

# Chest Radiography

**By**

**A. Prof. Walid I.  
Elgendy**

**Professor of Chest  
diseases**

**Zagazig University,  
Egypt**



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا [?]  
[?] عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

[البقرة: 32]

- Chest x-ray is the most commonly performed diagnostic x-ray examination
- Imaging with x-rays involves exposing a part of the body to a small dose of ionizing radiation to produce pictures of the inside of the body.

# What are some common uses of the procedure?

**The chest x-ray is performed to evaluate:**

- Lungs,
- Heart
- Chest wall.

**Chest x-ray is the first imaging test used to help diagnose symptoms such as:**

- Persistent cough.
- Hemoptysis.
- Shortness of breath.
- Chest pain or injury.

## **Different parts of the body absorb the x-rays in varying degrees:**

- Bone absorbs much of the radiation ⇒ white
- Soft tissue, such as muscle and organs, allow more of the x-rays to pass through them ⇒ shades of gray
- Air not absorb any radiation ⇒ black

**Lung tissue absorbs little radiation and will appear dark on the image**

- **DENSITIES**

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**BONE**

**SOFT  
TISSUES**

**WATER**

**FAT**

**AIR**

# The 12-Step Program

1. Name
2. Date
3. Old films
4. What type of view(s)



Pre-read

1. Penetration
2. Inspiration
3. Rotation
4. Angulation



Quality Control

5. Soft tissues / bony structures
6. Mediastinum
7. Diaphragms
8. Lung Fields



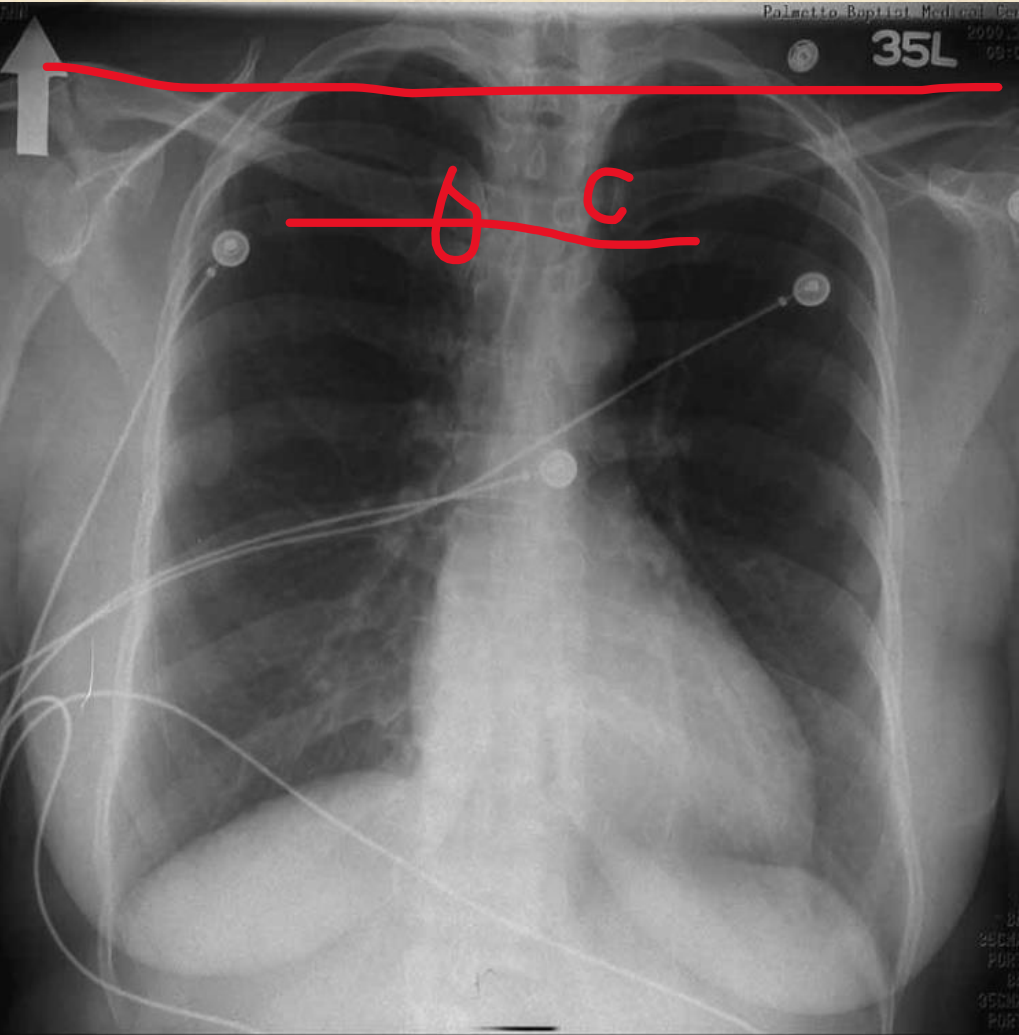
Findings

# Pre-Reading

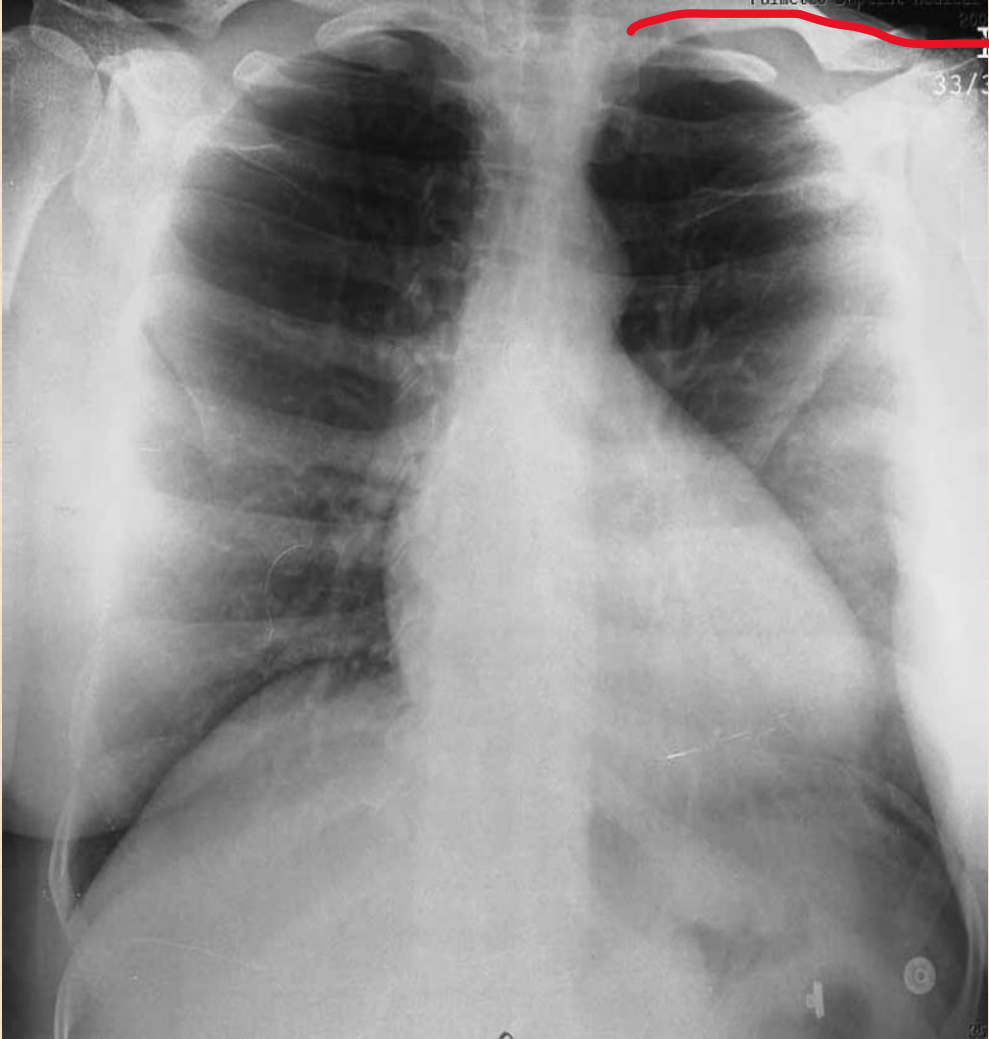
1. Check the name, sex
2. Check the date
3. Obtain old films if available
4. Which view(s) do you have?
  1. PA & lateral view.
  2. AP view.
  3. Lateral Decubitus,
  4. Oblique view.
  5. Lordotic view.
  6. Kyphotic view.



# Types of views

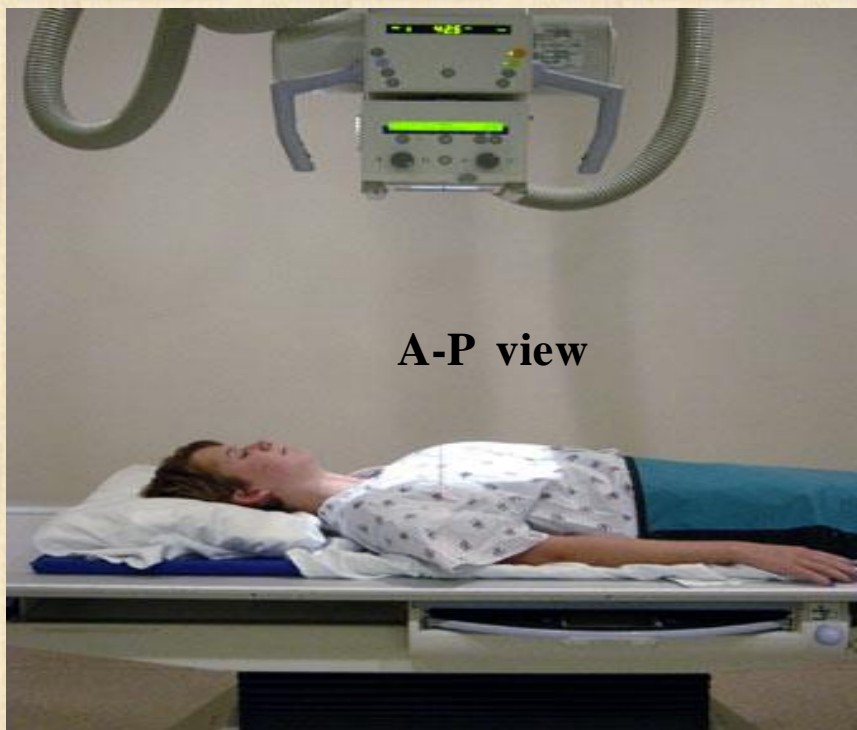


**PA**



**AP**



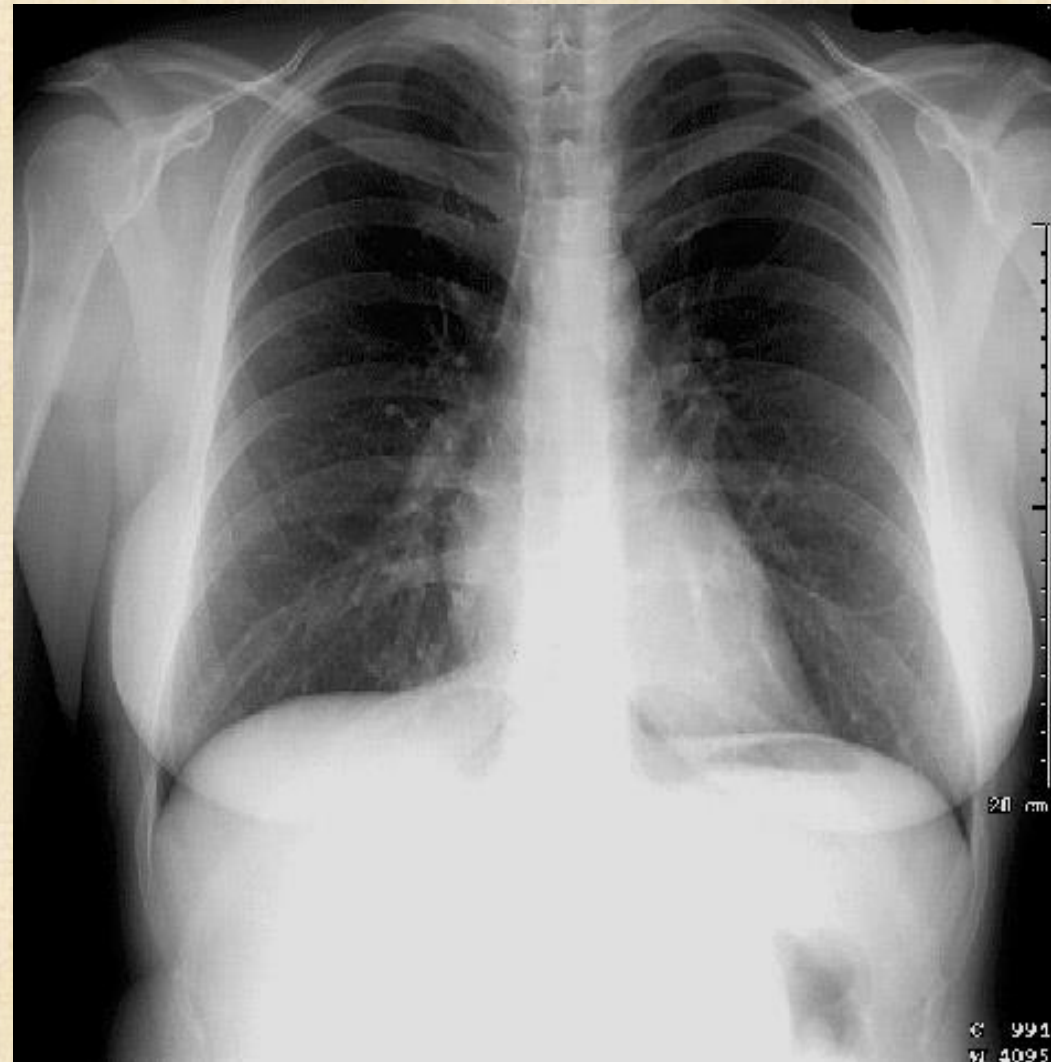


# Quality Control

## 5. Penetration (dose of X-Ray)

### Ideal chest x-ray film:

- Shouldn't see ribs through the heart
- Barely see the spine through the heart
- Shouldn't see pulmonary vessels nearly to the edges of the lungs





**soft**

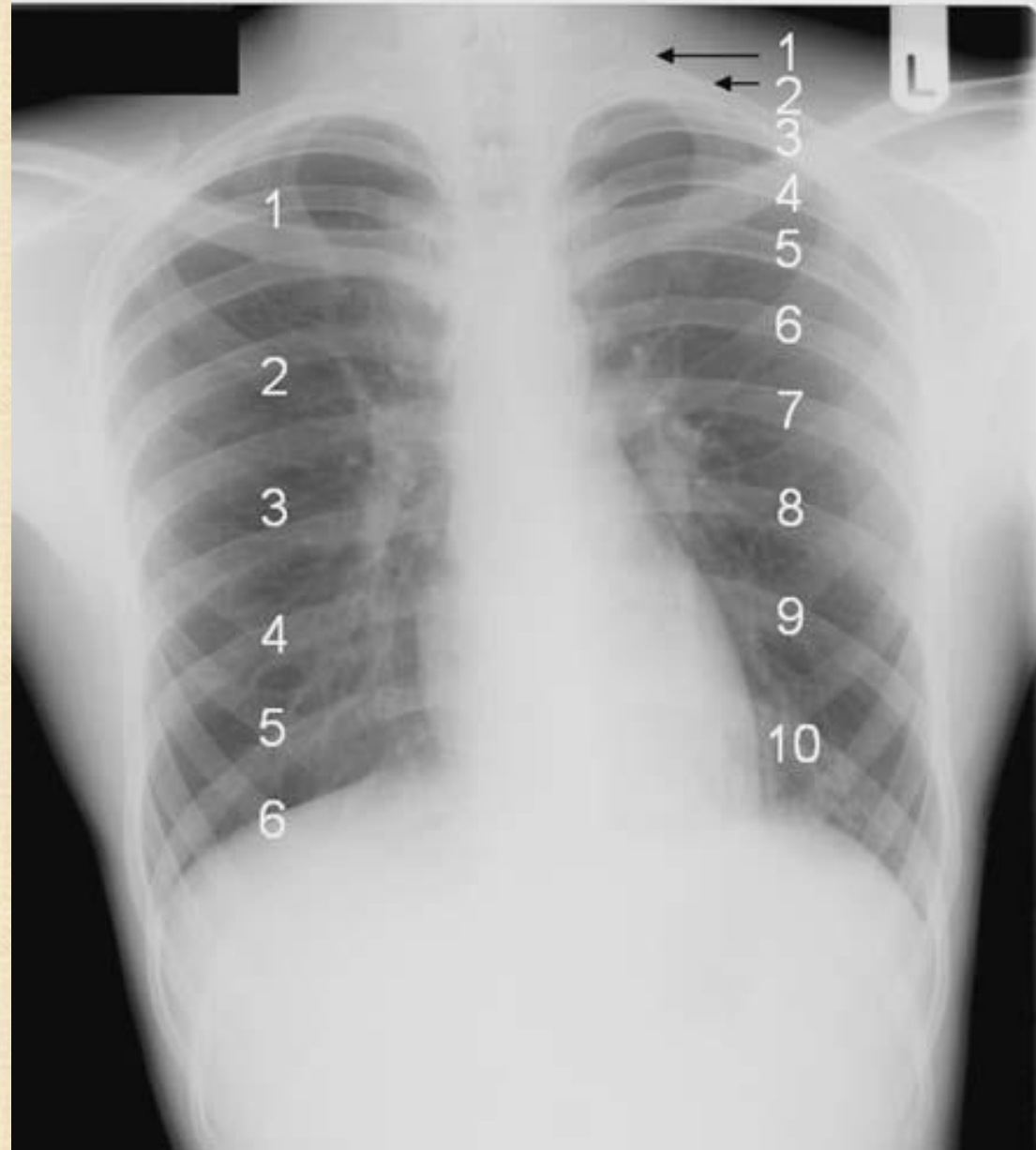


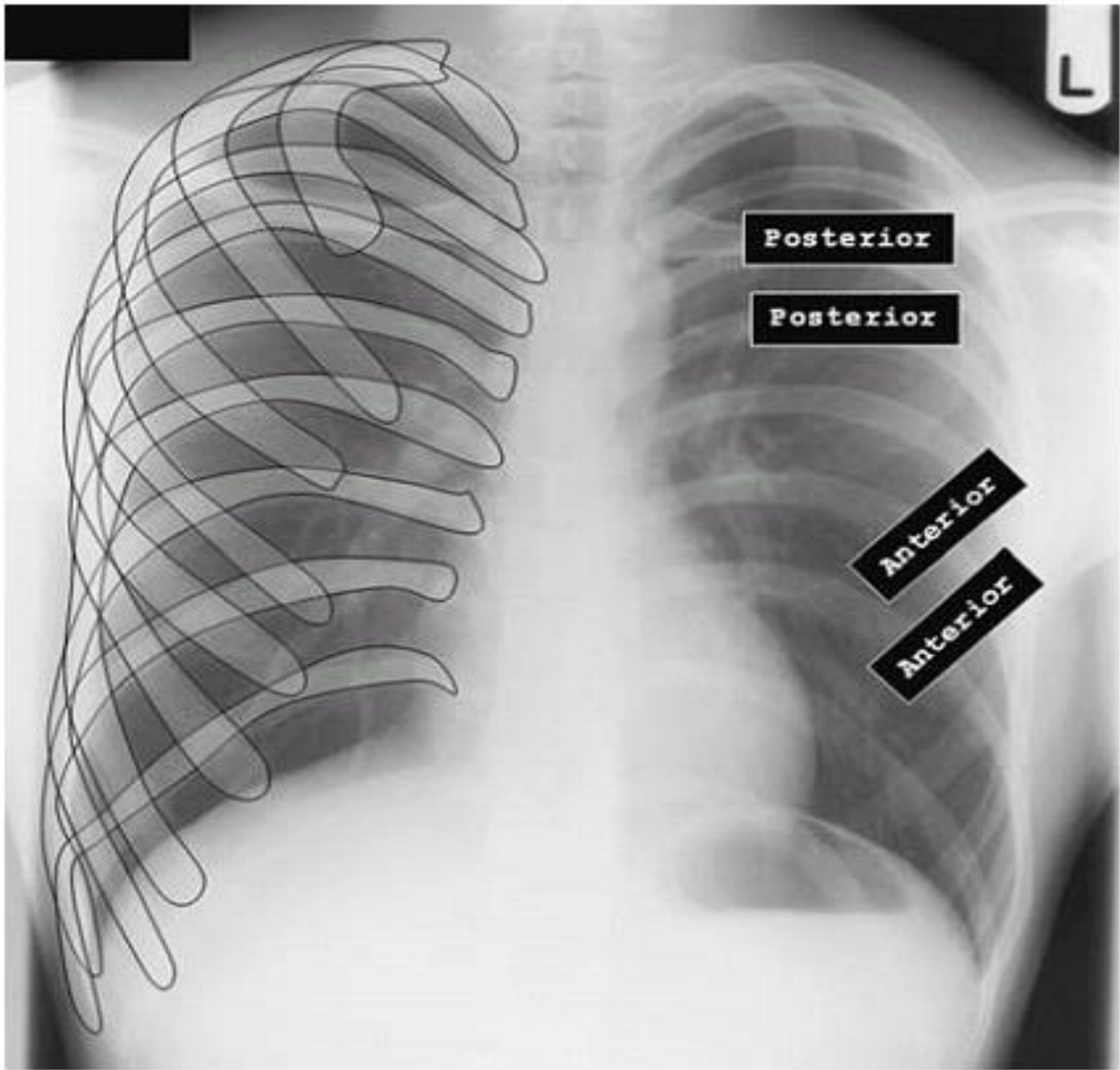
**Hard**

# Quality Control

## 6. Inspiration

- Should be able to count **10th** ribs posteriorly **OR** **6th** rib anteriorly.
- Heart shadow should not be hidden by the diaphragm





# Inspiration



# Expiration







About 8 posterior ribs are showing

**Poor inspiration can crowd lung markings producing pseudo-air-space disease**

**With better inspiration, the “disease process” at the lung bases has cleared**

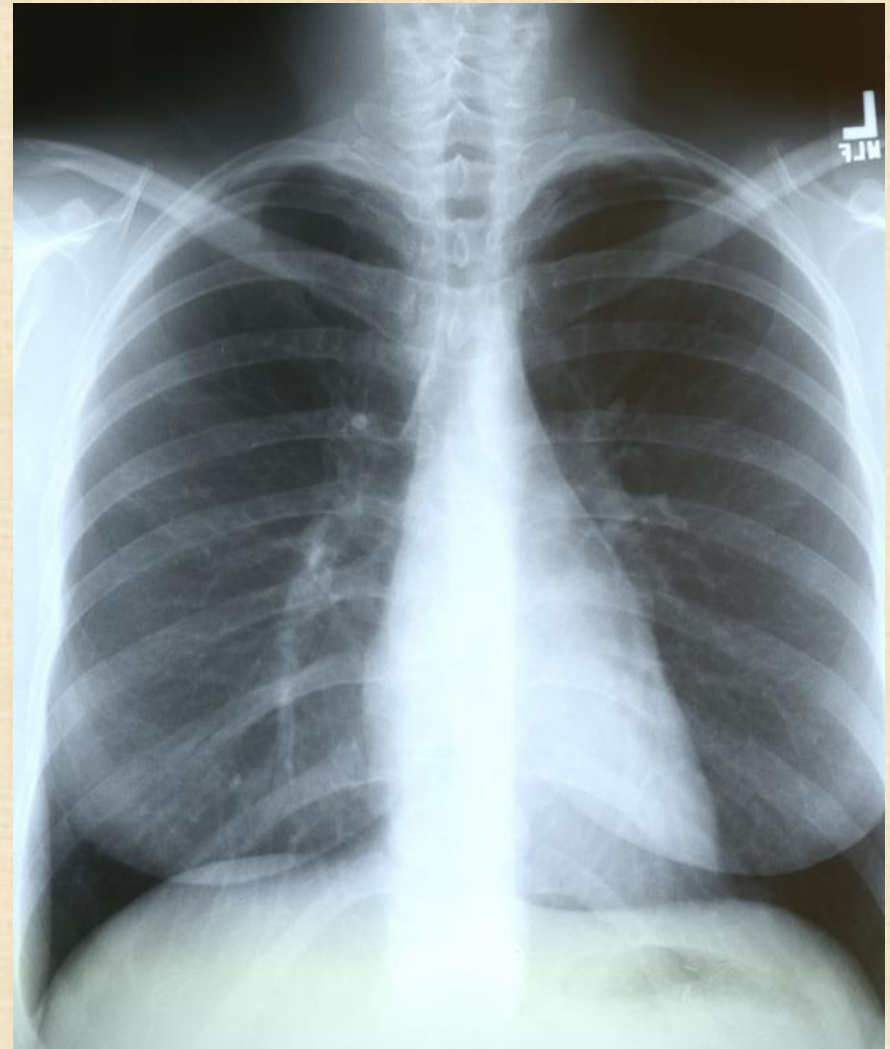


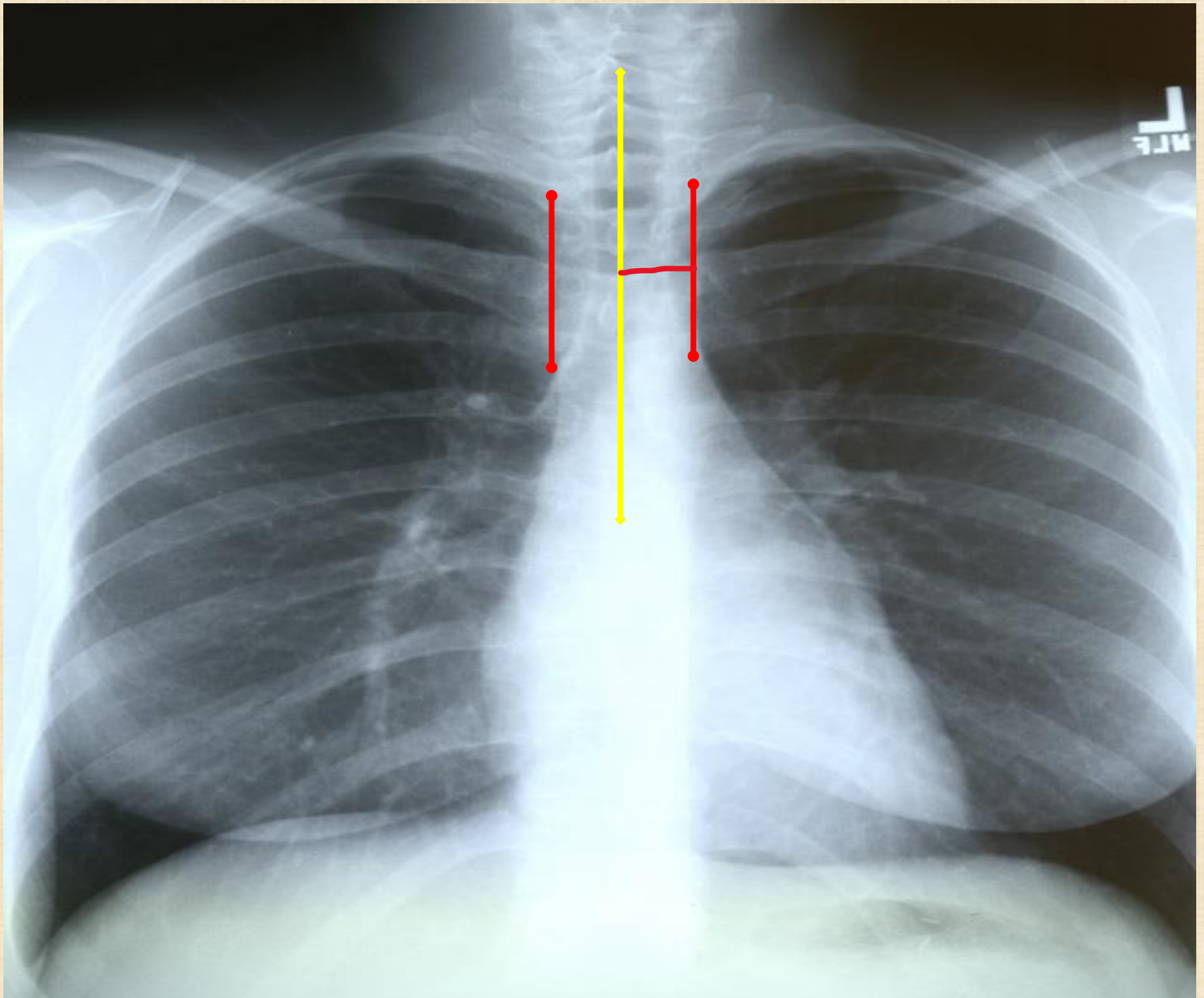
9-10 posterior ribs are showing

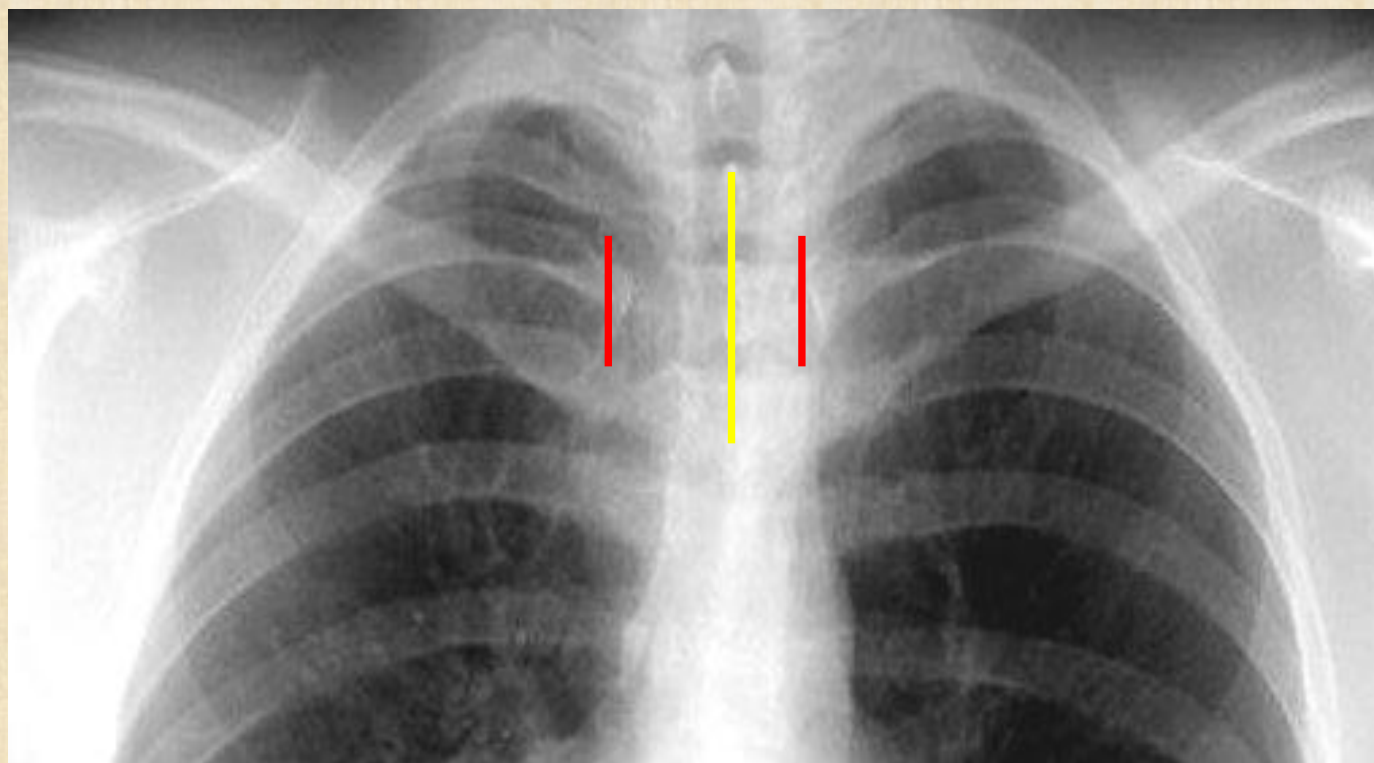
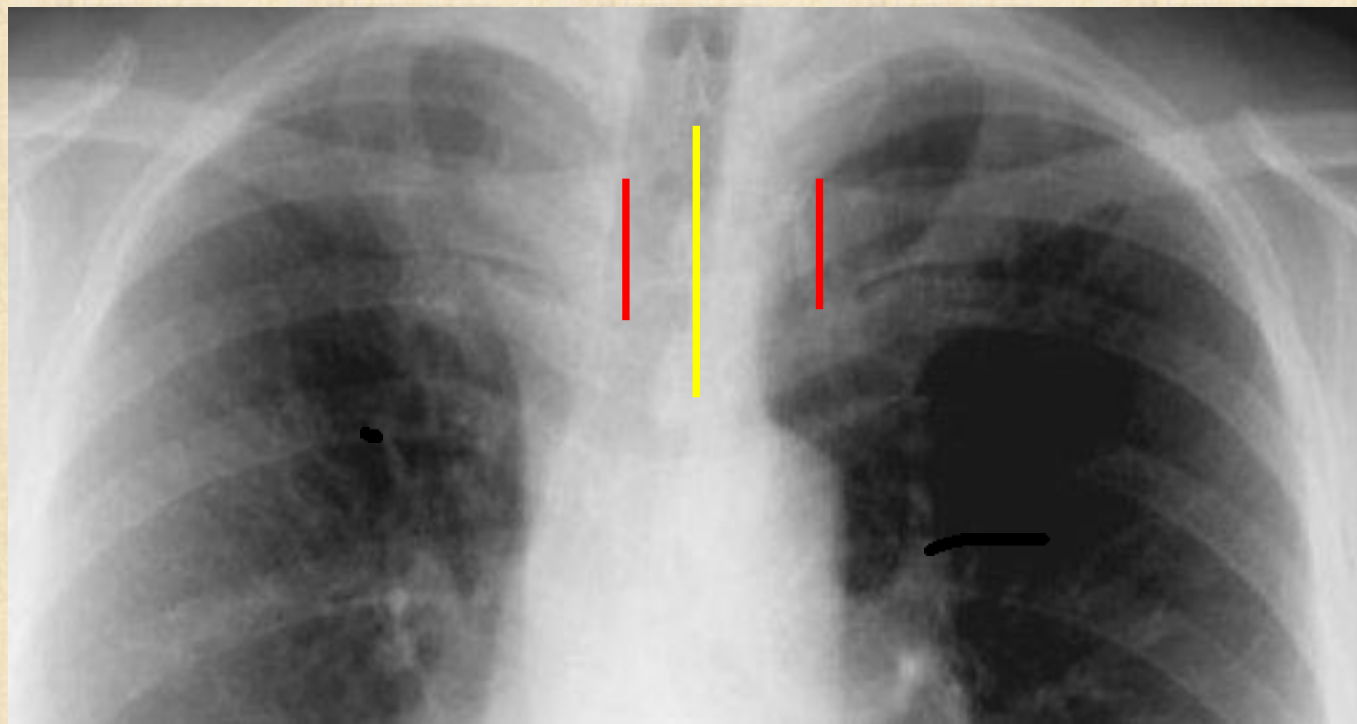
# Quality Control

## 7. Rotation

- Medial ends of bilateral clavicles are equidistant from the midline or vertebral spines







# Findings

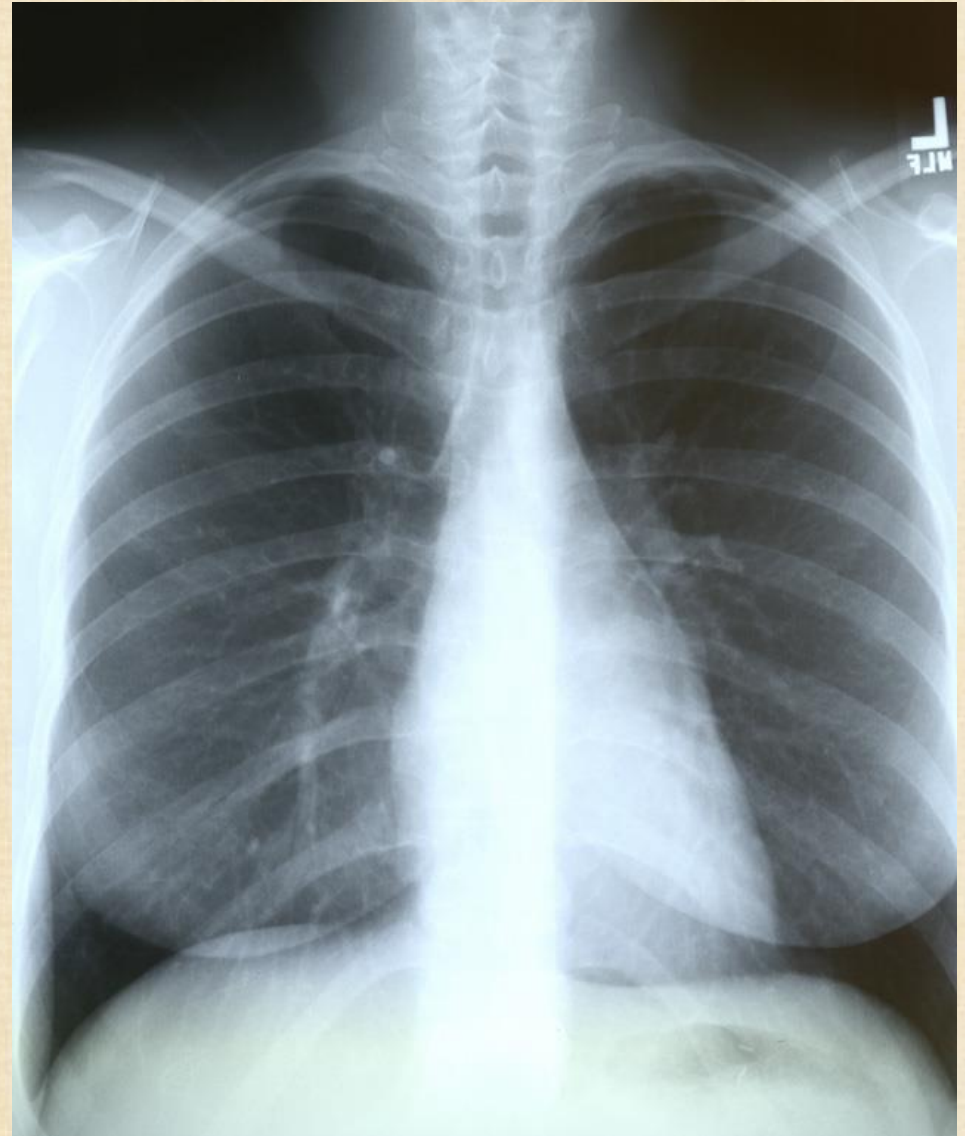
## 9. **Soft tissue** (Breast shadows, Supraclavicular areas, Axilla) **and bony structures**

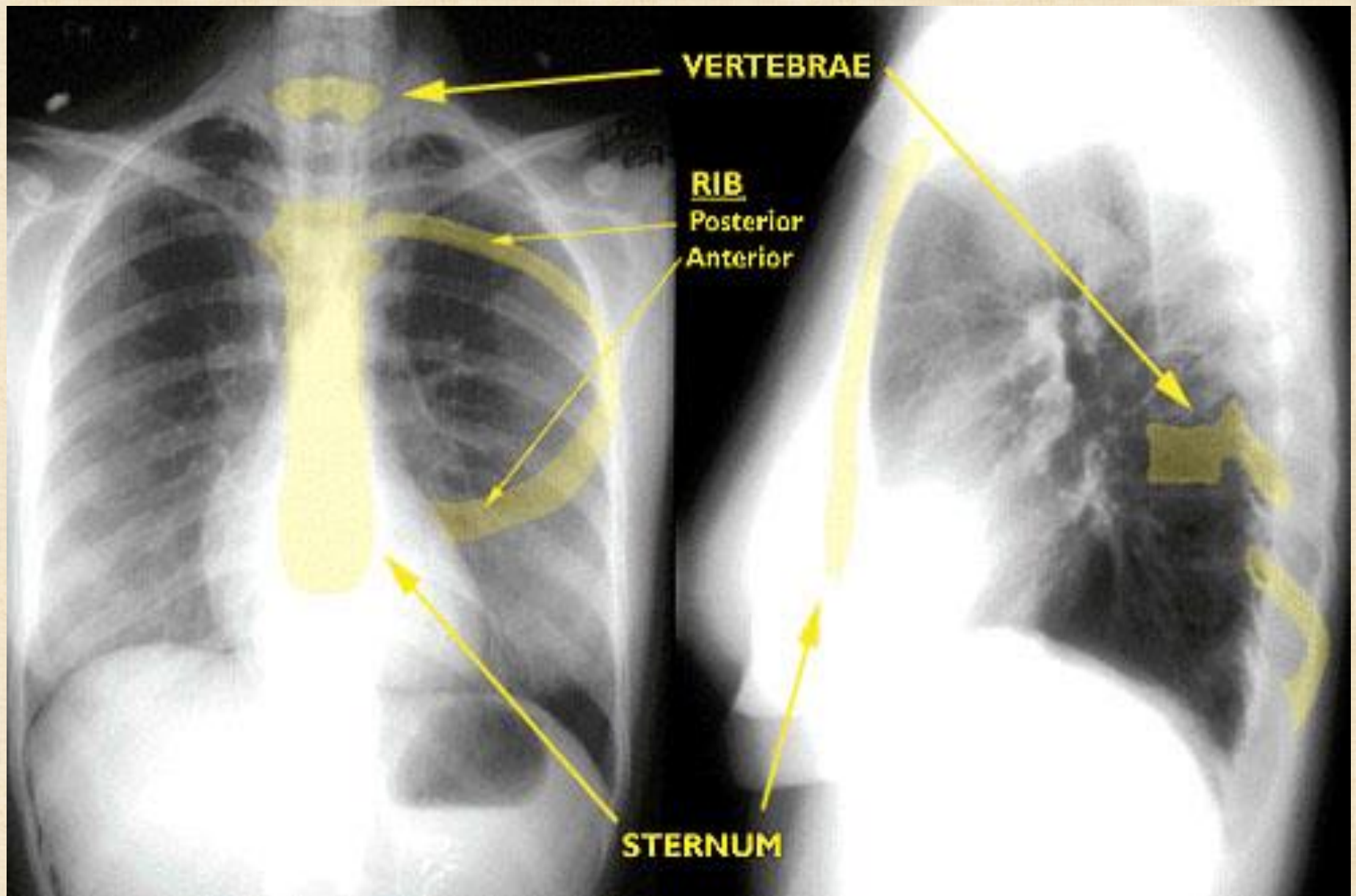
### **Bony structures:**

- Ribs
- Sternum
- Spine
- Shoulder girdle

### **Check for**

- Symmetry
- Deformities
- Fractures
- Masses
- Calcifications
- Lytic lesions



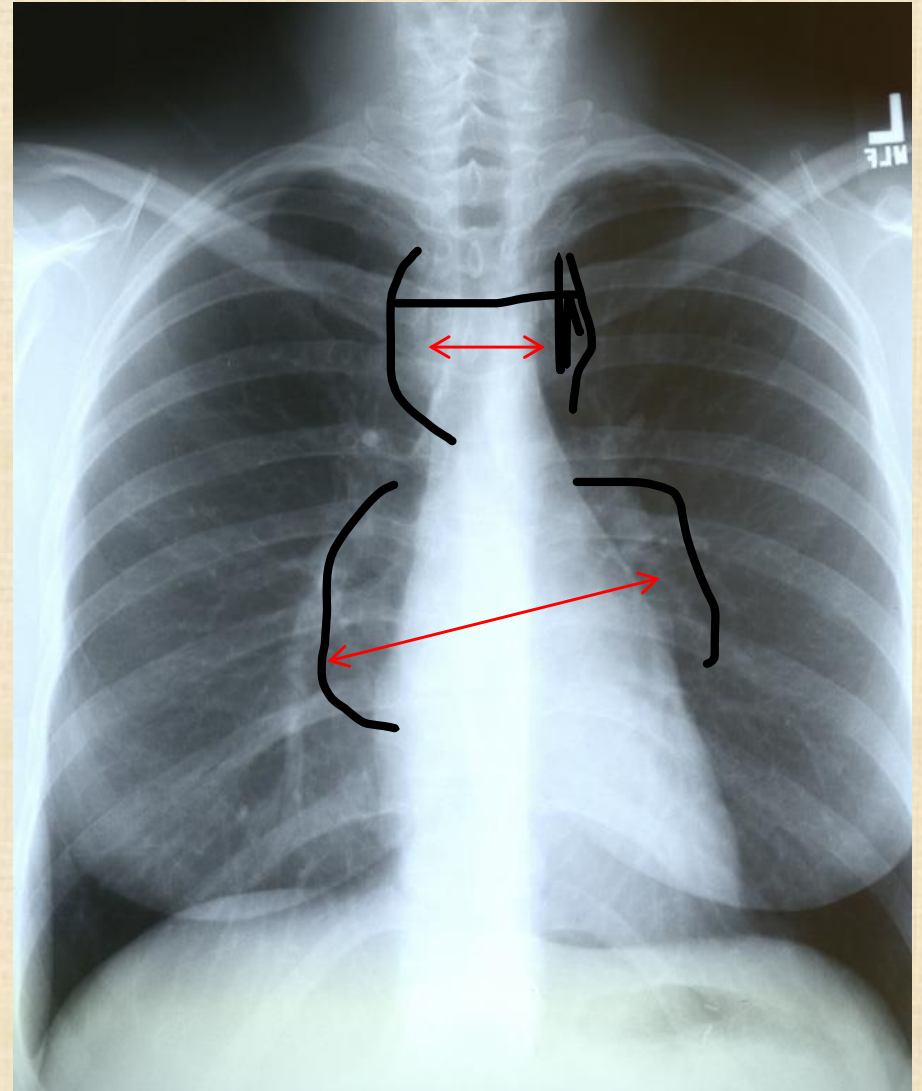


# Findings

## 10. Mediastinum

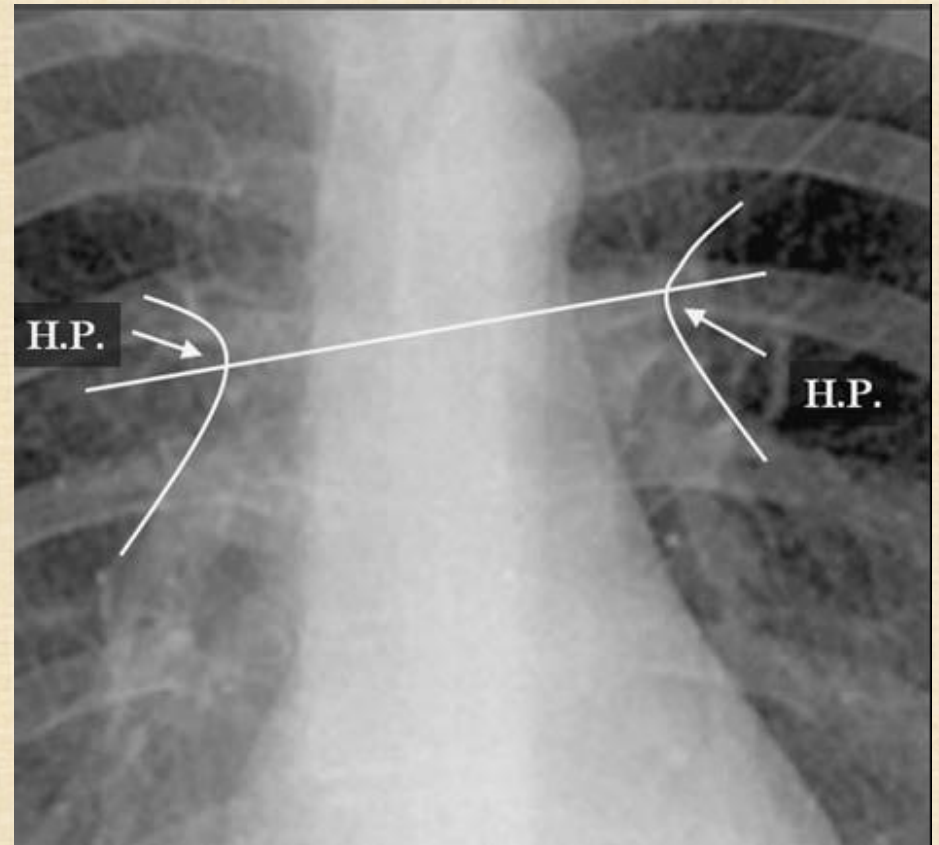
### Check for

- Upper mediastinum
- Hilar contours for increased densities
- Lower Mediastinum

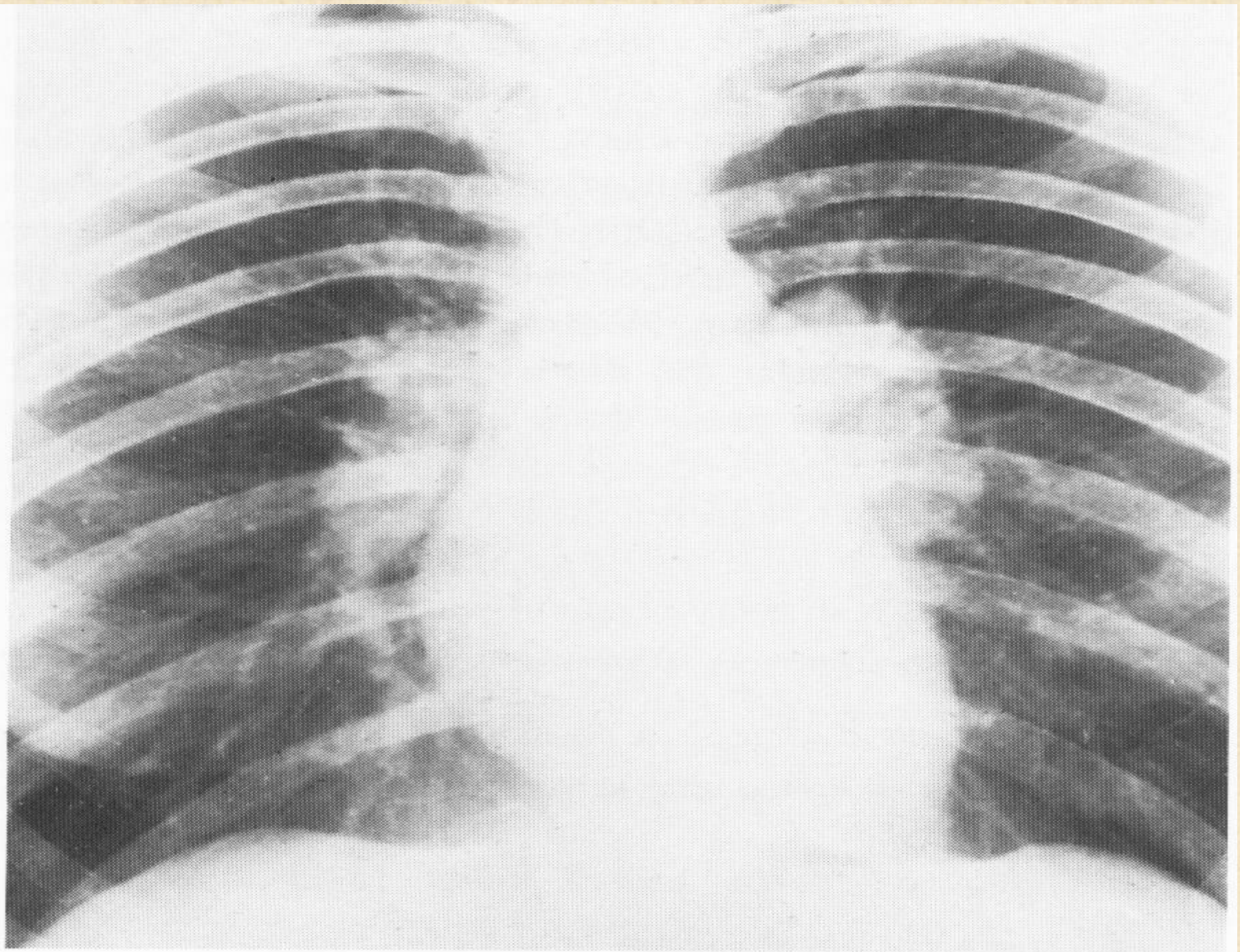


## Hilar region:

- Both hila should be concave.
- Both hila should be of similar density.
- The left hilum is usually superior to the right by **up to 1 cm.**

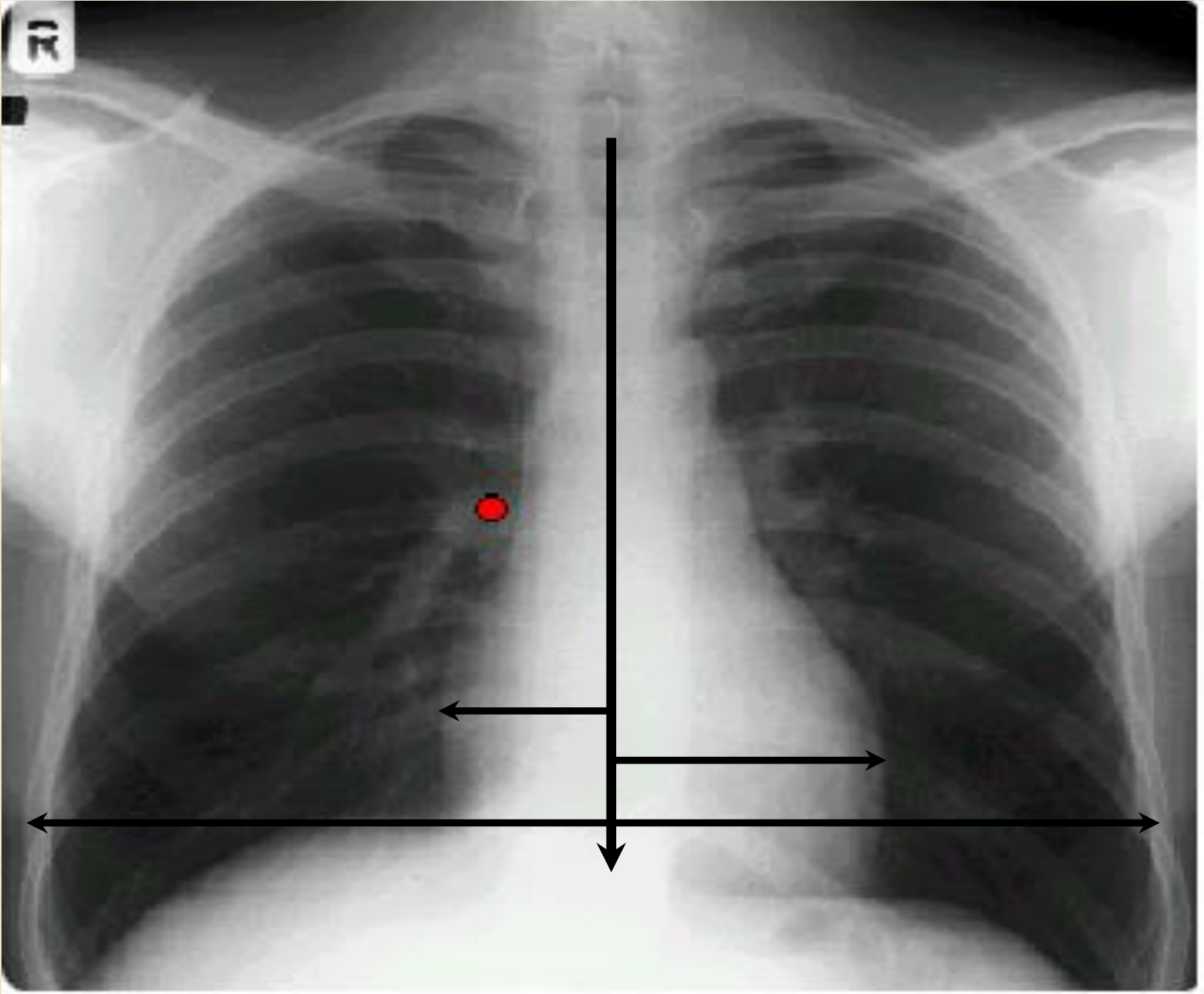


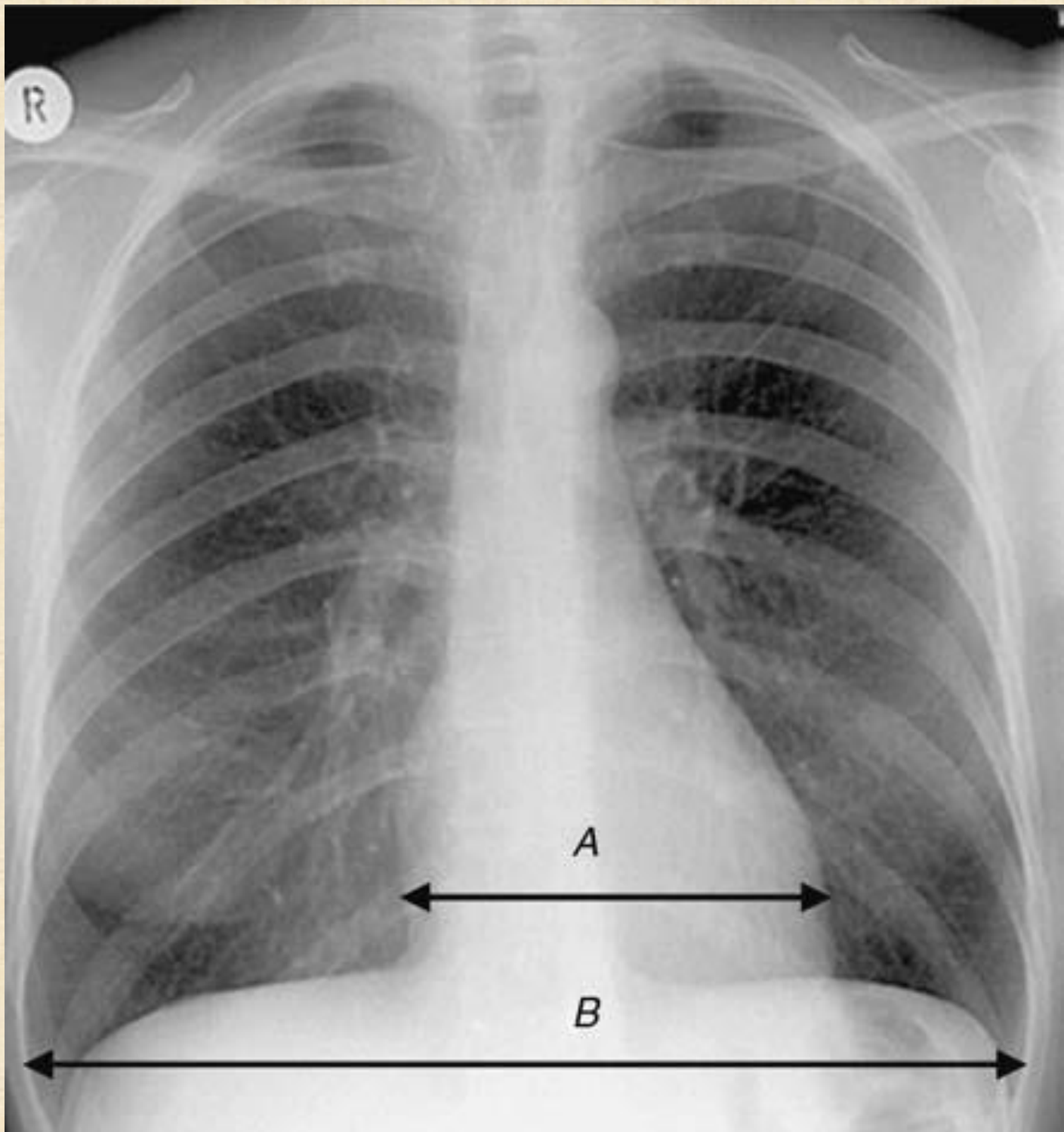


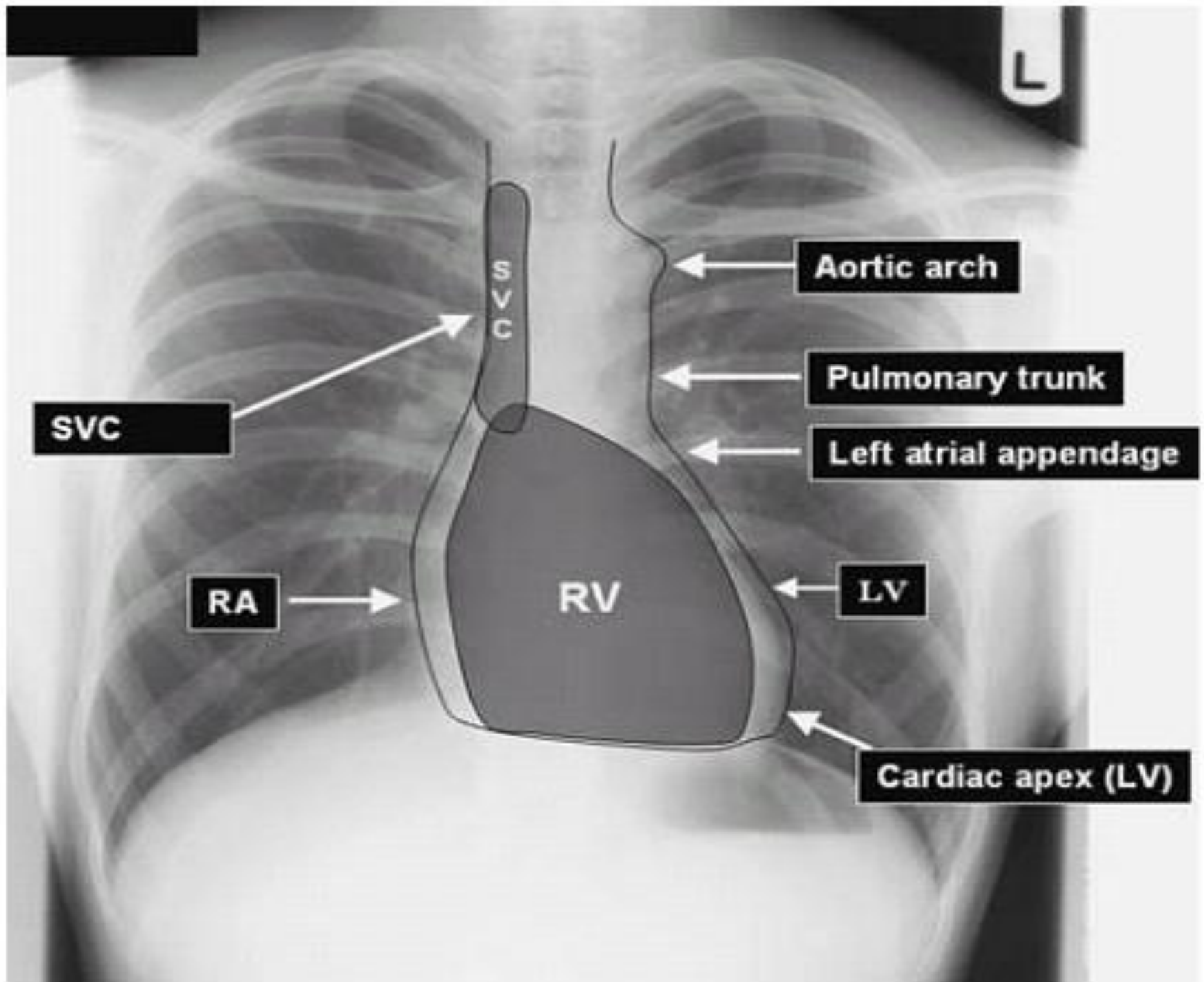


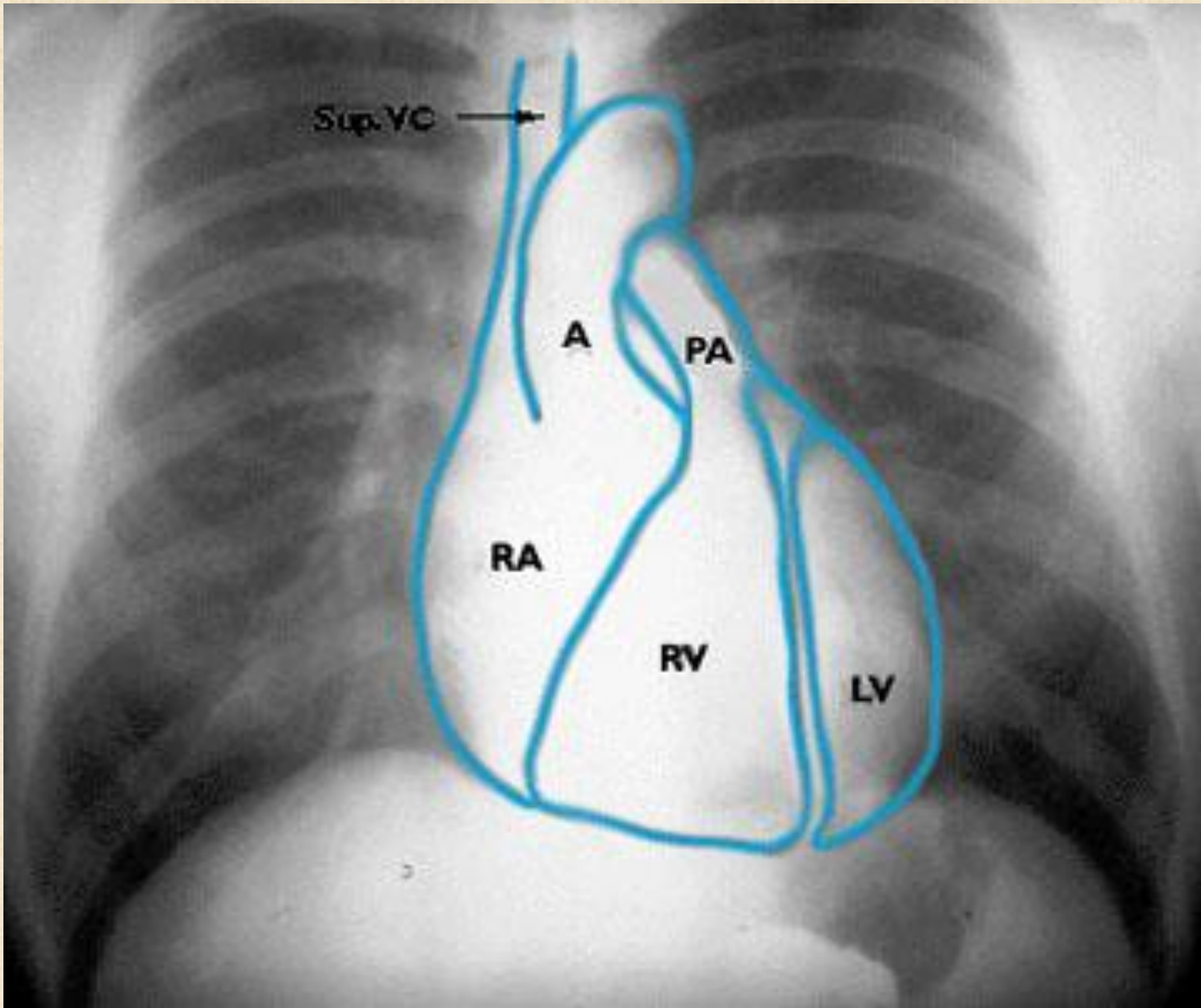
**Fig. 7.1** Sarcoidosis. Bilateral hilar node enlargement.

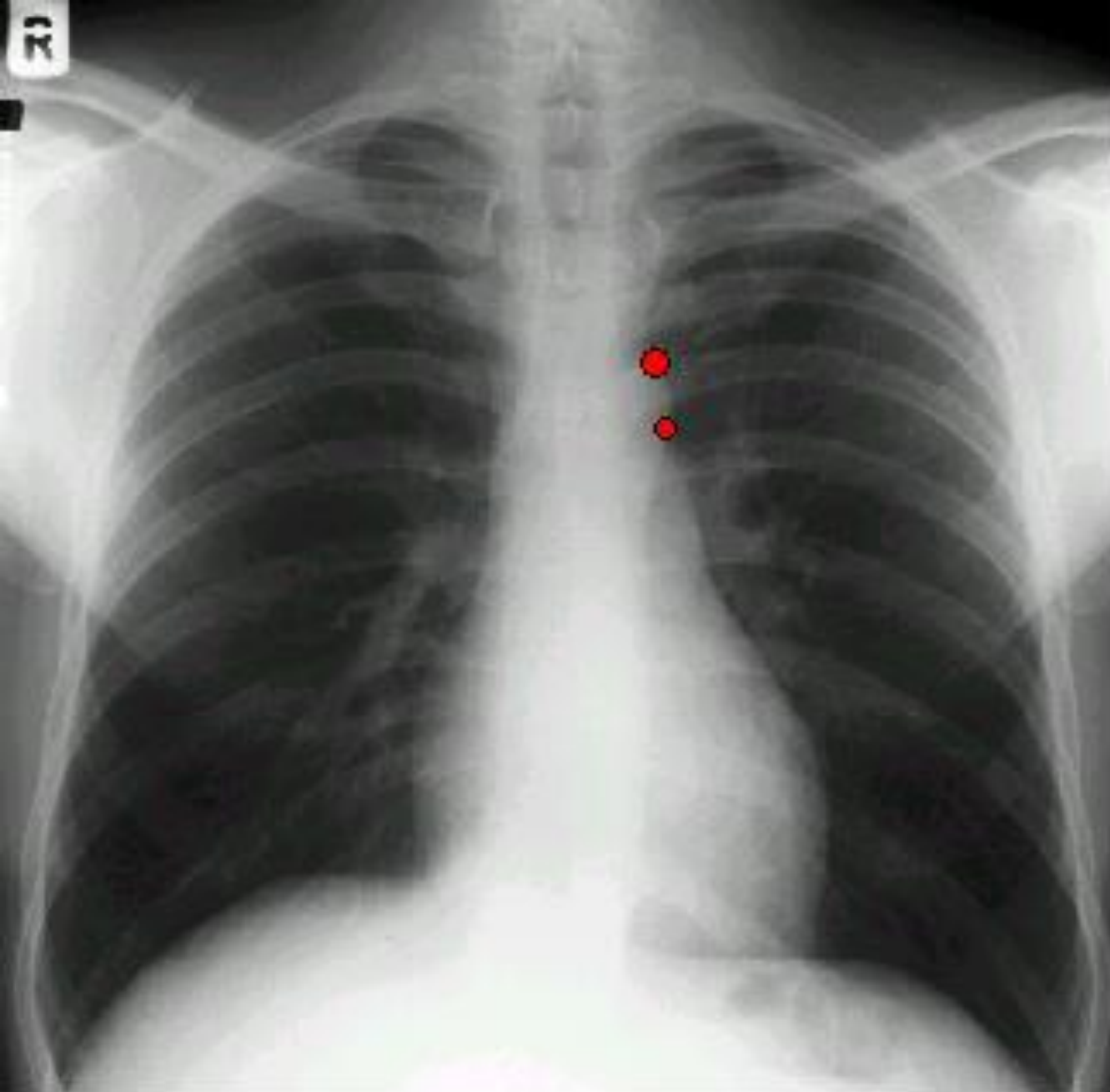








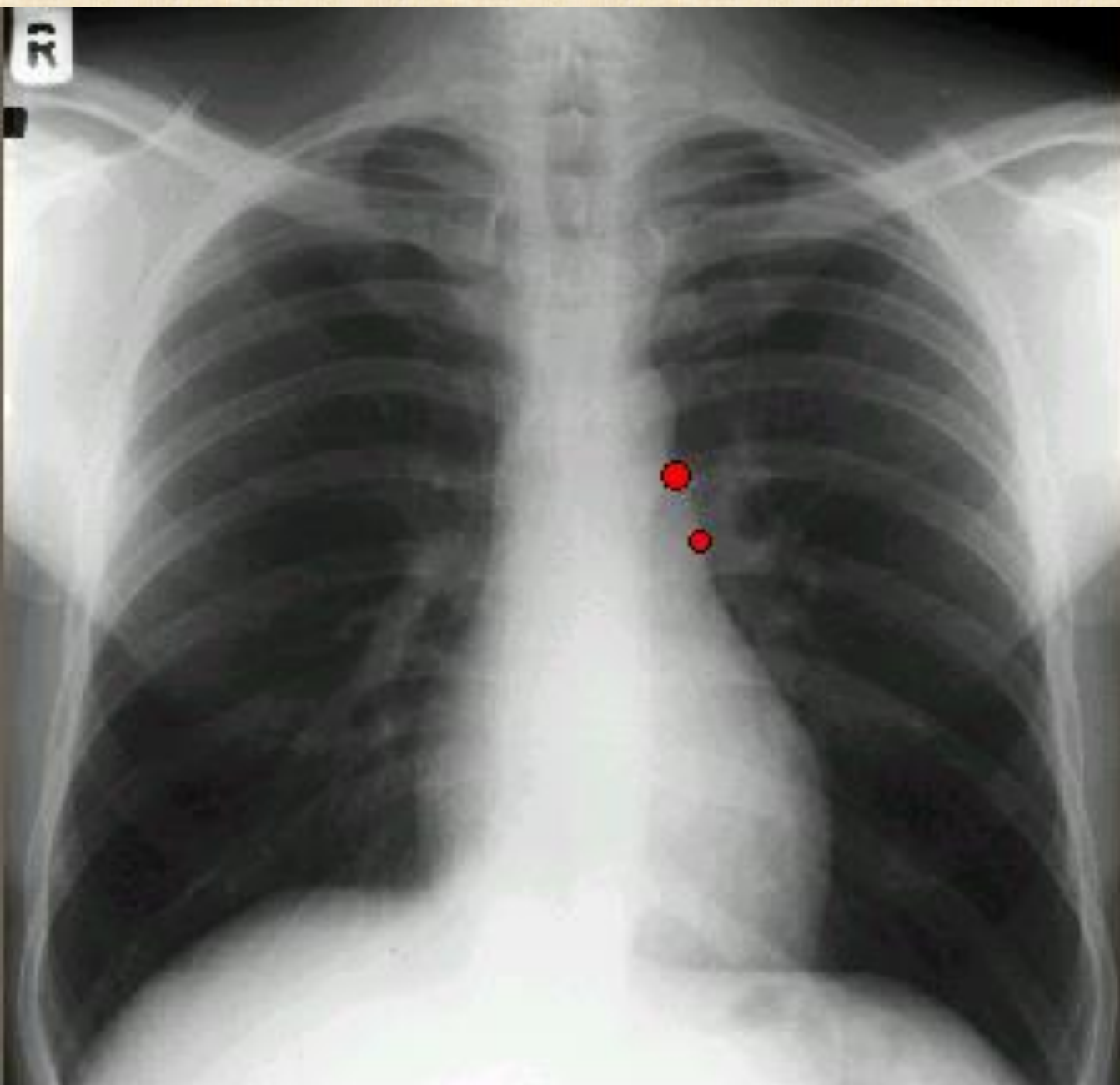




## Heart & Vessels

Prominent  
Knuckle Indicate  
Aortic Aneurysm  
mostly

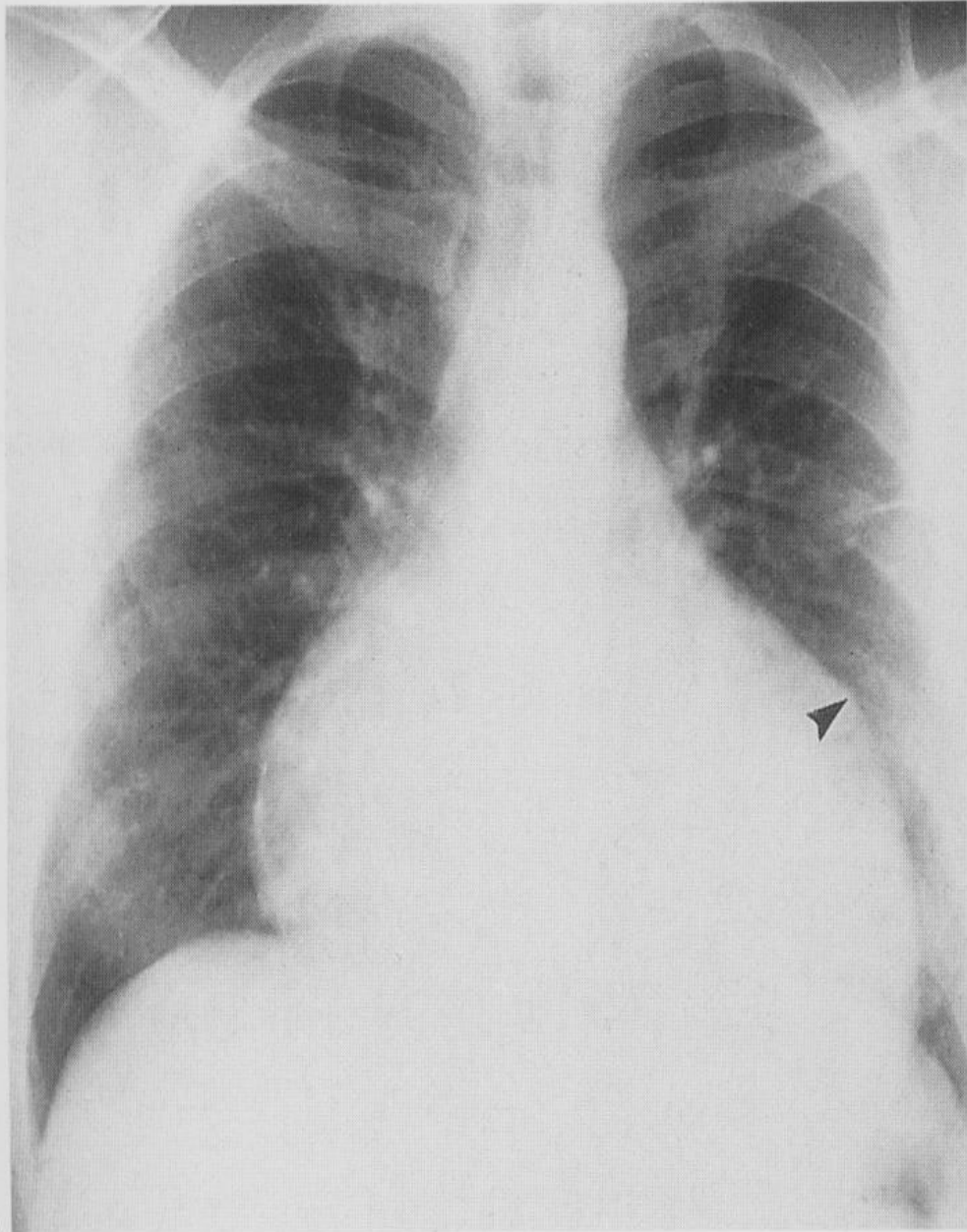
**Arch of Aorta  
(Aortic knuckle)**



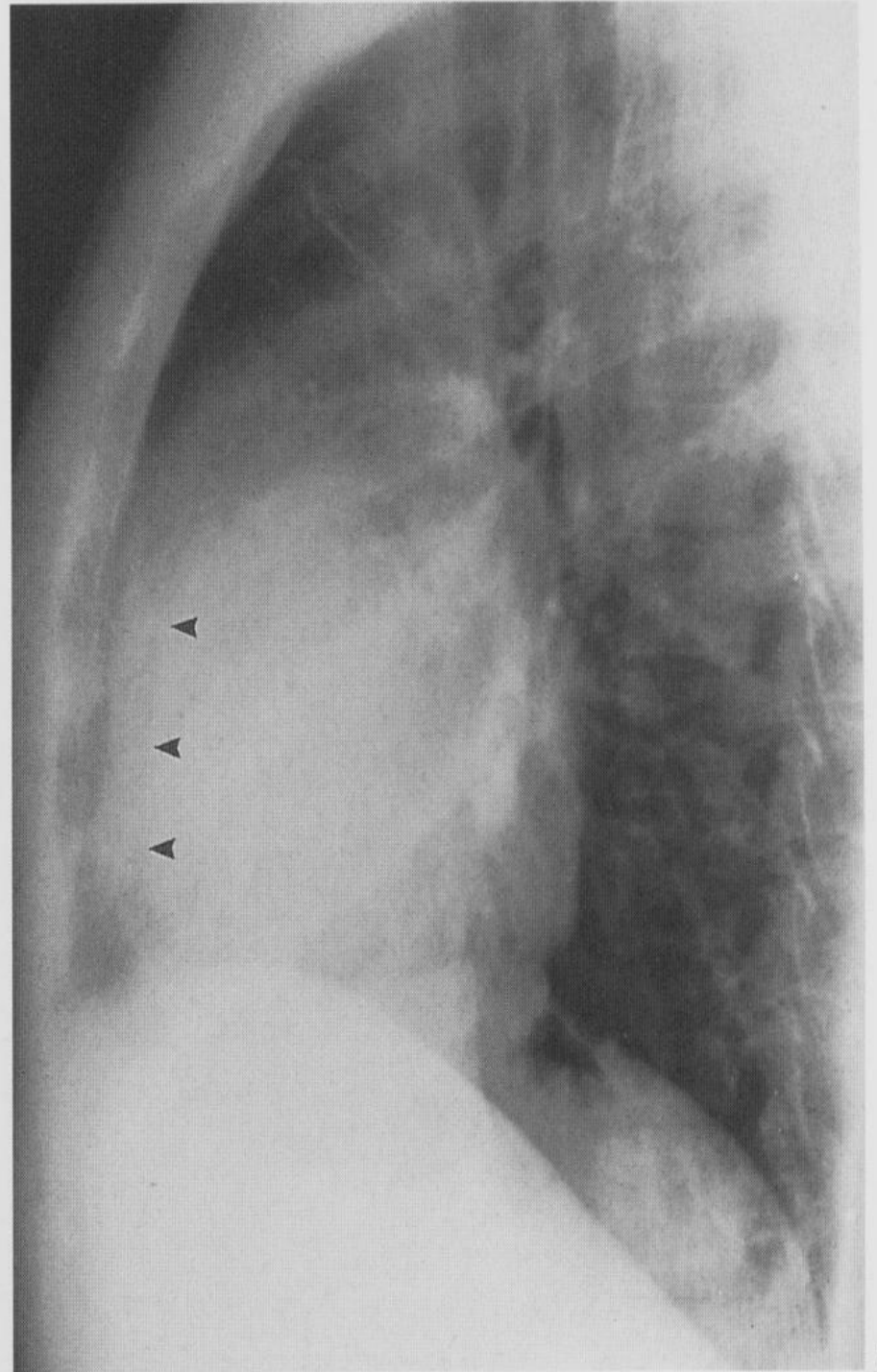
**Heart  
&  
Vessels**

**Pulmonary Trunk**





A

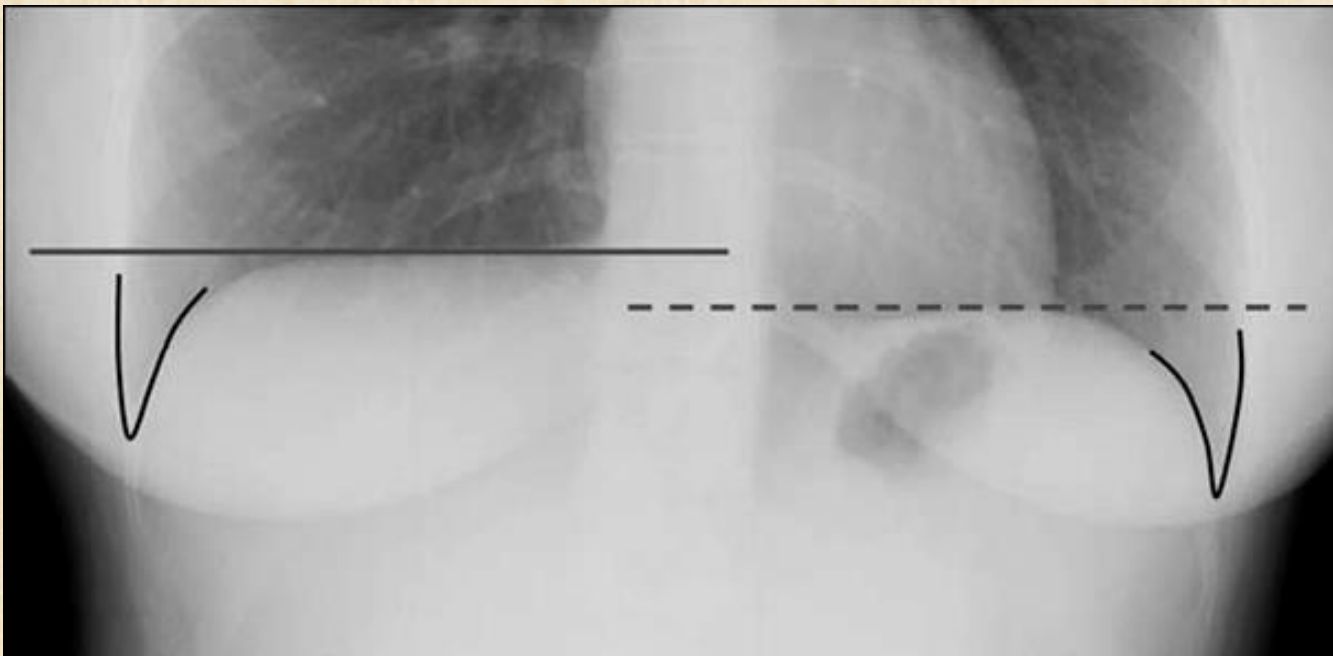


B

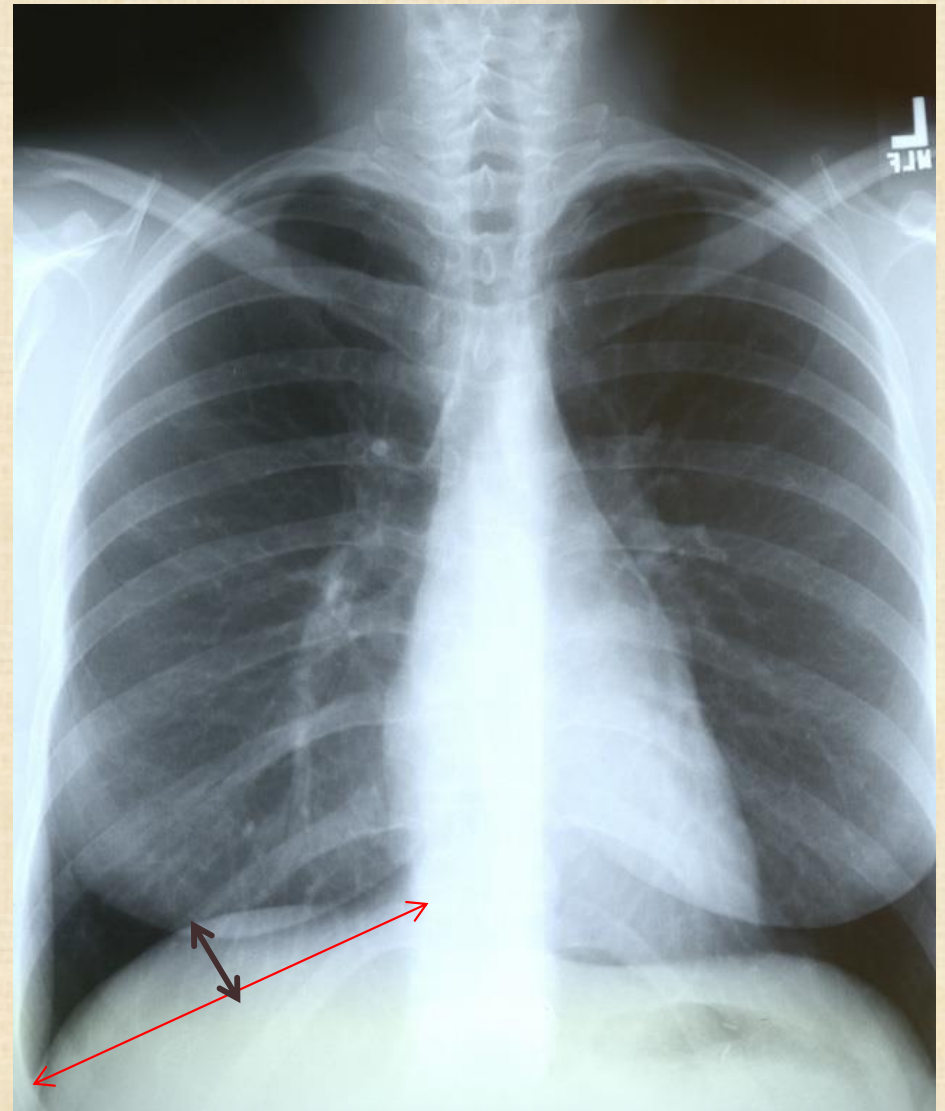
# Findings

## 11. Diaphragm:

- The highest point of the right diaphragm is usually 1–1.5 cm higher than that of the left.
- Each costophrenic angle should be sharply outlined.



- Check convexity and domes.
- Check for low flat diaphragm with indentations.



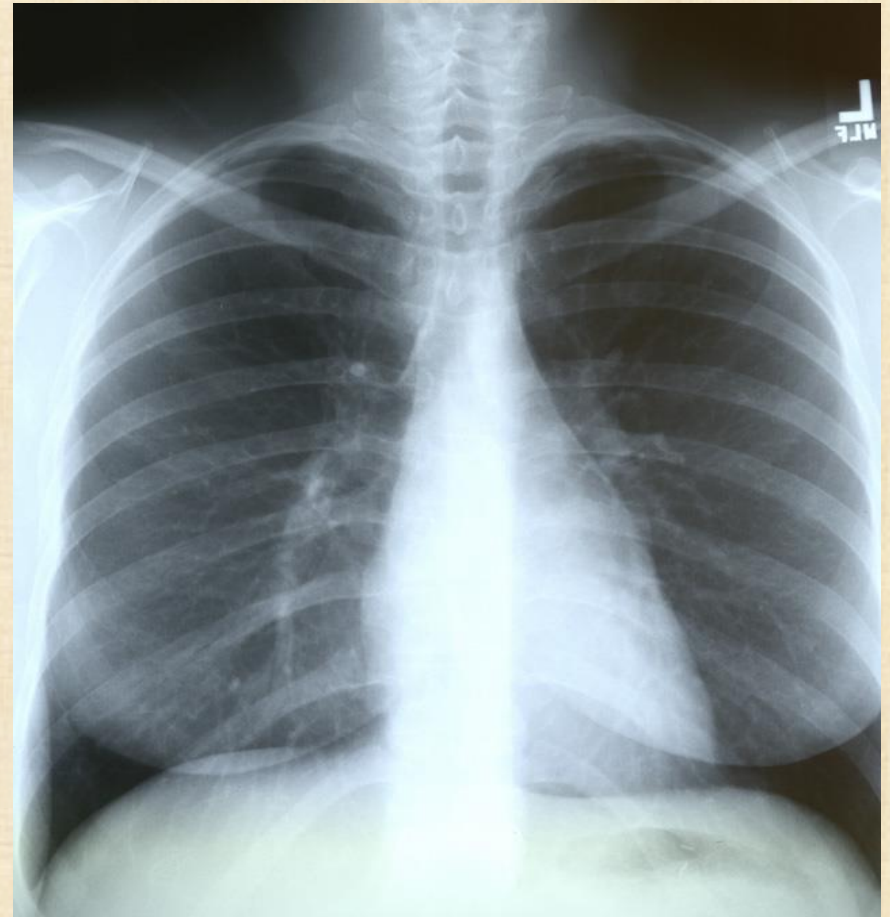




# Findings

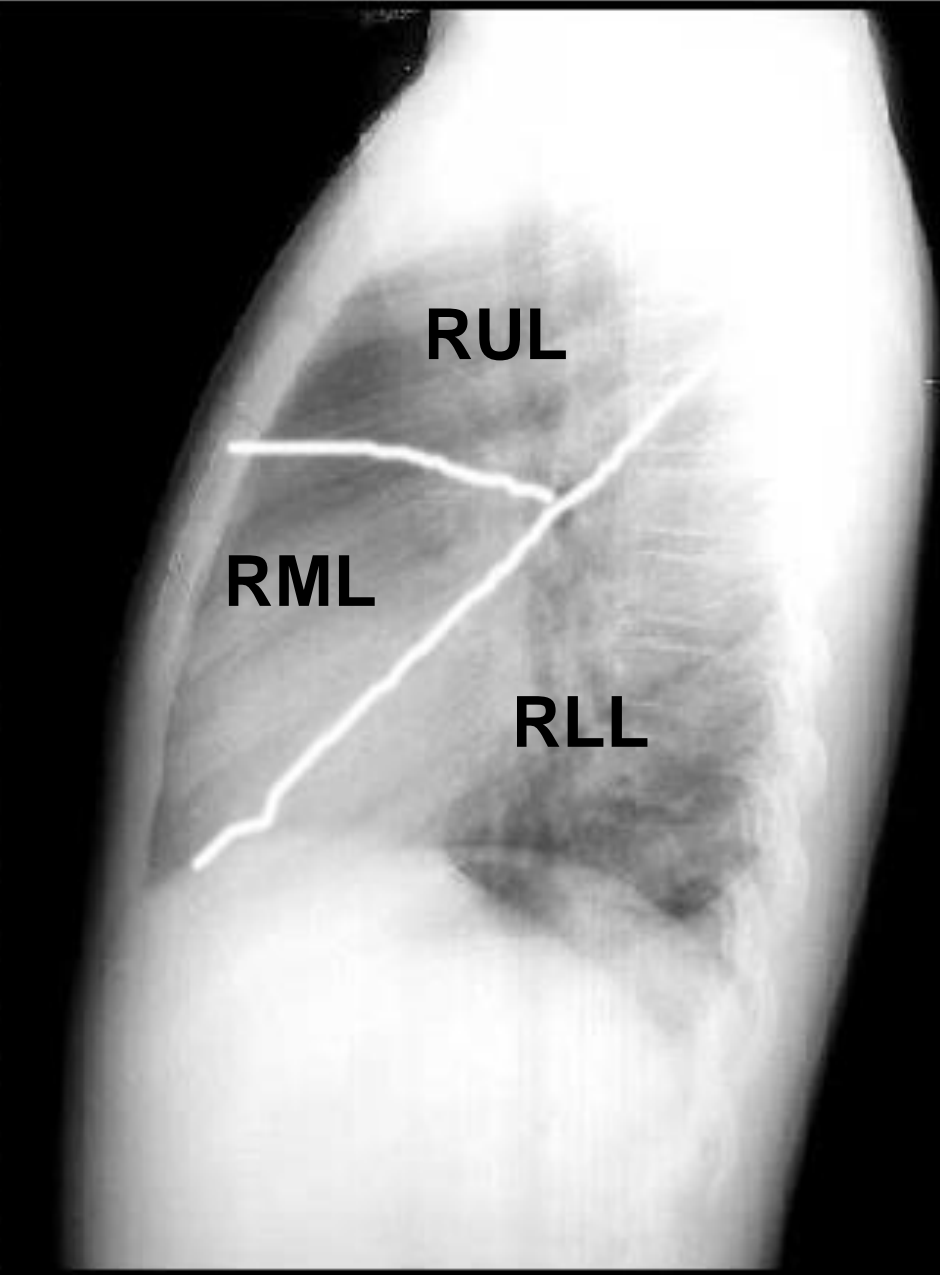
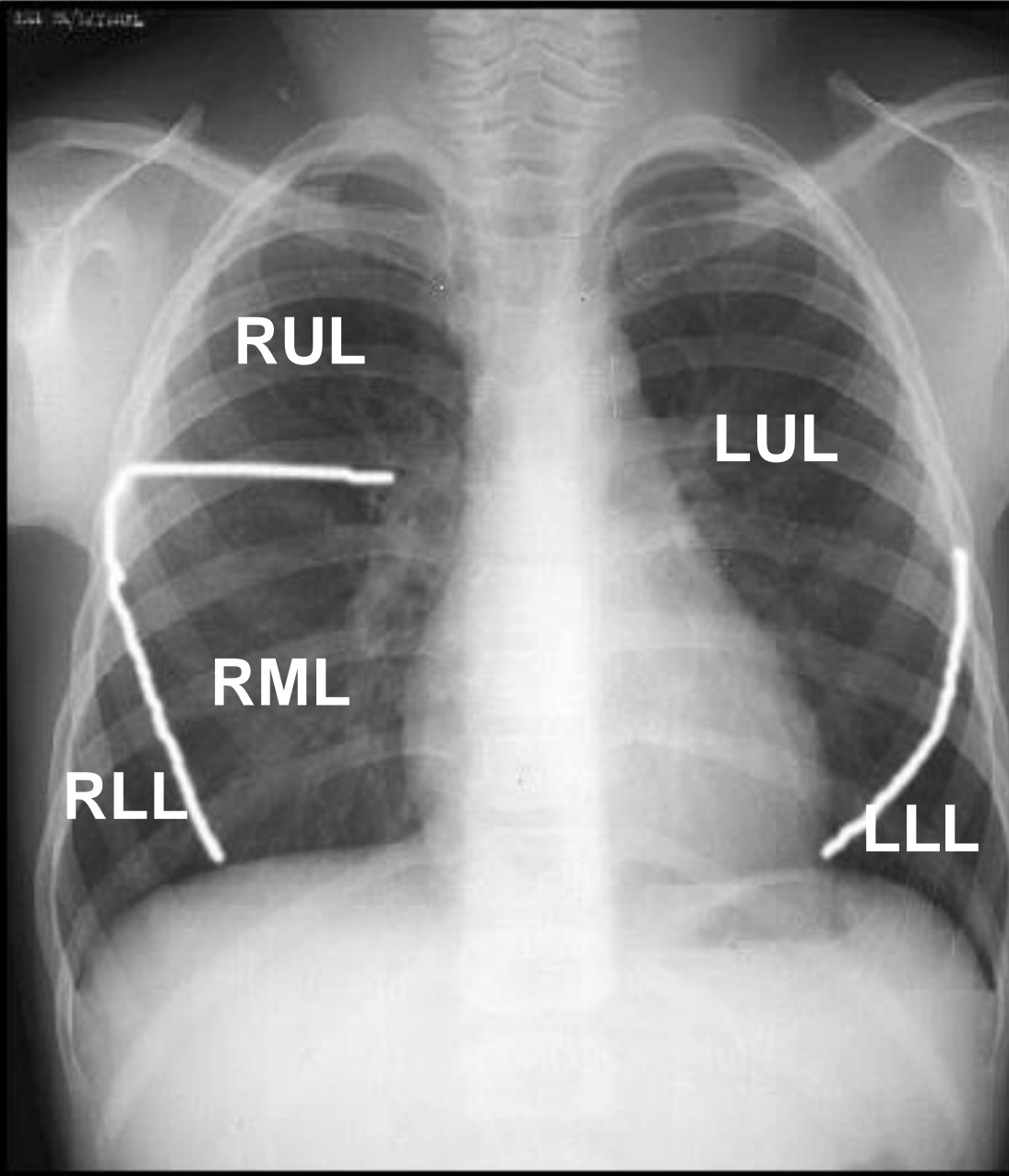
## 12. Lung Fields:

- Pulmonary vascular markings (BVM)
- Opacities, localized or diffuse.
- To determine location of any abnormalities ...
  - Use radiologic lung zones.
  - Use fissures to define lung lobes

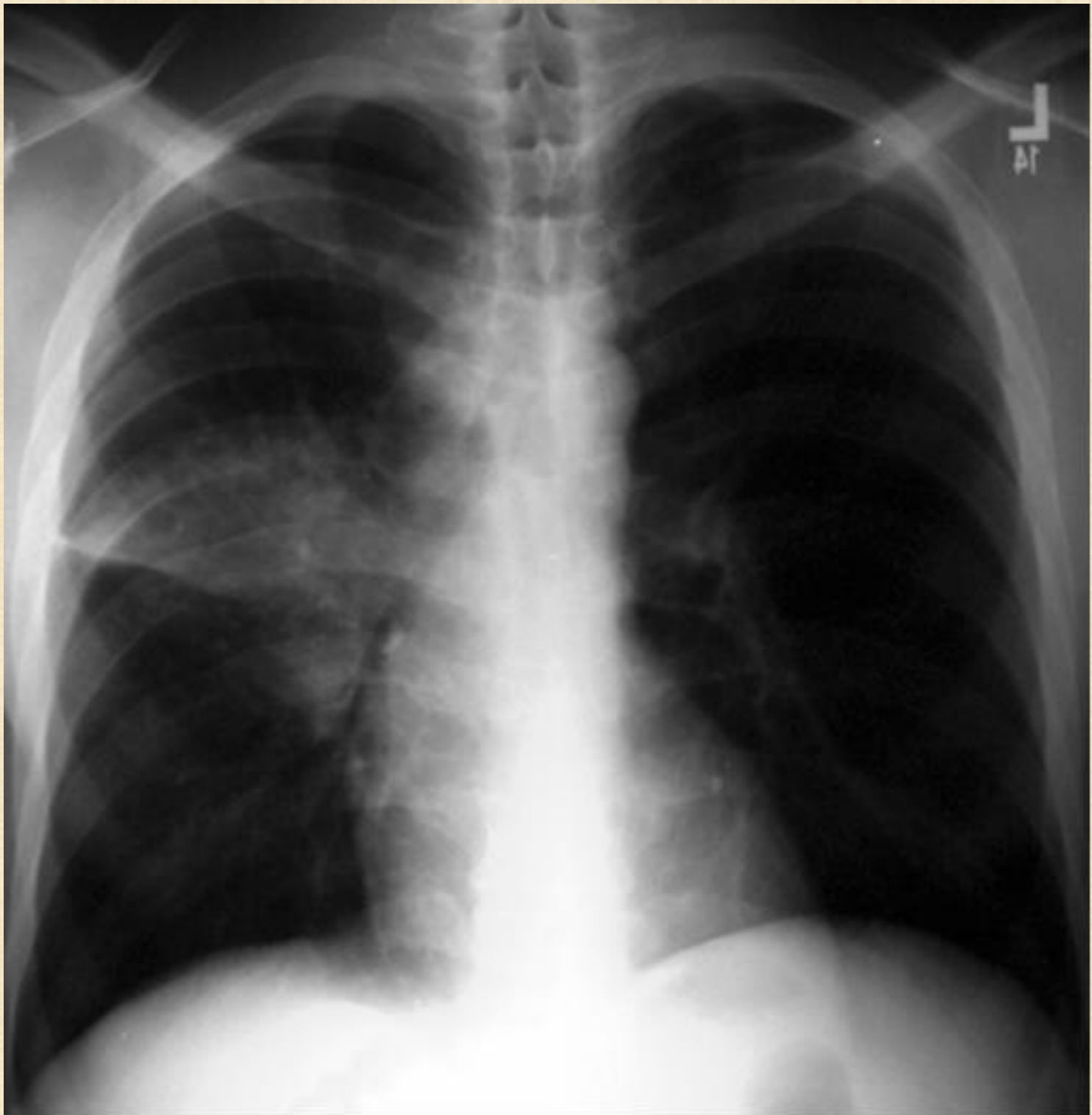


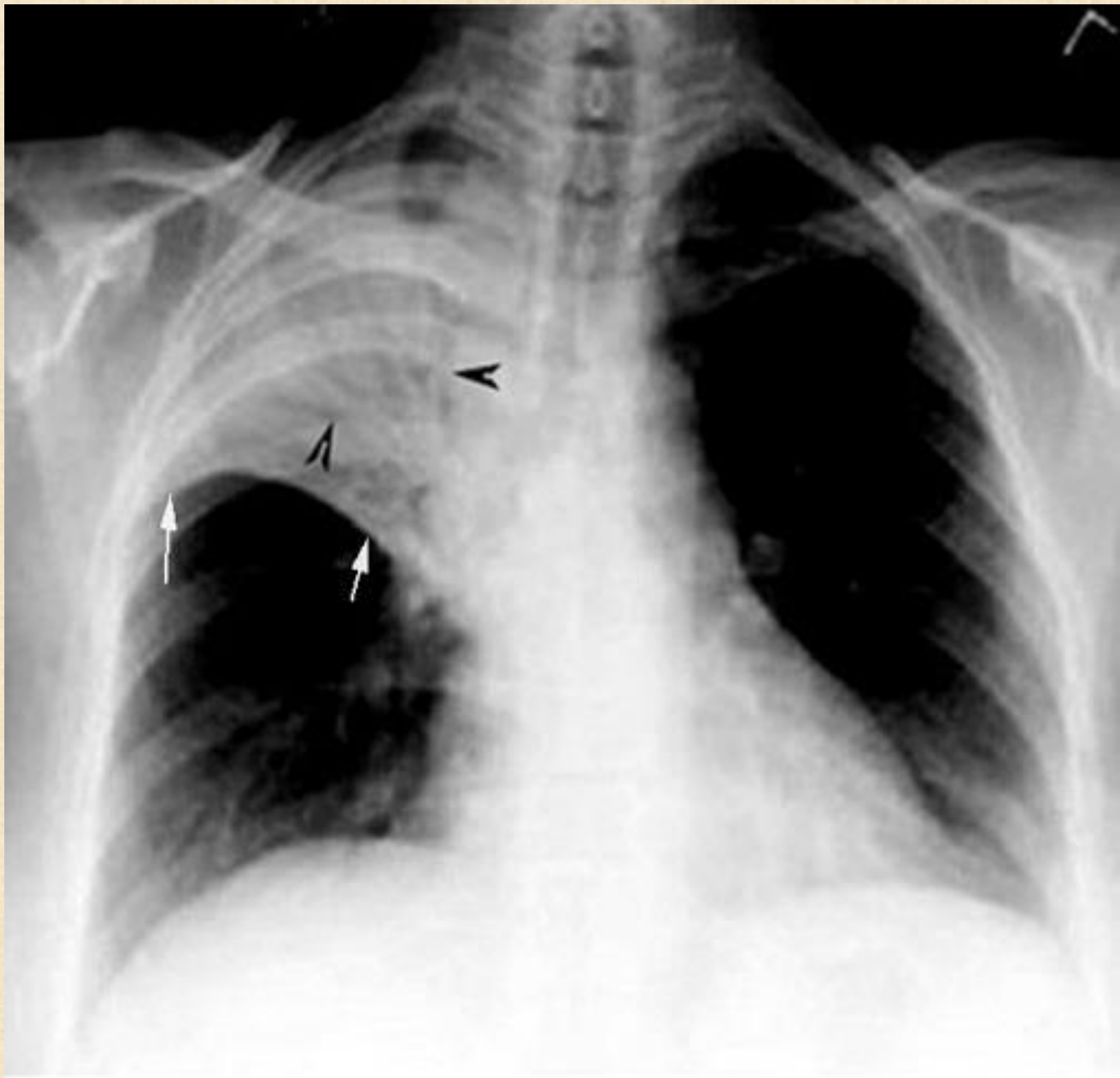


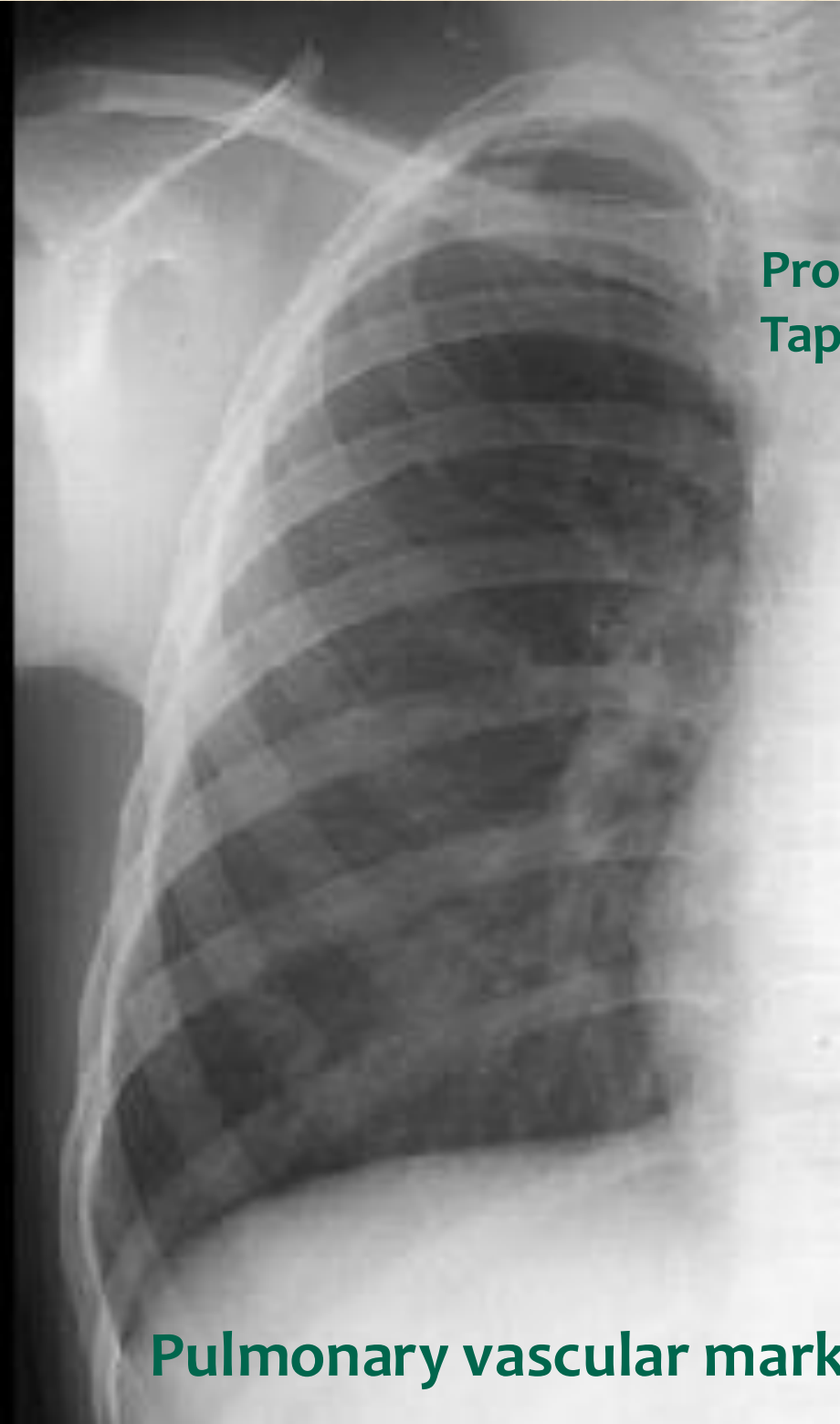
Each of these zones occupies approximately one third of the height of the lungs.





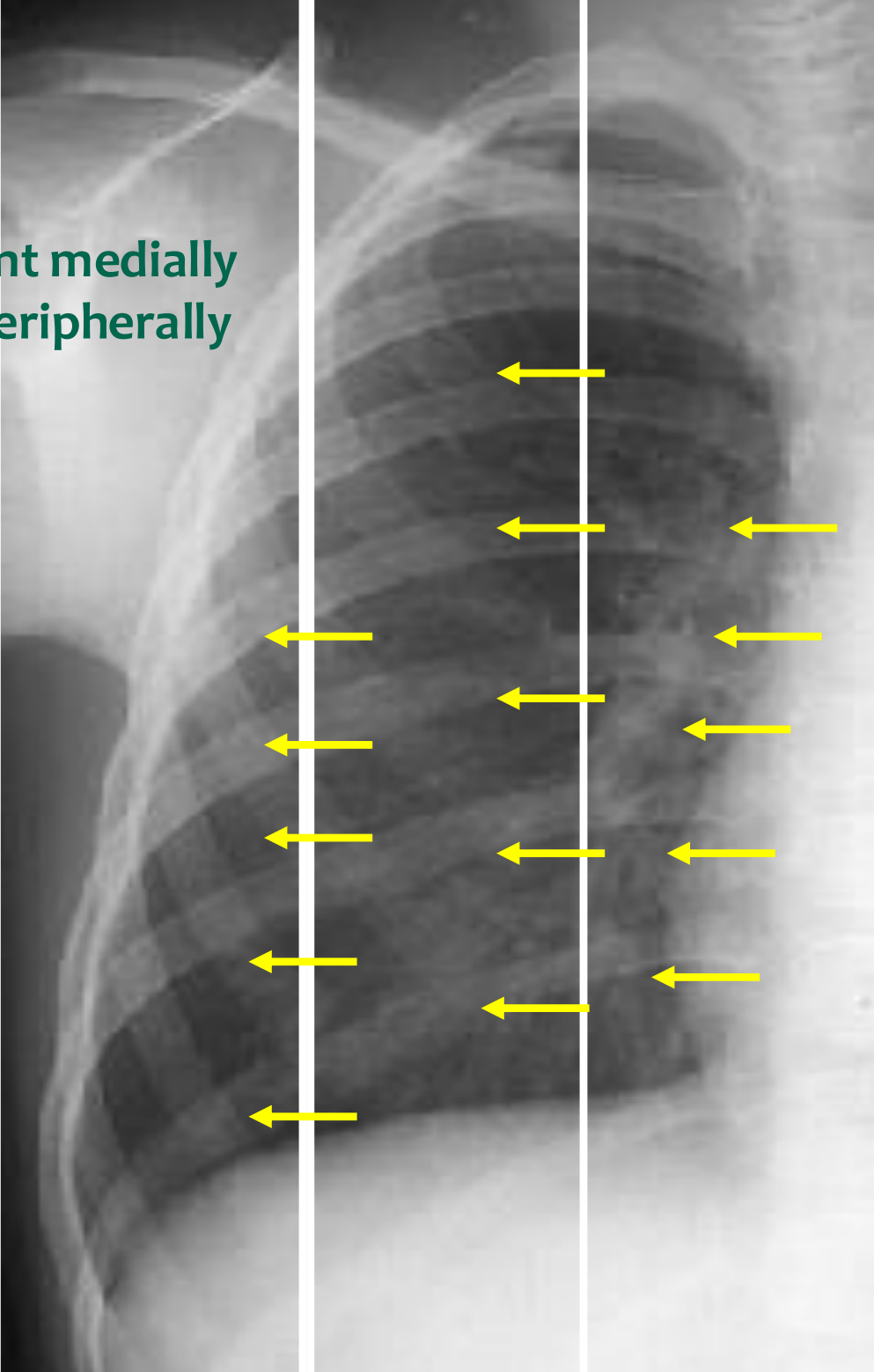






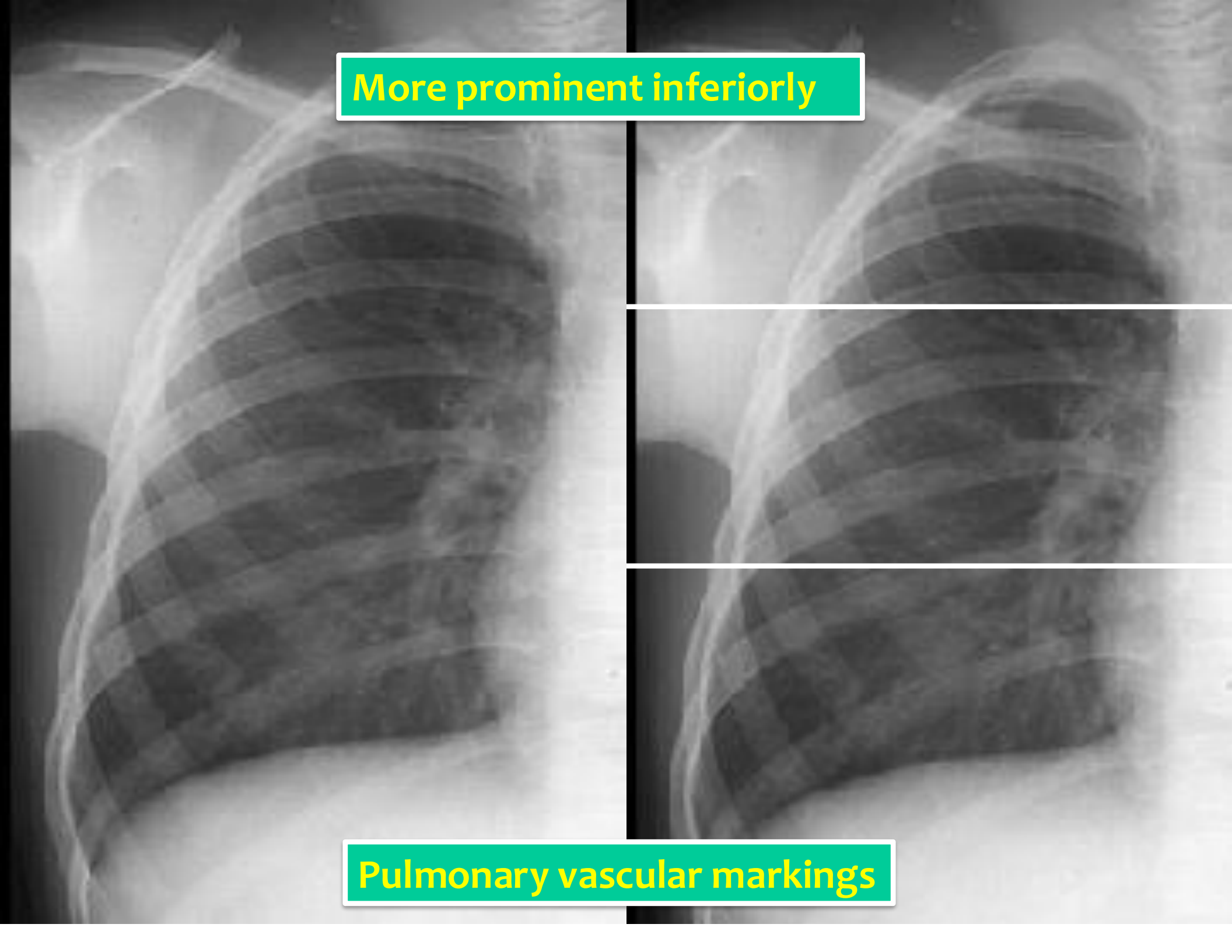
**Pulmonary vascular markings**

**Prominent medially  
Tapers peripherally**



**More prominent inferiorly**

**Pulmonary vascular markings**



# How to comment???????

- Plain x-Ray P-A view
- Site of the lesion
- Description
- Diagnosis or DD

**Opacity**  
(Liquid or soft tissue density)

**Hypertranslucency**  
(Increased air density)

**Diffuse**

**Localized**

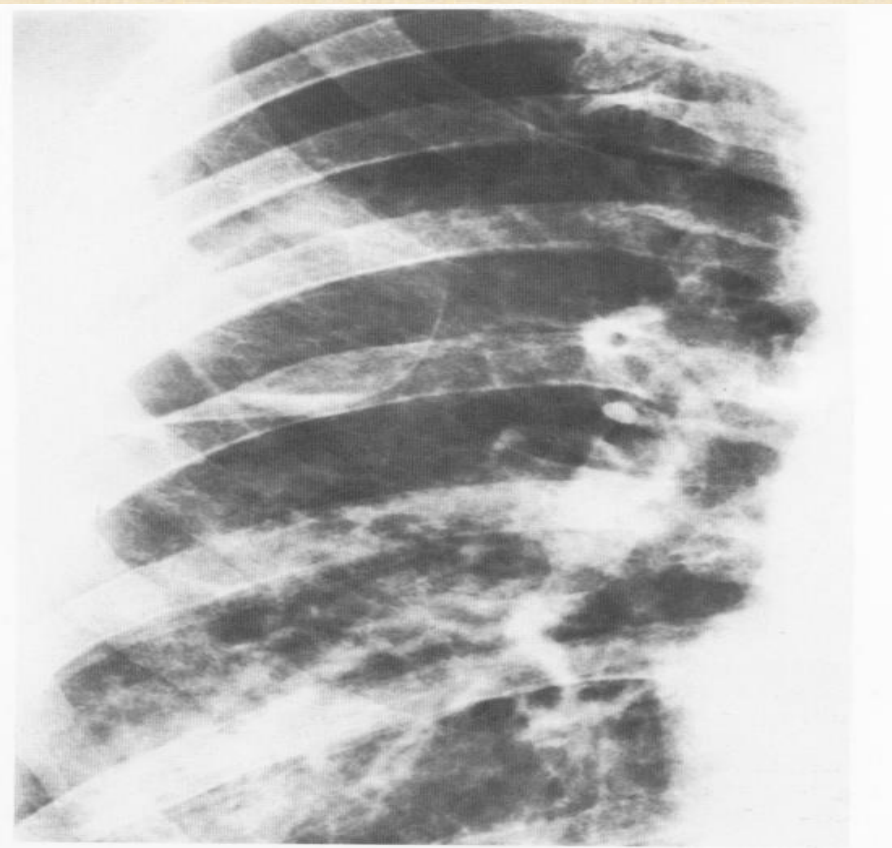
- Diffuse alveolar
- Diffuse interstitial
- Mixed
- Vascular

- Consolidation
- Cavitation
- Mass
- Fibrosis
- Atelectasis

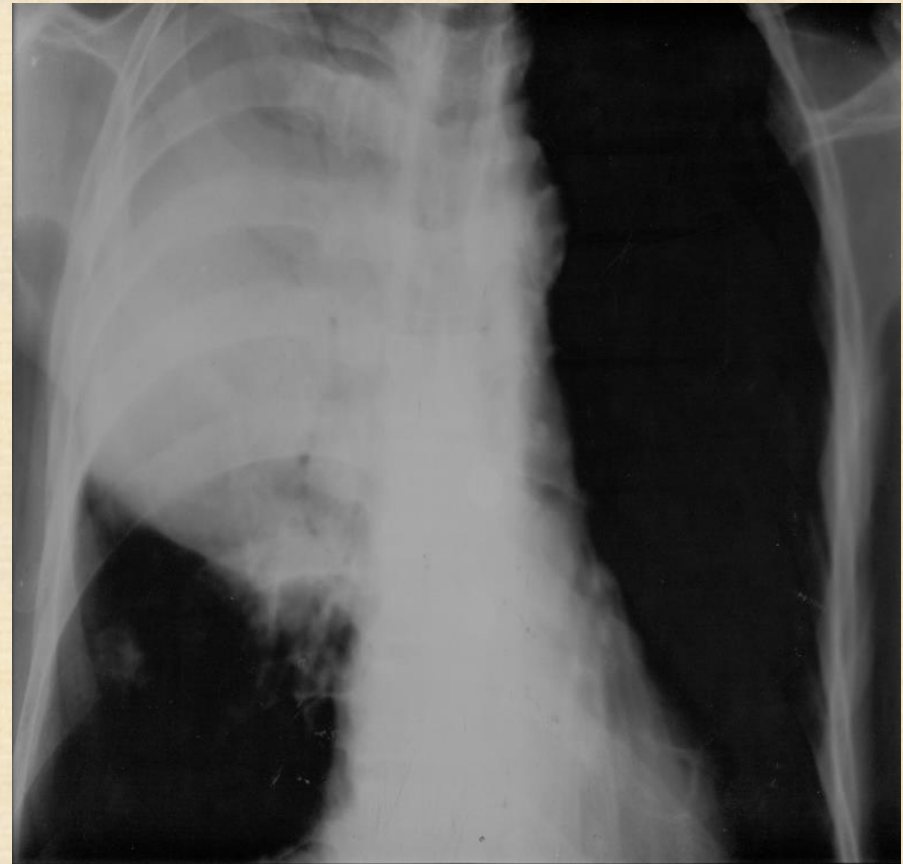
- Bulla
- Localized airway obstruction
  
- Diffuse airway obstruction  
e.g. Emphysema

# Radiological description:

**Heterogenous opacity.**



**Homogenous opacity.**



# Radiological description:

- **Nodule:**

Well circumscribed pulmonary opacity ( 5 mm - 3 cm in diameter) and surrounded by normal lung.





# Radiological description:

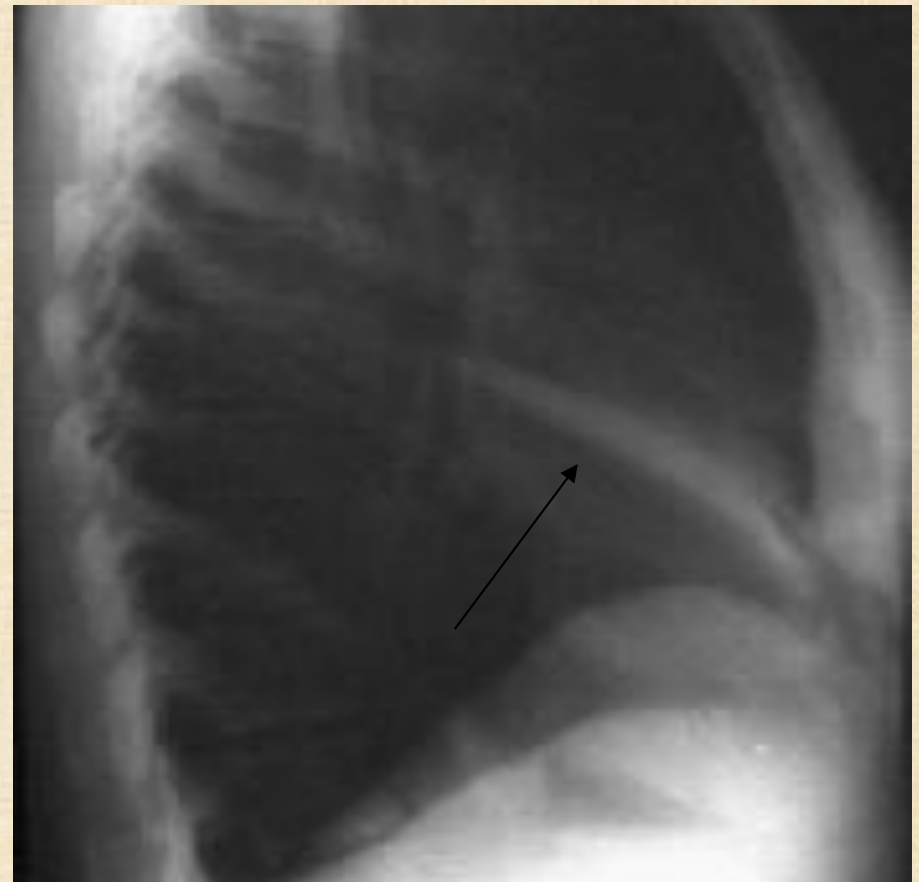
## Mass:

Pulmonary opacity 3 cm or more in diameter.



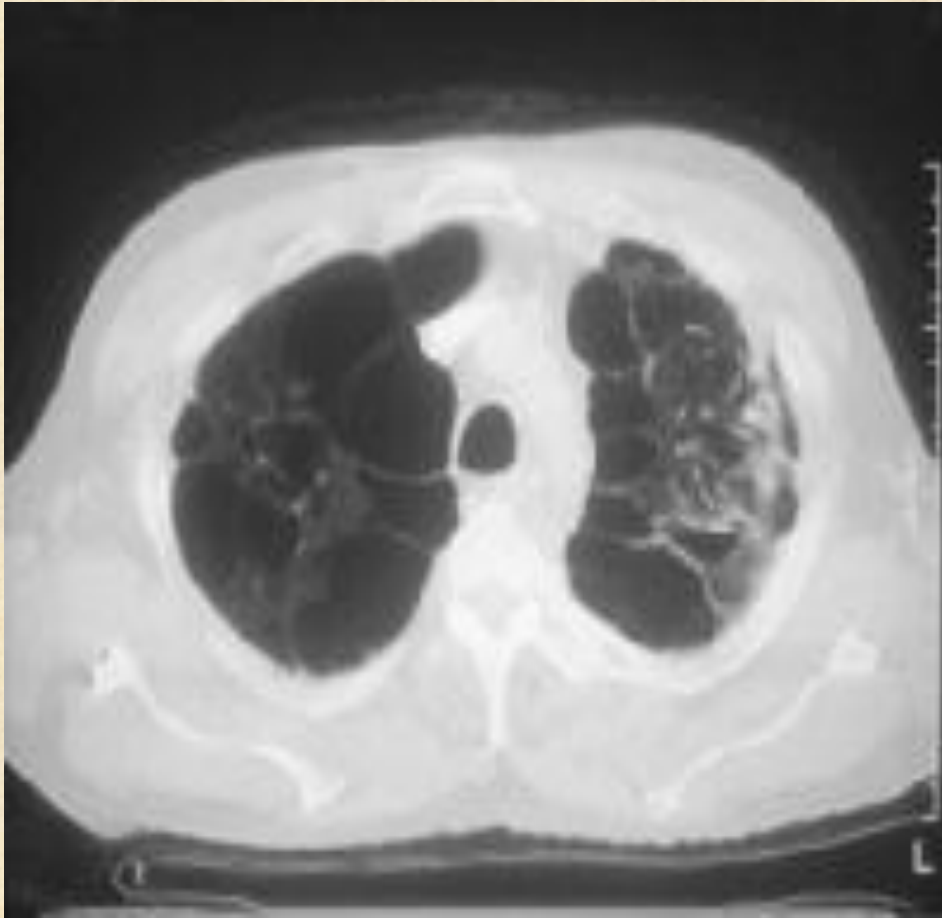
# Radiological description:

- **Linear shadows:** 1-3 mm in thickness and 1 - 10 cm or more in length
- **Band like shadows:** 3-10 mm in width.



# Radiological description:

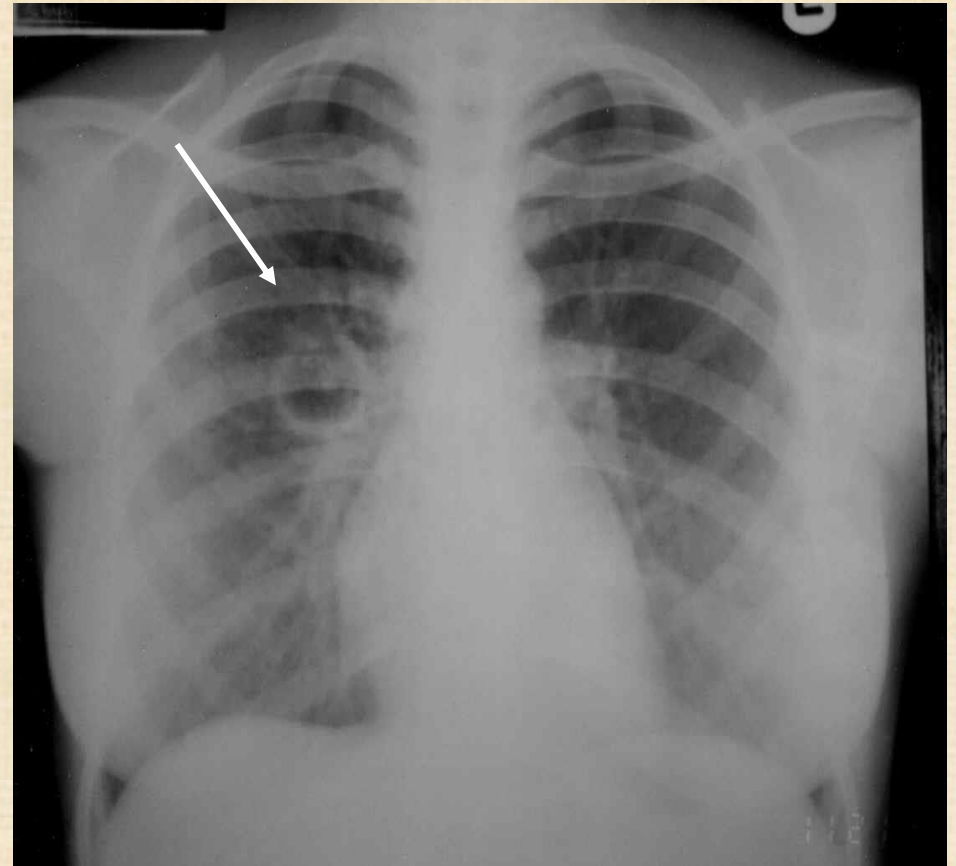
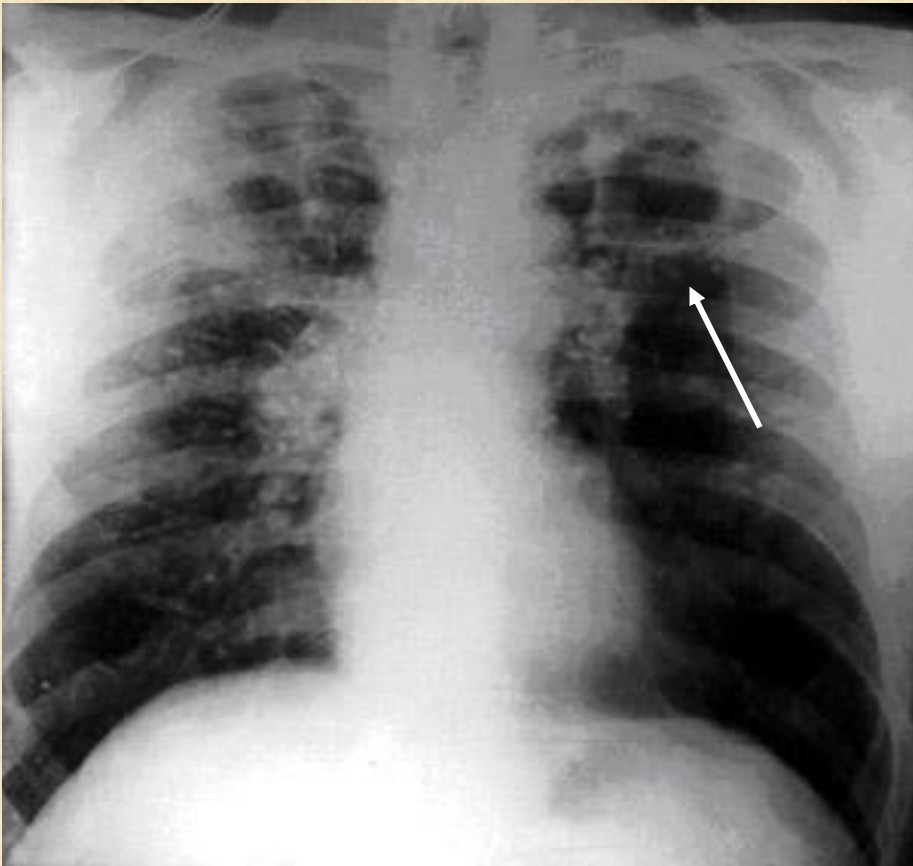
**Bulla:** Air filled space at least 1 cm in diameter and wall is hairline (<1 mm in thickness).





# Radiological description:

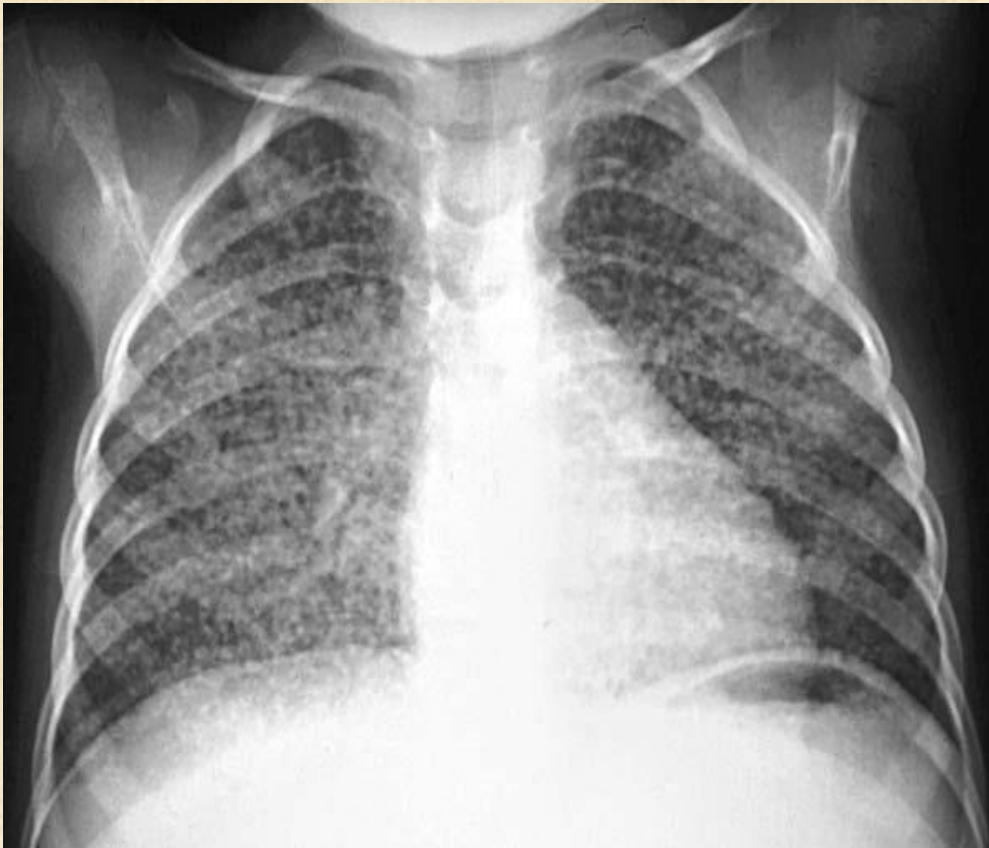
- **Cavity:** Air filled space at least 1 cm in diameter with complete wall and wall thickness is  $>3$  mm.



# Radiological description:

## **Miliary shadows:**

small discrete opacities of similar size 2-5 mm in diameter.



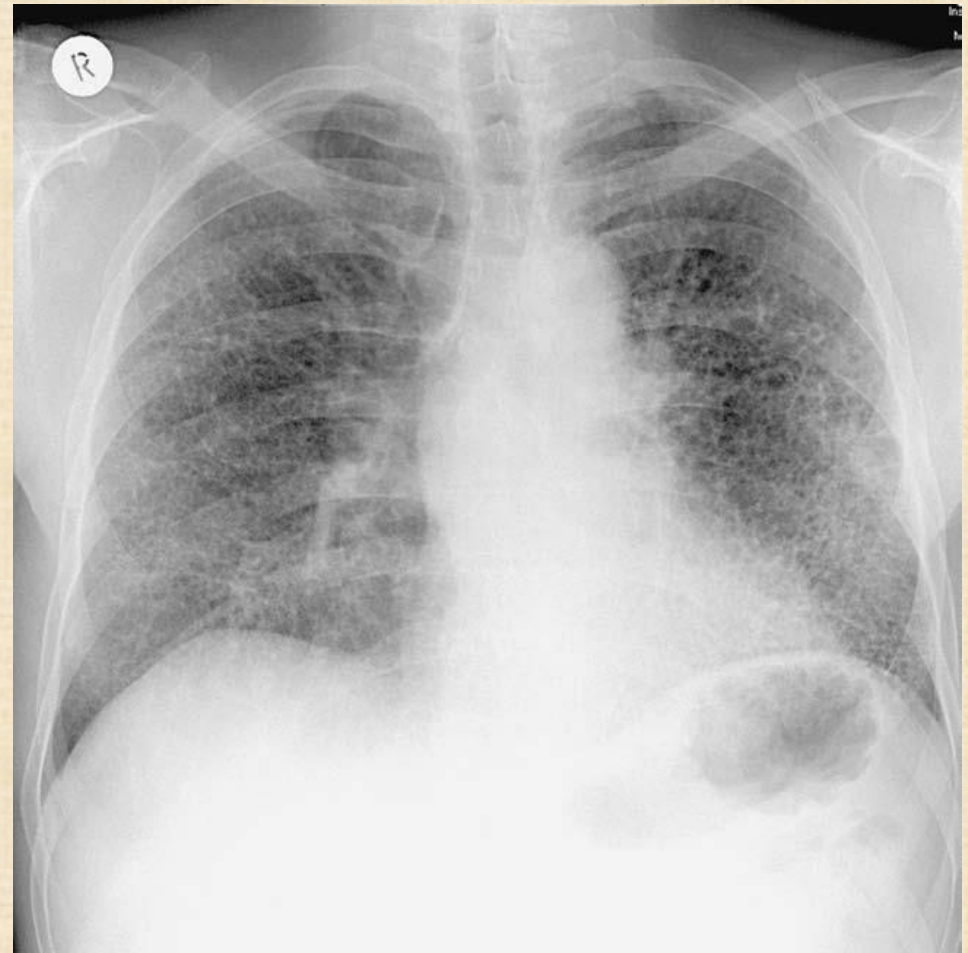
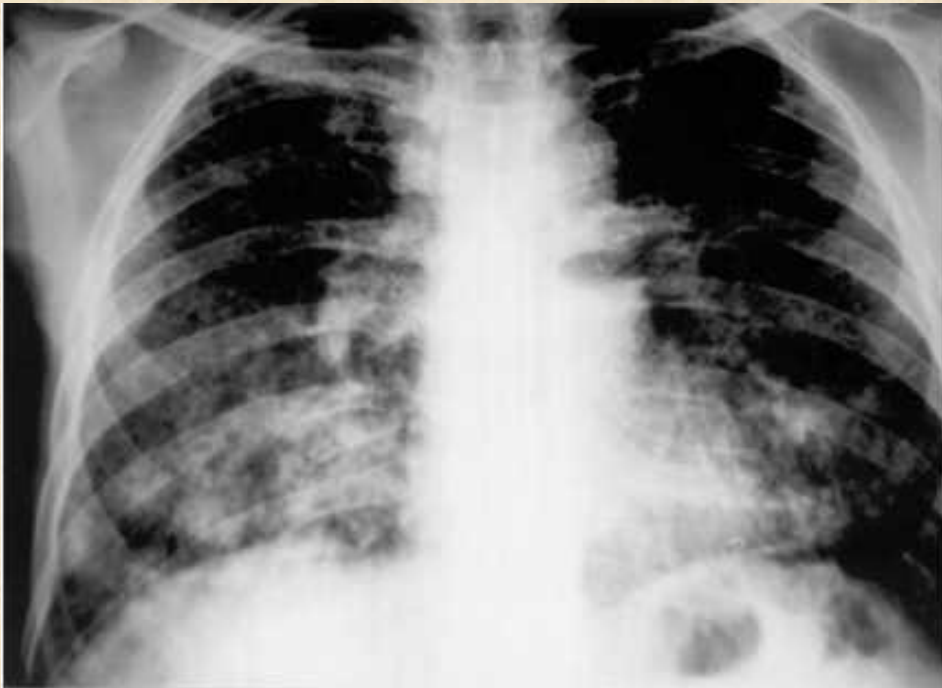
# Radiological description:

- **Reticular:**

Linear streaks with mosaic appearance (1 -3 mm thickness).

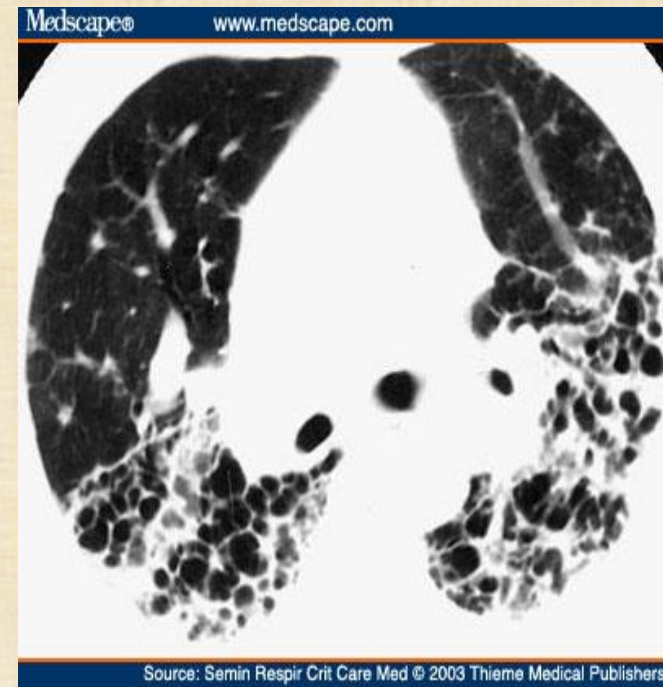
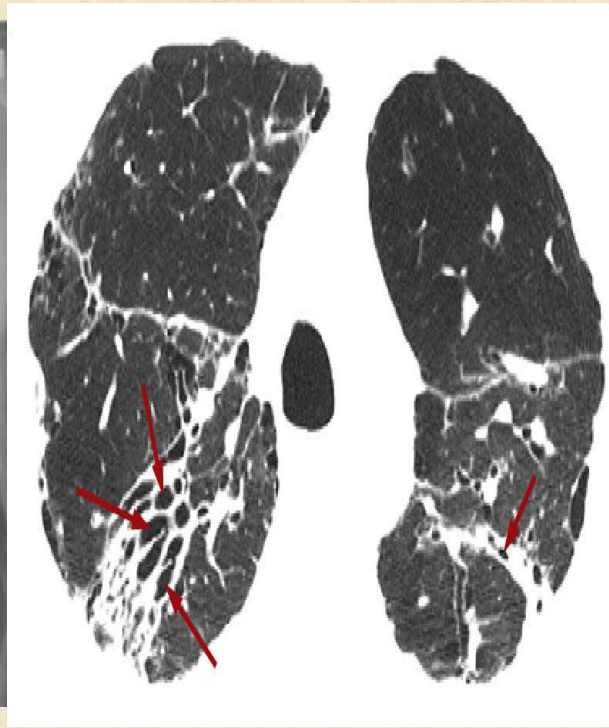
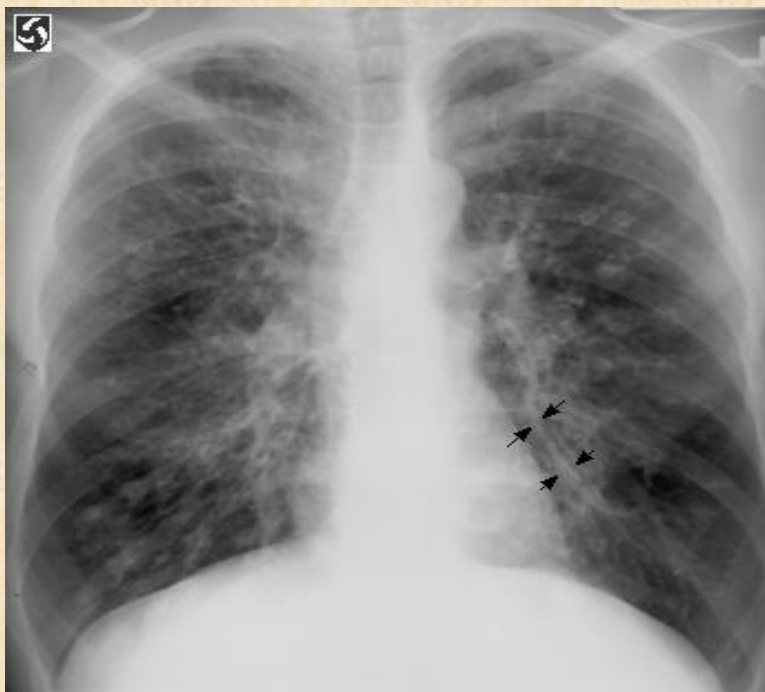
- **Reticulonodular:**

Mixed reticular and miliary.

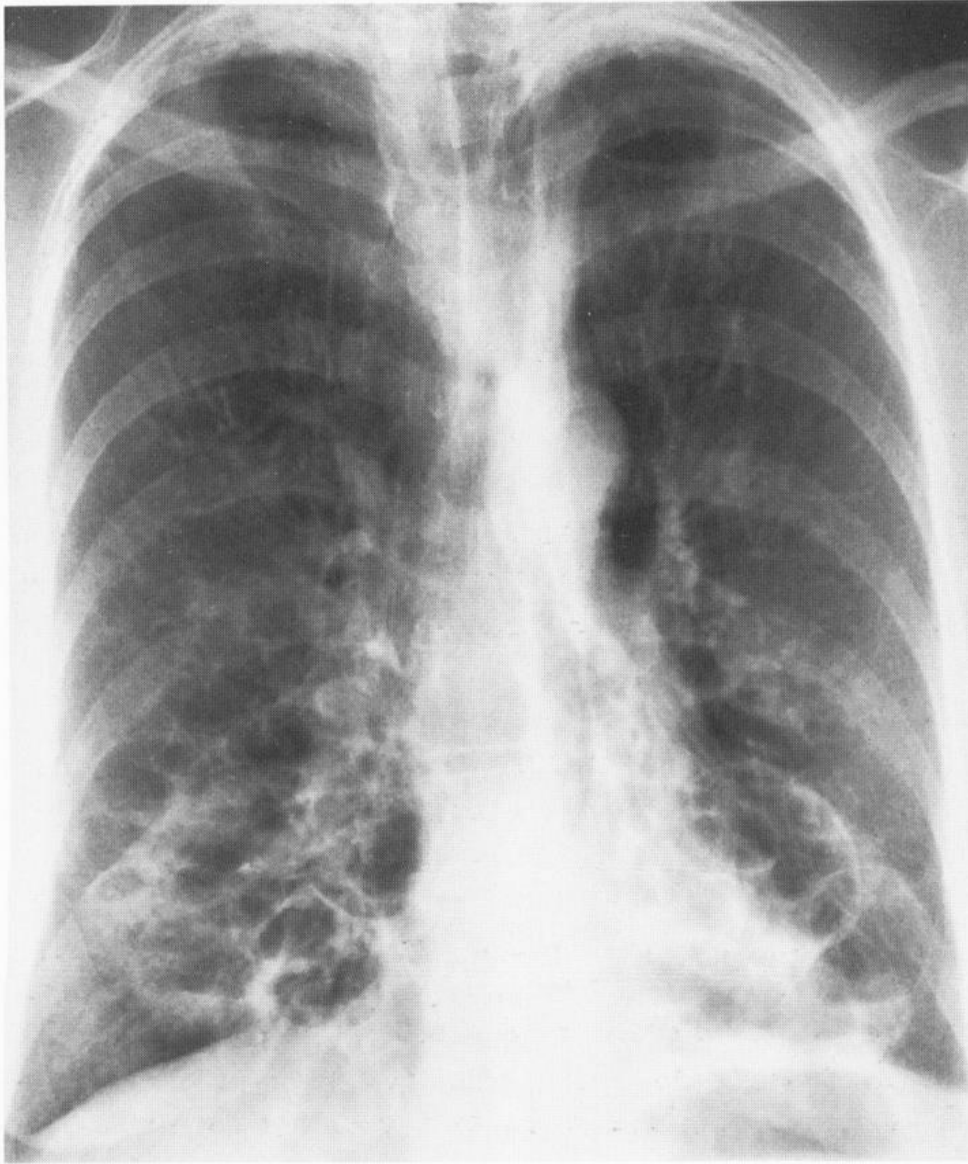


# Radiological description:

**Honeycomb shadowing:**  
Multiple Cysts more than 10 mm in size.







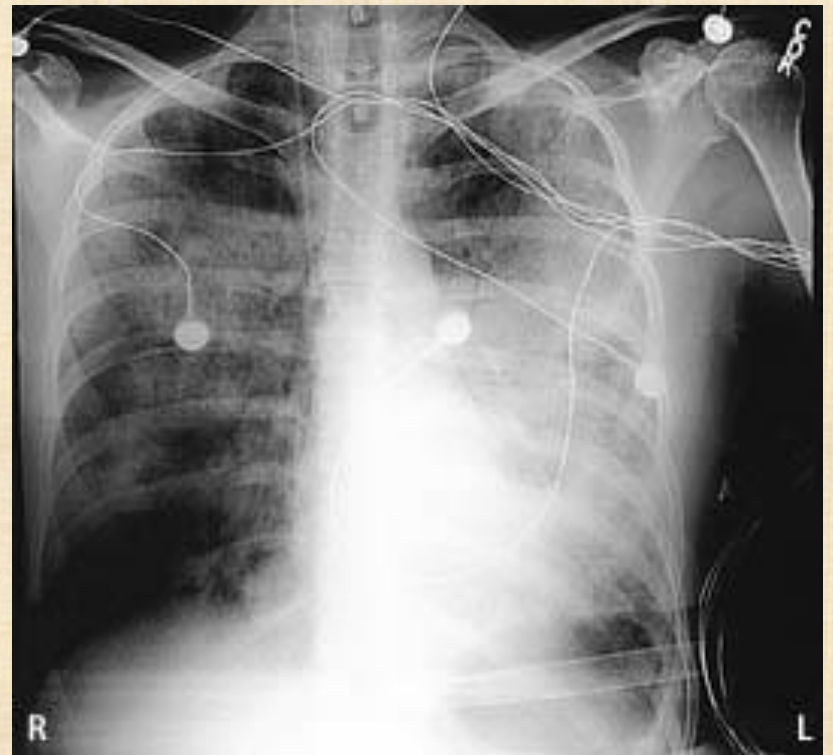
**Fig. 6.9** Bronchiectasis. Multiple ring shadows, many containing air–fluid levels, are present throughout the lower zones of this patient with cystic bronchiectasis.



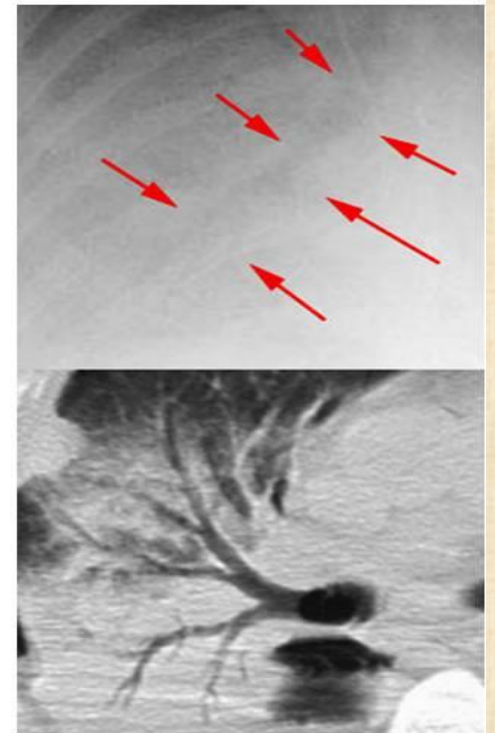
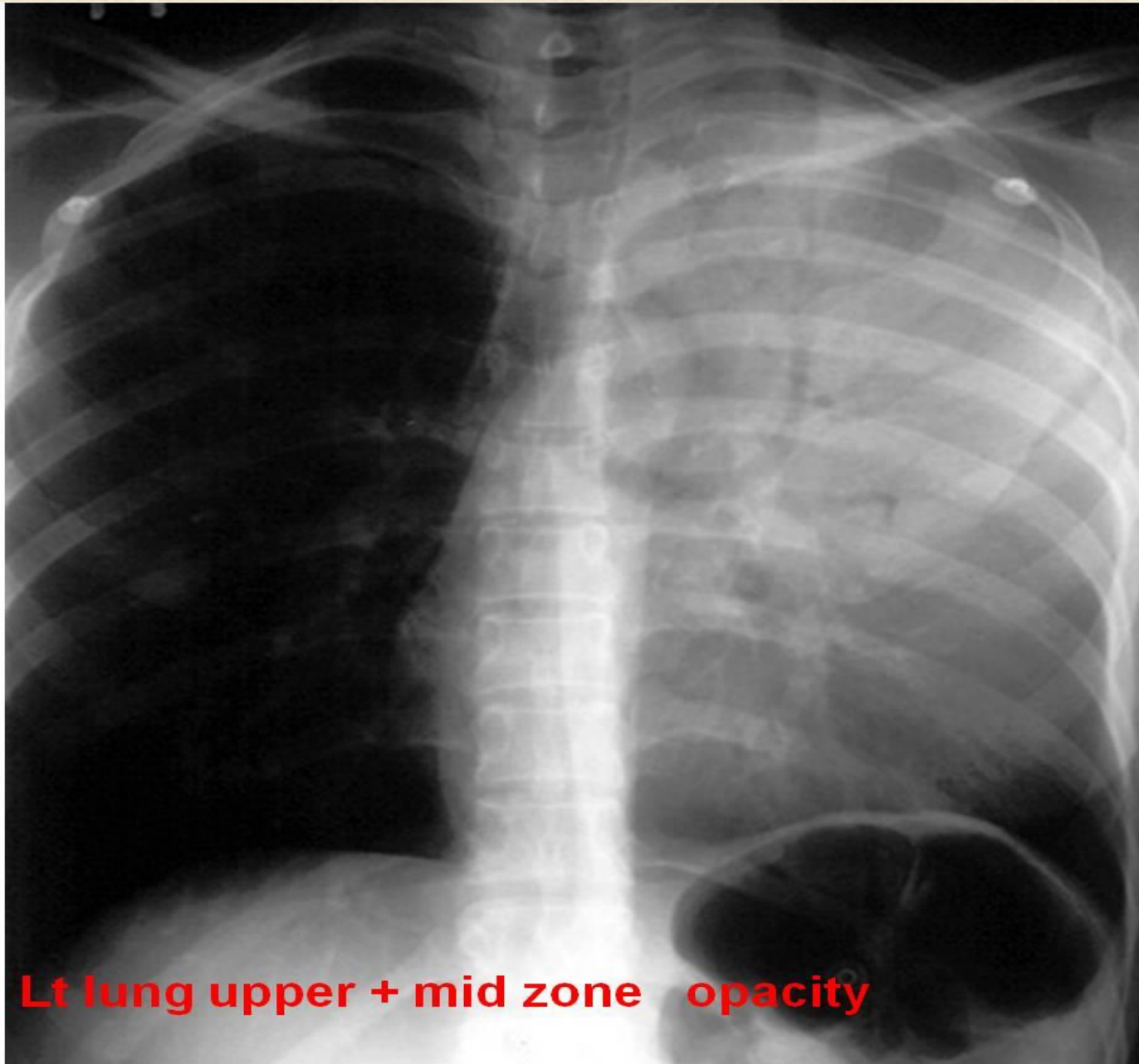
**Fig. 6.11** Cystic bronchiectasis. A CT image through the upper lobes demonstrates multiple ring shadows. More caudal images reveal these to be due to irregularly dilated bronchi.

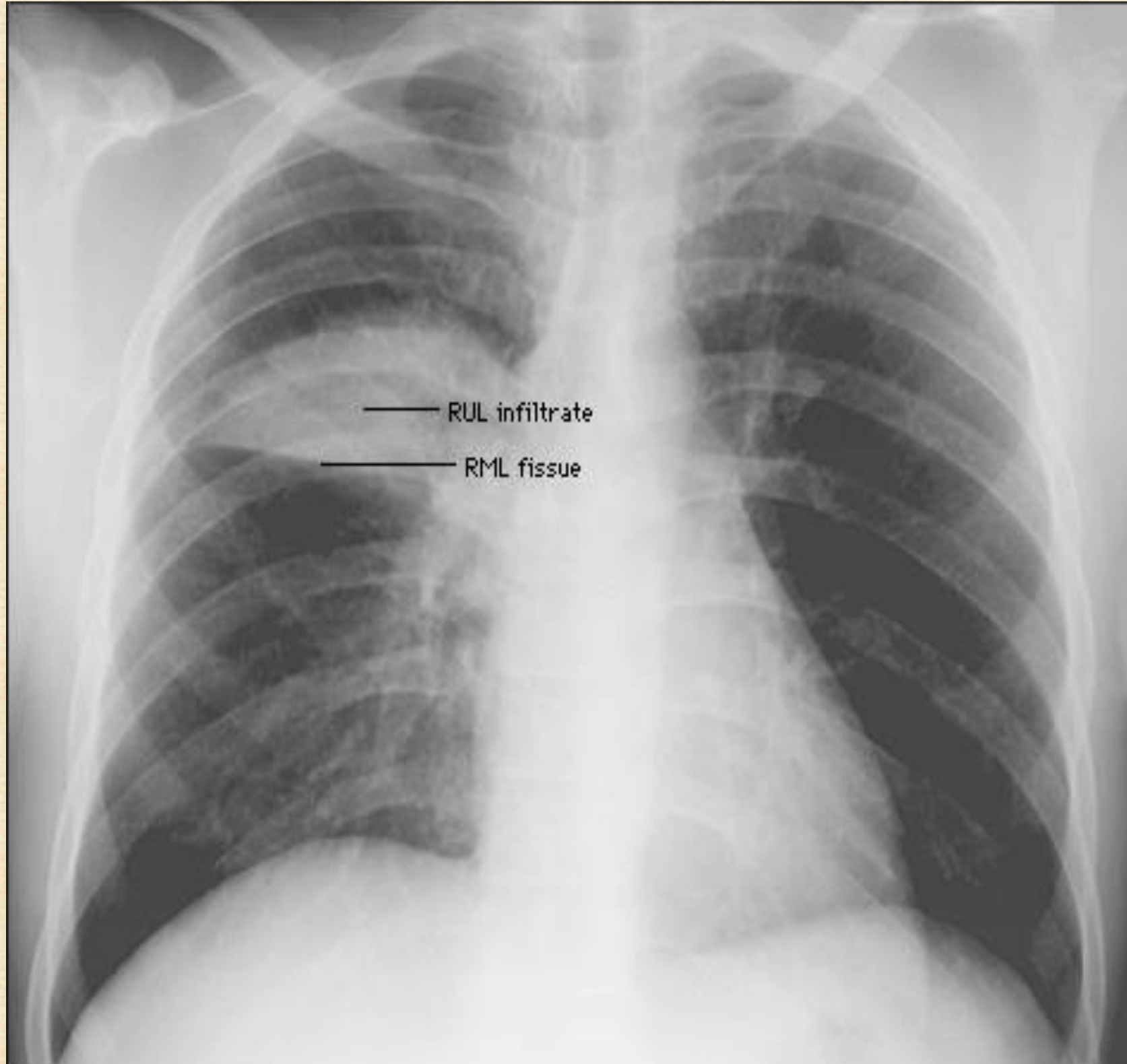
□ **Ground-Glass Opacity**  
**“GGO”:**

**Fine granular pattern which obscures the normal anatomic detail of the lung with preservation of BVM.**



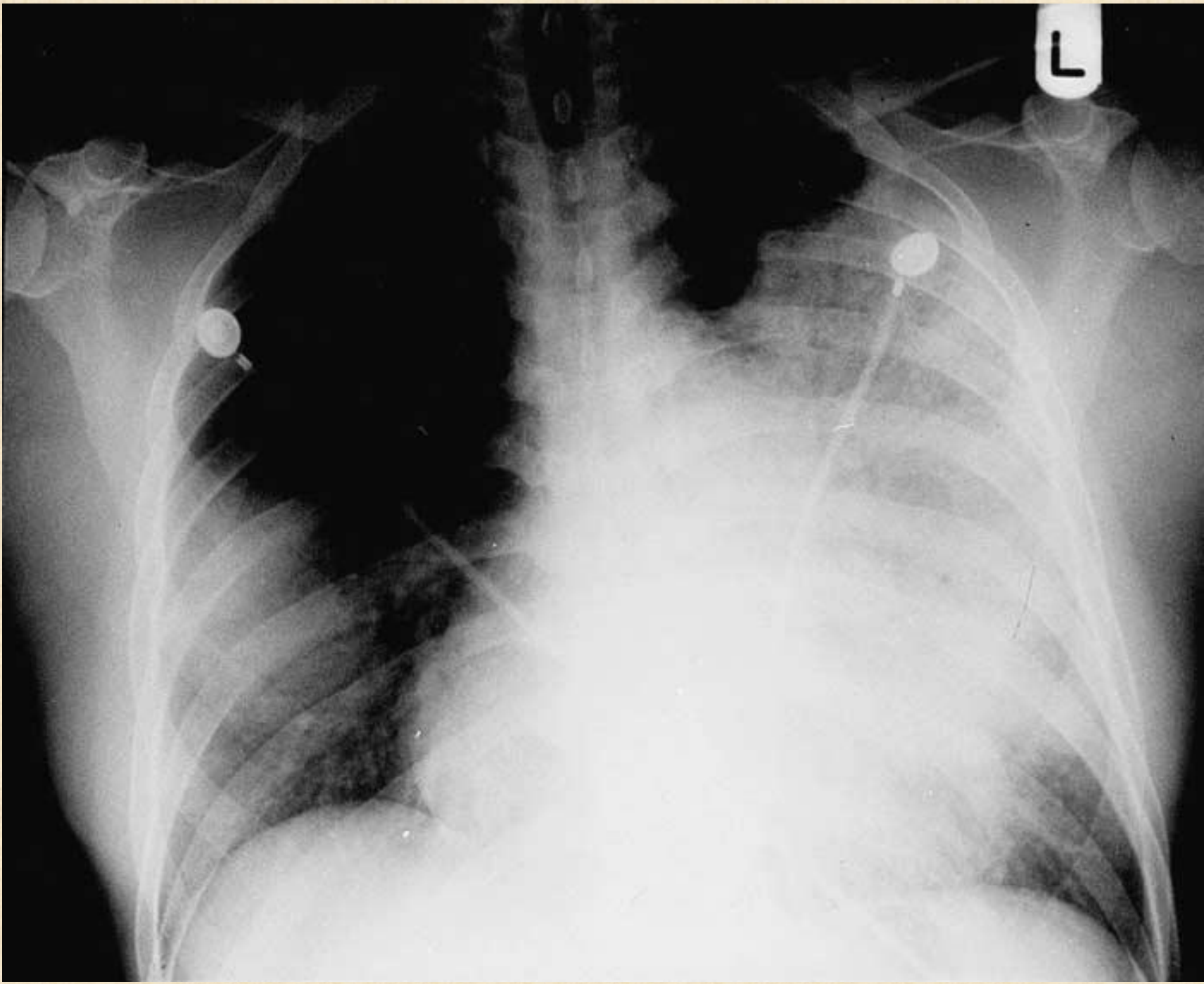
# Air-Bronchogram Sign





— RUL infiltrate

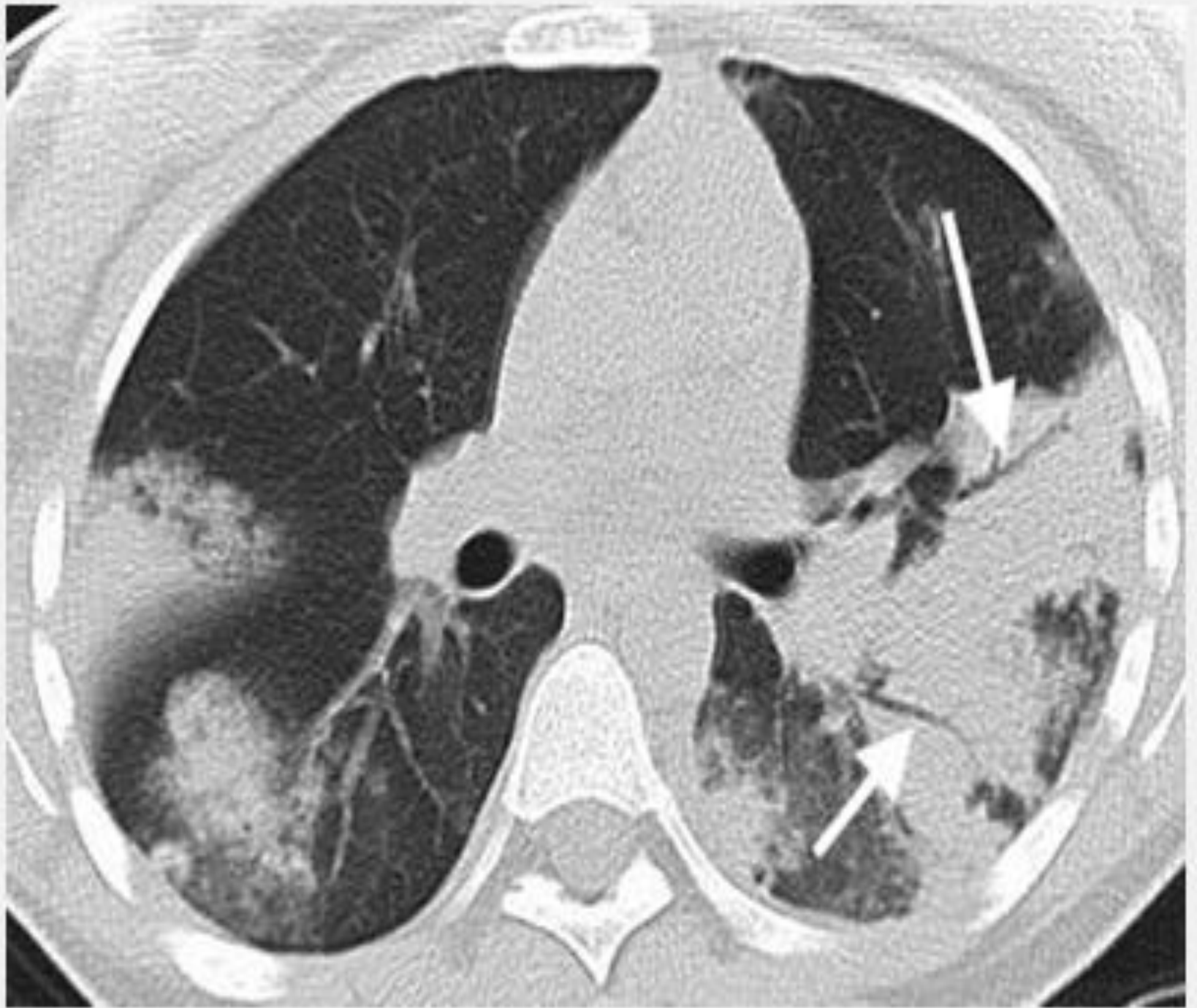
— RML fissure



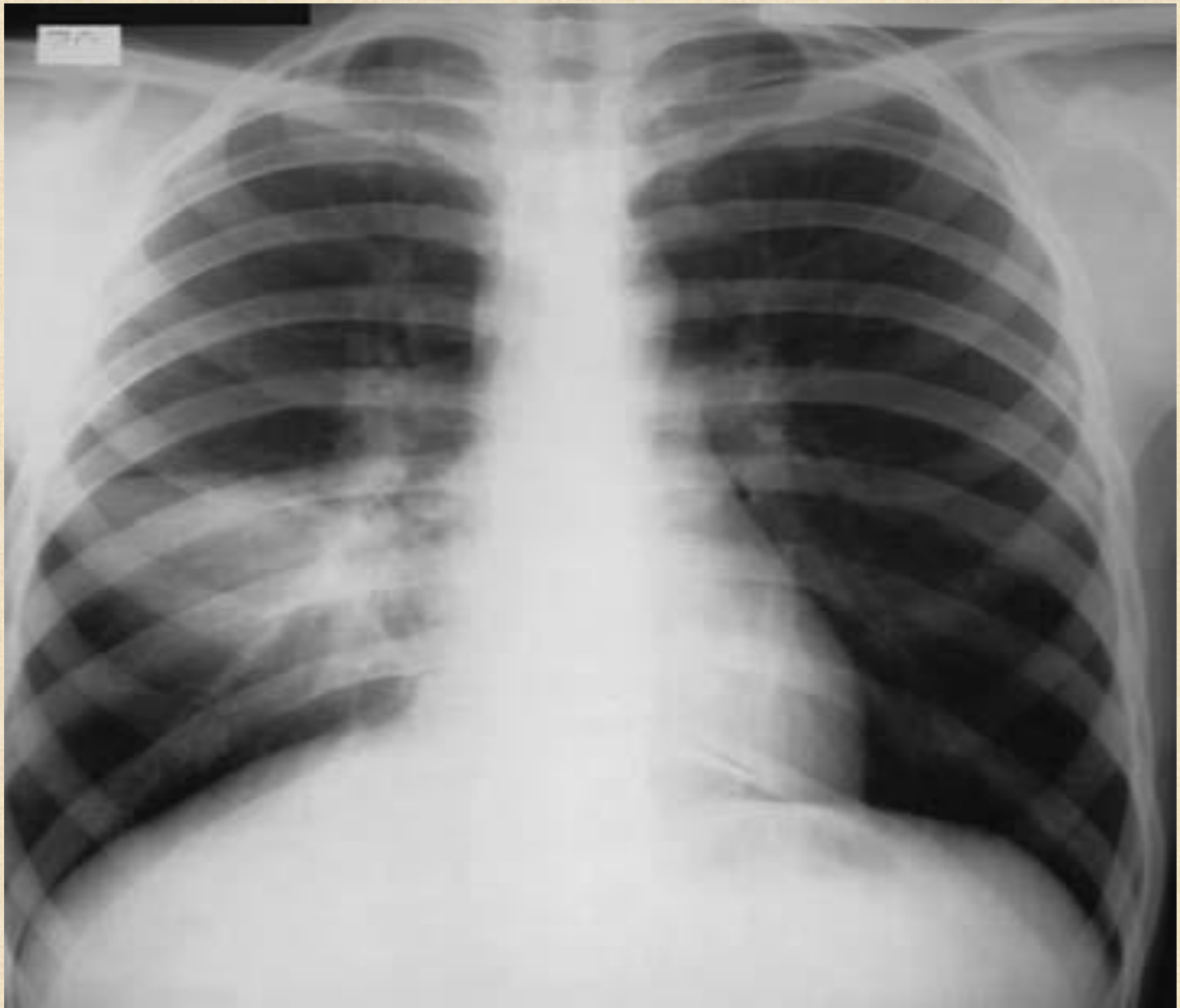
Severe pneumonia Multilobar involvement



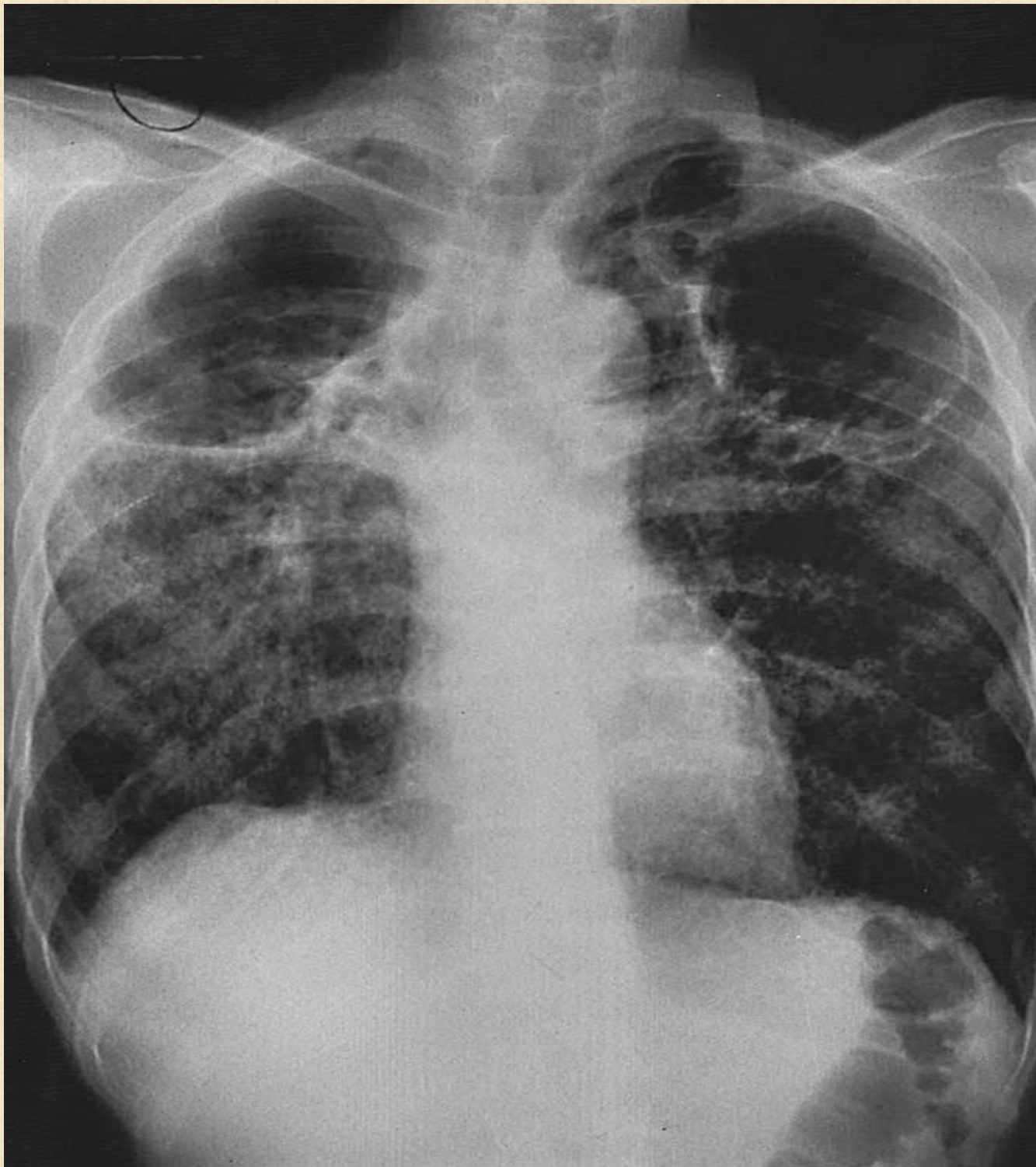


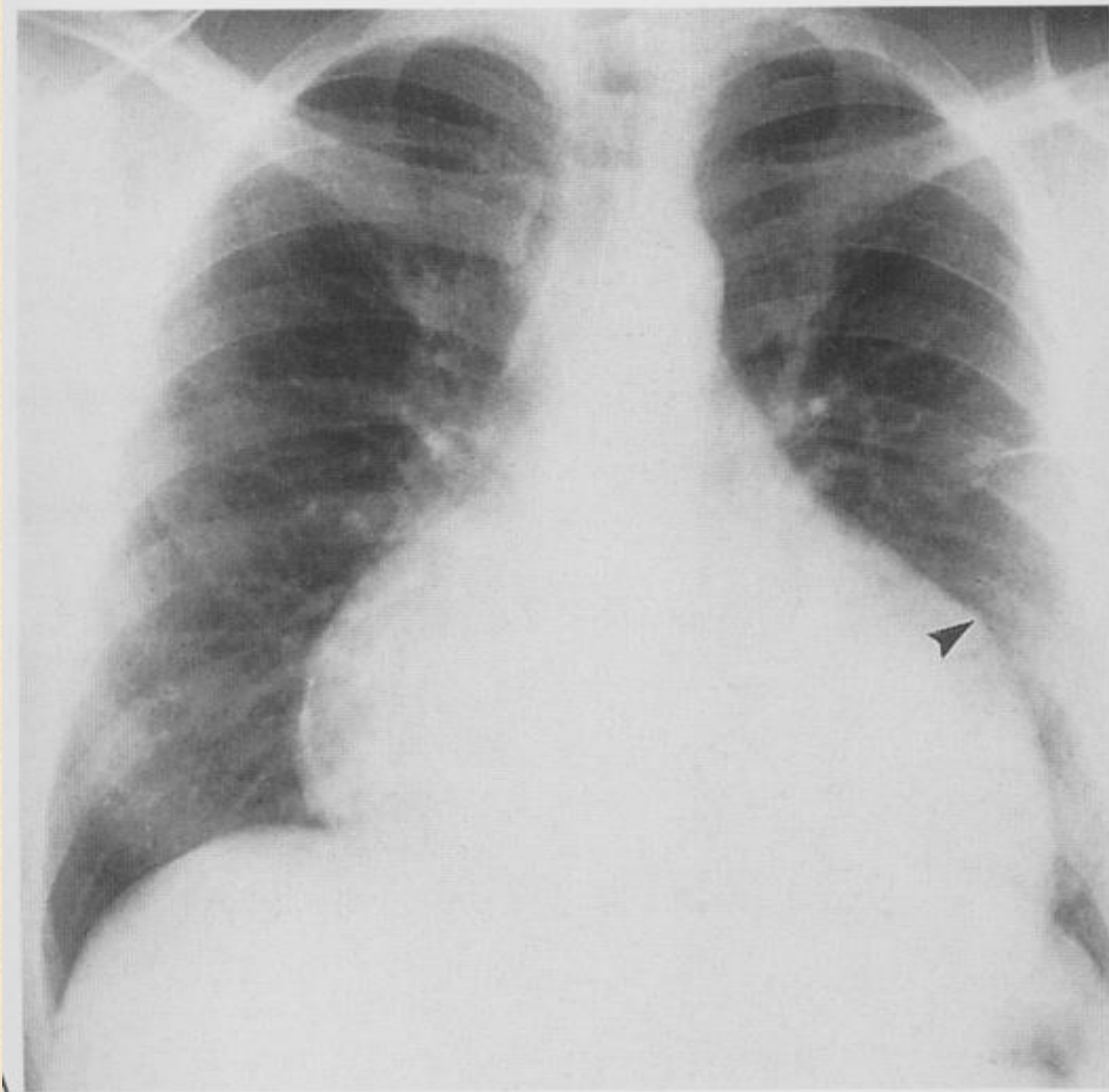


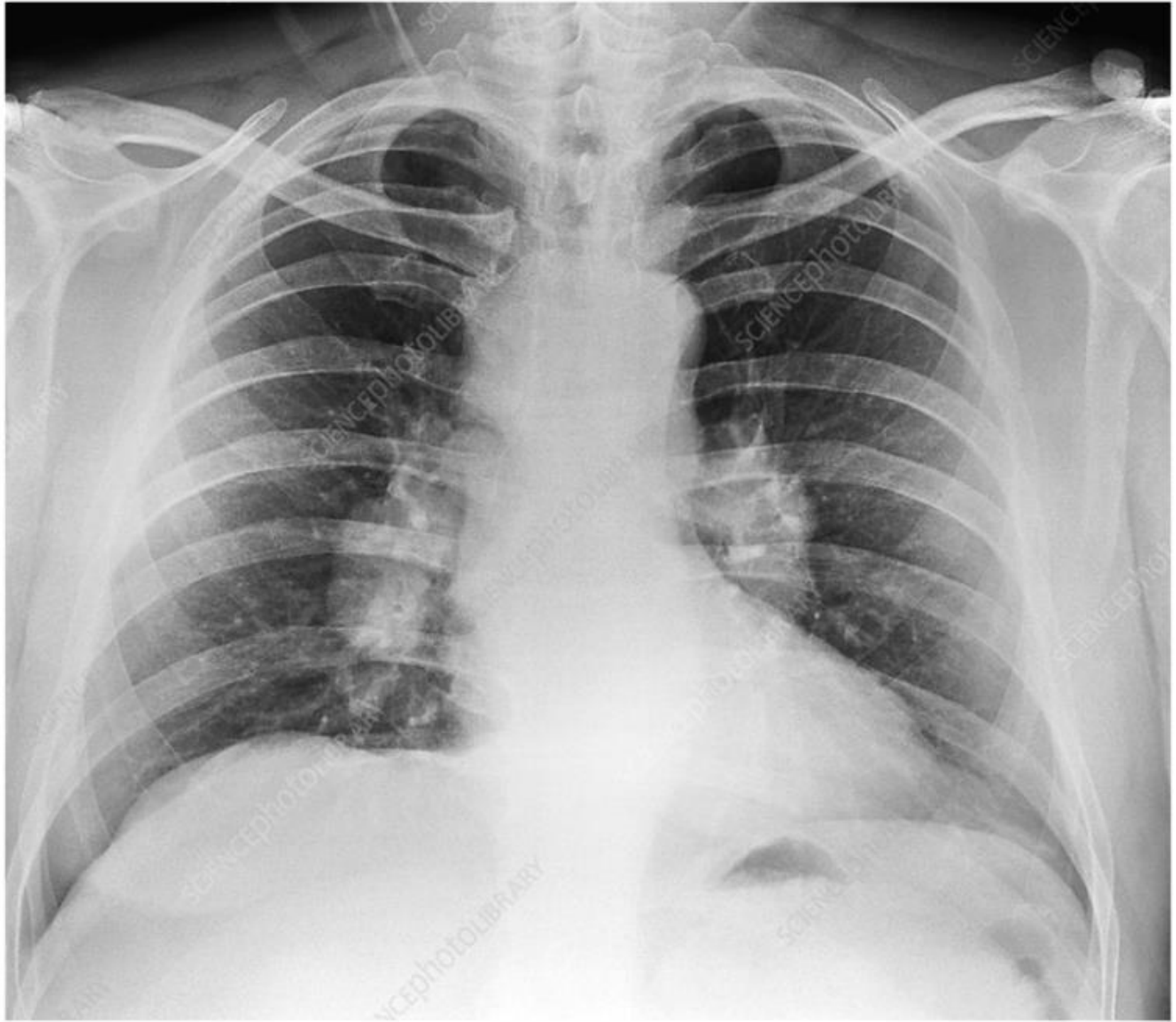


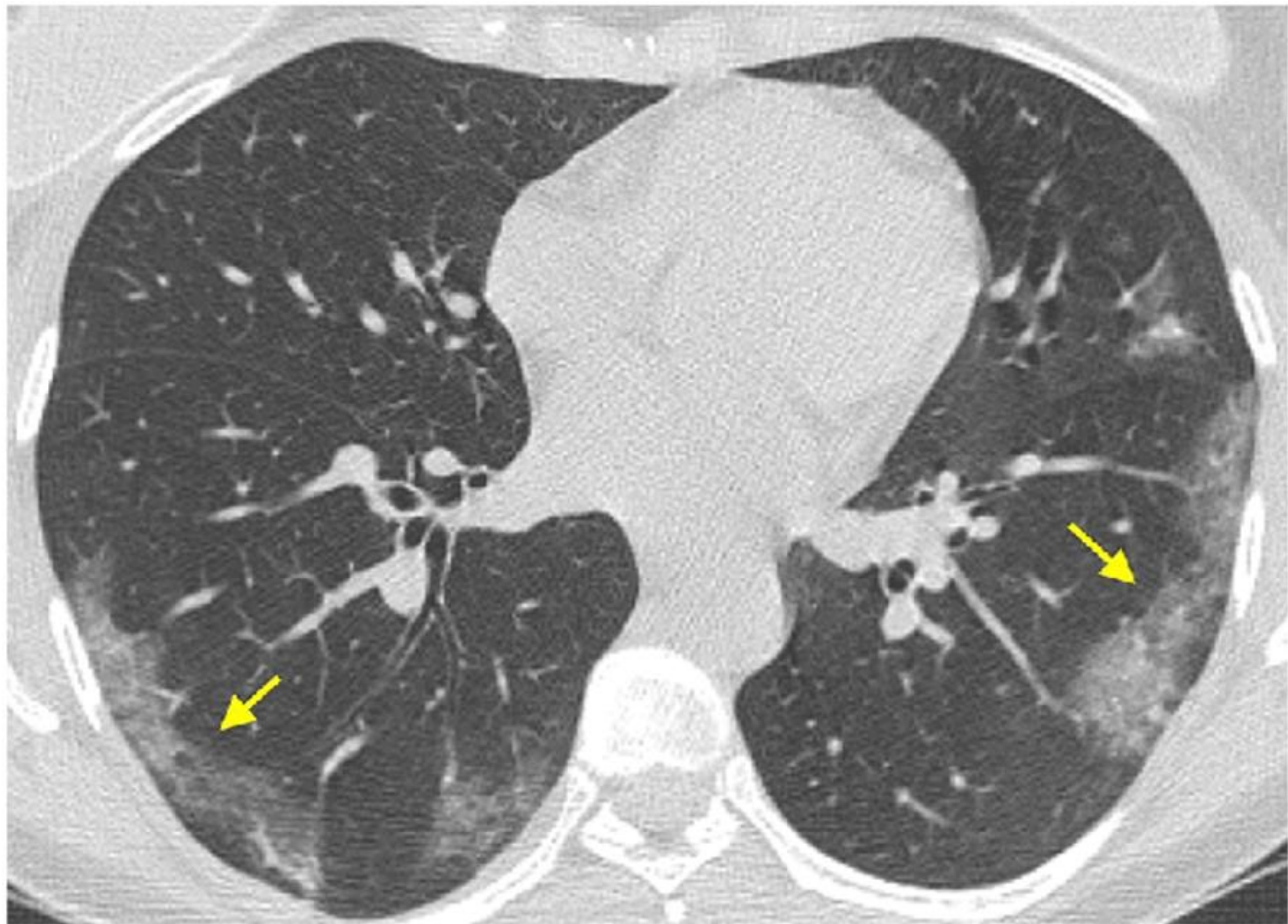


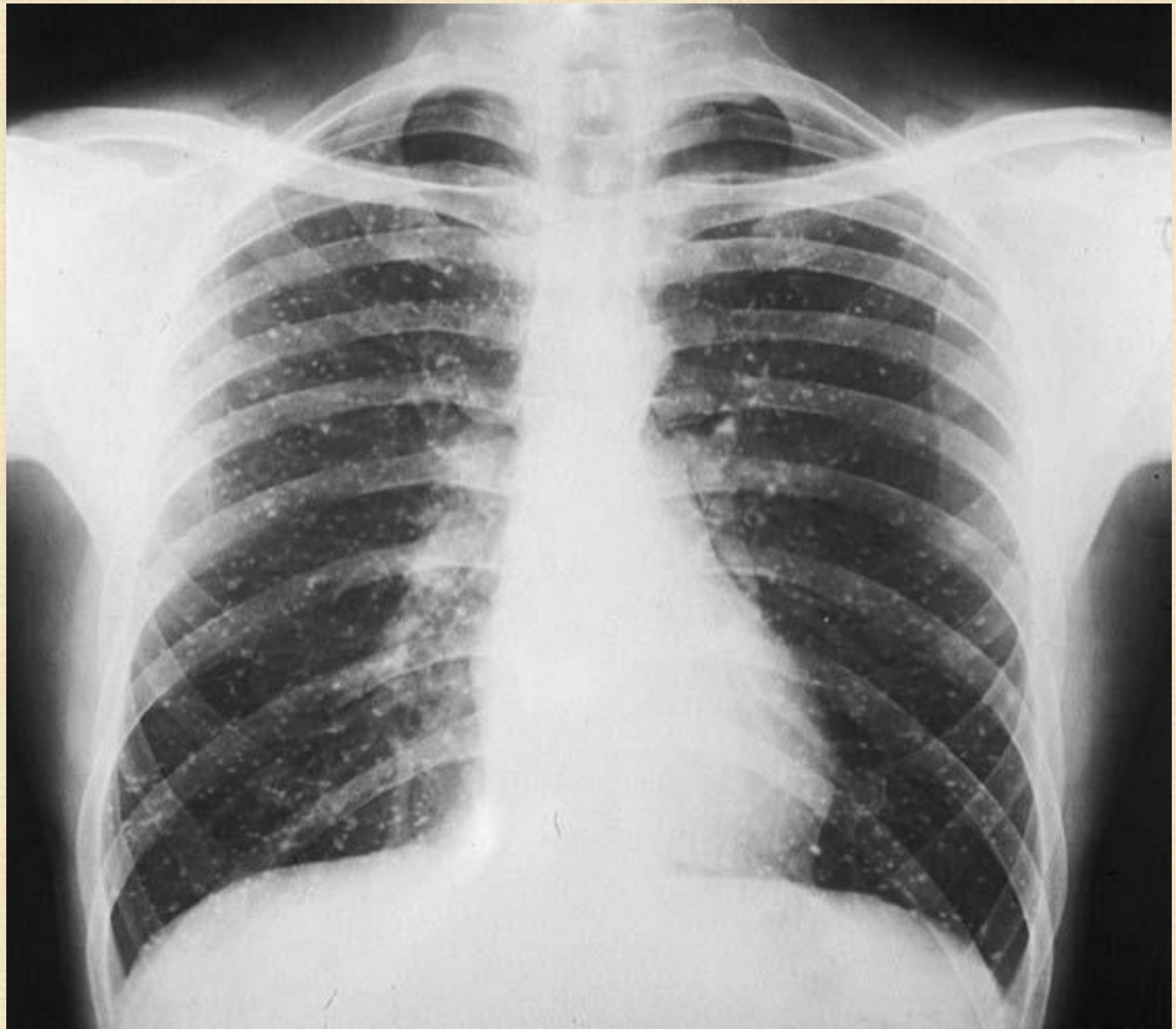


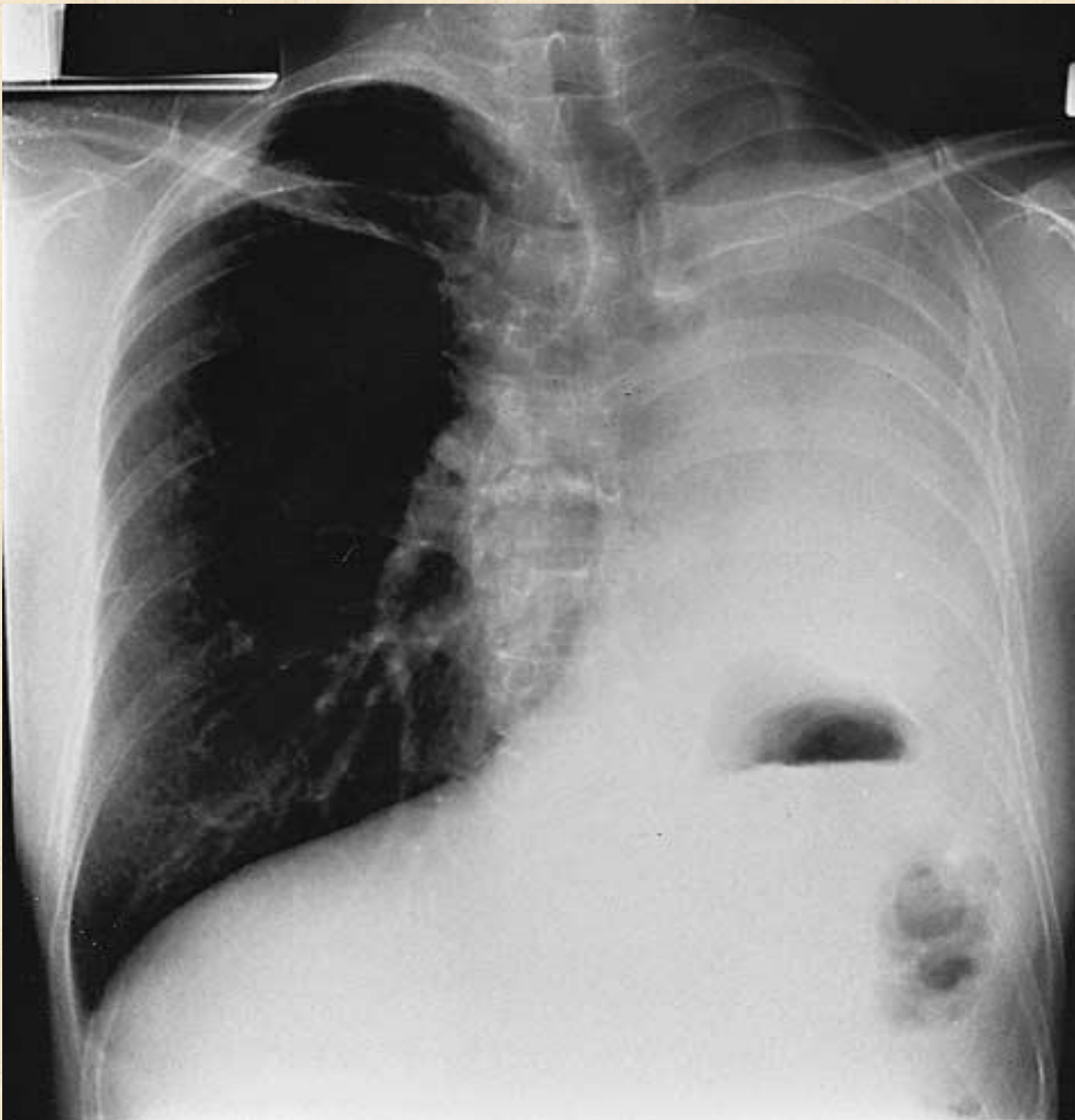










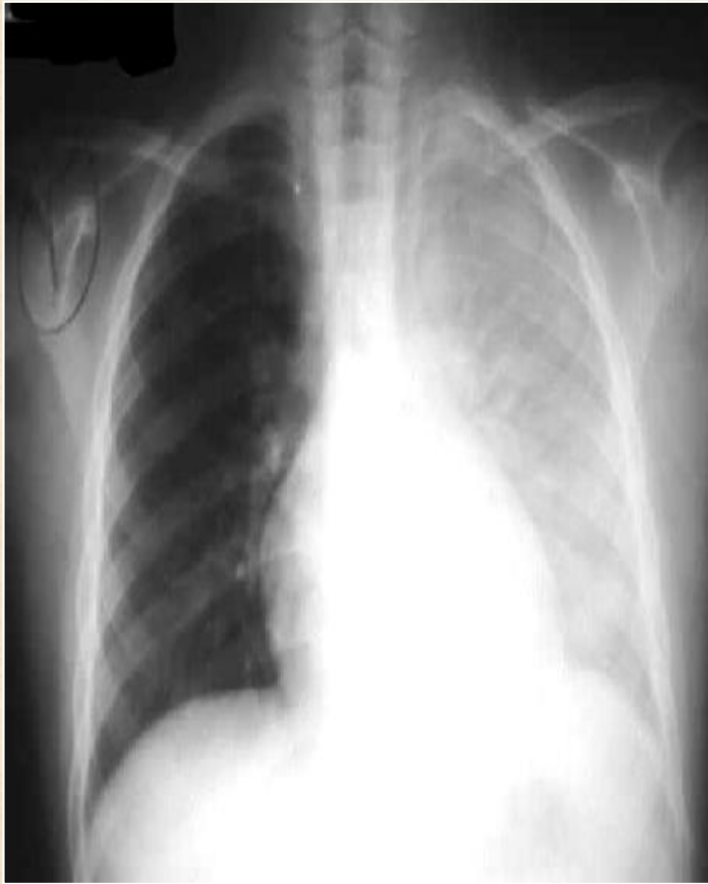


**homogenous  
opacification of the  
left hemithorax.**

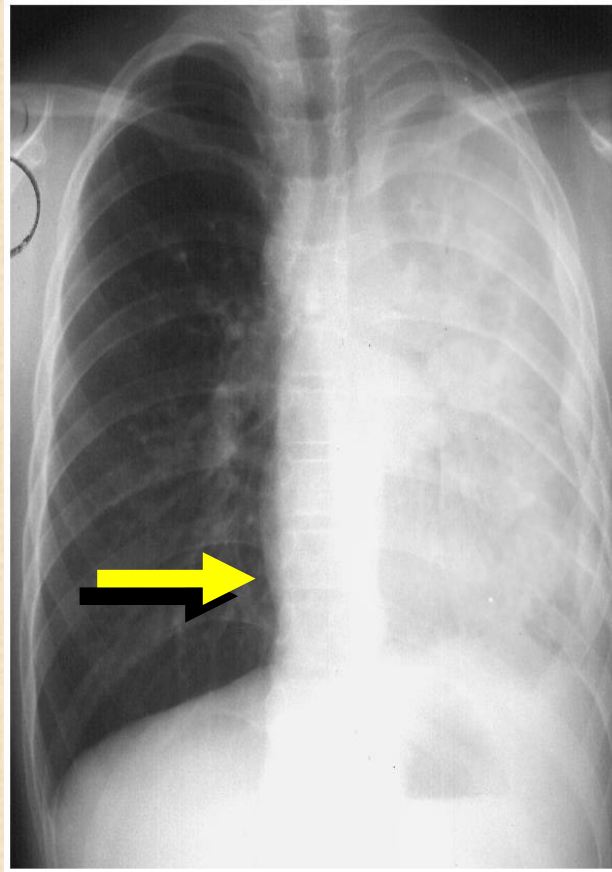
**DD:**

- 1. Collapse**
- 2. Fibrosis**
- 3. Pneumonectomy**
- 3. Consolidation**
- 4. Effusion**
- 5. Mass**

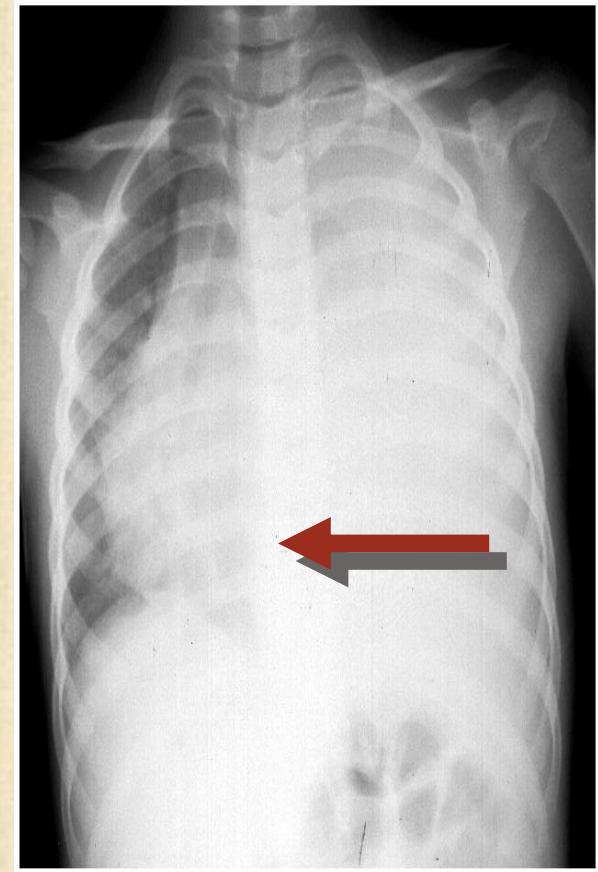




**Consolidated  
Pneumonia**



**Massive  
Atelectasis**



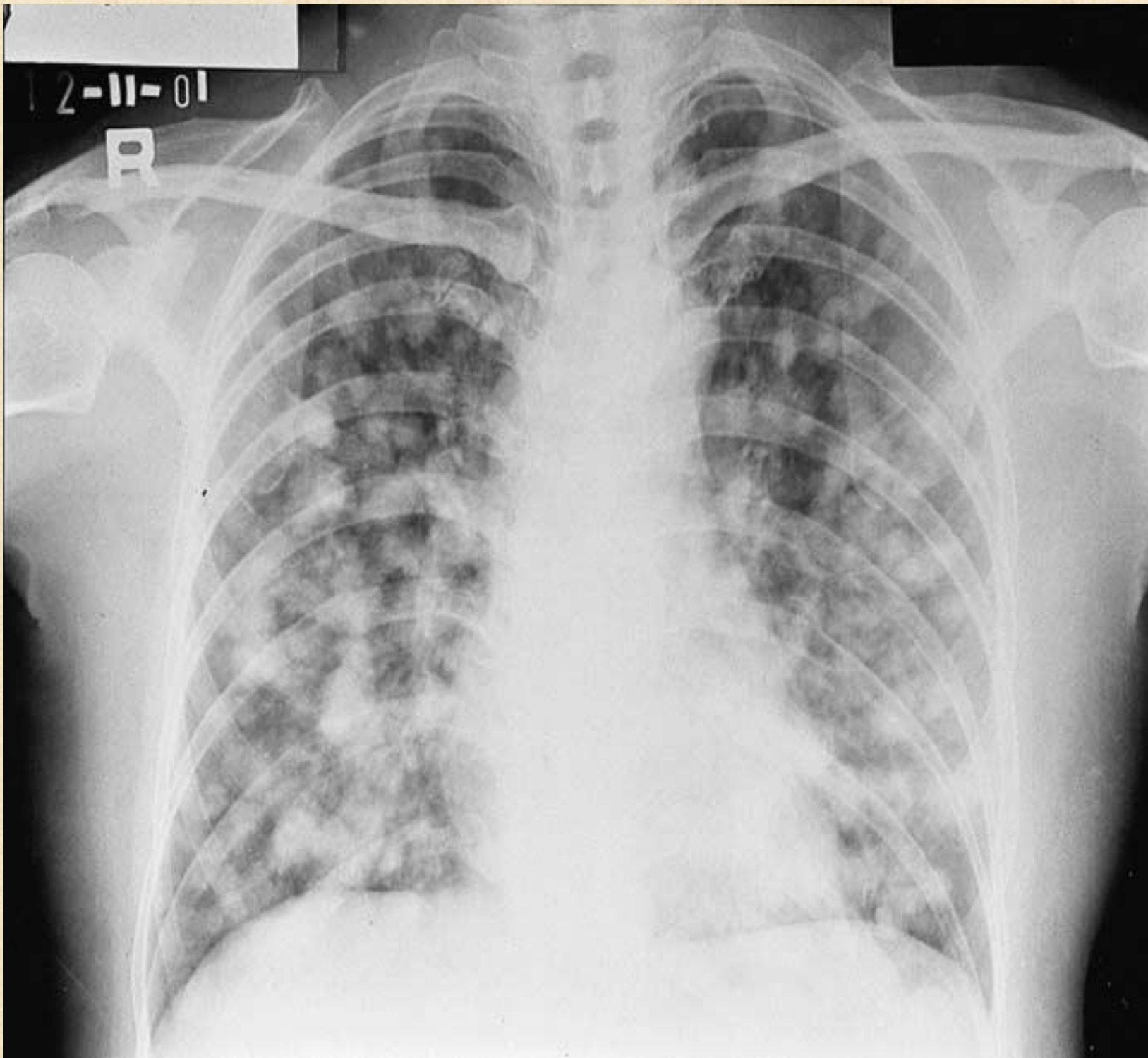
**Massive Pleural  
Effusion**



**Homogenous opacity, rounded, well defined border, overlying the left hilum**

**DD:**

- **Pulmonary artery dilatation.**
- **Lymphoma**
- **Mediastinal mass**
- **Sarcoidosis**



**Bilateral lung nodules**

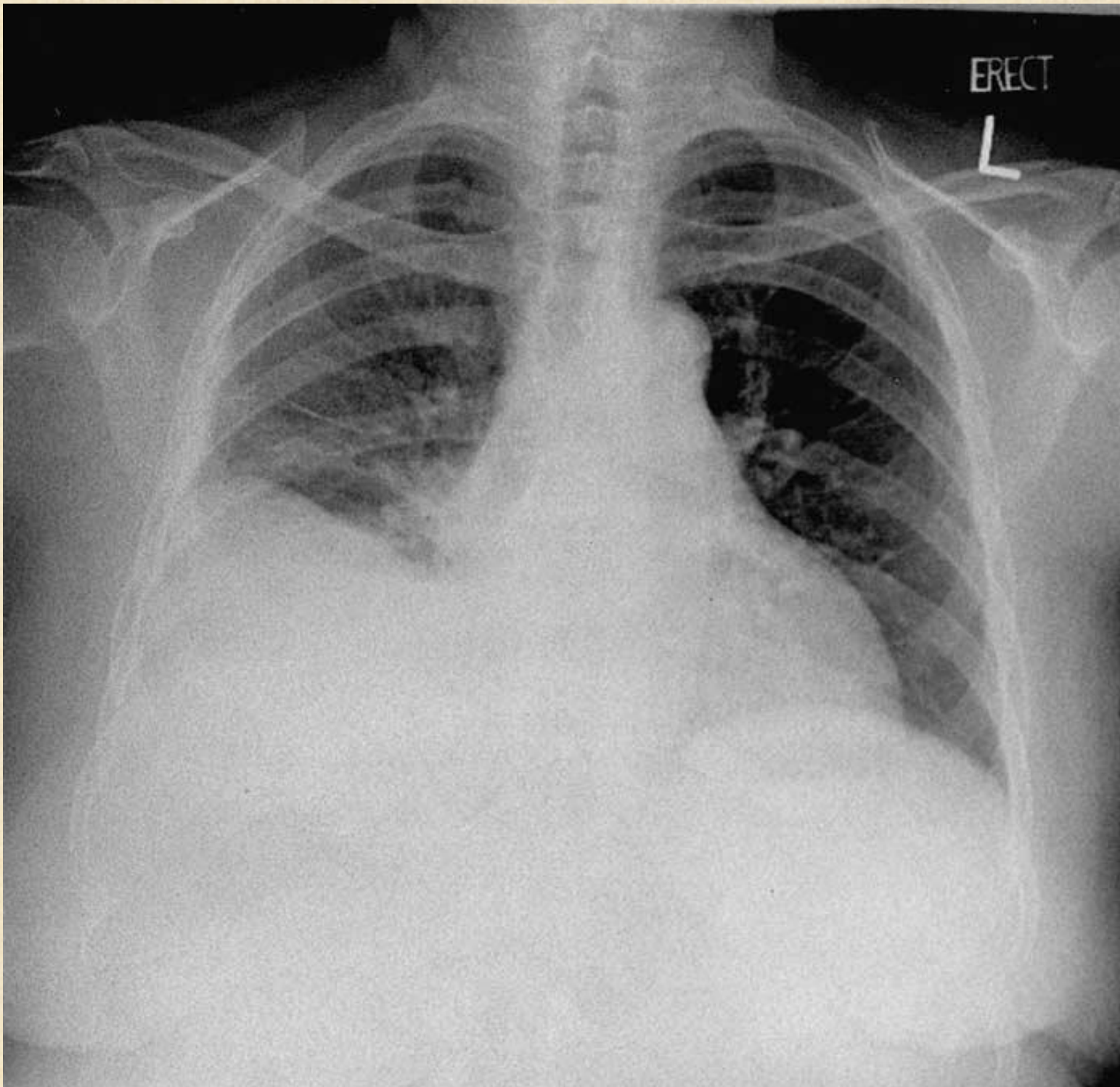
**DD**

➤ **Metastases from cancers:**

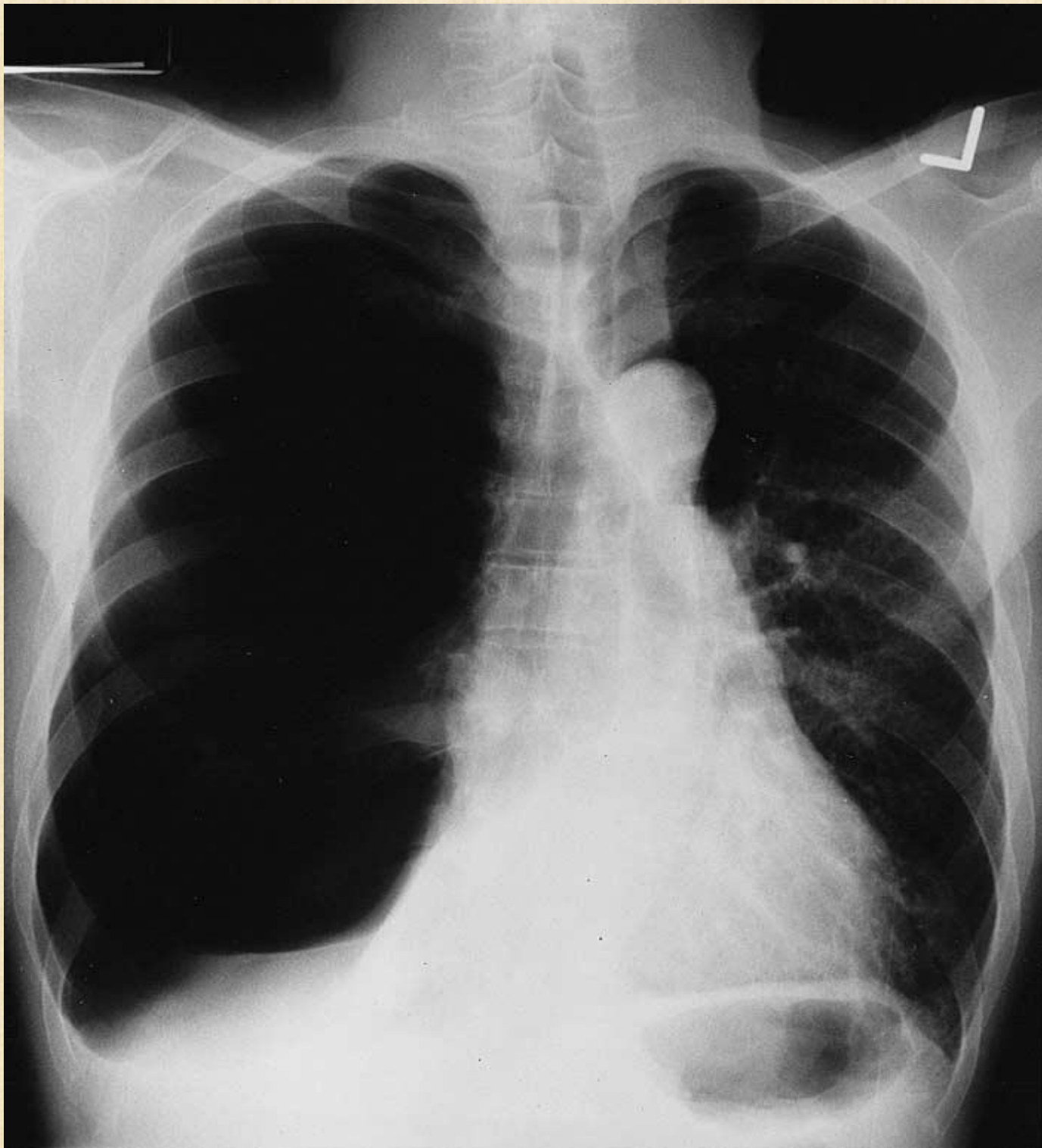
- **Breast**
- **Colon**
- **Rectum**
- **Kidney.**

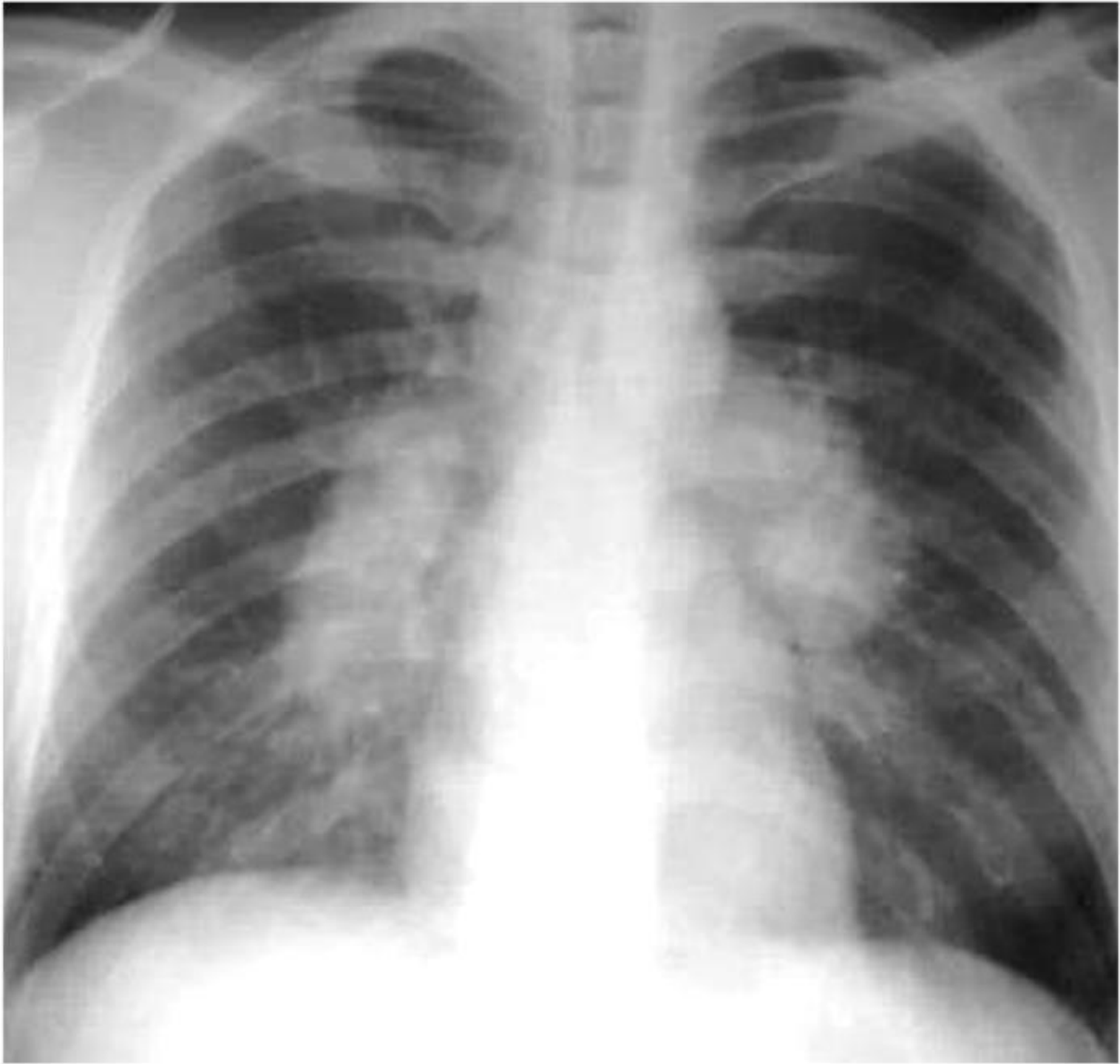
➤ **Bronchopneumonia**

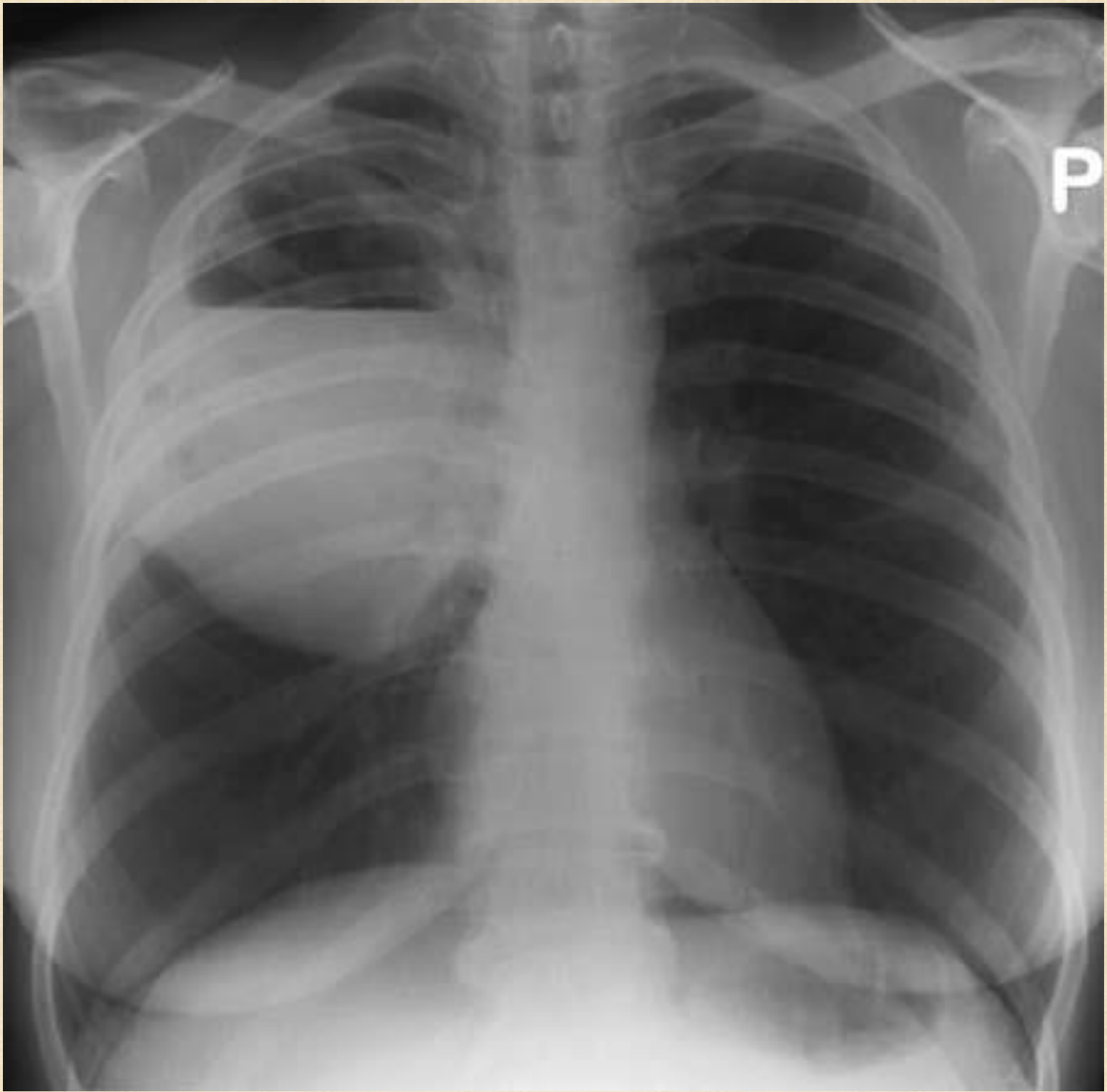
➤ **Rheumatoid**



**This patient gave history of liver cirrhosis and ascites. Pleural effusion.**



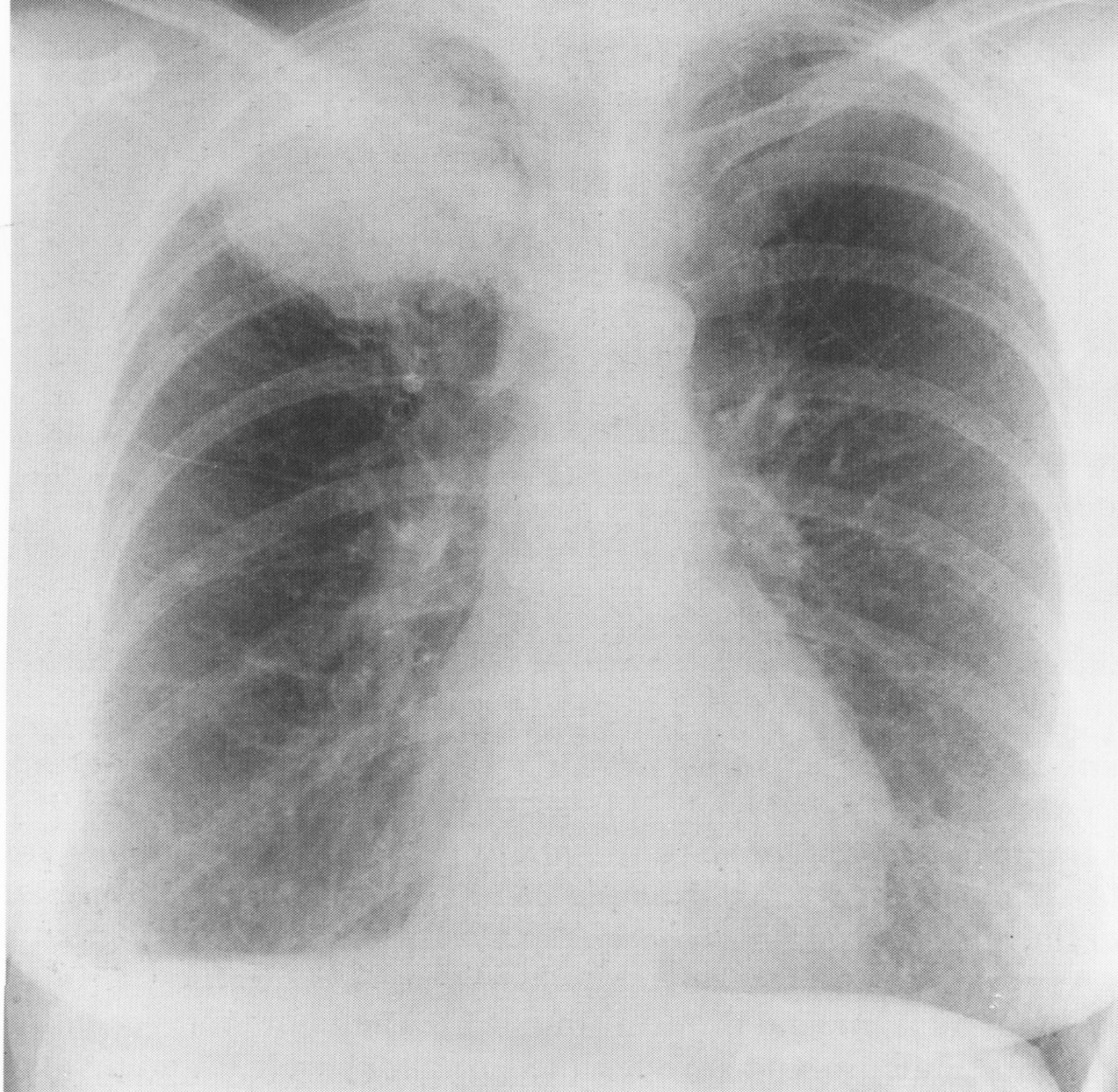


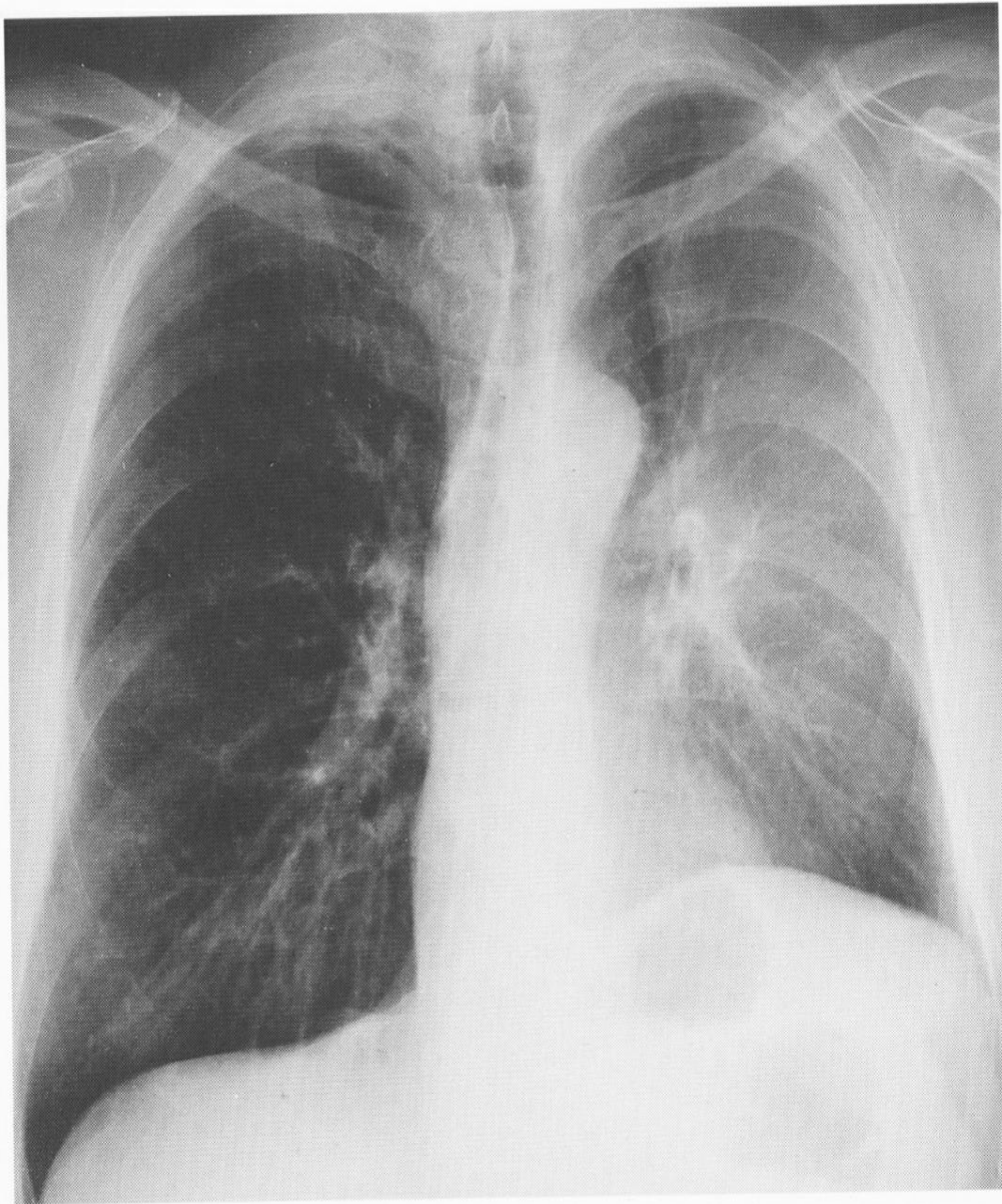










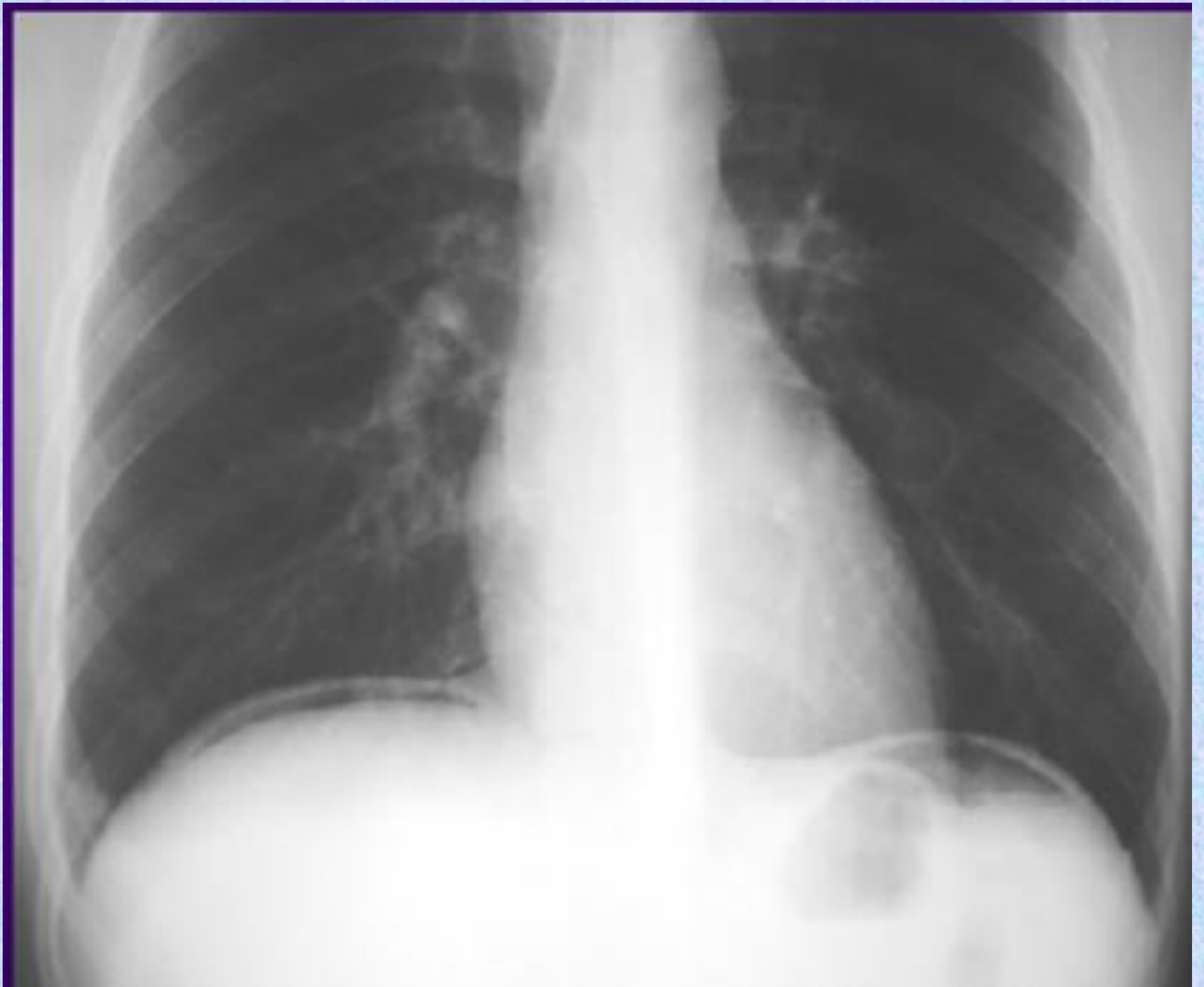


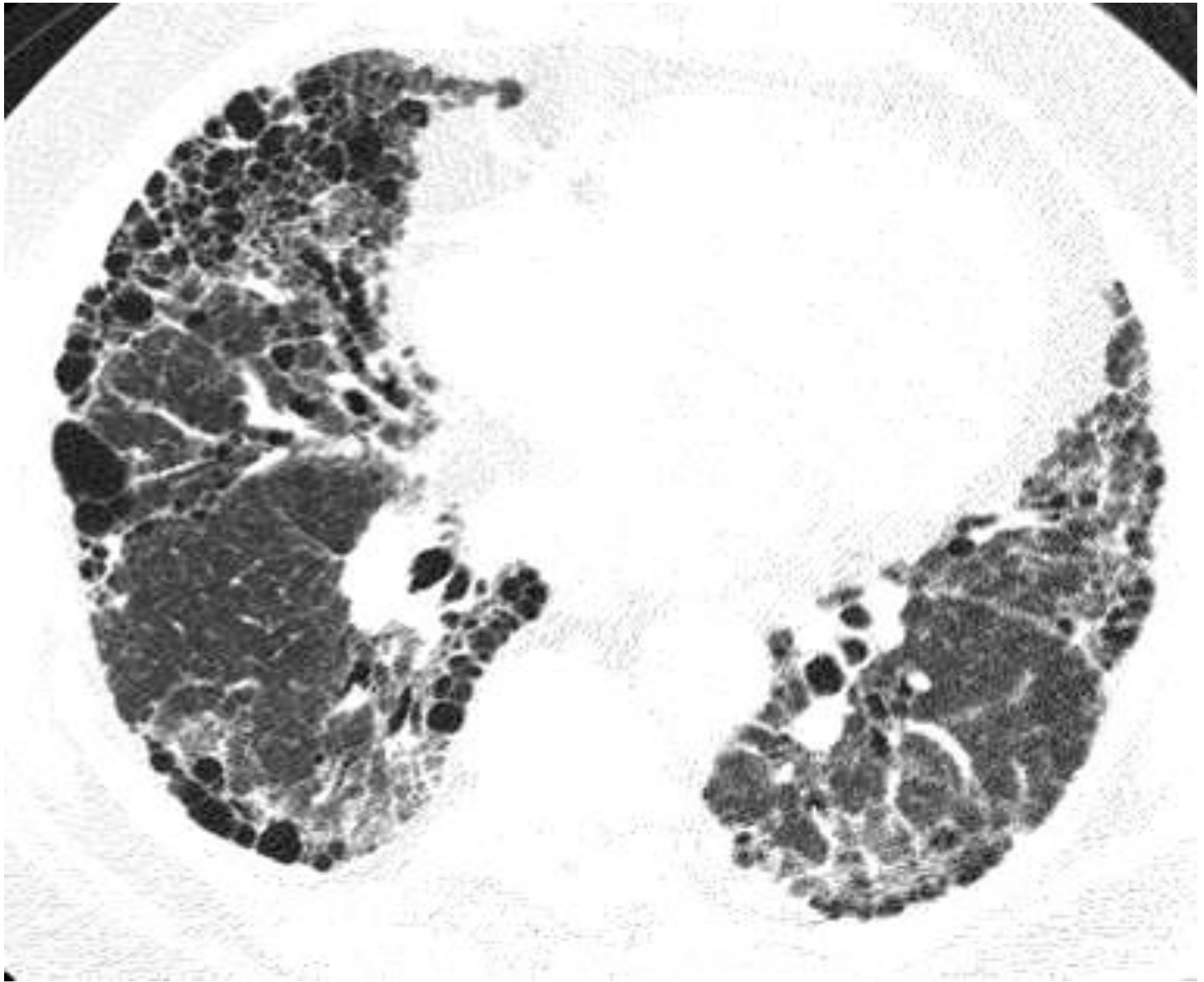
D



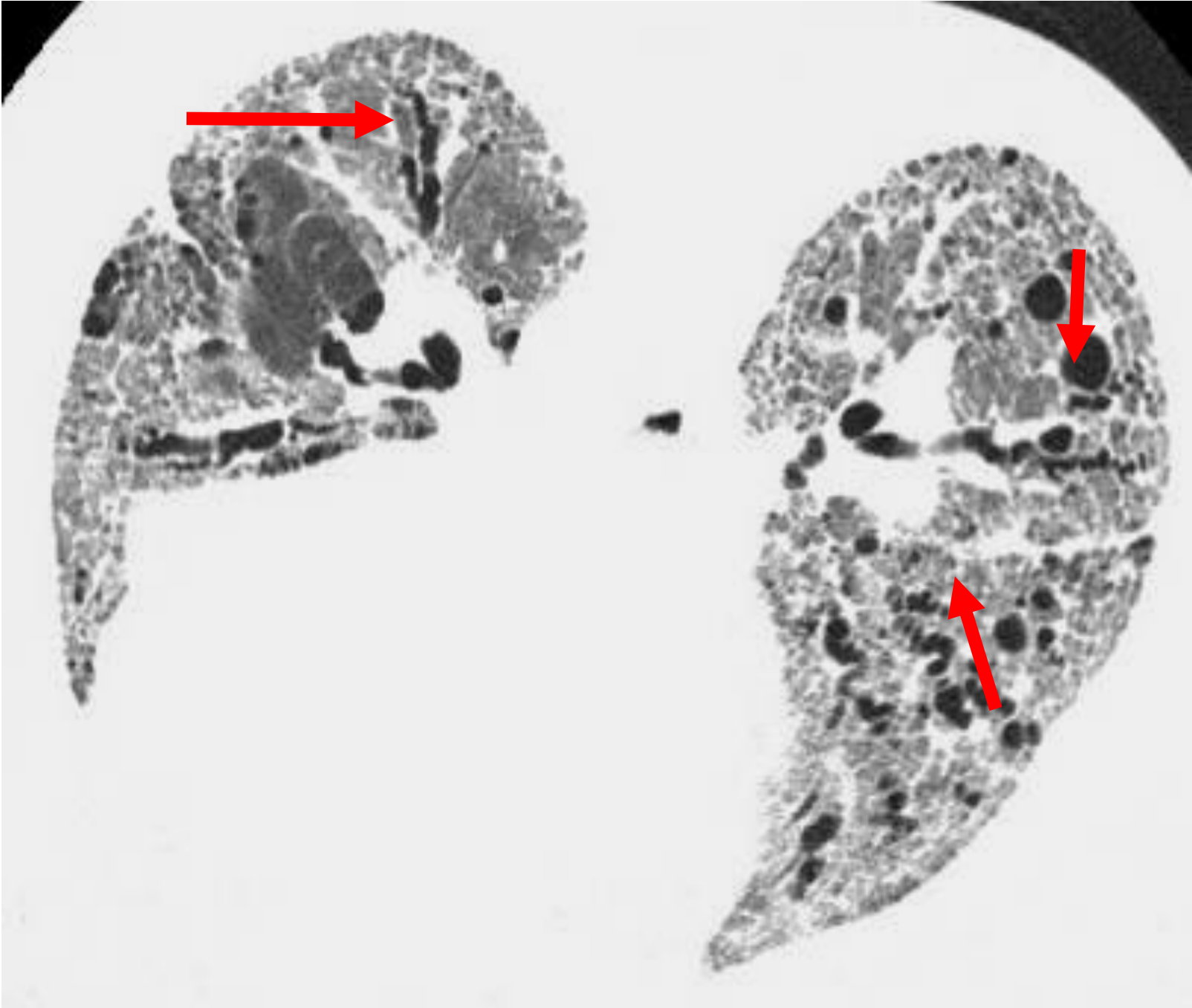
E

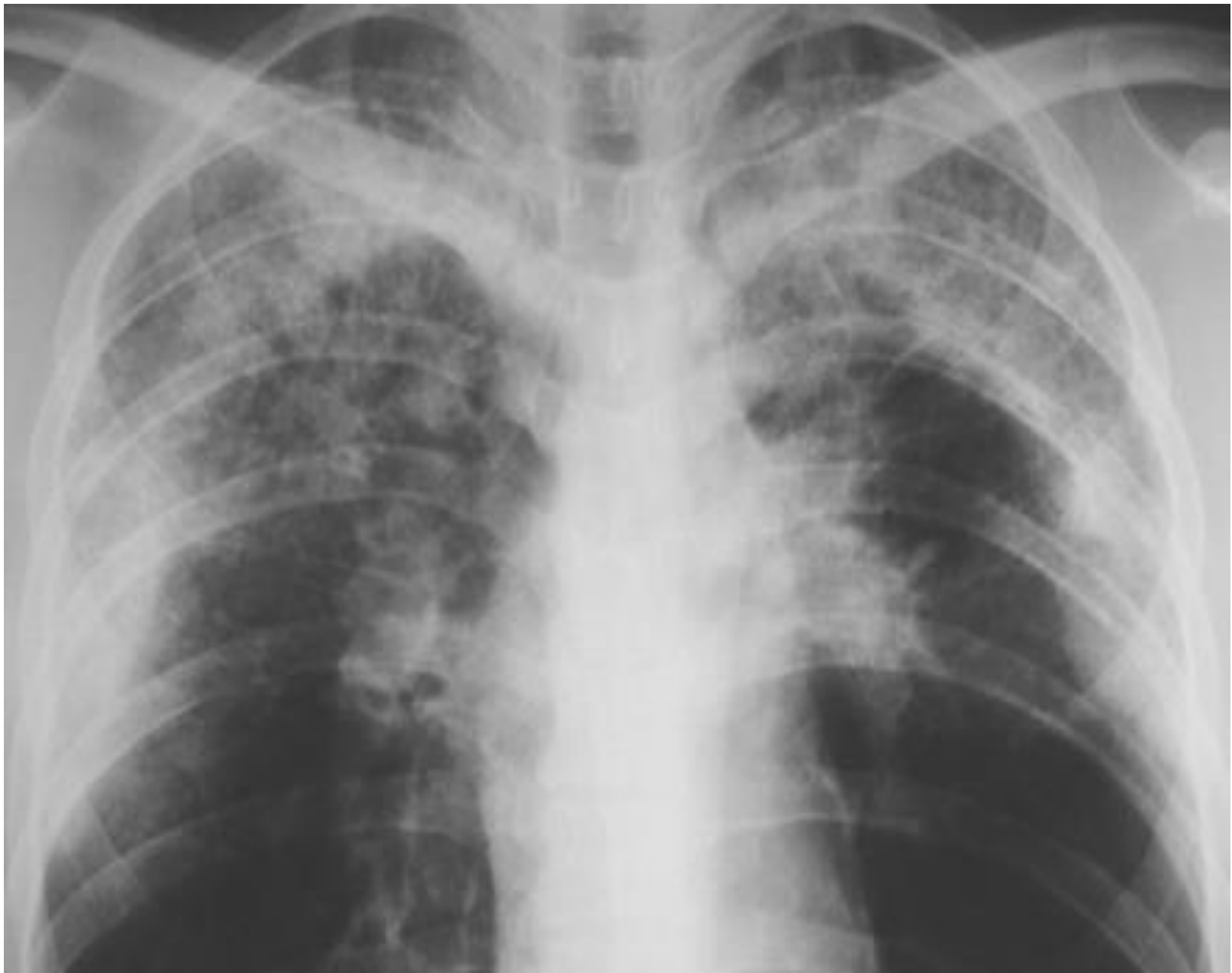
**Fig. 4.3 (contd.)** (D, E) A further 3 months later there is now complete collapse of the left upper lobe, and the left hemidiaphragm is elevated. This is due to phrenic nerve involvement.





# UIP: Traction Bronchiectasis





*Chest radiograph shows airspace consolidation confined mainly to the peripheral lung (photographic negative shadow of pulmonary edema).*







*CT scan (lung windowing) shows ground-glass opacities with intralobular interstitial thickening in both lower lobes.*





Air in the wall – air crescent



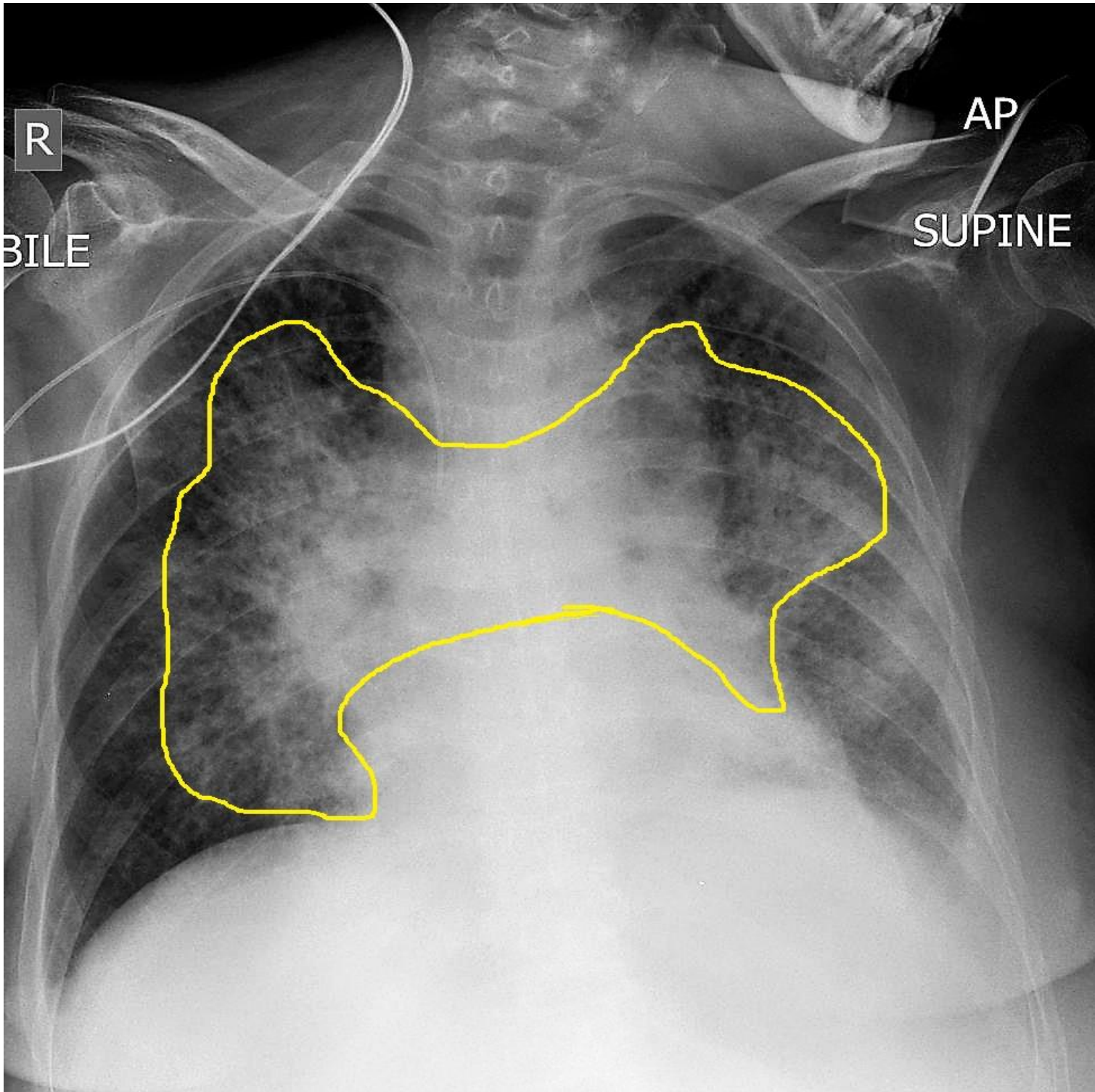




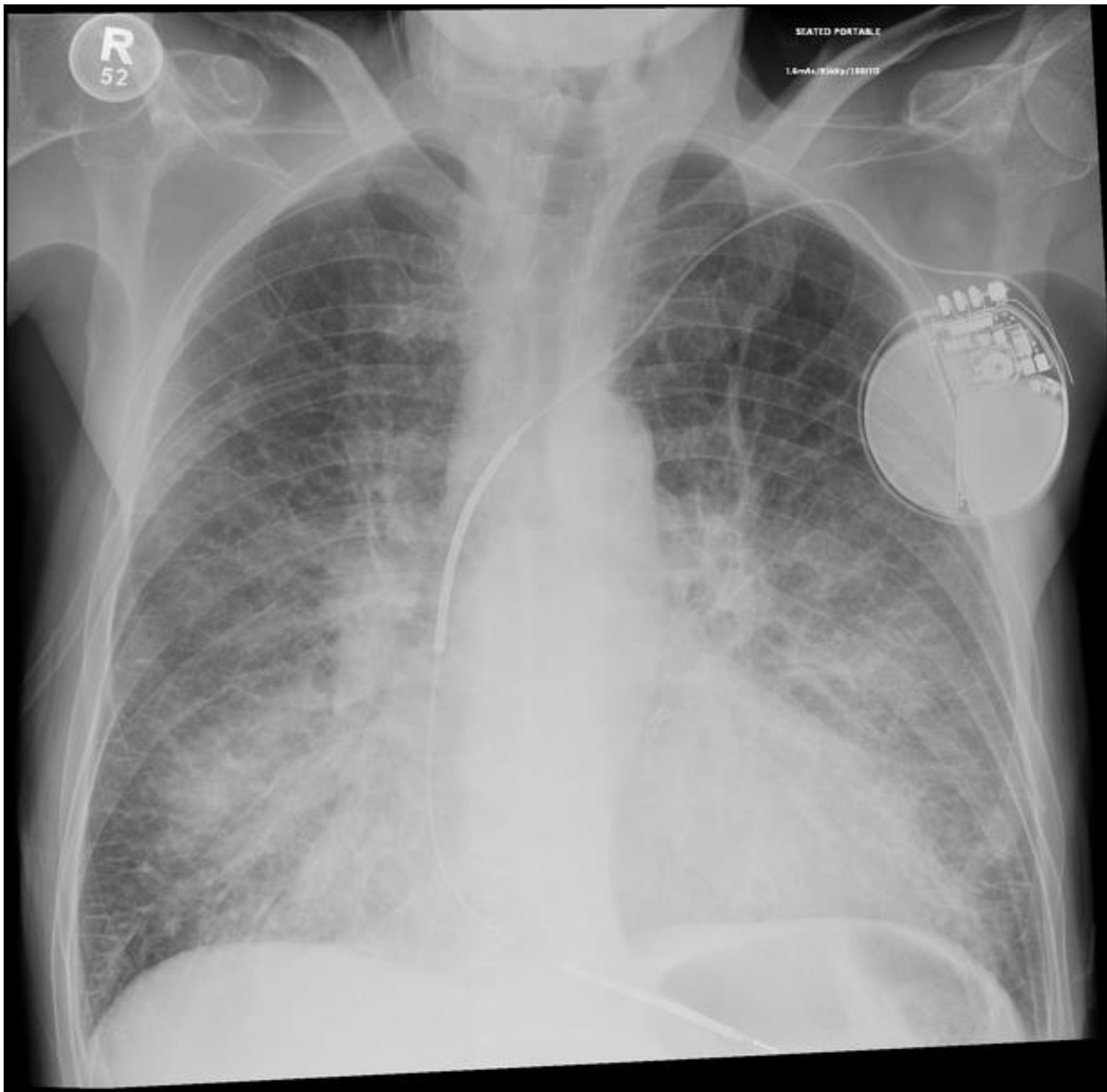


3422

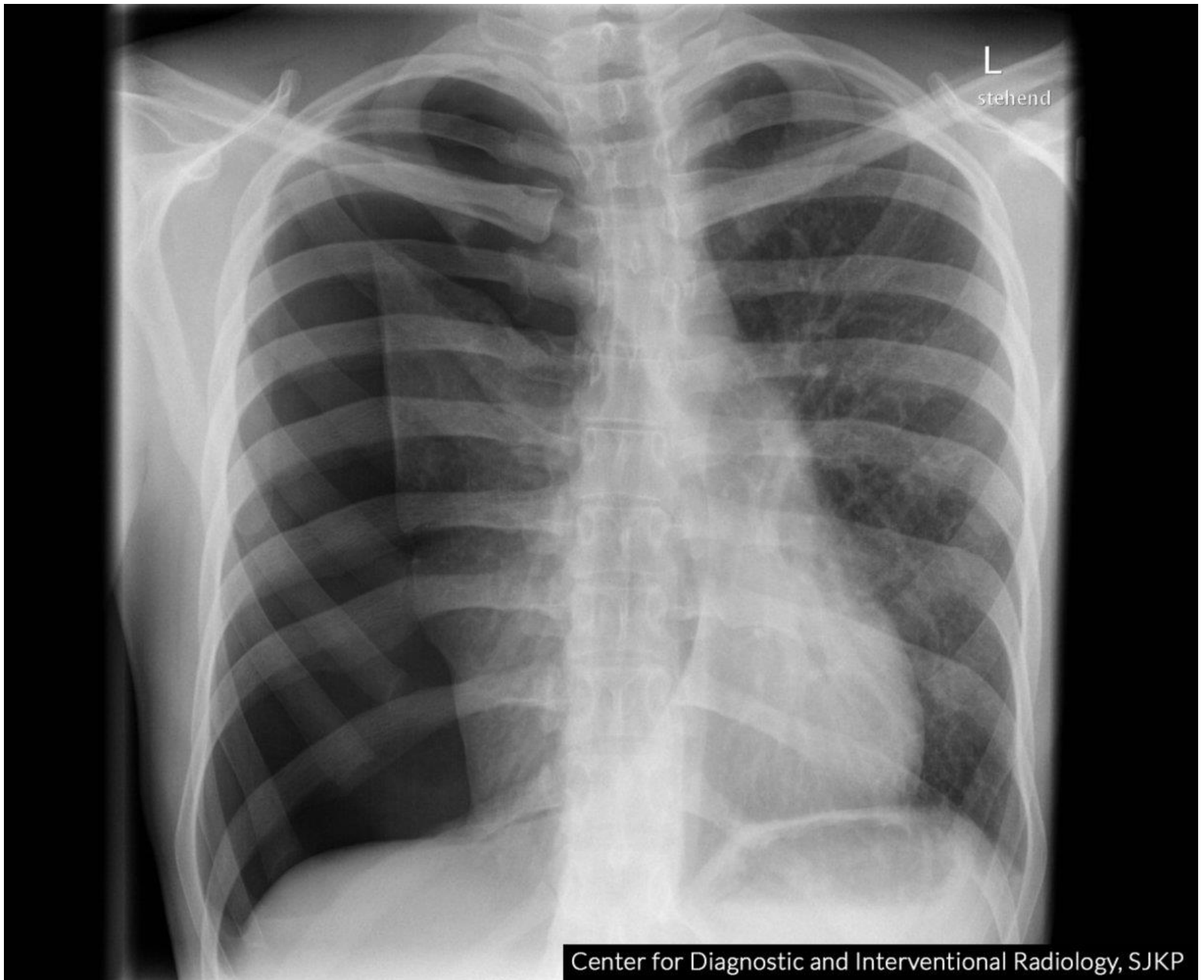
20 cm





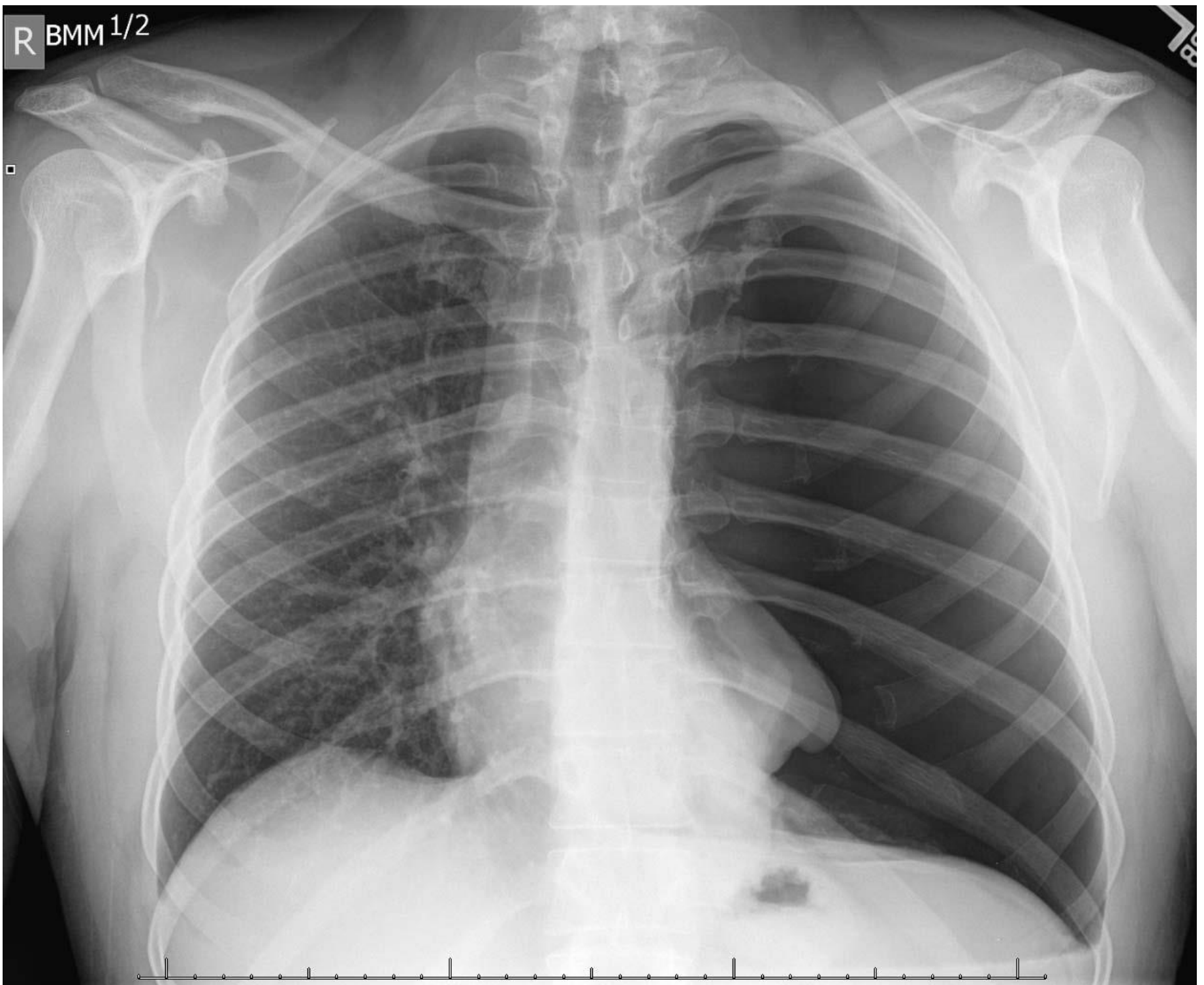








R BMM 1/2





# THANK YOU



سبحانك اللهم وبحمدك

نشهد أن لا إله إلا أنت

نستغفرك ونتوب اليك

