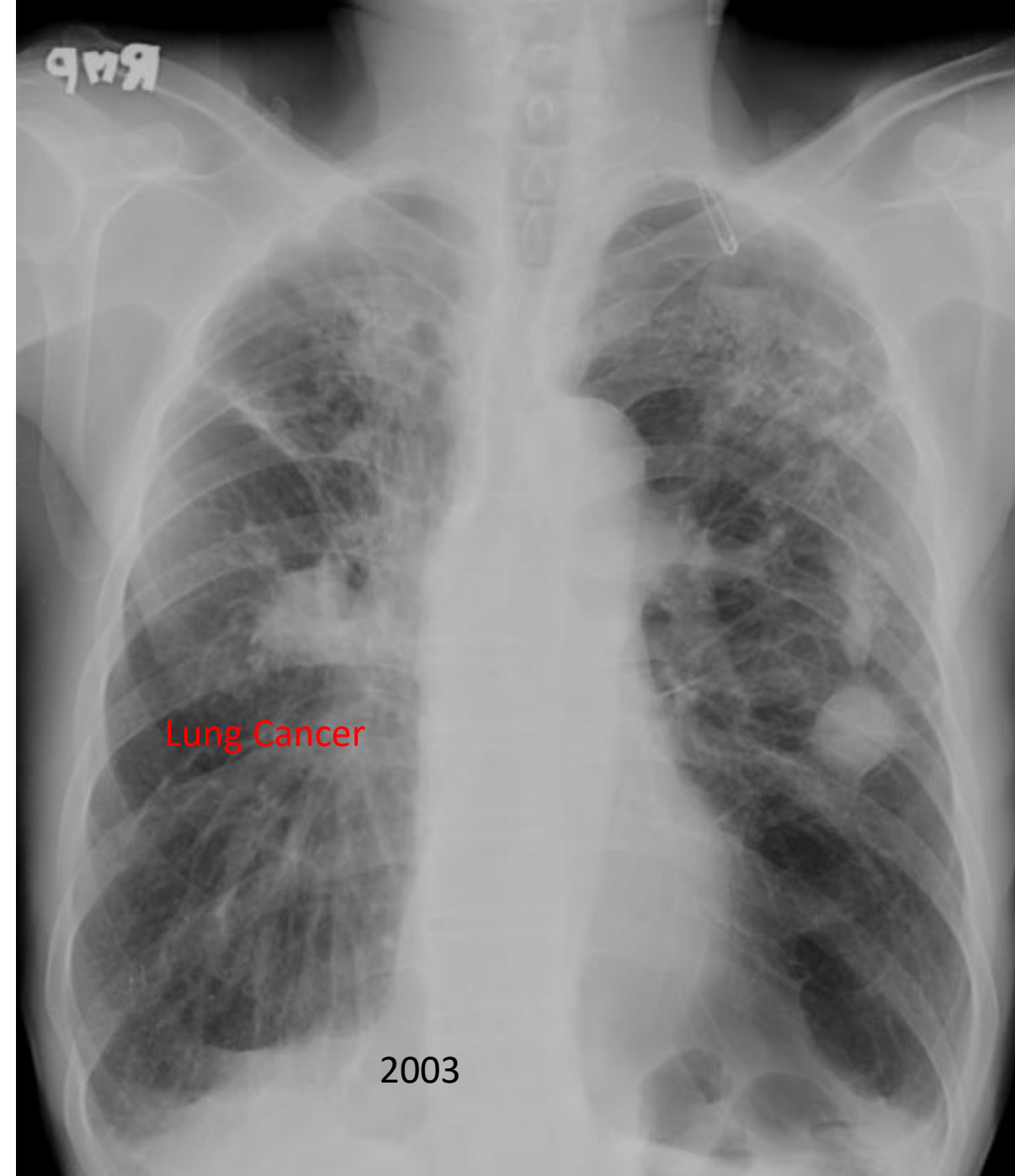


Lung cancer

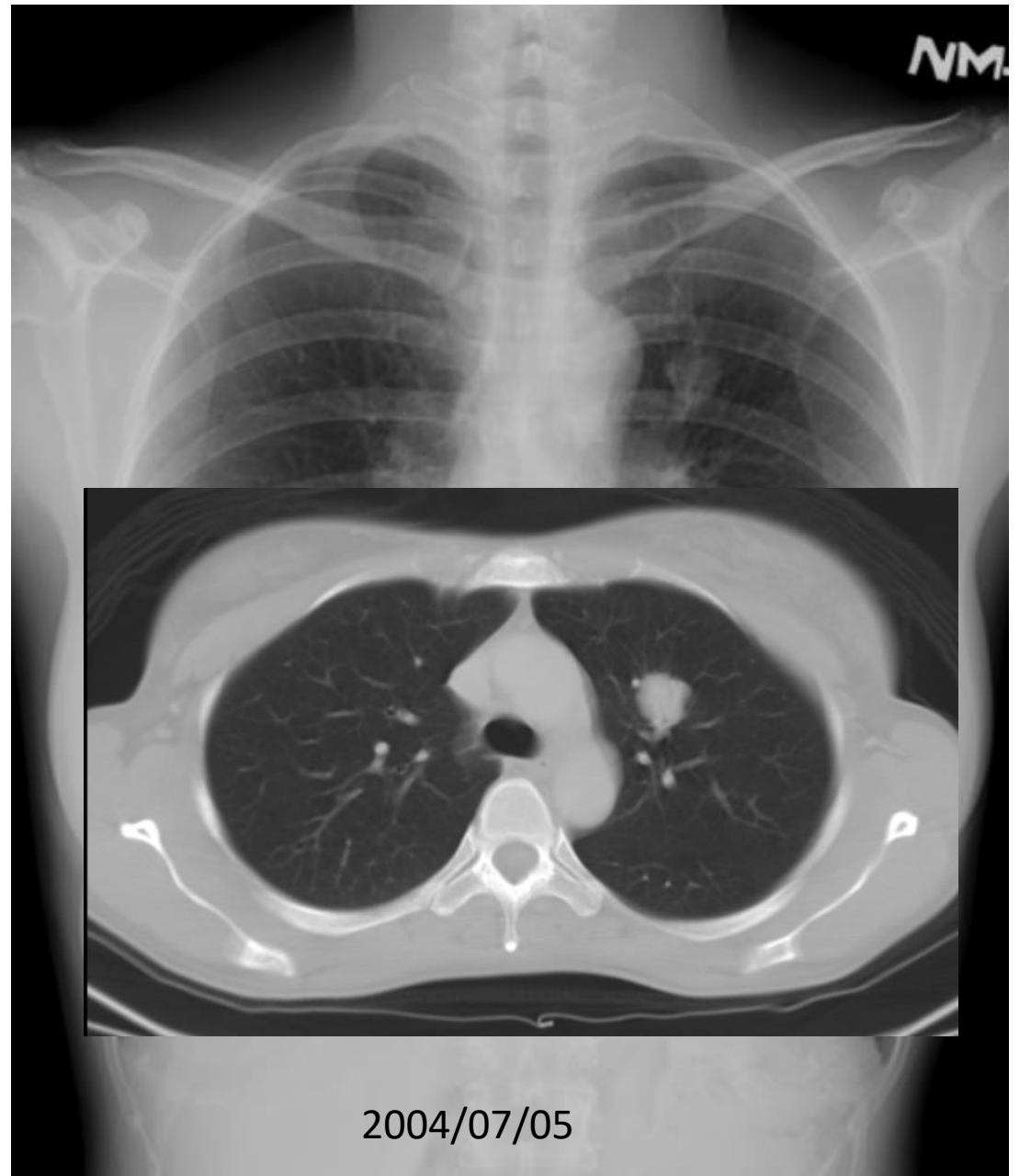


Colon cancer, lung metastasis





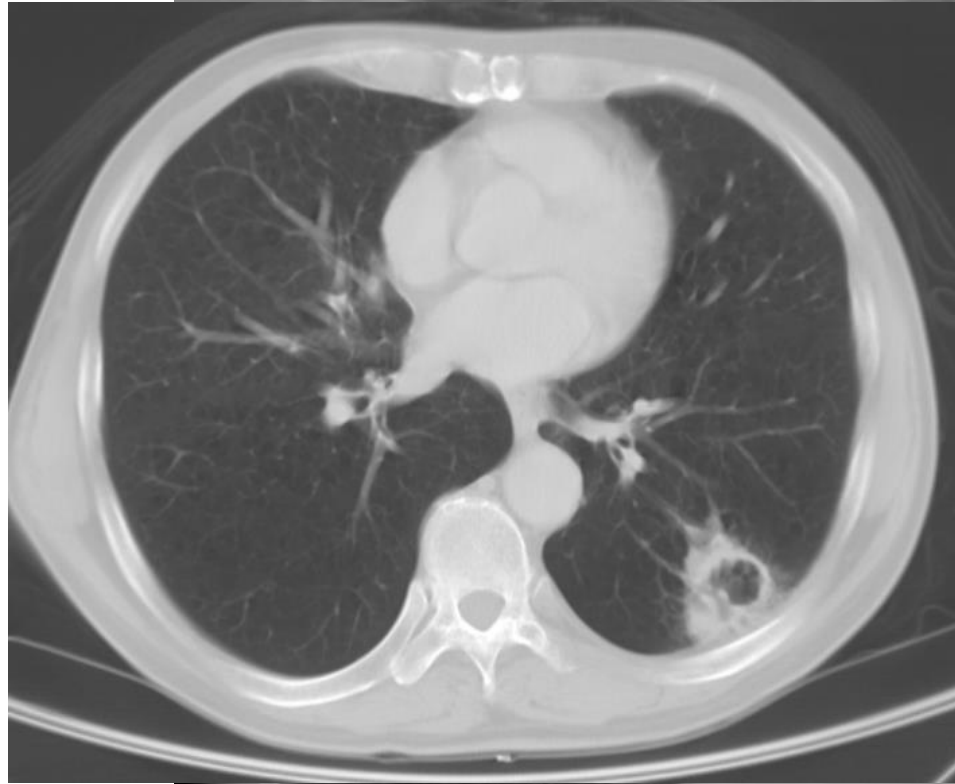




Gastric cancer with lung met

# Cavitation

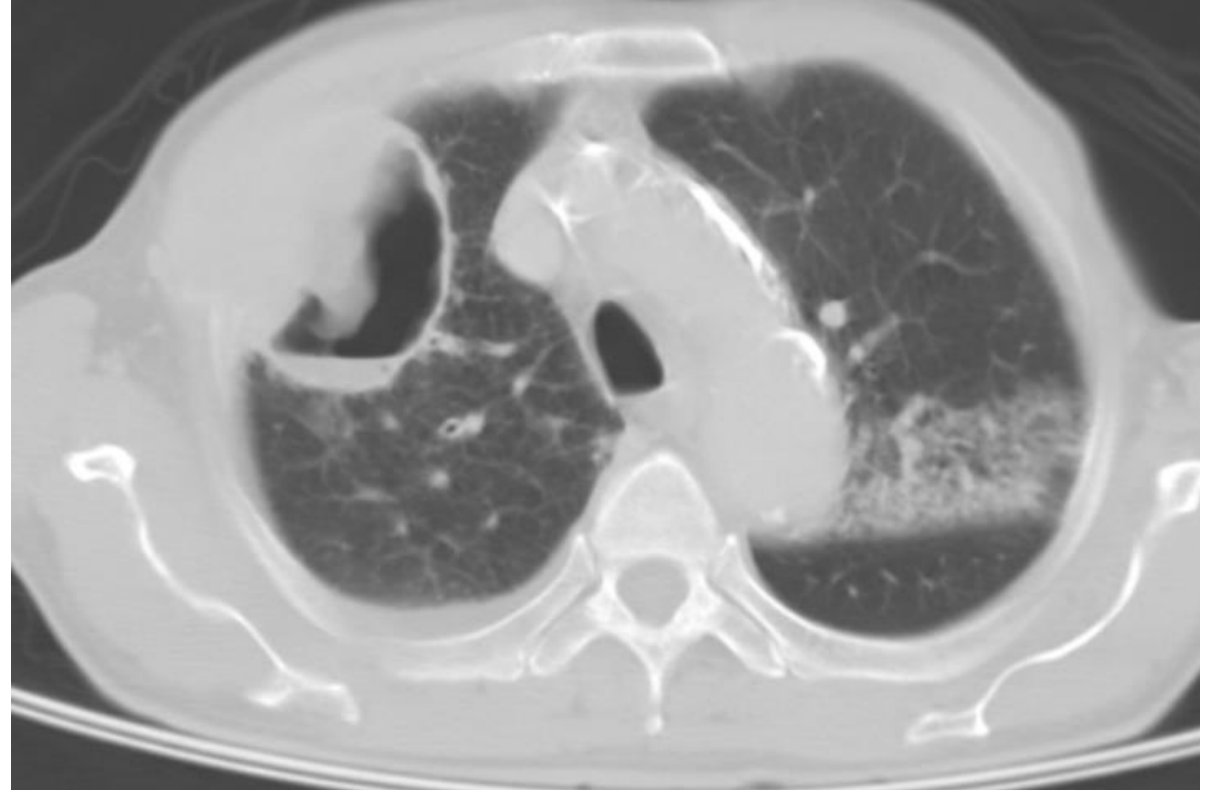
- Lung lesions became necrotic or caseous, the liquefied material is often expectorated and replaced with air
- Air Fluid level: If the necrotic material is only partially expelled, air and fluid remain in the cavity.
- Air Fluid level not seen On supine view
- Eccentric calcification: favor malignancy
- Wall thickness: <1mm benign, 1-4mm 90% benign, 5-15mm 50% benign, >15mm favor malignancy



LM

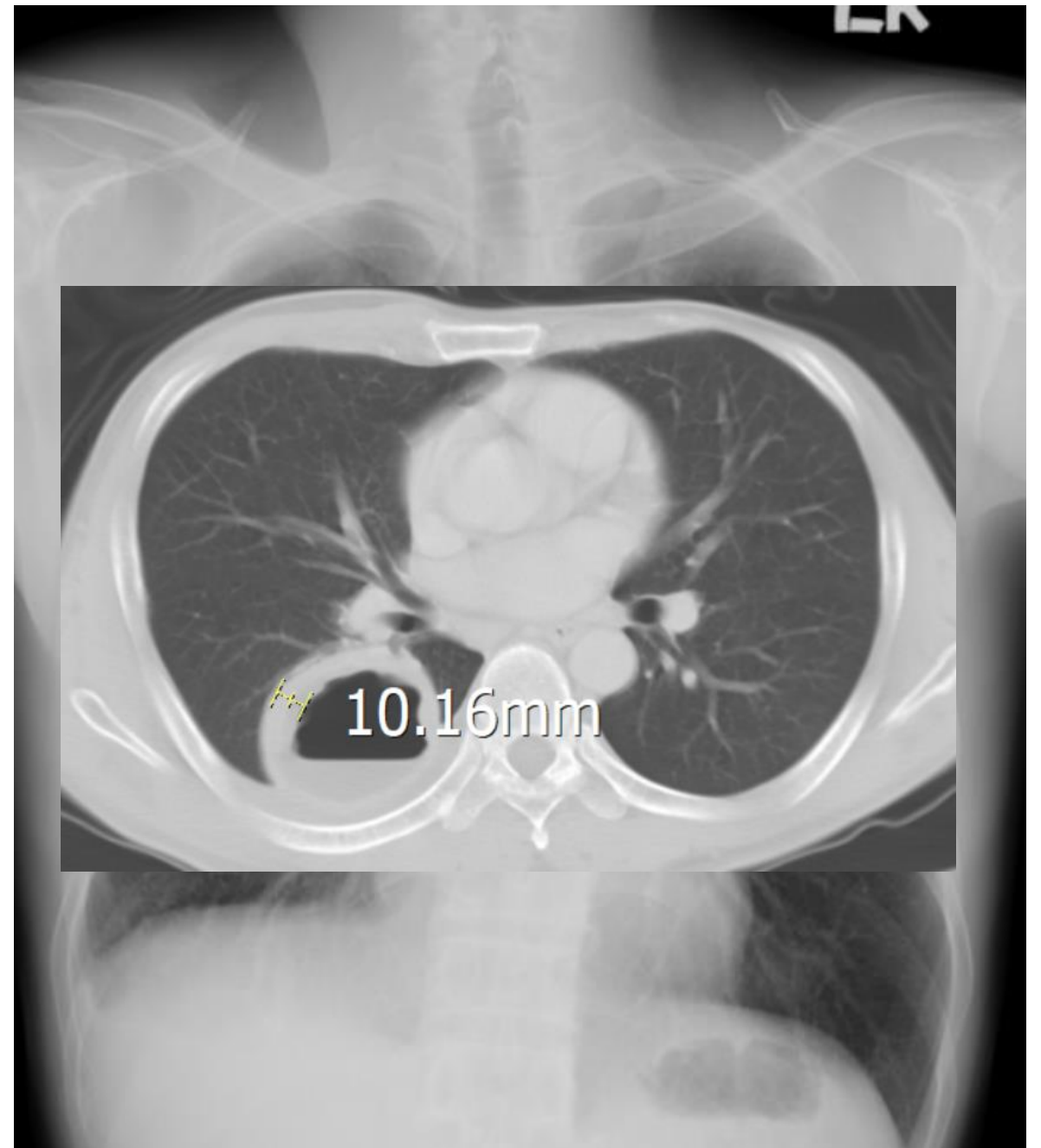
70 y/o M

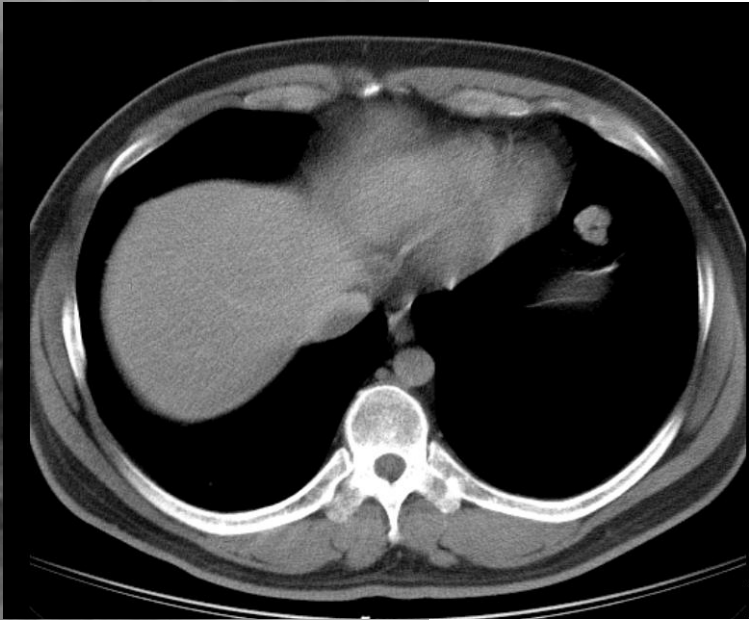
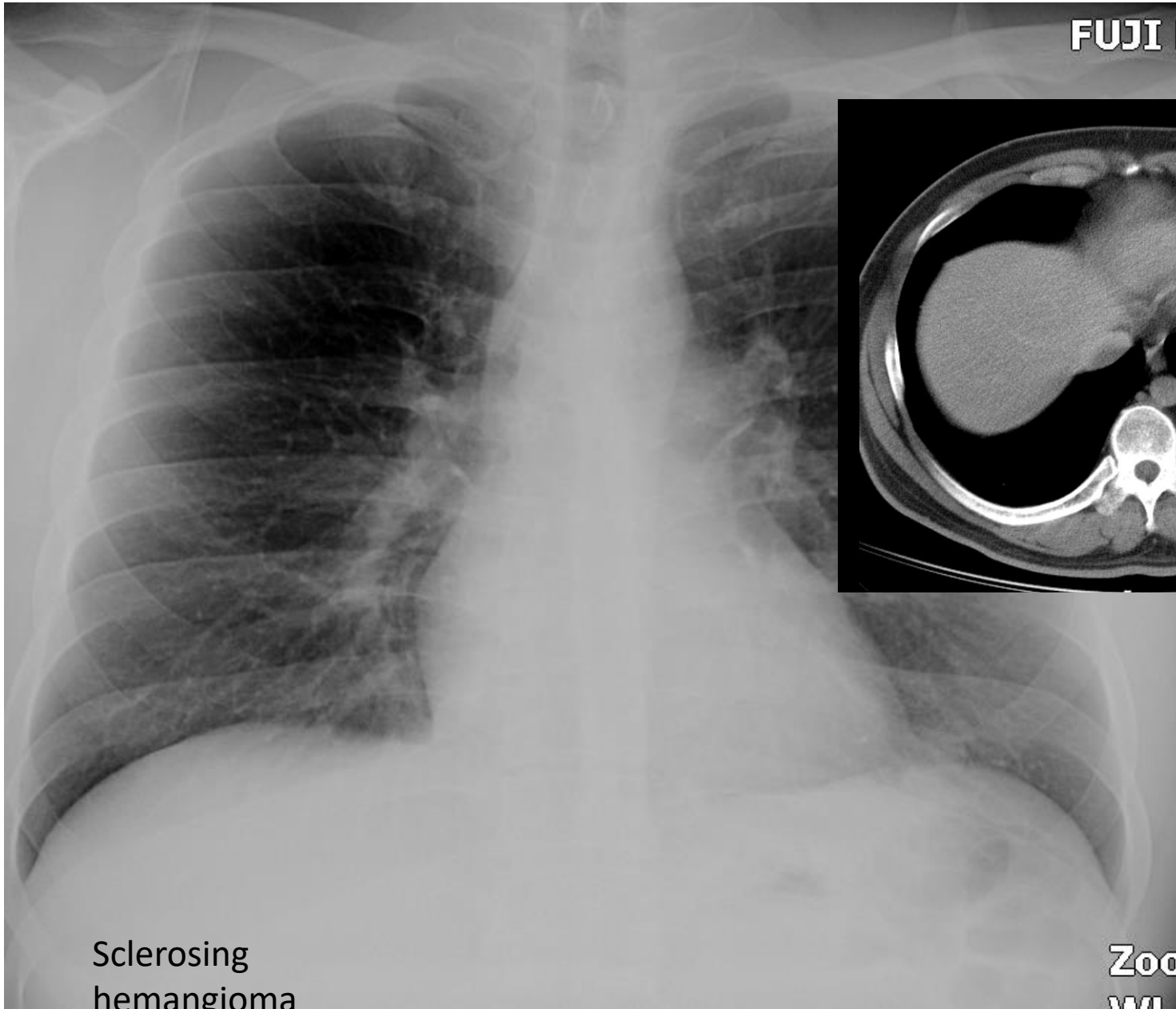
Lung cancer, LLL, SCC



Lung cancer, SCC

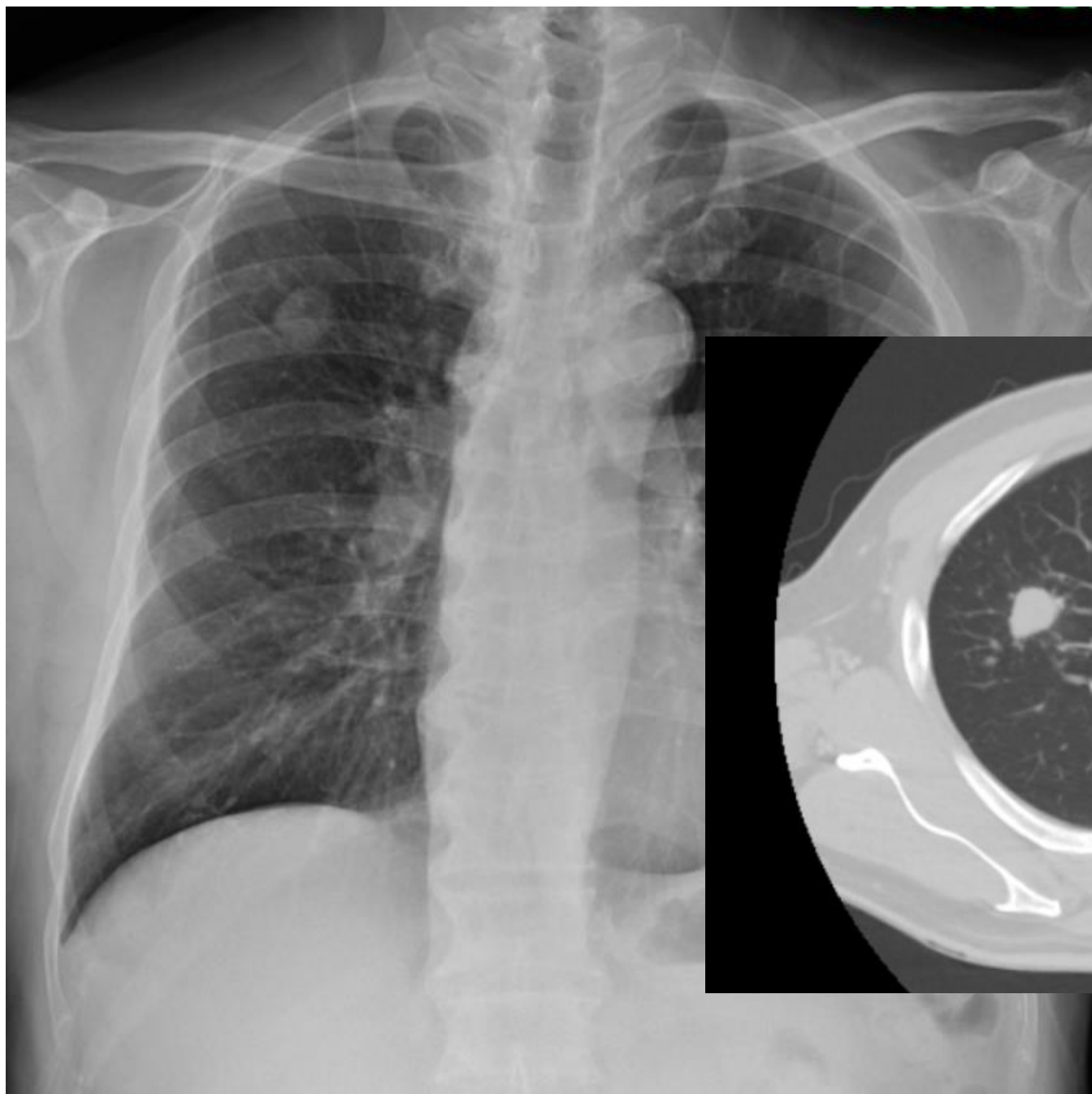
s/p antibiotics 2 months later



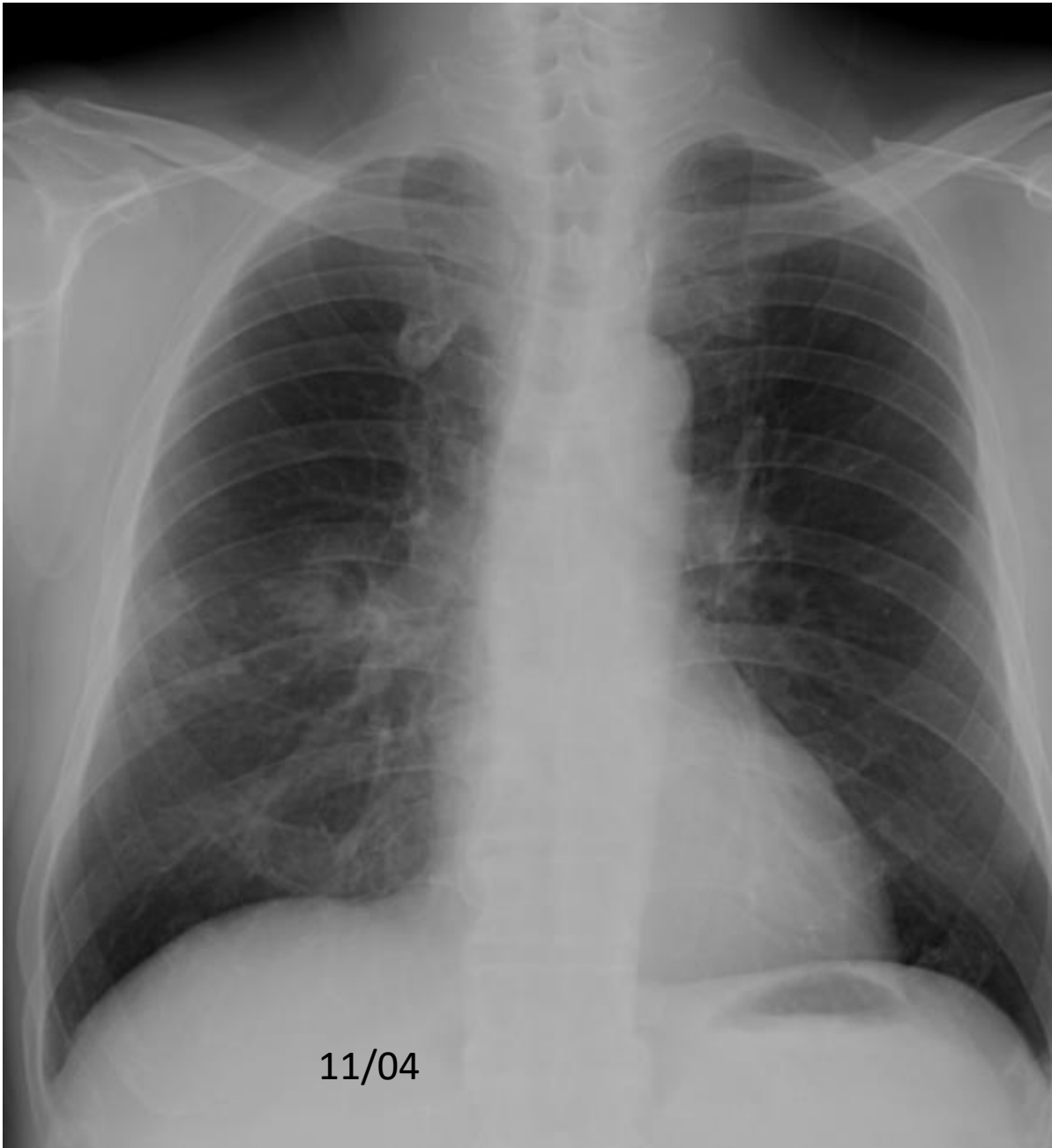


Accompanying signs

Satellite Lesion

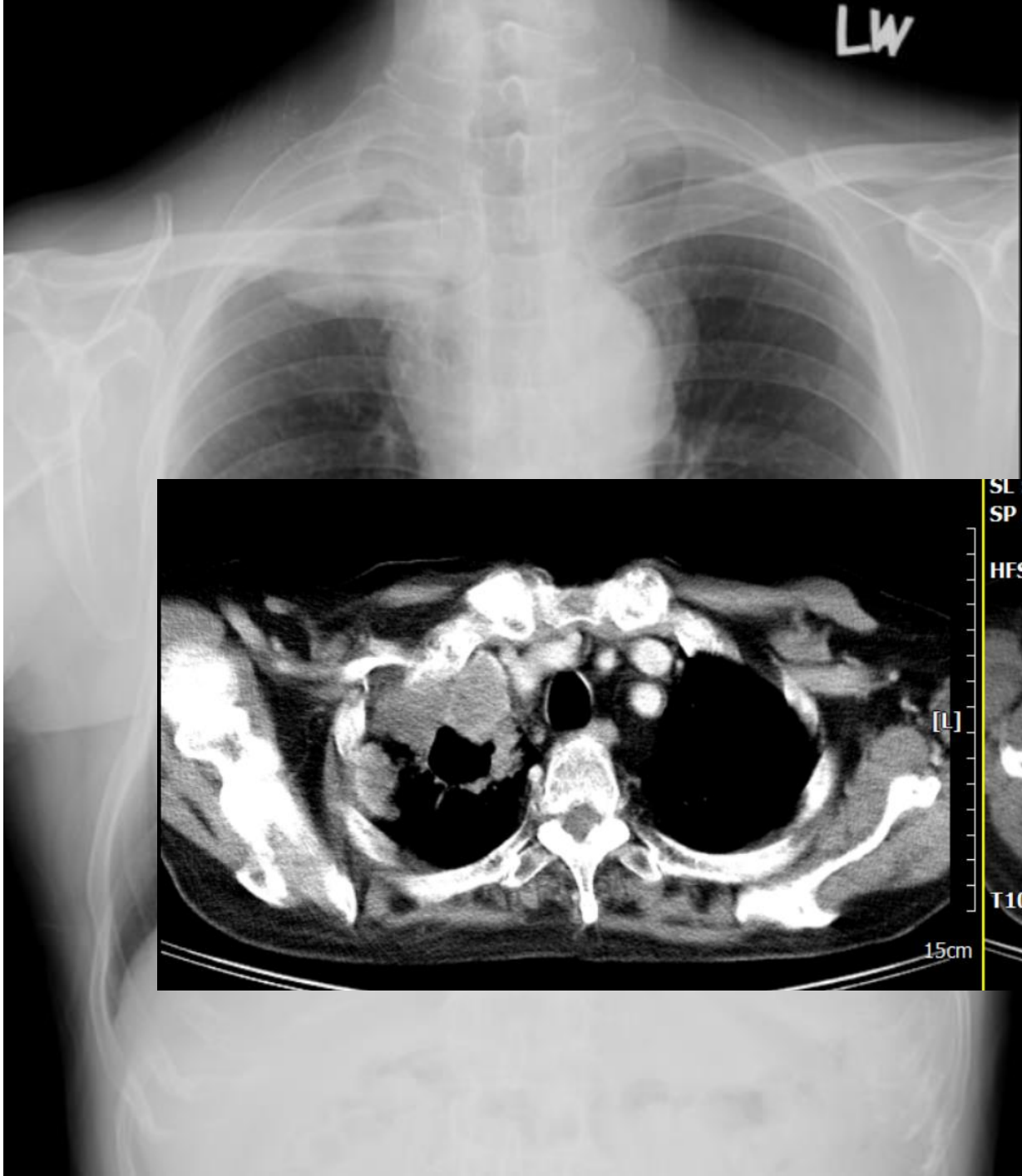






DM, pulmonary TB

Lymphadenopathy



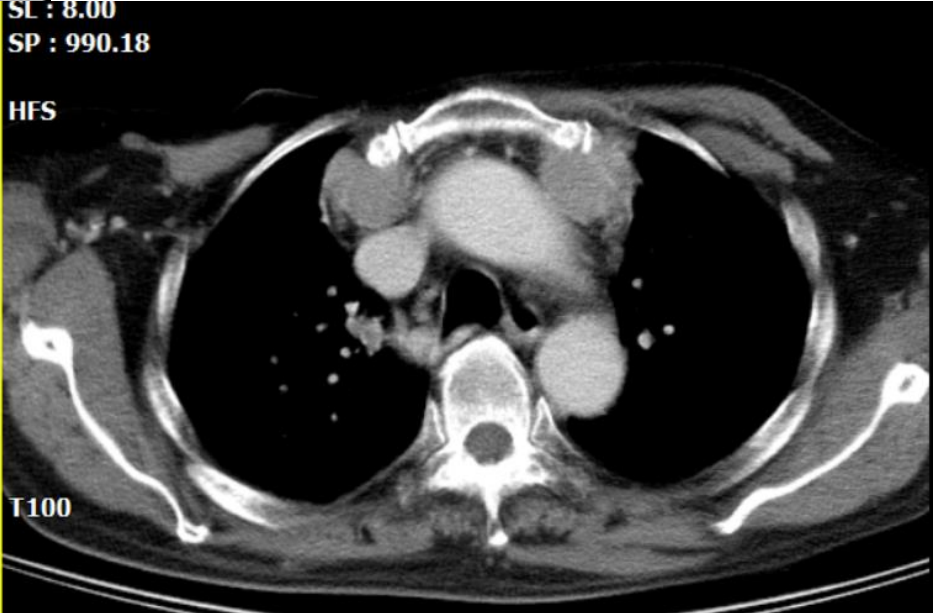
SL : 8.00  
SP : 990.18

HFS

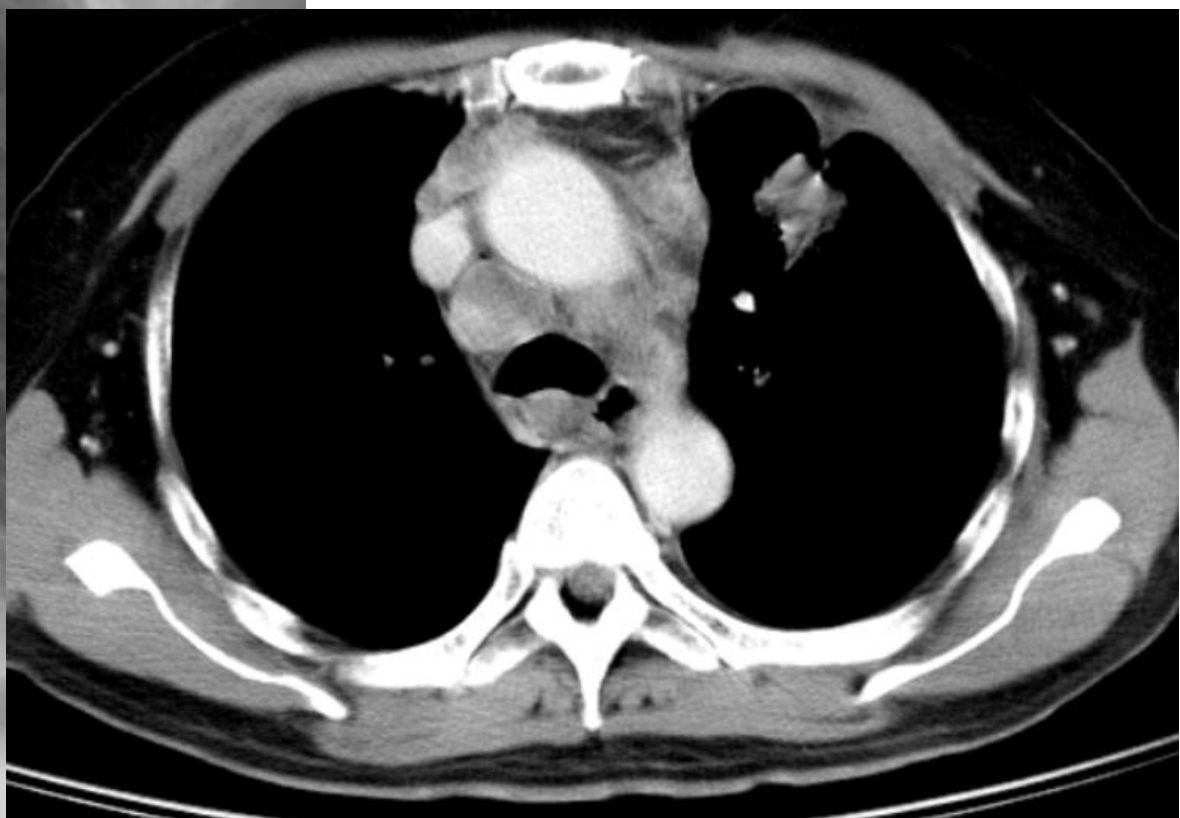
[L]

T100

15cm

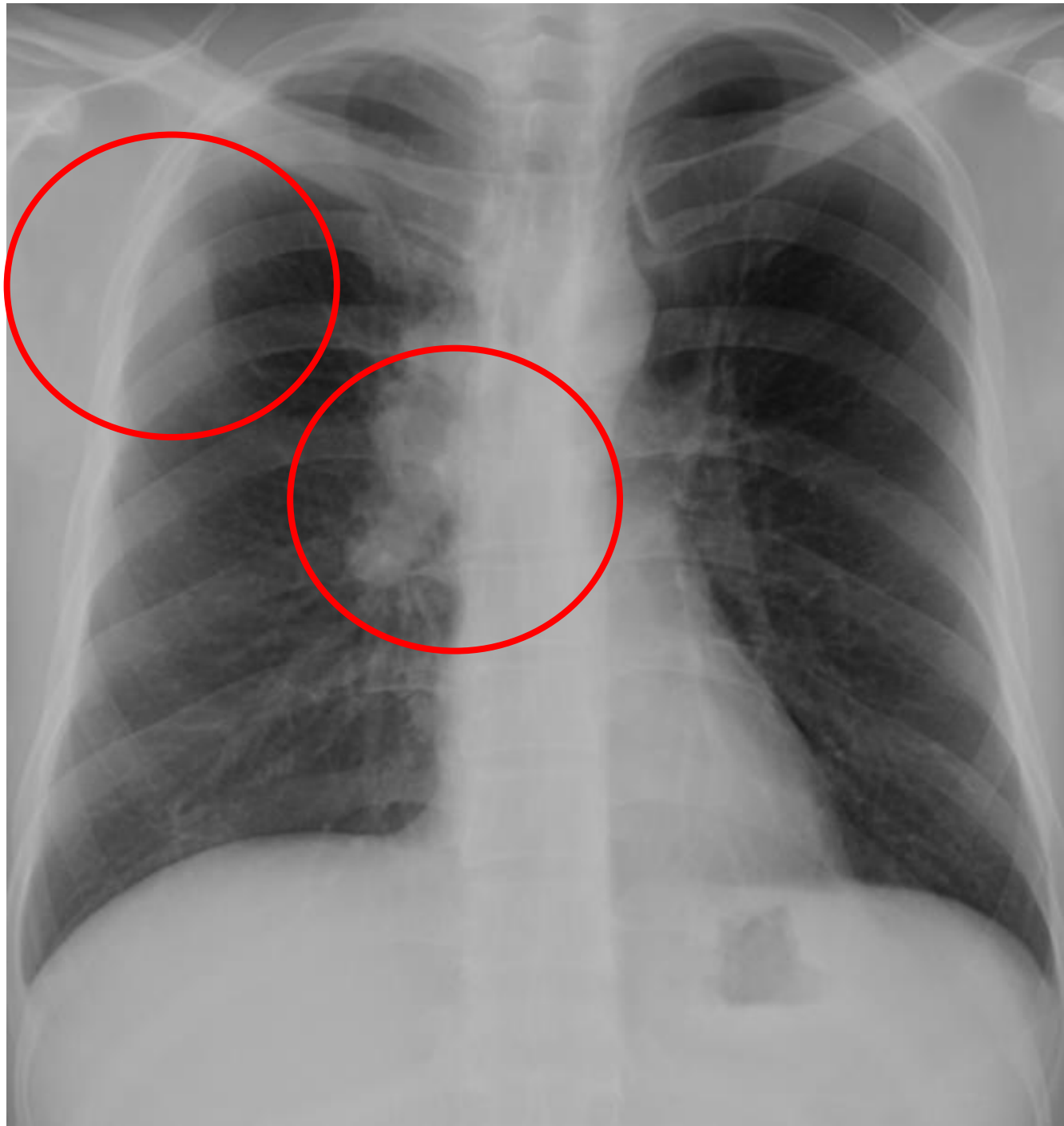


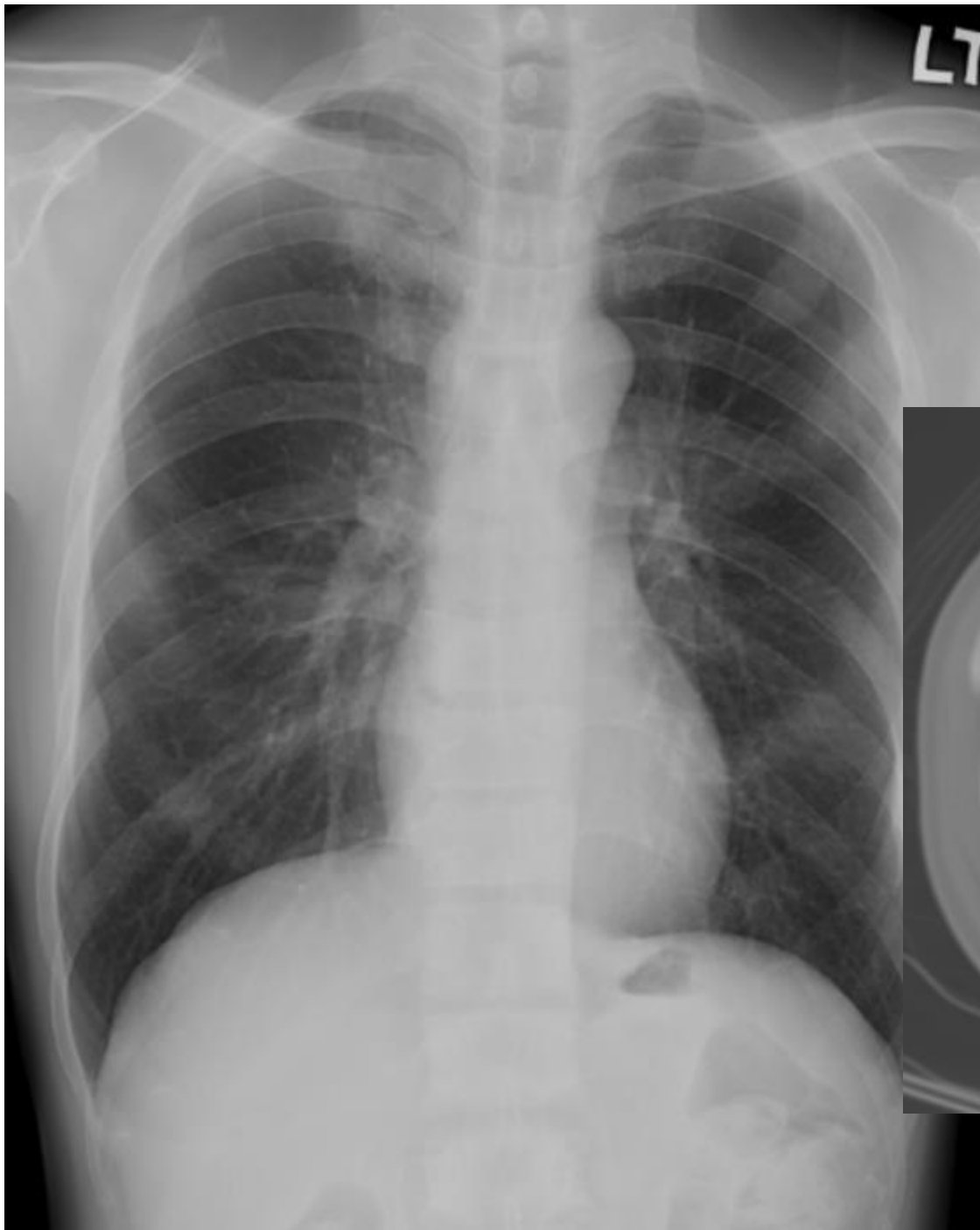
Lung cancer, SCC



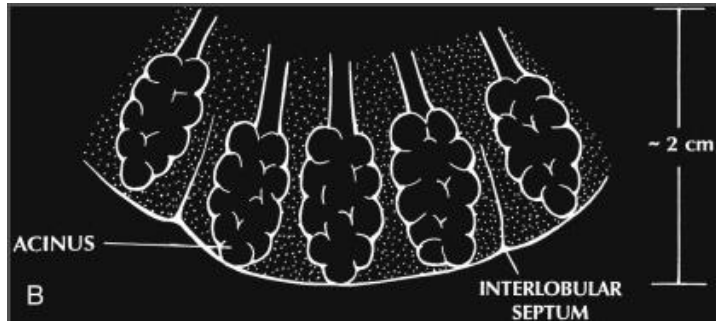
Bone Metastases



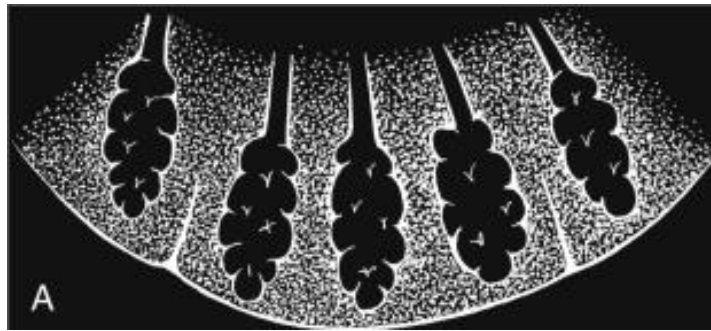




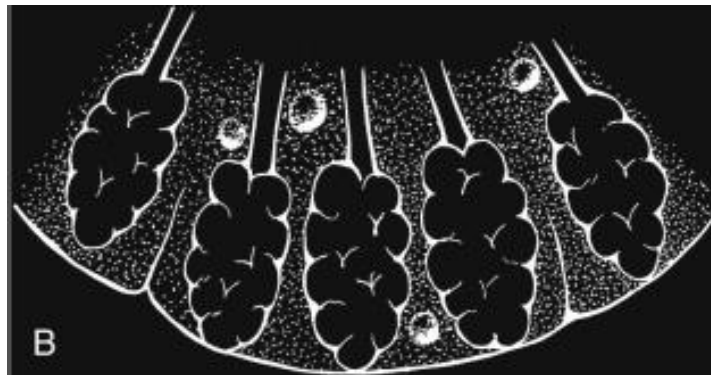
# Multiple Pulmonary Opacities



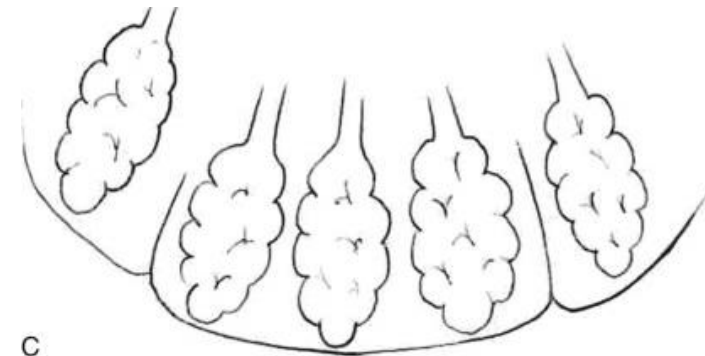
Normal



Linear Interstitial Thickening (Reticular)

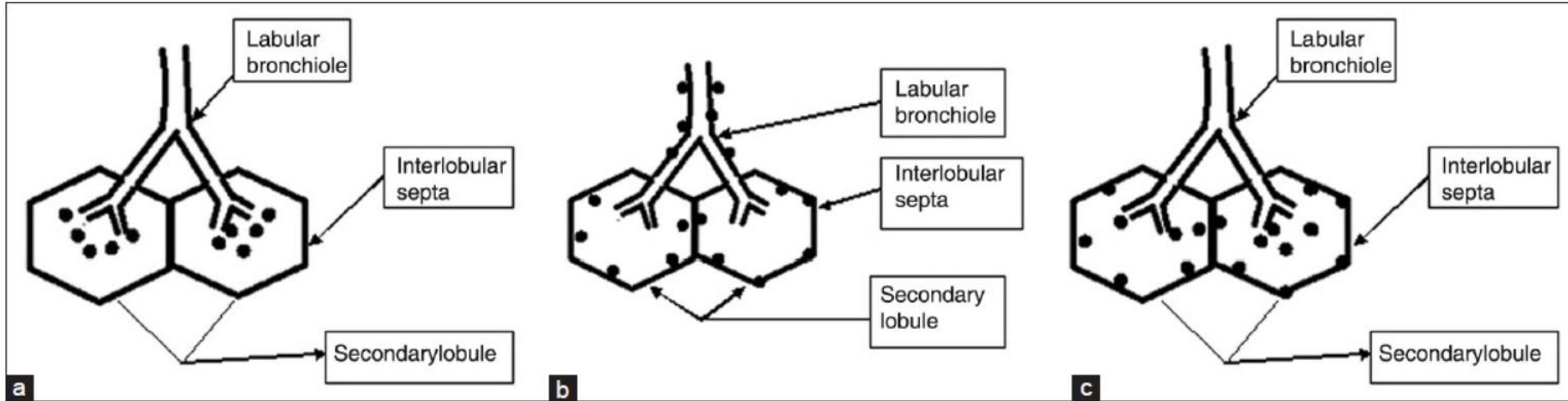


Nodular Interstitial Thickening



Alveolar Filling Disease





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### Centrilobular nodules

- Infectious bronchiolitis including tuberculosis.
- Pneumoconiosis
- Diffuse panbronchiolitis.
- Vasculitis and vascular metastases.
- Respiratory bronchiolitis-interstitial lung disease.
- Hypersensitivity pneumonitis

### Perilymphatic

- Sarcoidosis
- Silicosis, coal worker's pneumoconiosis
- Lymphangitic carcinomatosis
- Amyloidosis
- Lymphoid interstitial pneumonia

### Random

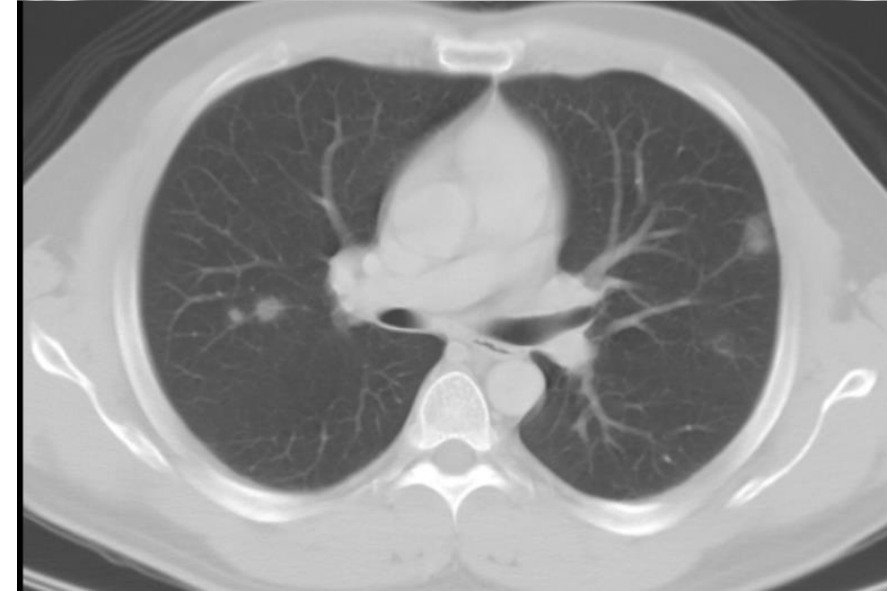
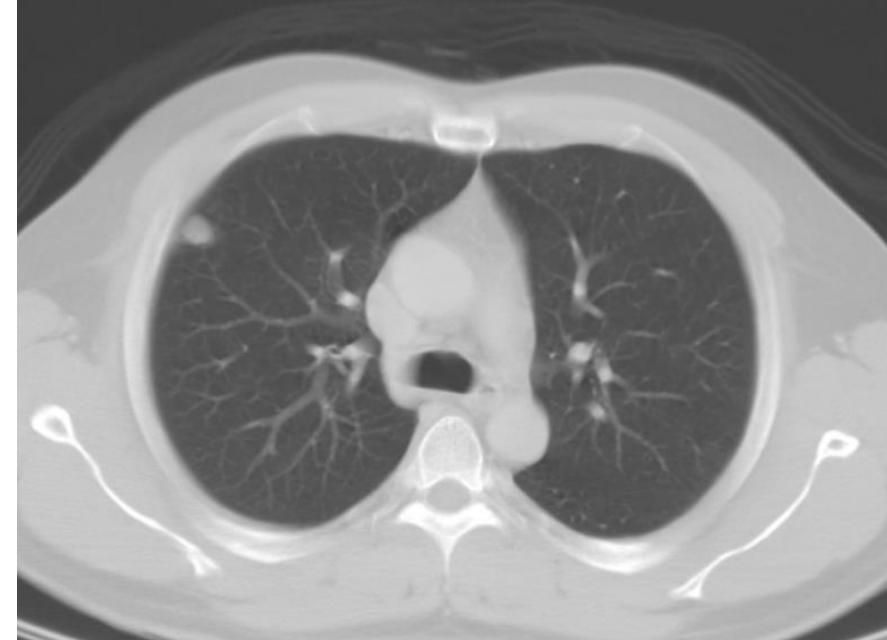
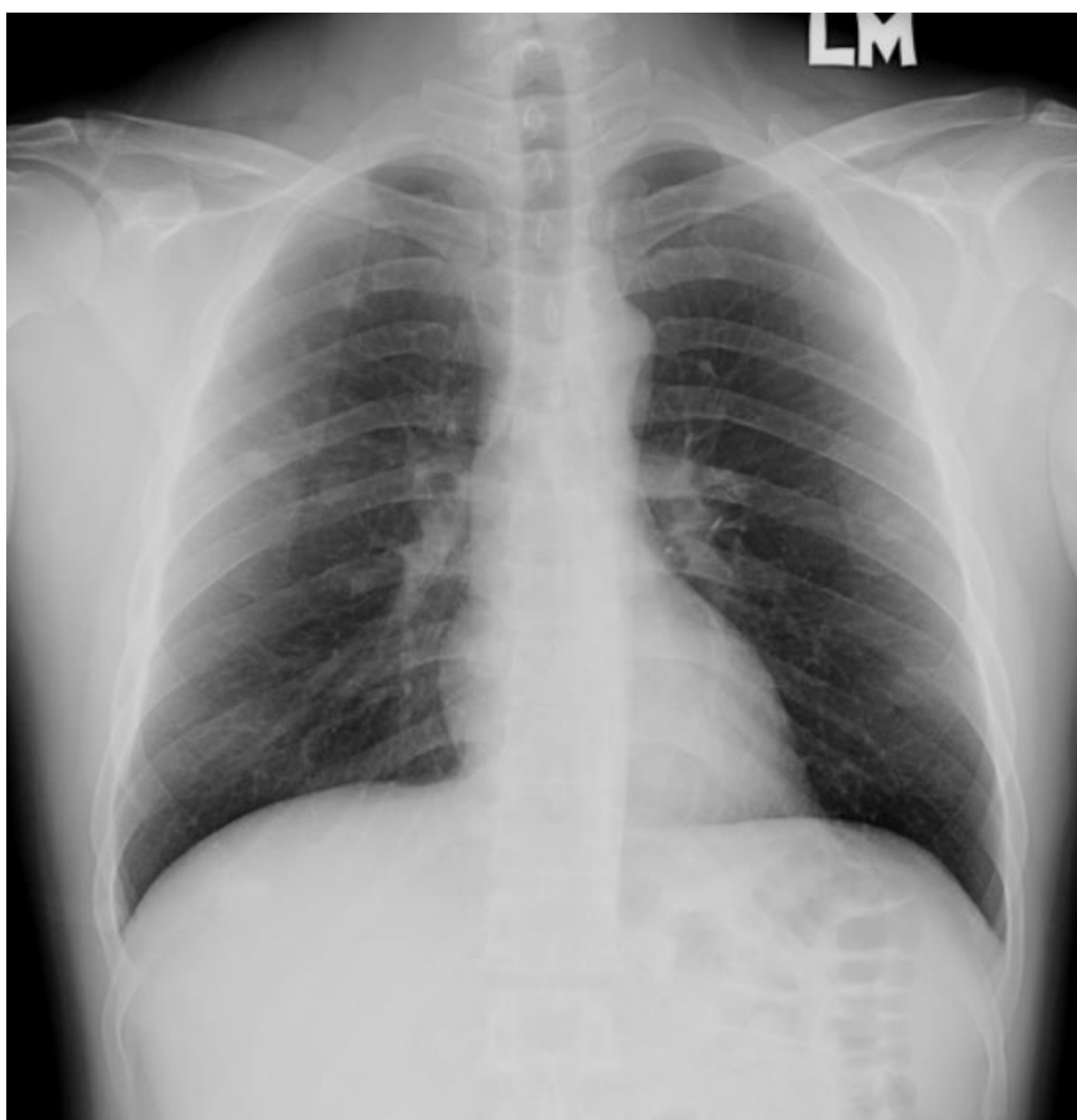
- Miliary tuberculosis
- Fungal infection
- Metastasis

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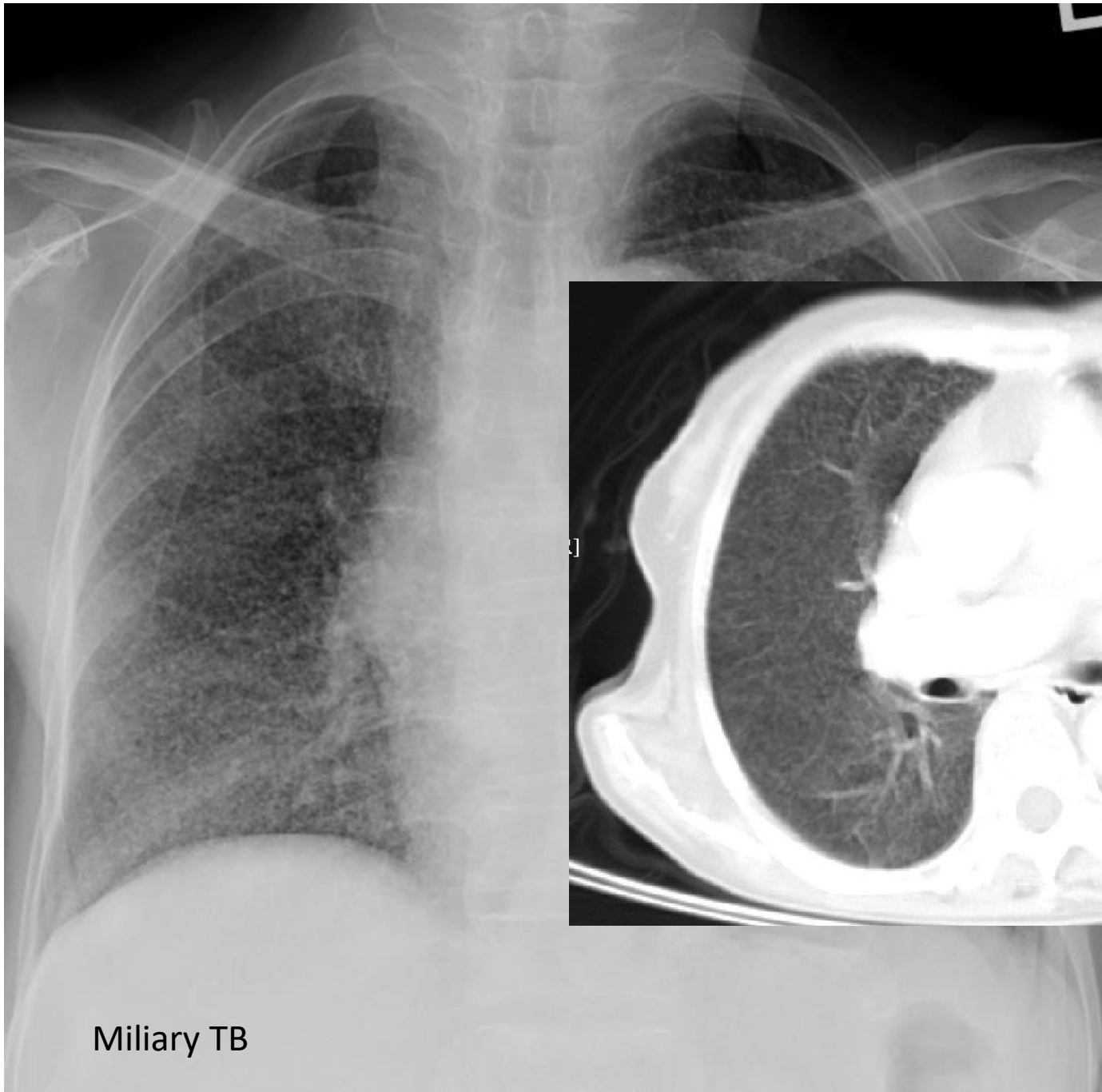
HRCT = High-resolution computed tomography



Lung cancer, LLL, lung to lung meta.



Radom, oseteosarcoma,  
met

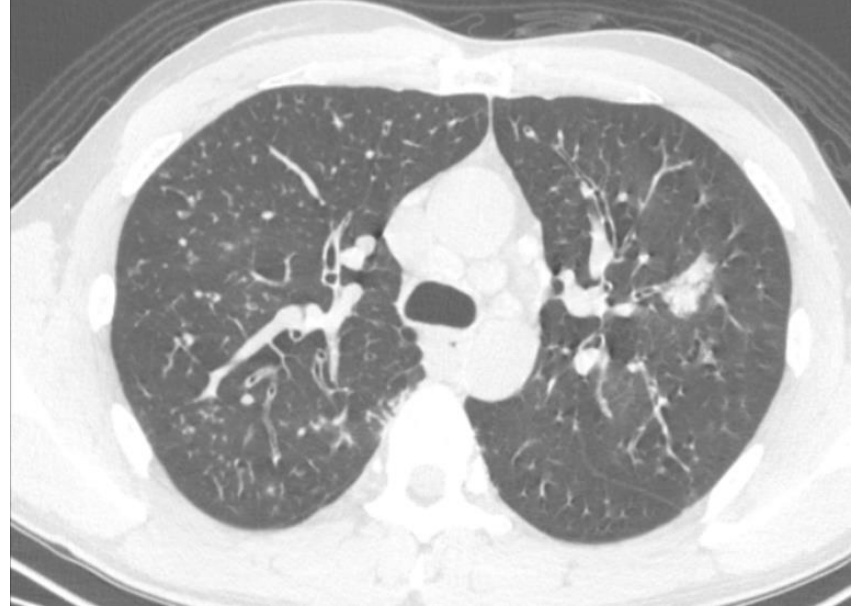


78 y/o Female

Miliary TB

69613789



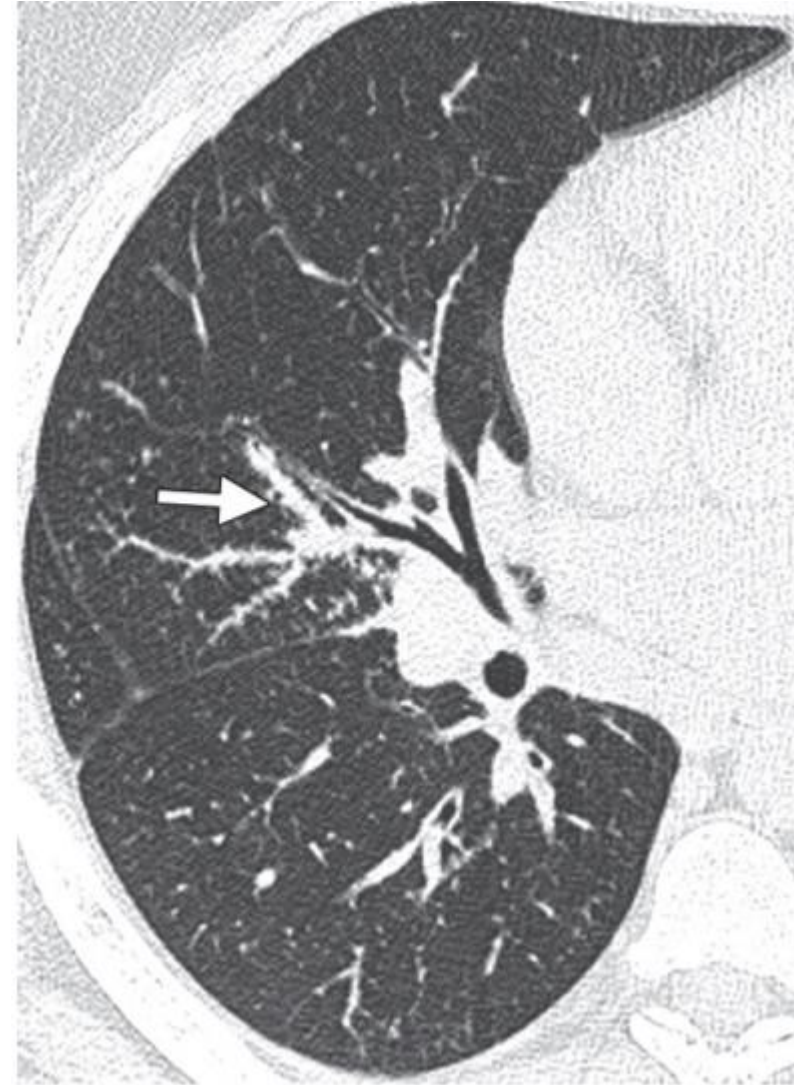


Centrilobular nodules  
Bronchiectasis  
DPB



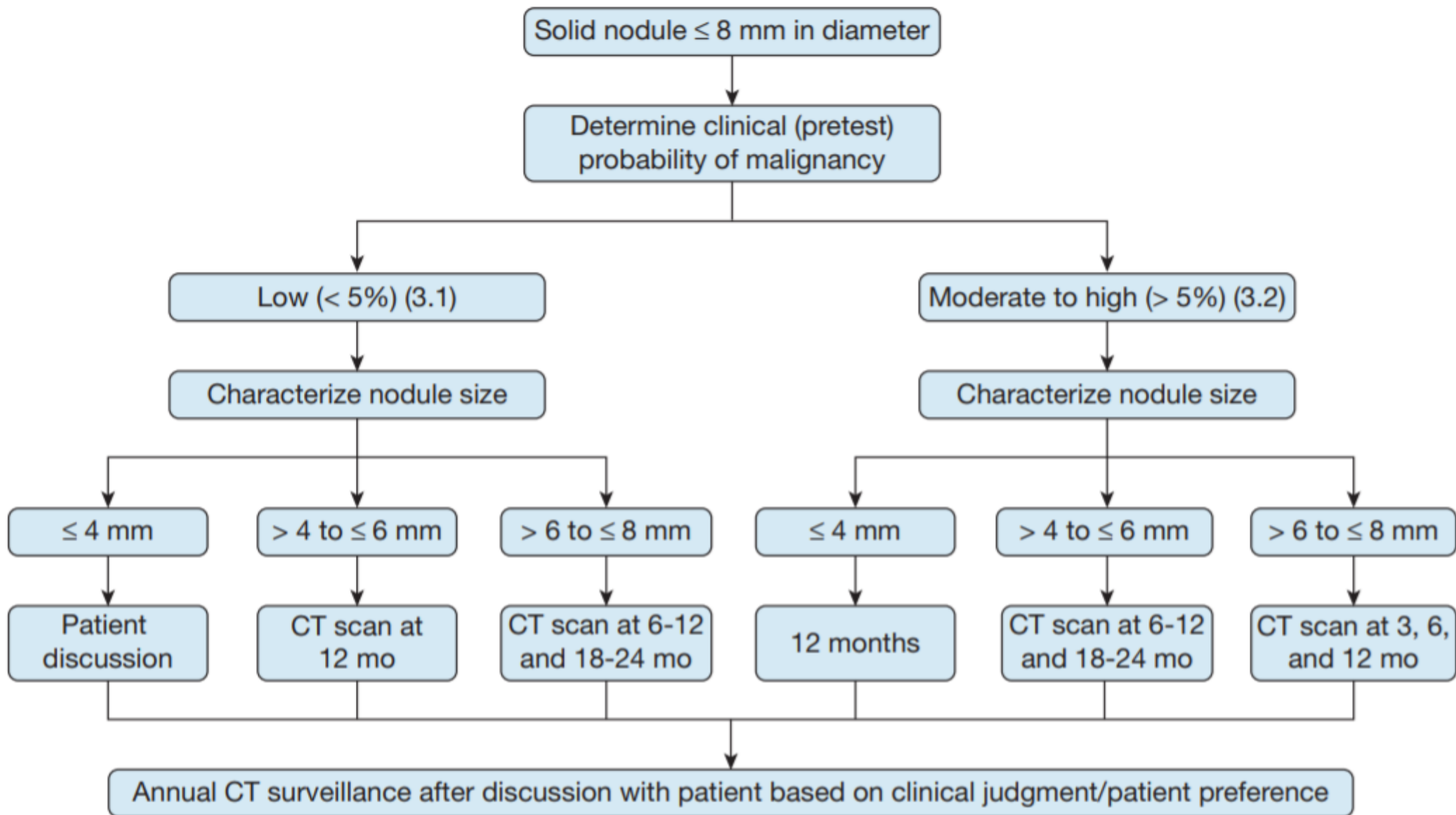
## Staging of Sarcoidosis on the Basis of Chest Radiographs

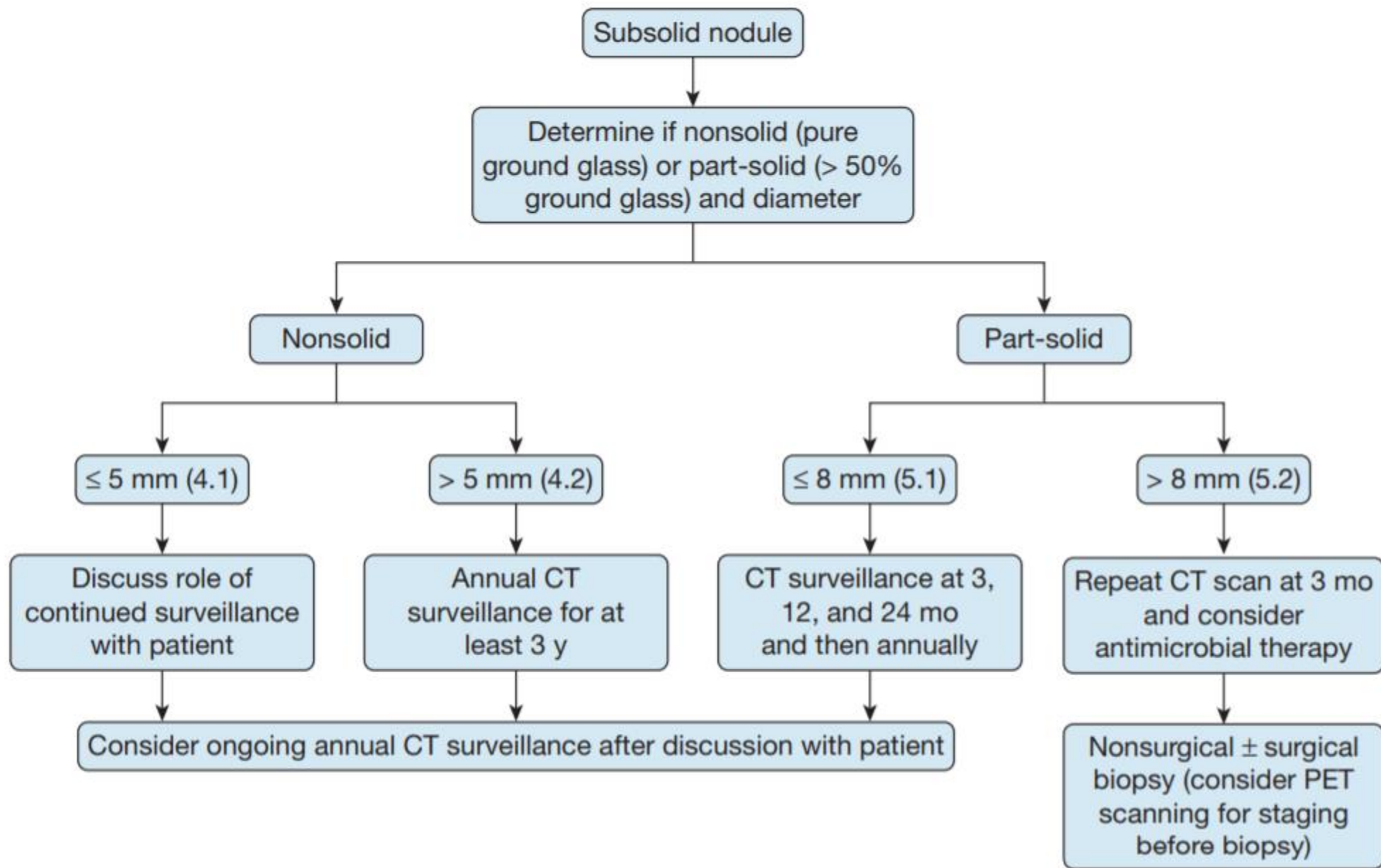
|         |                                                   |                                                    |
|---------|---------------------------------------------------|----------------------------------------------------|
| STAGE 0 | No abnormalities                                  | 5%–10%                                             |
| STAGE 1 | Lymphadenopathy (fig. A)                          | 50%                                                |
| STAGE 2 | Lymphadenopathy + pulmonary infiltration (fig. B) | 25%–30%                                            |
| STAGE 3 | Pulmonary infiltration (fig. C)                   | 10%–12%                                            |
| STAGE 4 | Fibrosis                                          | 5%<br>(up to 25% during the course of the disease) |



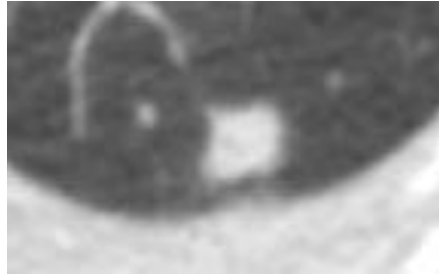




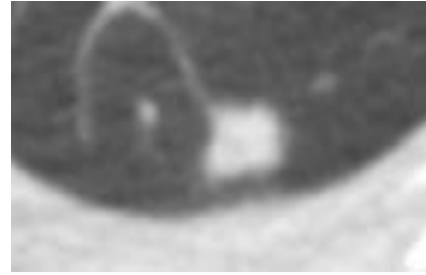




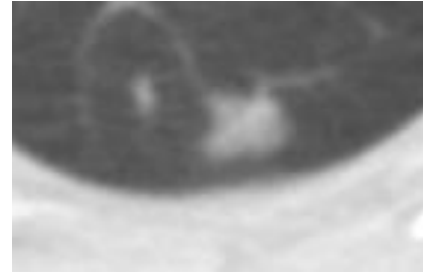
# CT density of the solid nodule different slice thickness



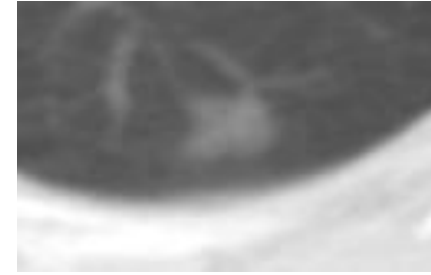
Slice thickness: **1.2 mm**  
CT density : -10 HU



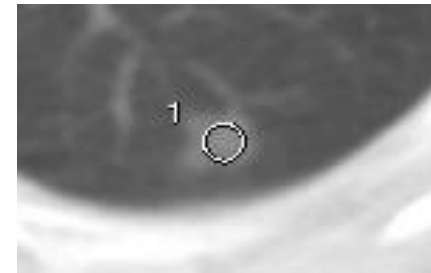
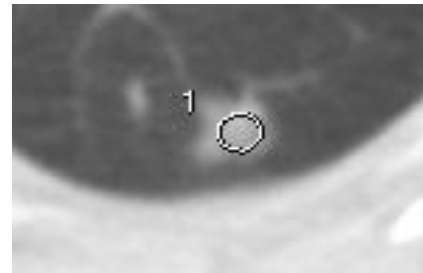
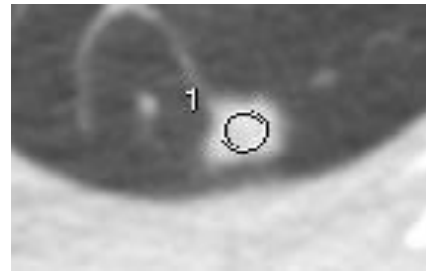
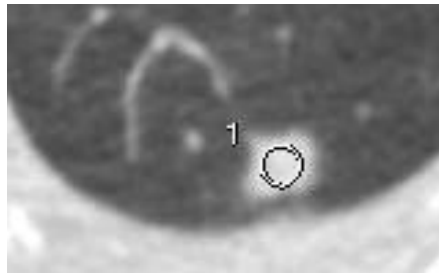
Slice thickness: **2.5 mm**  
CT density : -17 HU



Slice thickness: **5 mm**  
CT density : --304 HU



Slice thickness: **10 mm**  
CT density : --549 HU



**GGN < -300 HU**

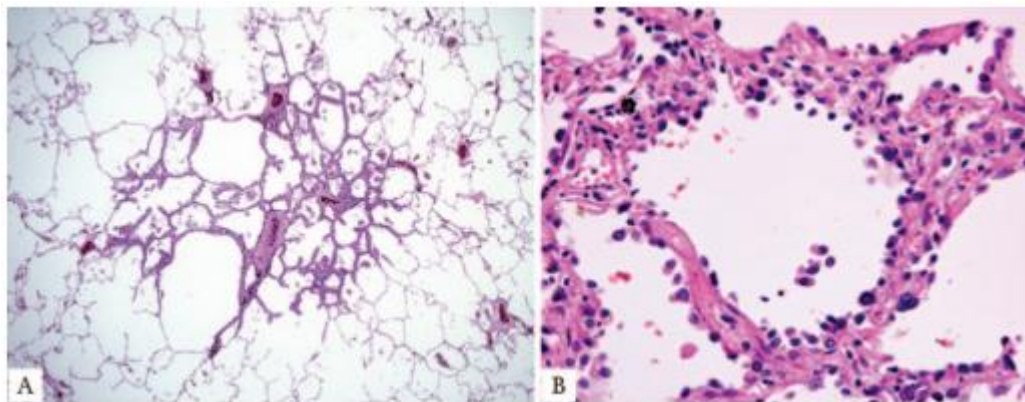
**Solid Nodule > - 300 HU**



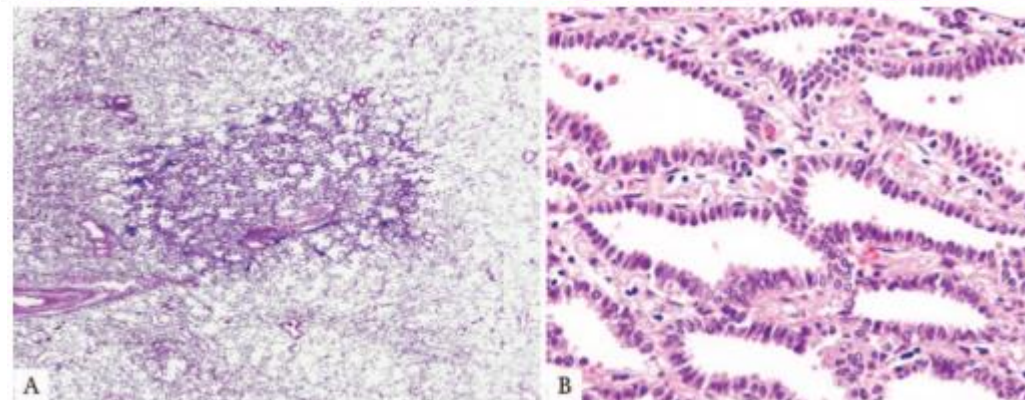
癌前病變 AAH

低倍

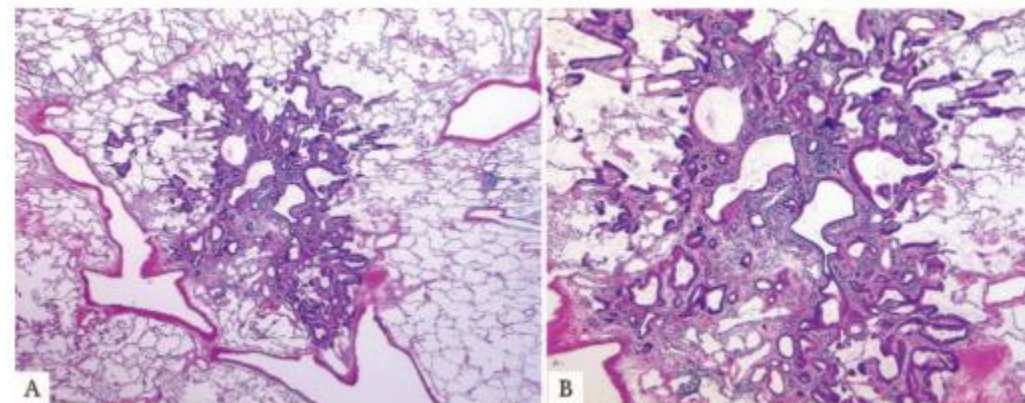
高倍



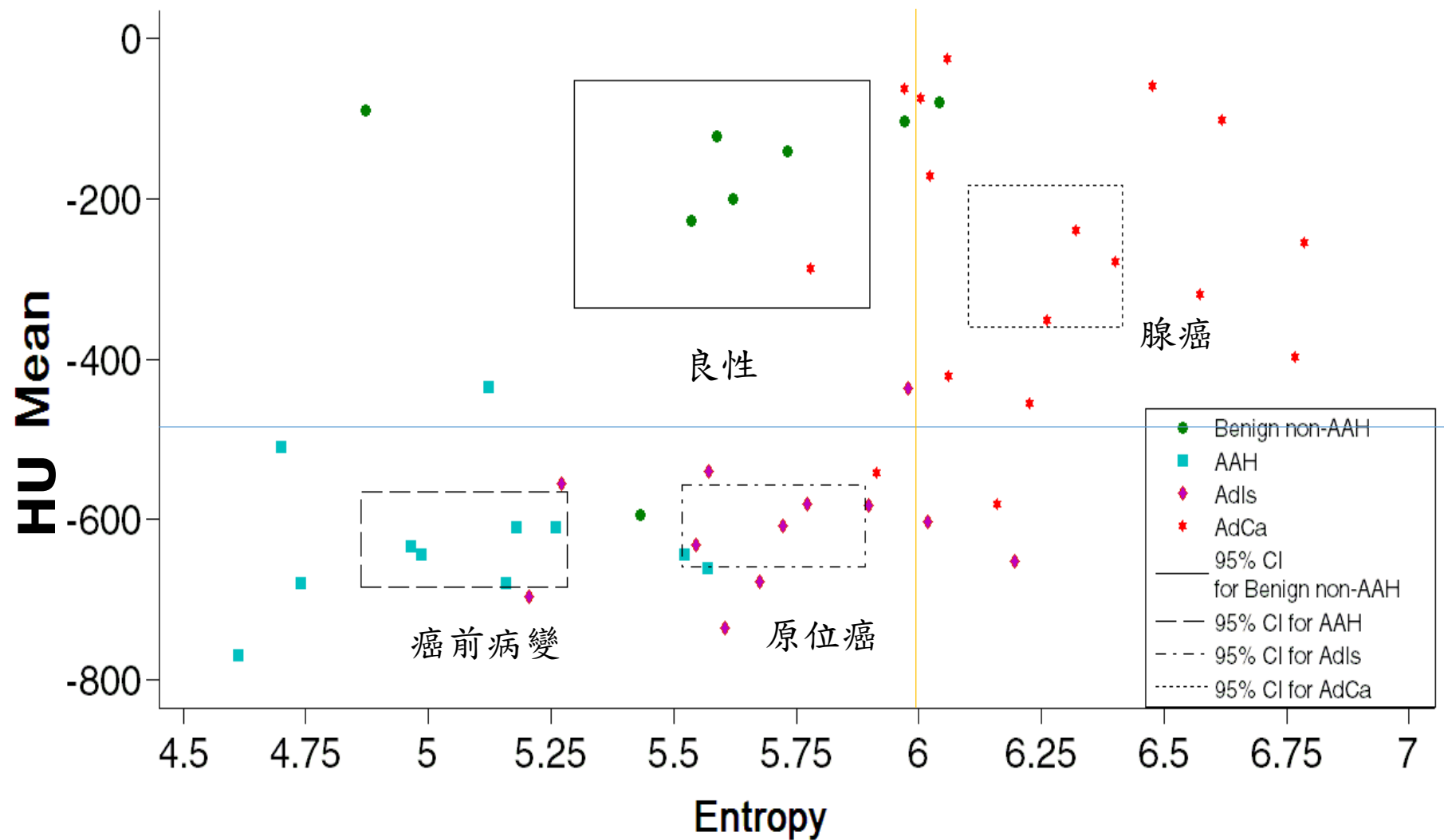
原位癌 AIS



侵襲癌



# Feature plane



Shen WC, Chen CY, Yu YH. Density features of screened lung tumors in low-dose computed tomography. *Acad Radiol.* 2014 Jan;21(1):41-51.

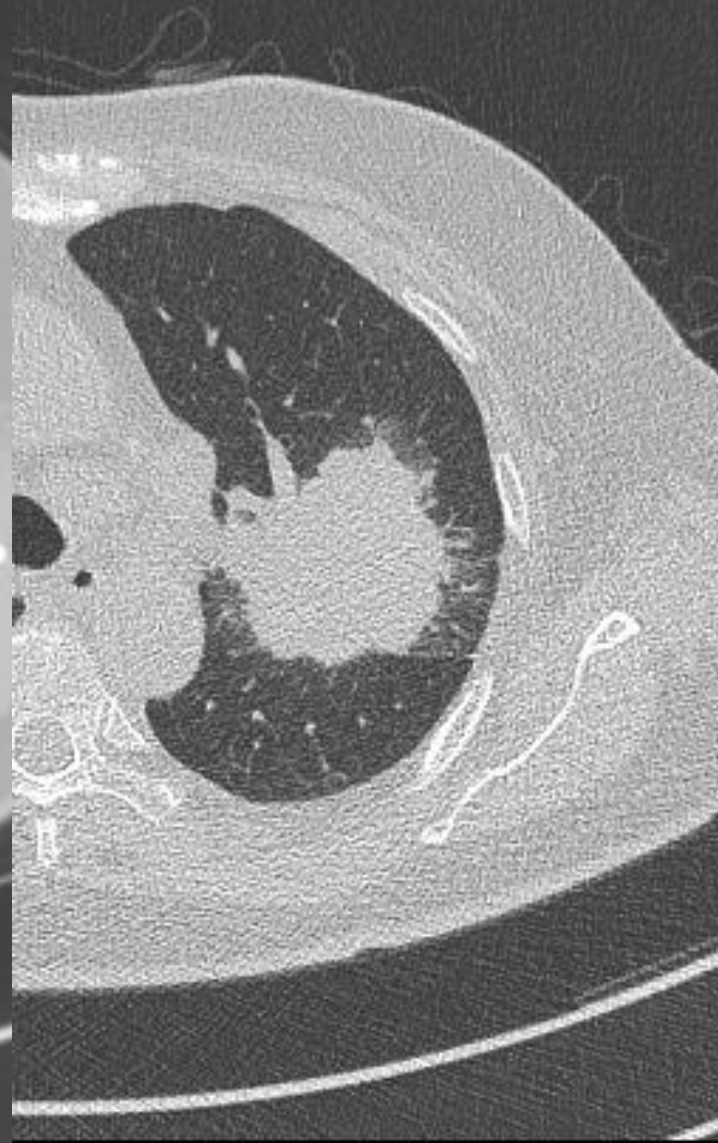
71y/o  
Female

延遲診斷

2013/03/01



2018/06/12



# 早期肺癌是可以治癒的。

- 低劑量電腦斷層可以偵測早期肺癌，但影像品質要良好。
- 有經驗的醫師運用科技輔助可以提高手術正確性。