Chest Radiography

By

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بسم الله الرحمن الرحيم

" قَالُوا سُبْحَانَكَ لا عِلْمَ لَنَا إِلا 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

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

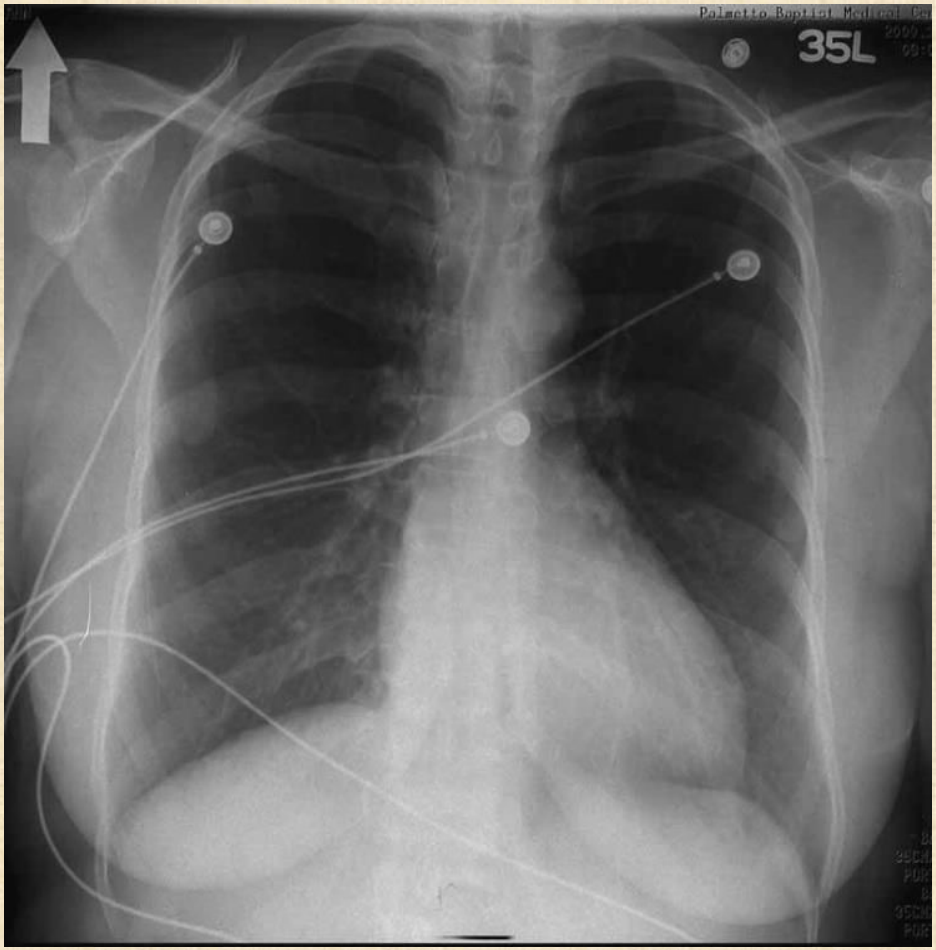
5. Soft tissues / bony structures
6. Mediastinum
7. Diaphragms
8. Lung Fields

} Findings

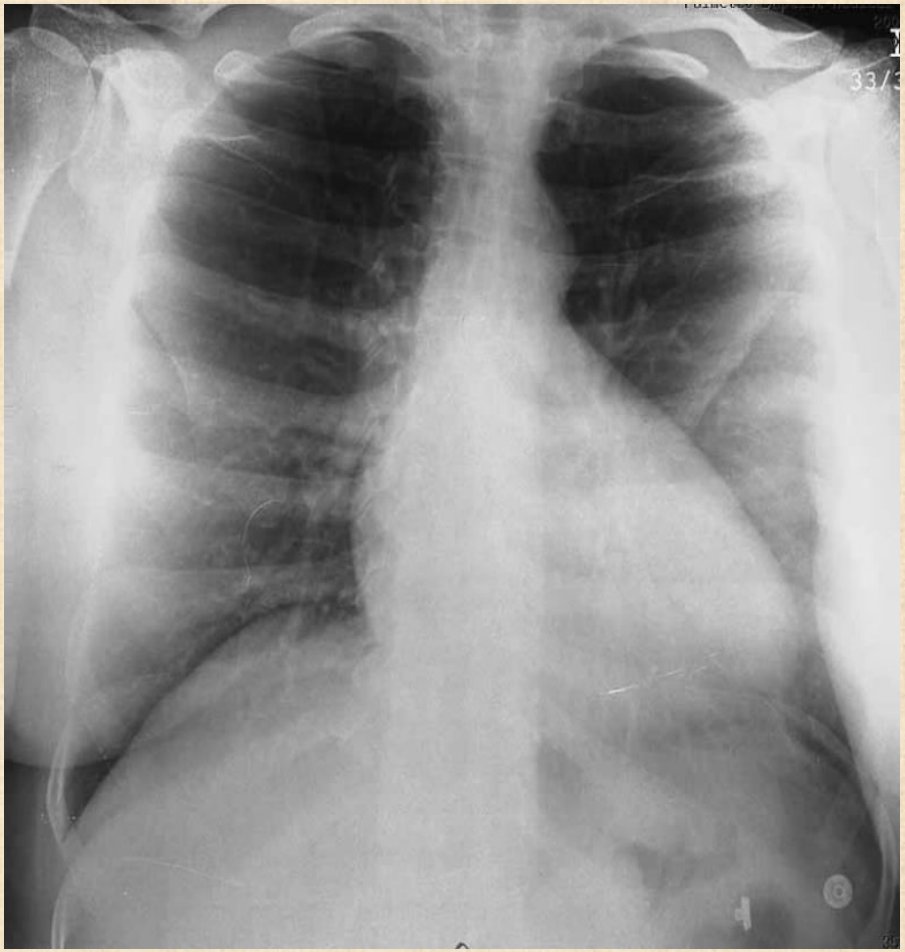
Pre-Reading

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.

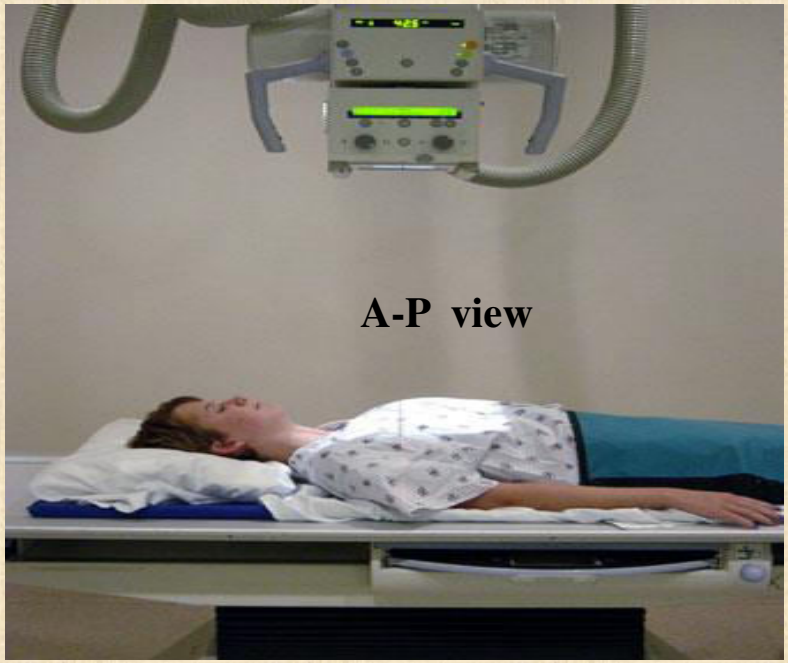
Types of views



PA



AP


A-P view

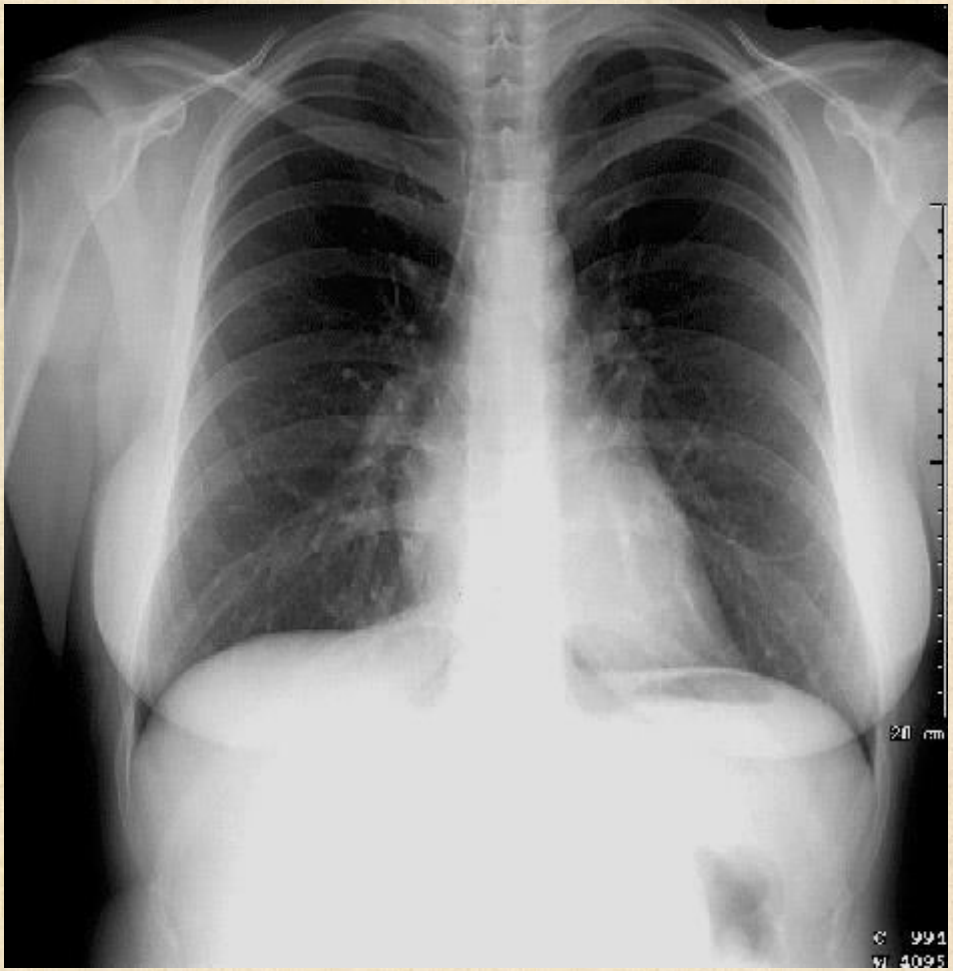

Lateral view

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



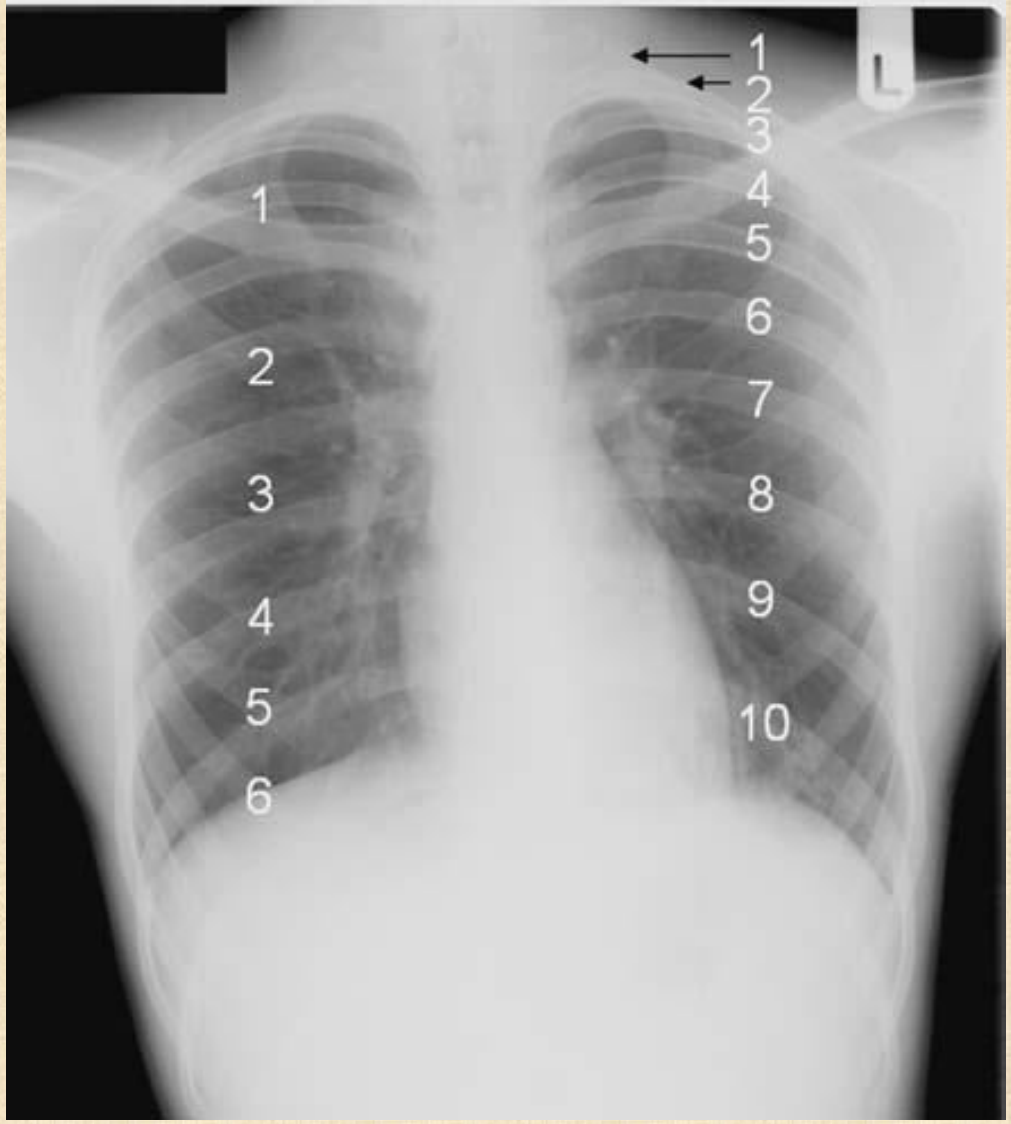
soft

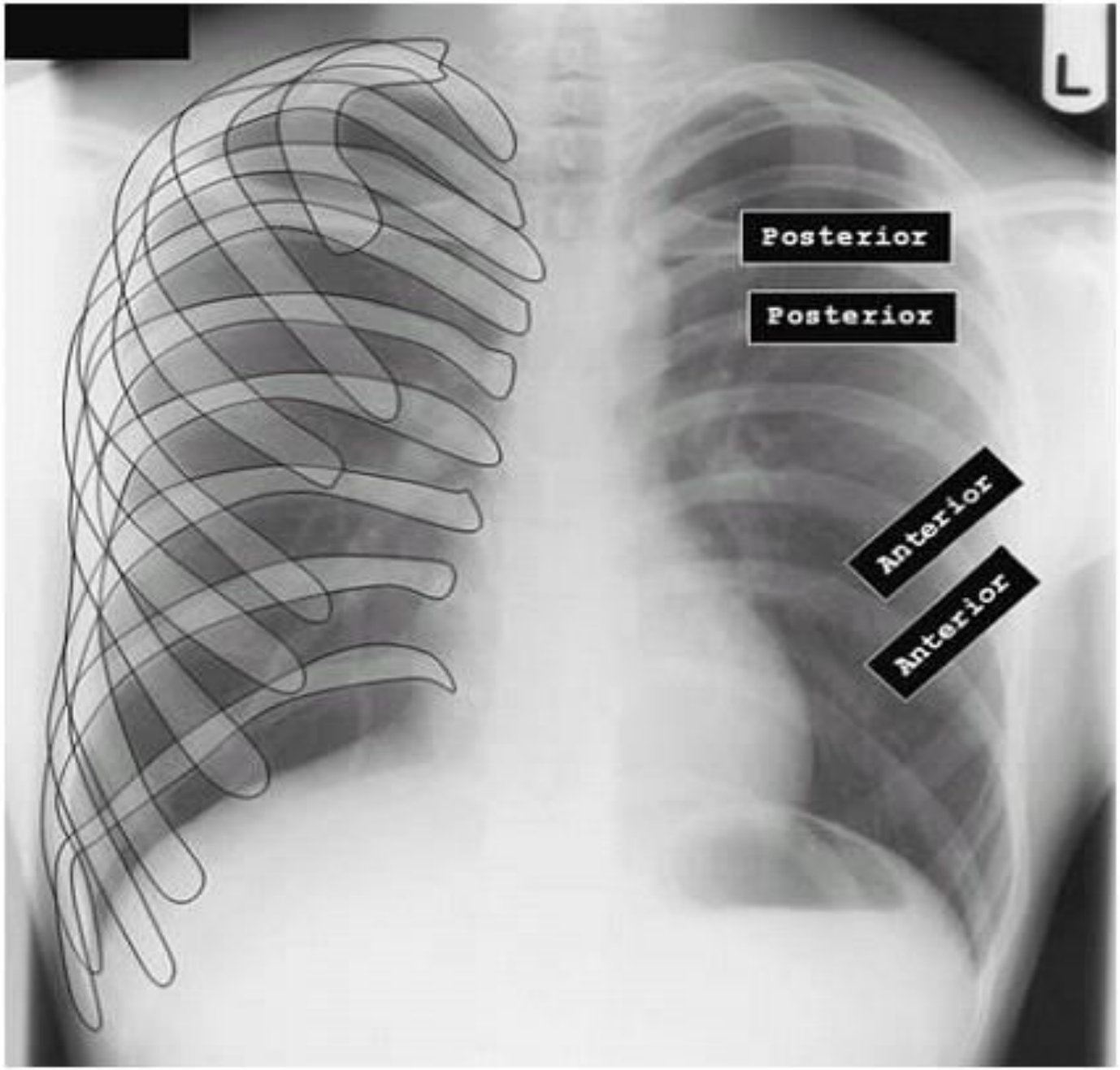
Hard

Quality Control

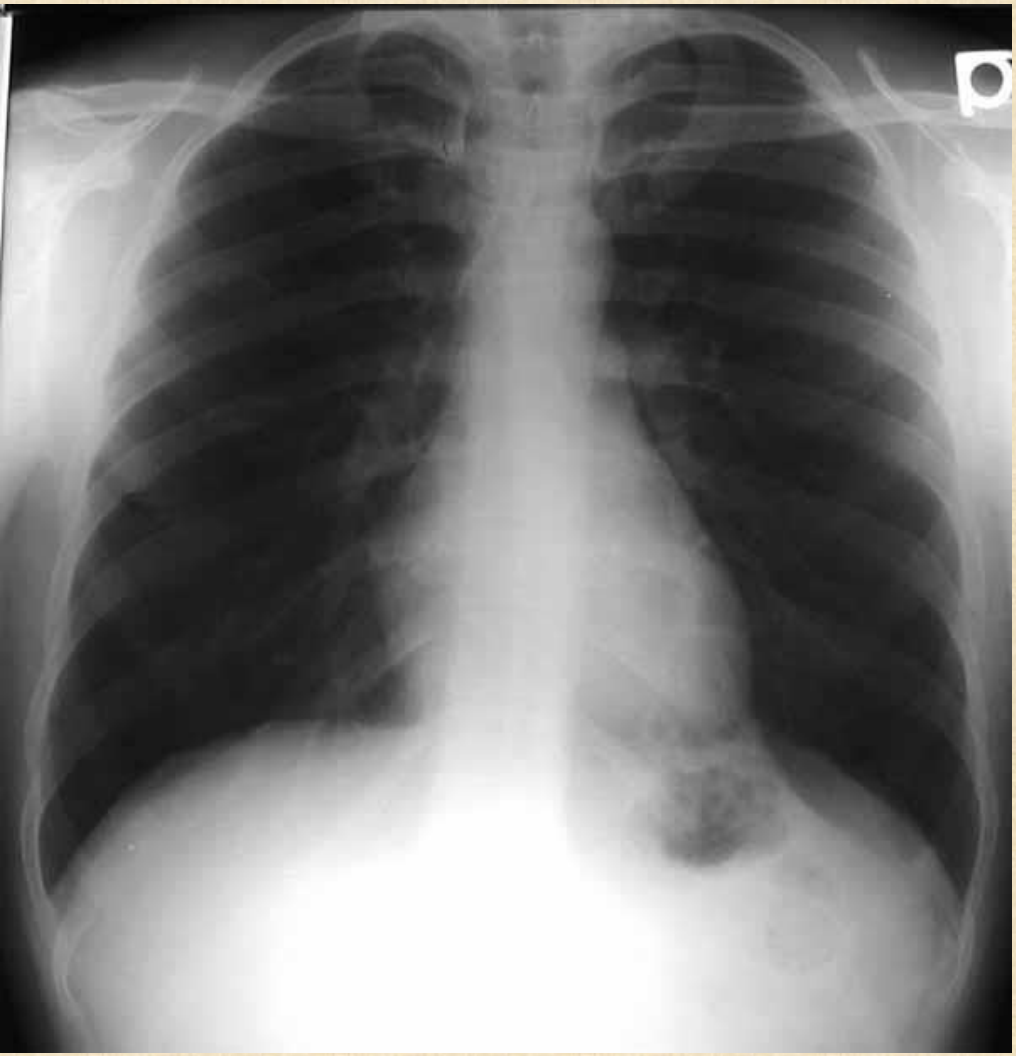
6. Inspiration

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

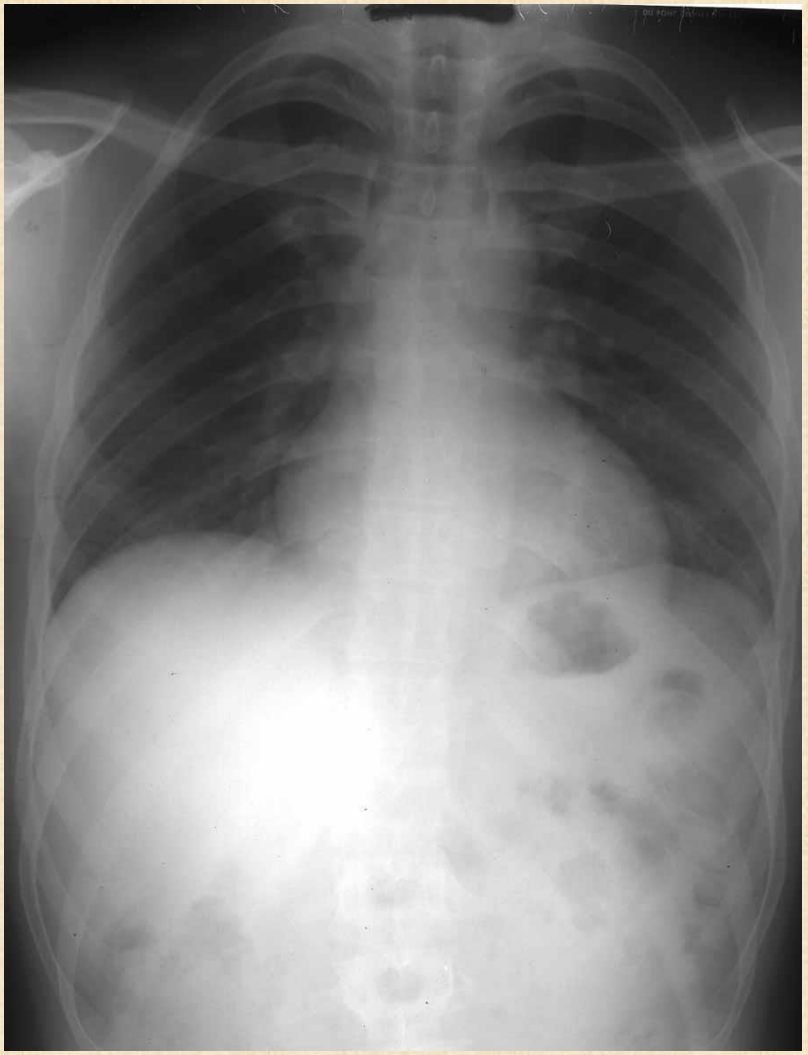



L
Posterior
Posterior
Anterior
Anterior

Inspiration



Expiration



About 8 posterior ribs are showing

Poor inspiration can crowd lung markings producing pseudo-airspace disease

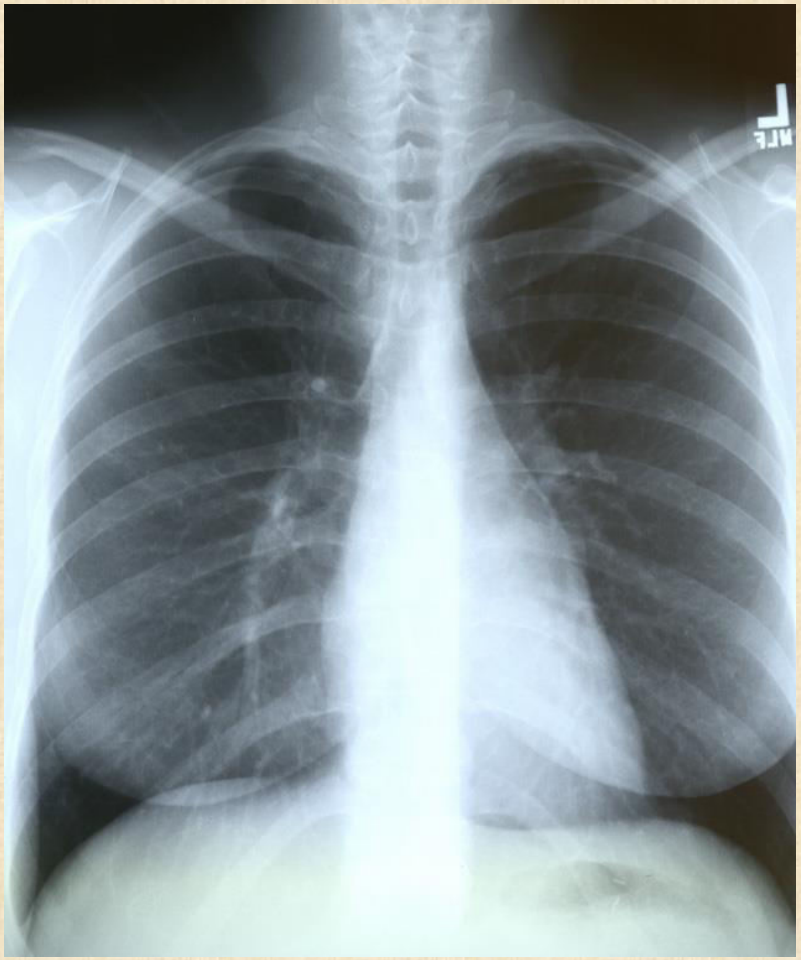
With better inspiration, the "disease process" at the lung bases has cleared

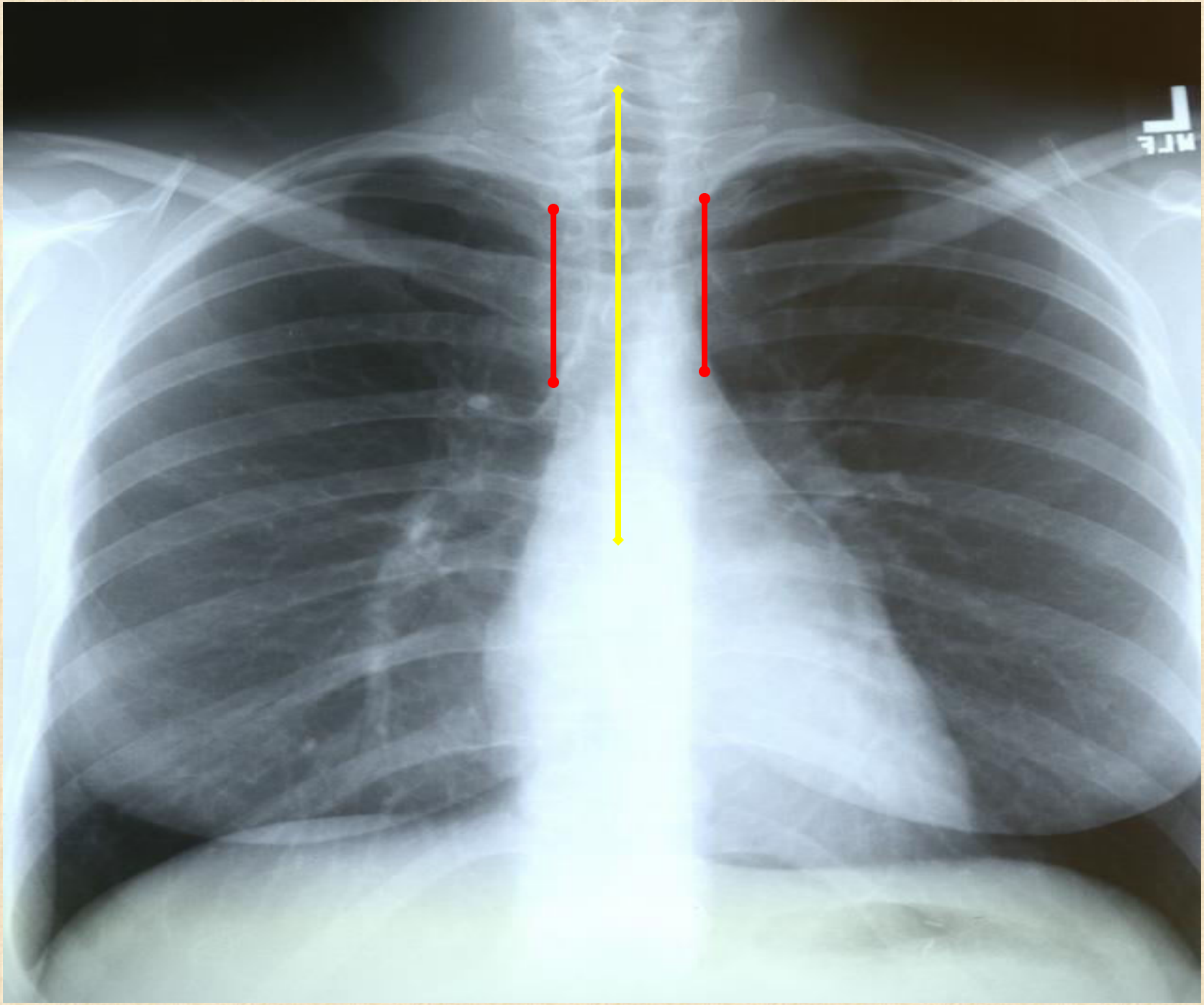
9-10 posterior ribs are showing

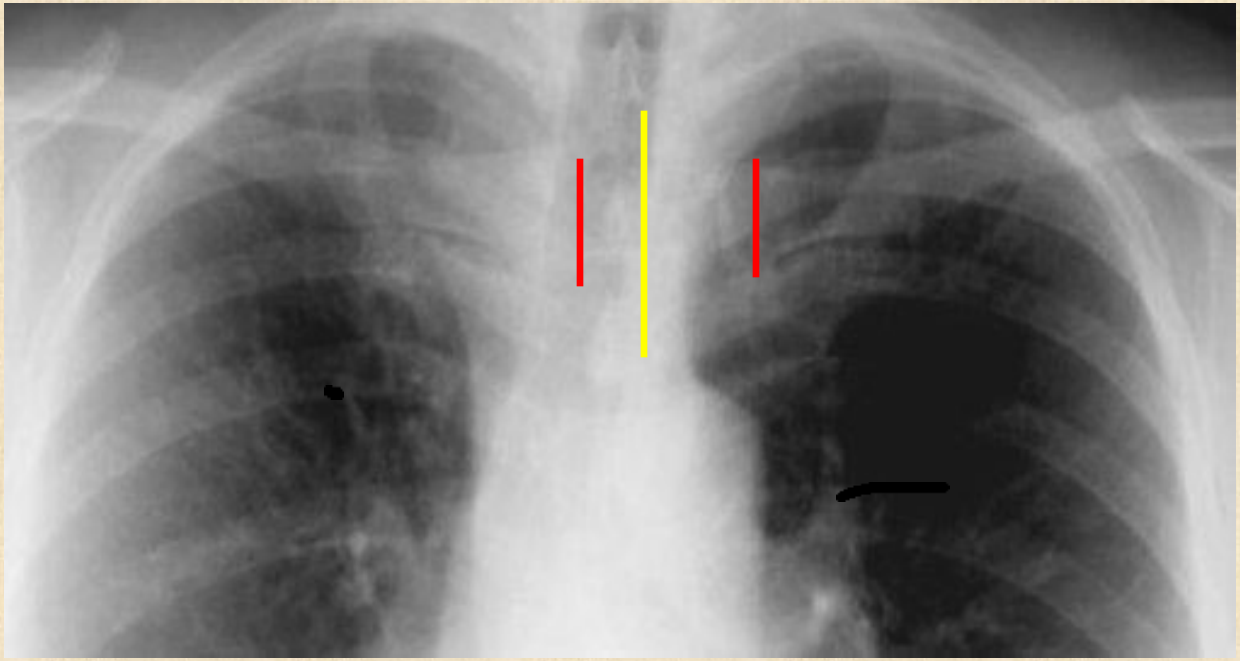
Quality Control

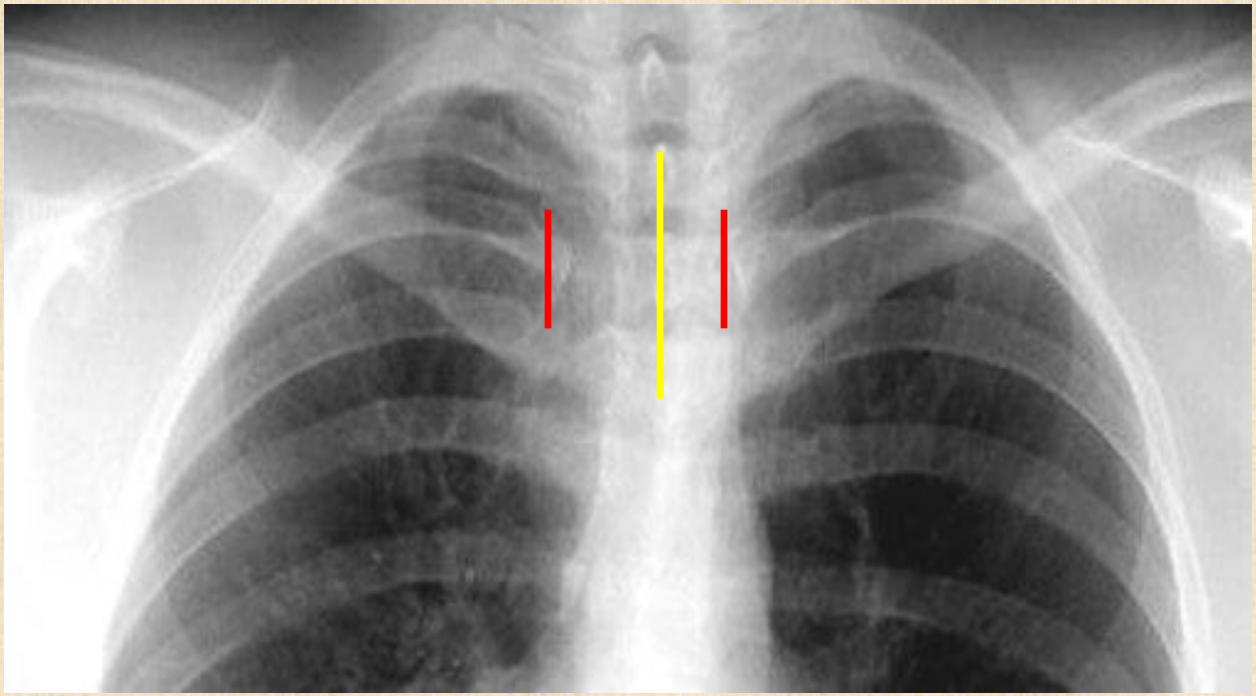
7. Rotation

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





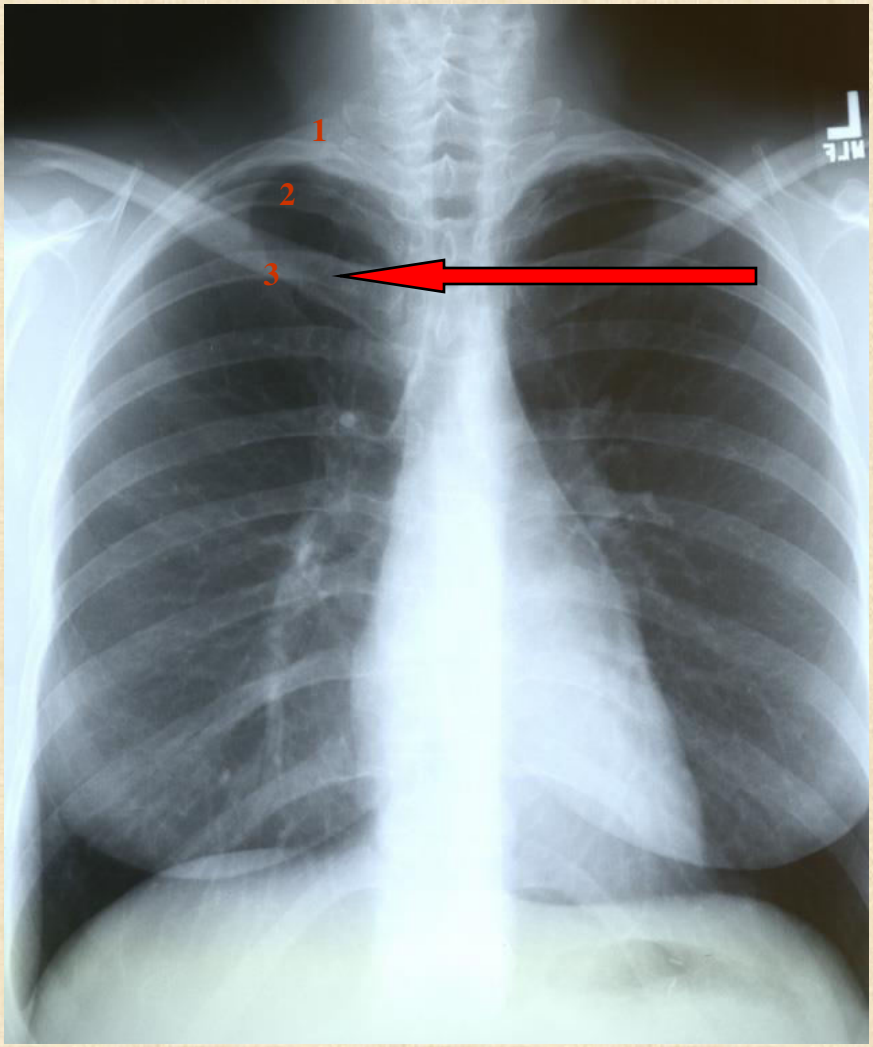




Quality Control

8. Angulation

- Clavicle should lay over 3rd rib posteriorly.



Same patient, not lordotic

Findings

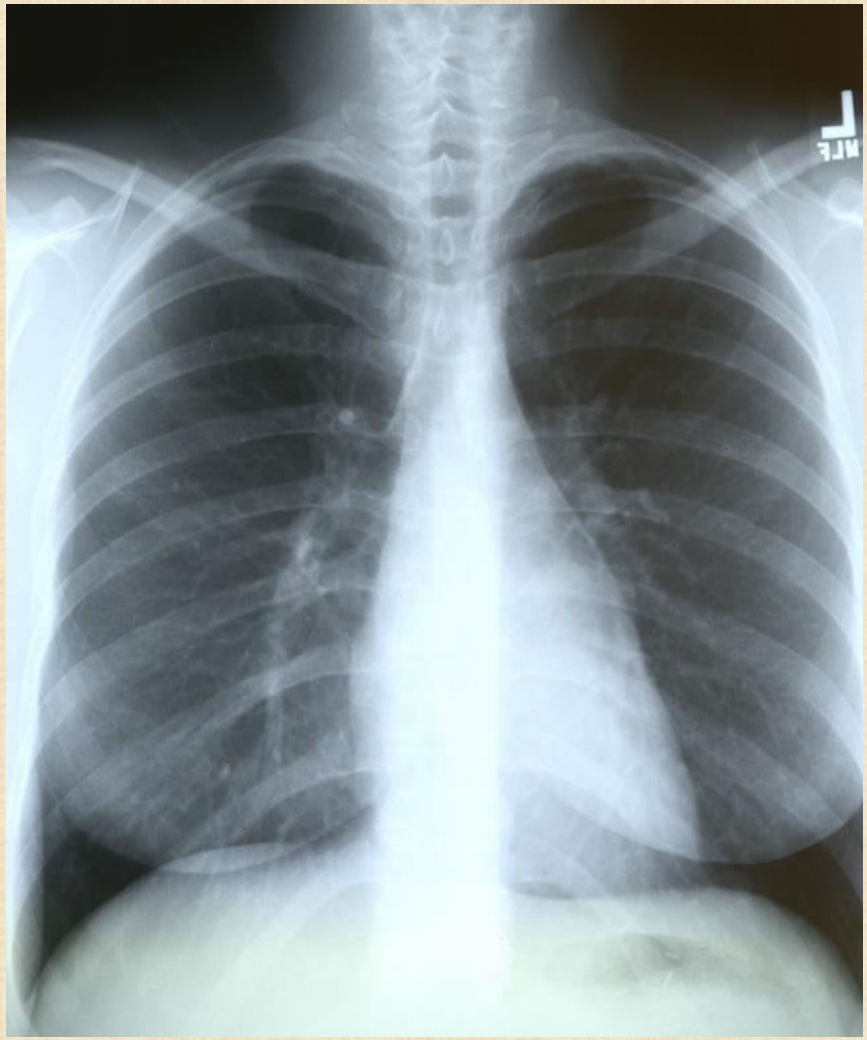
9. **Soft tissue** (Breast shadows, Supraclavicular areas, Axilla) **and bony structures**

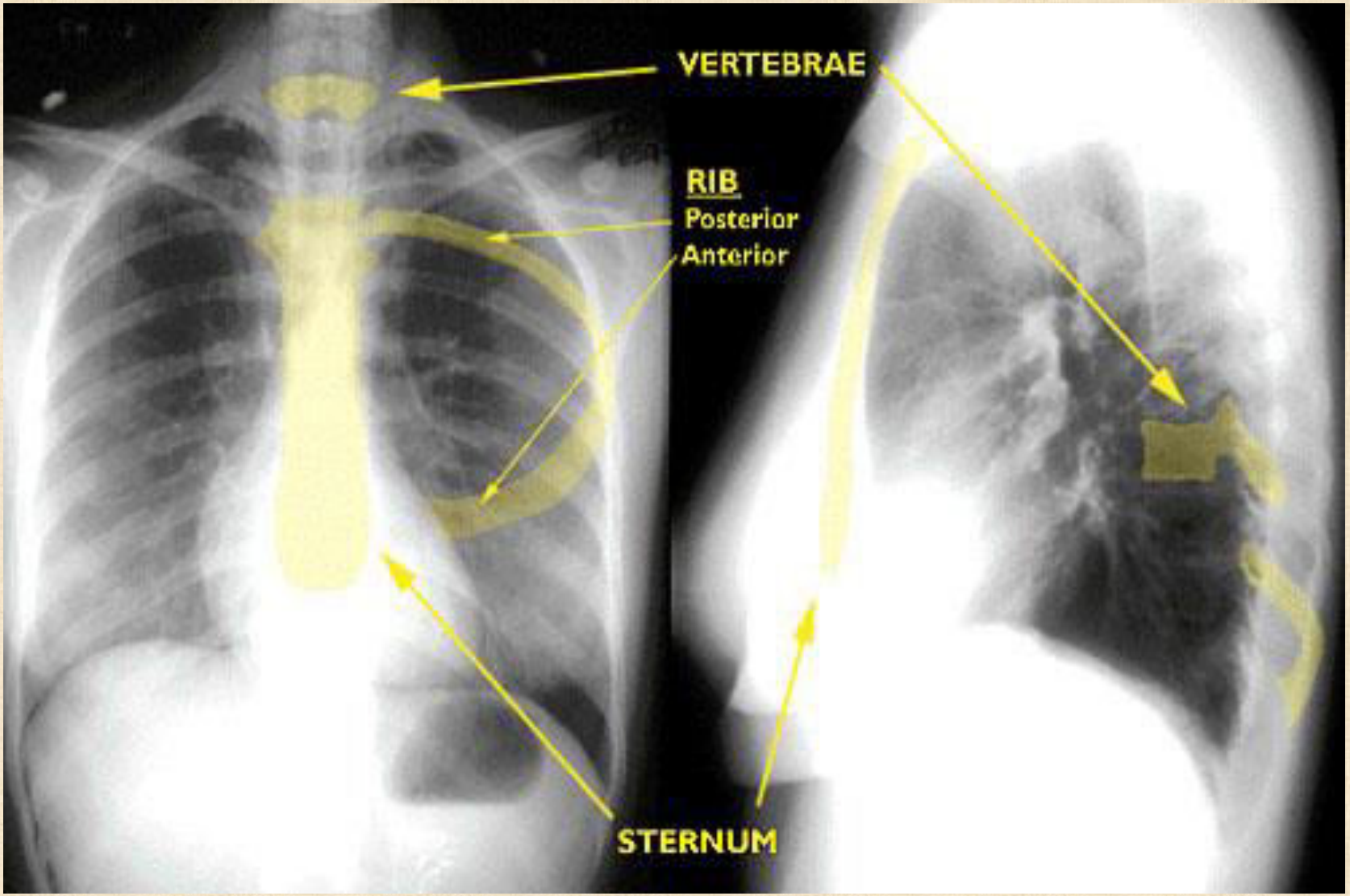
Bony structures:

- Ribs
- Sternum
- Spine
- Shoulder girdle

Check for

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



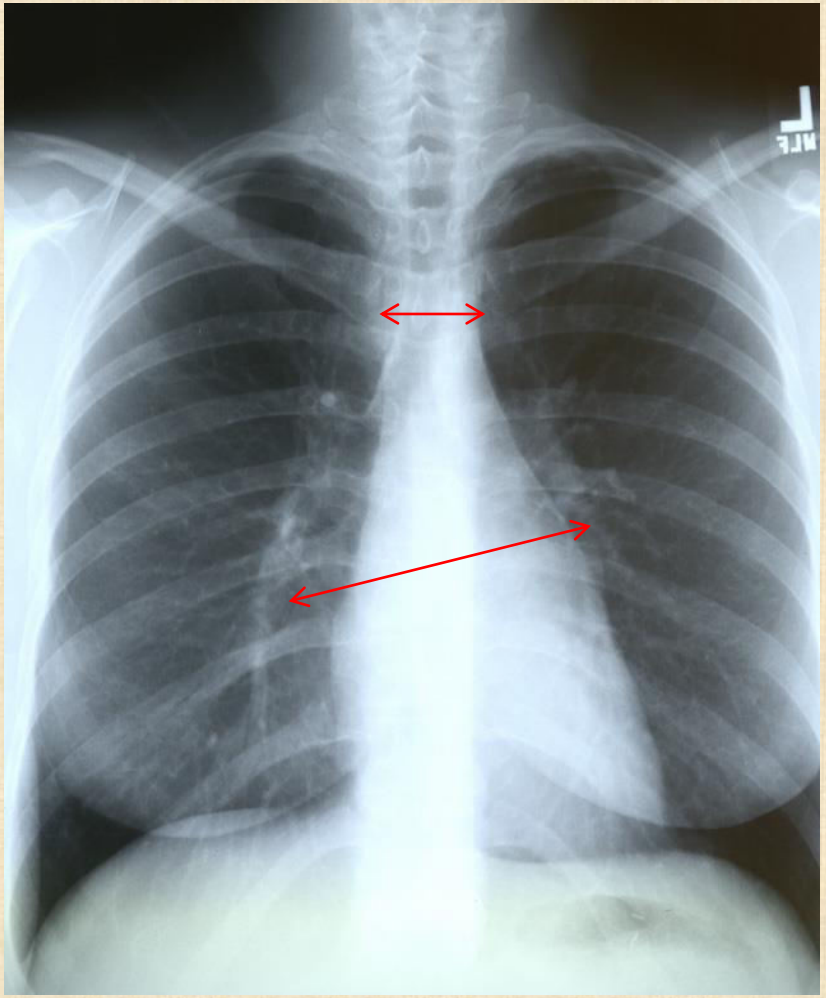

VERTEBRAE
RIB
Posterior
Anterior
STERNUM

Findings

10.Mediastinum

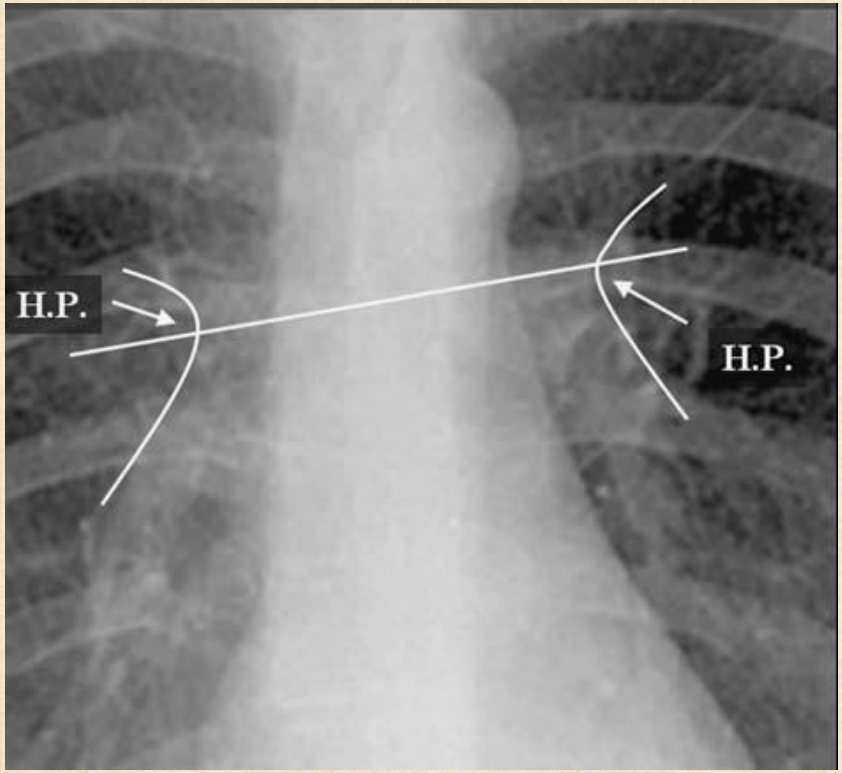
Check for

- Upper mediastinum
- Hilar contours for increase densities or deformities
- 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.**



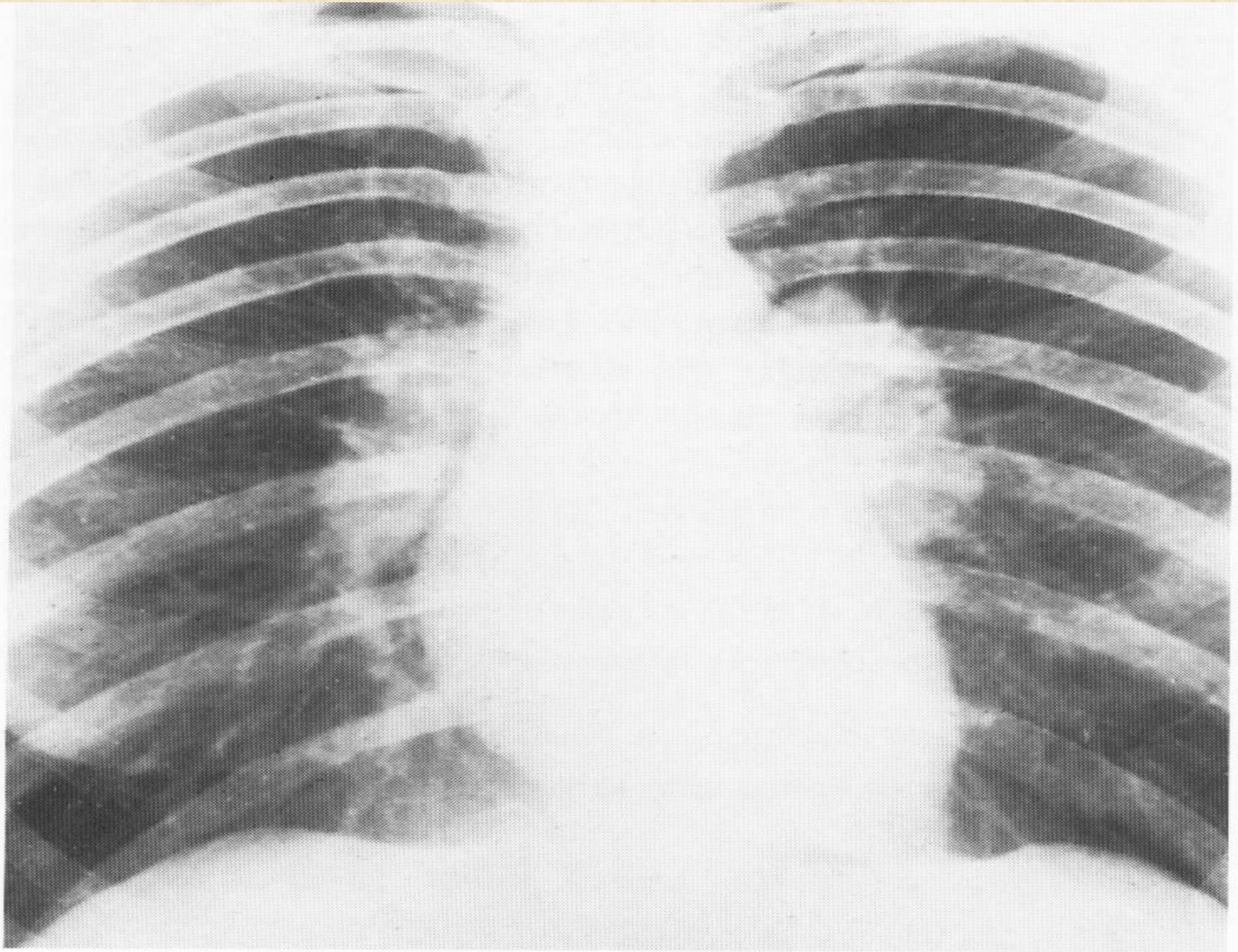
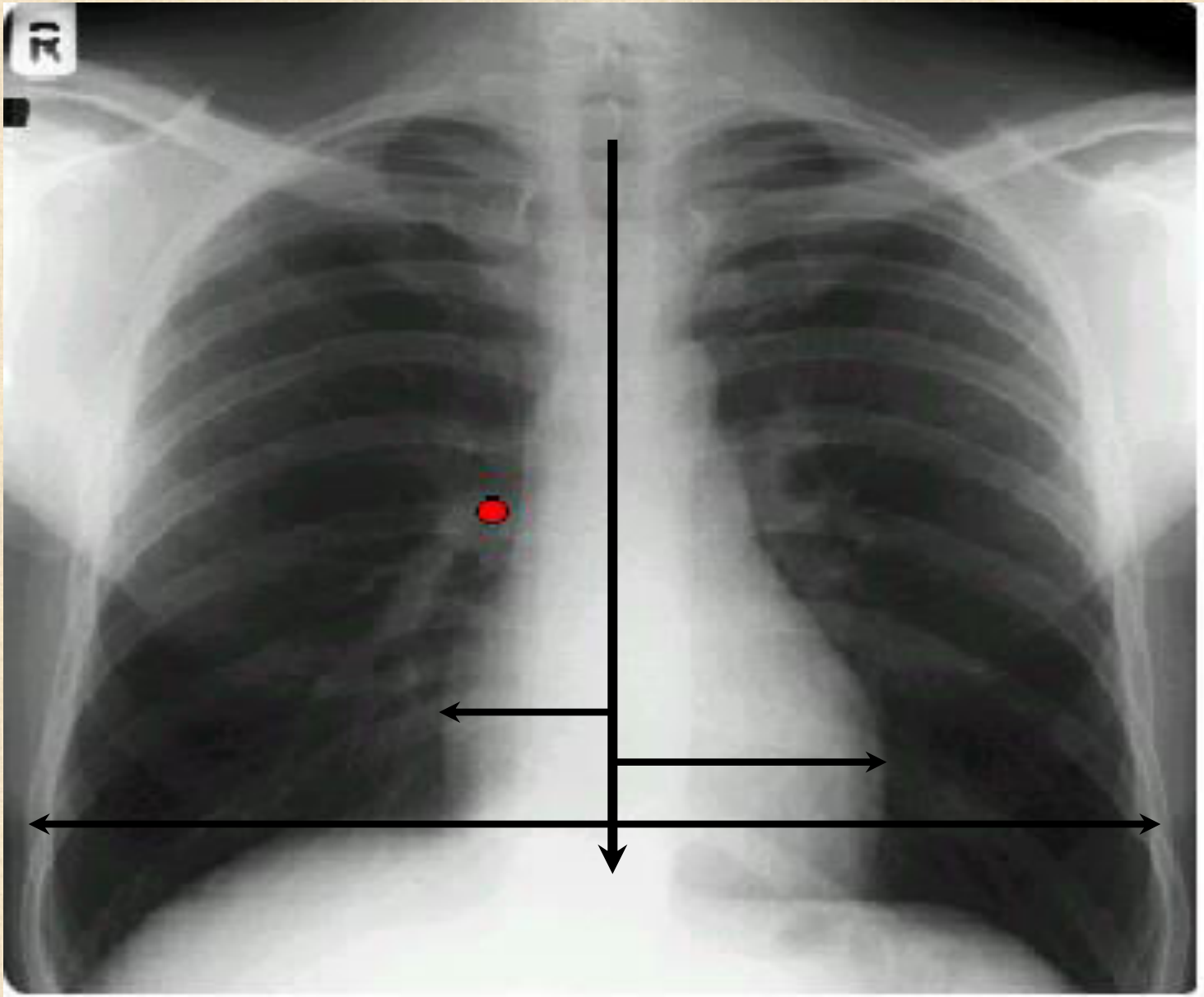
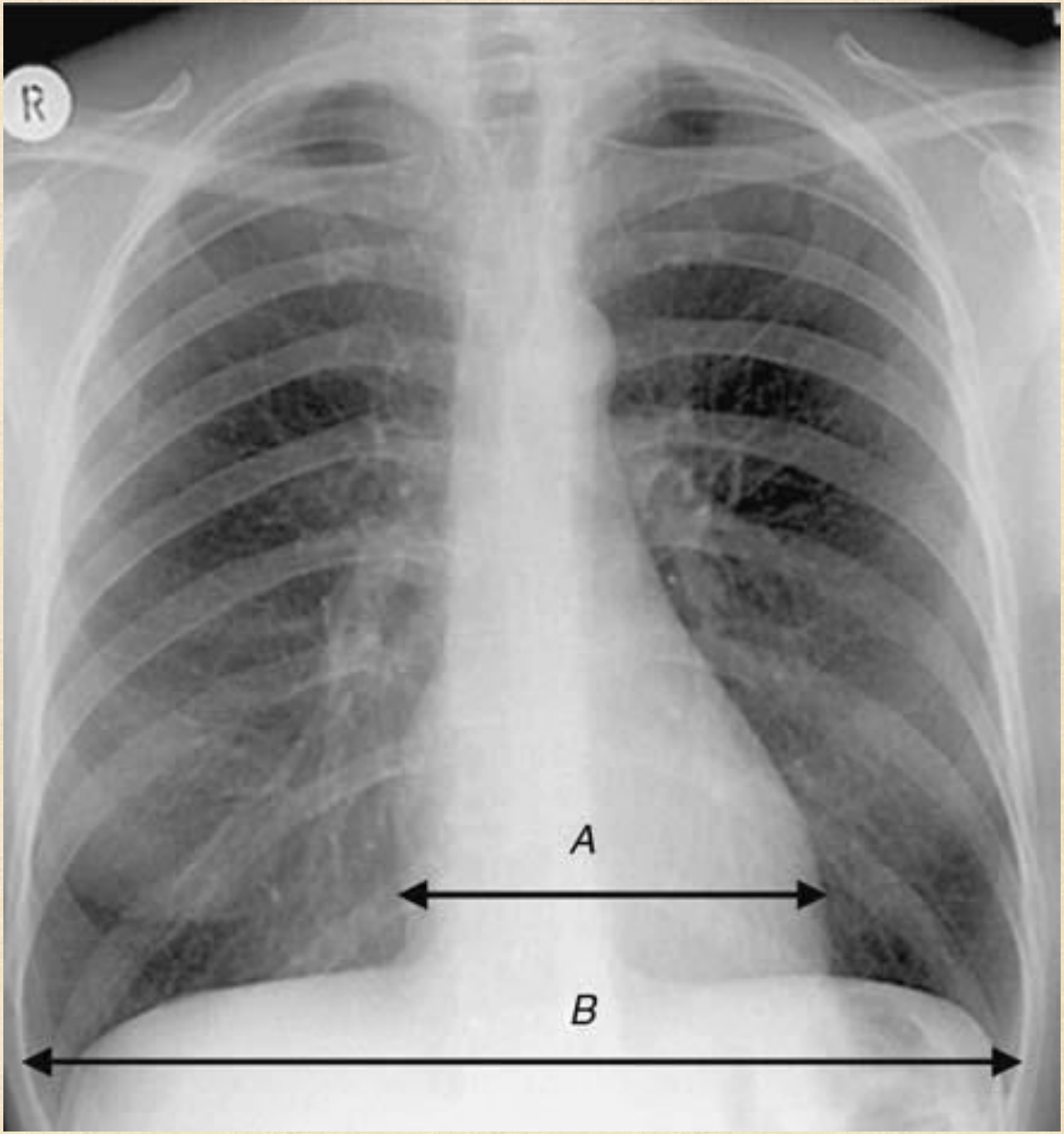
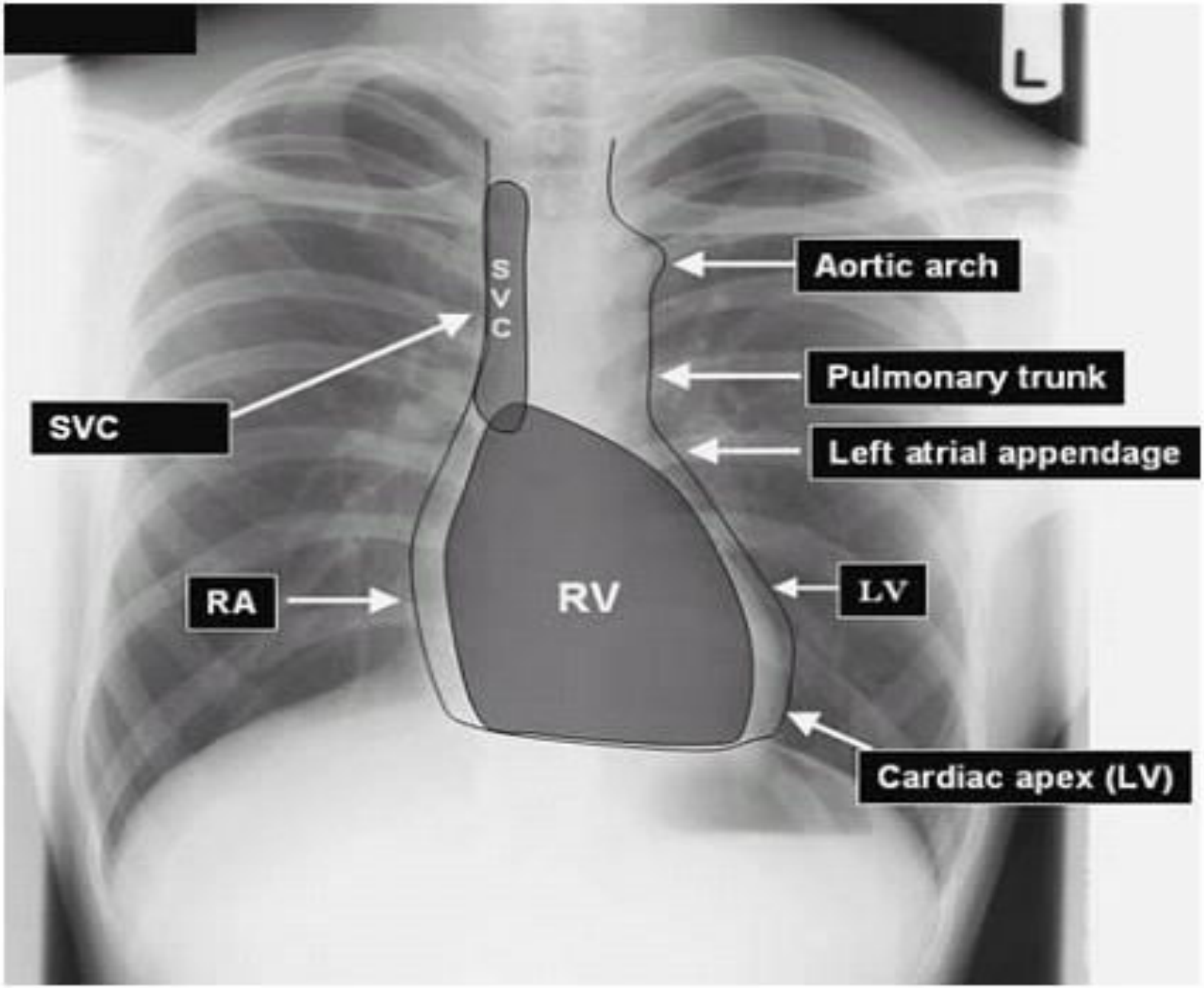
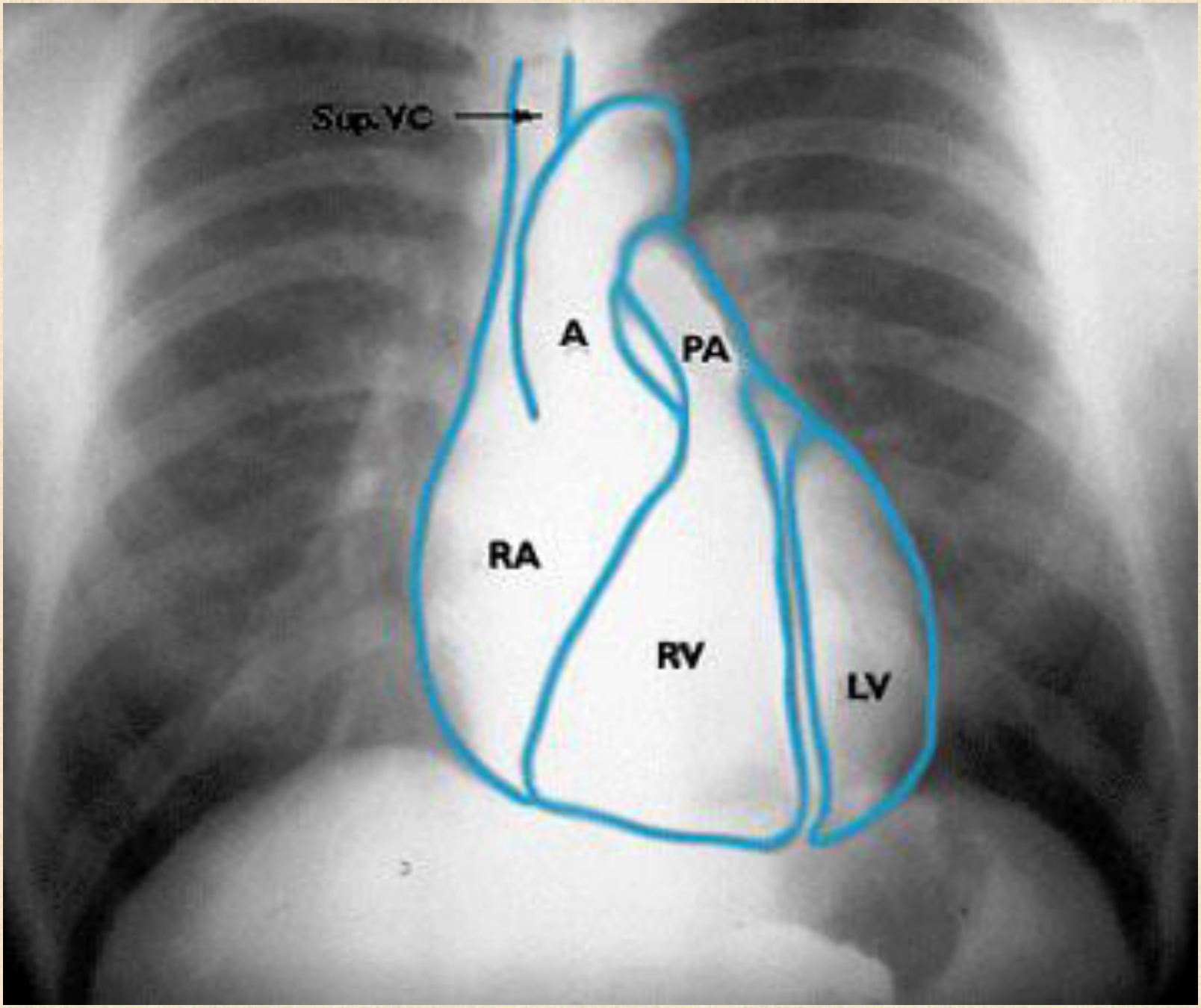


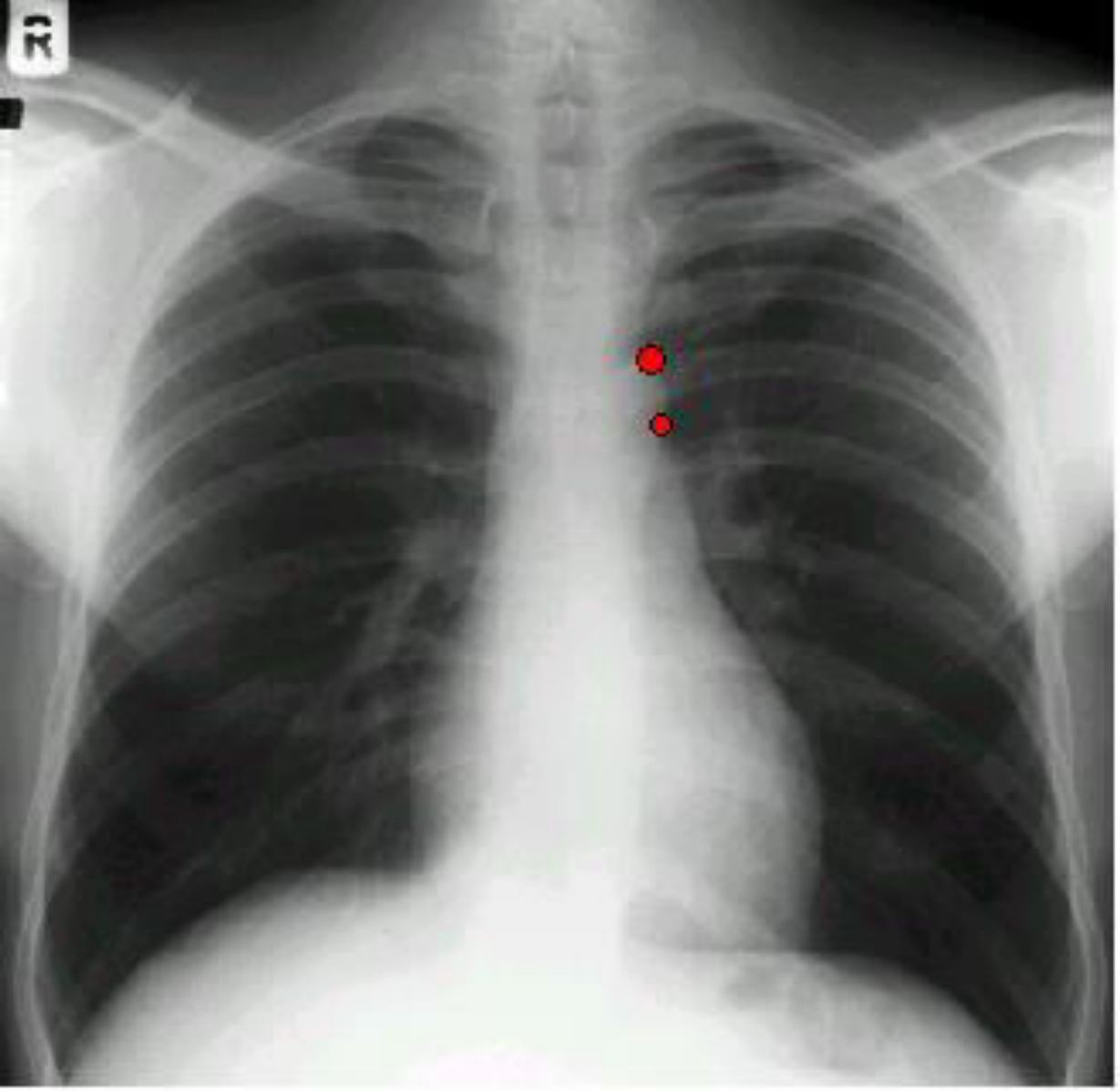
Fig. 7.1 Sarcoidosis. Bilateral hilar node enlargement.


R


R
A
B


L
SVC
Aortic arch
SVC
Pulmonary trunk
Left atrial appendage
RA
RV
LV
Cardiac apex (LV)

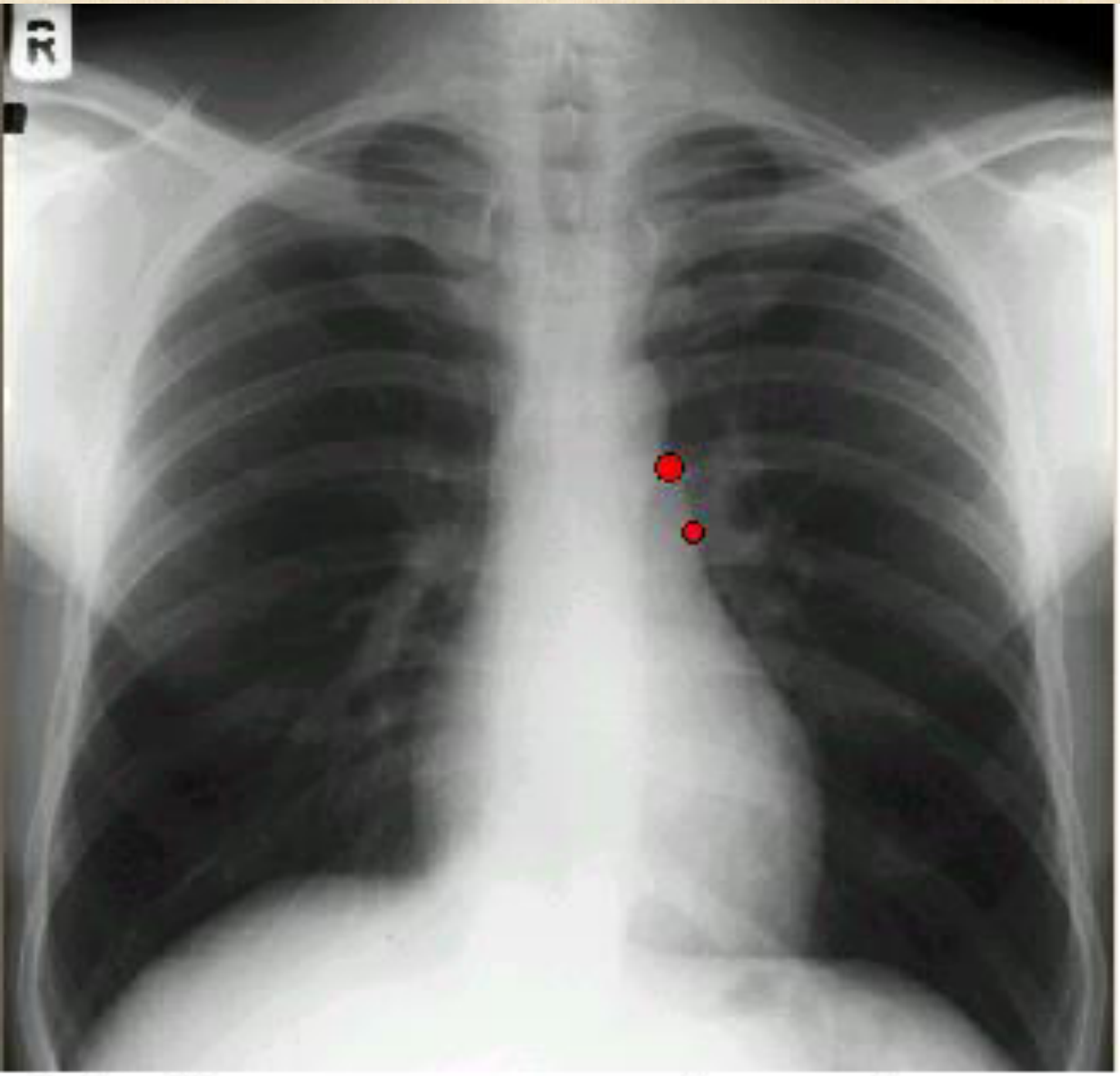

Sup.VC
A
PA
RA
RV
LV



Heart & Vessels

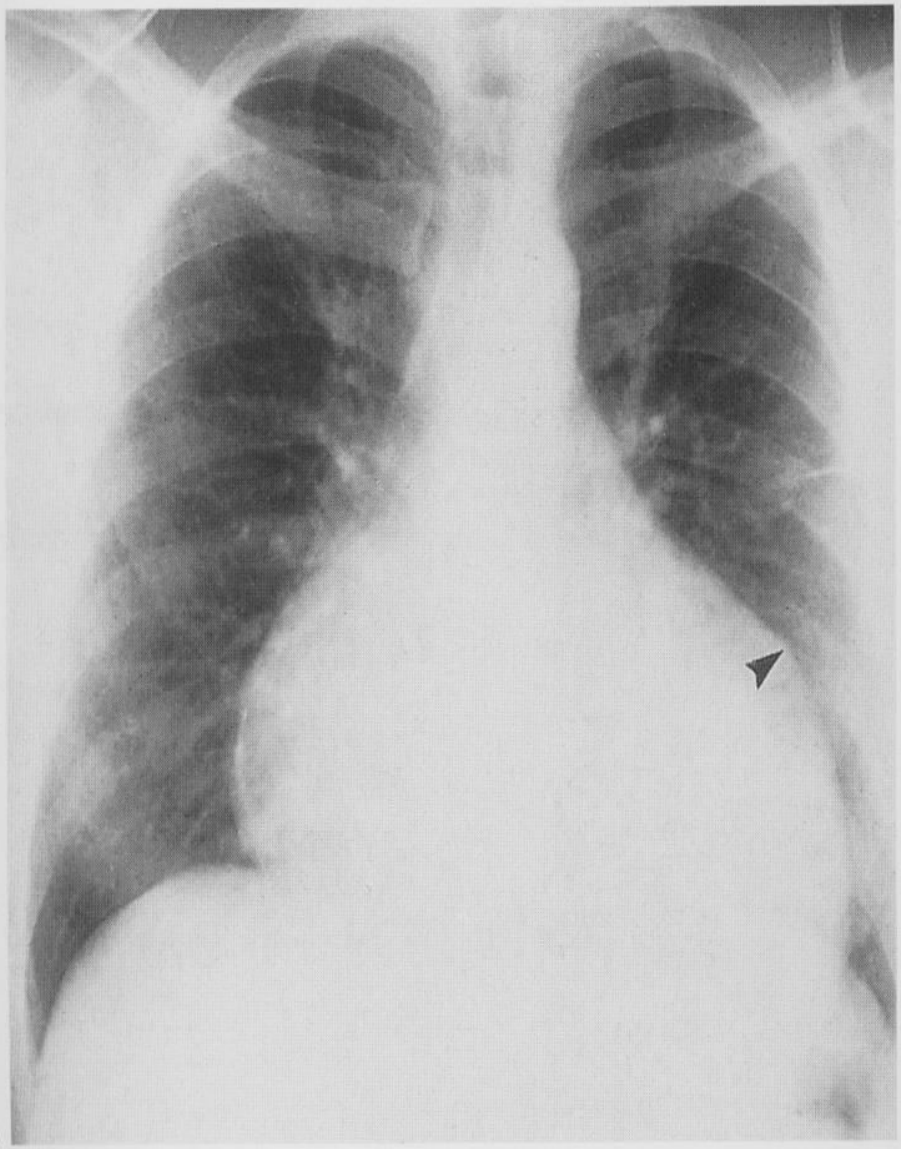
Prominent Knuckle Indicate Aortic Aneurysm mostly

Arch of Aorta (Aortic knuckle)

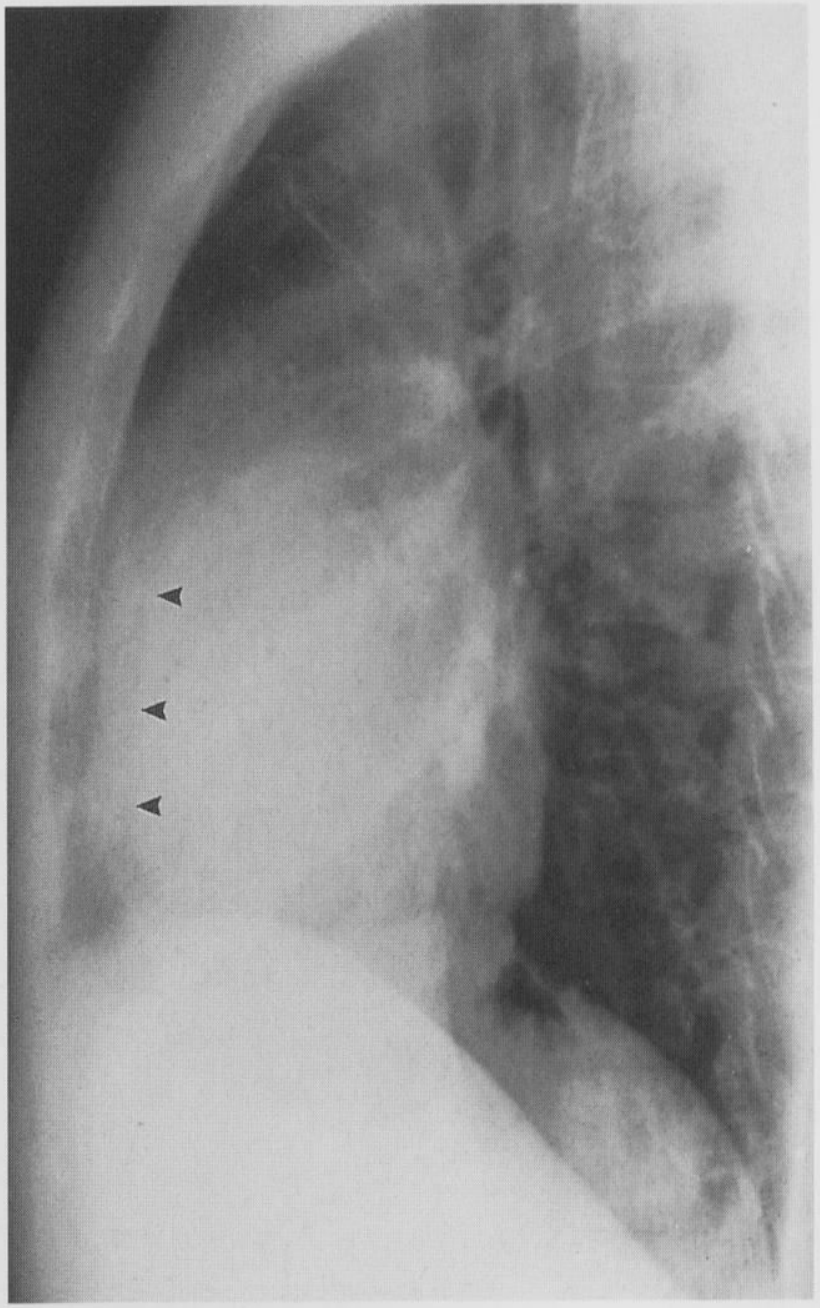


Heart
&
Vessels

Pulmonary Trunk



A

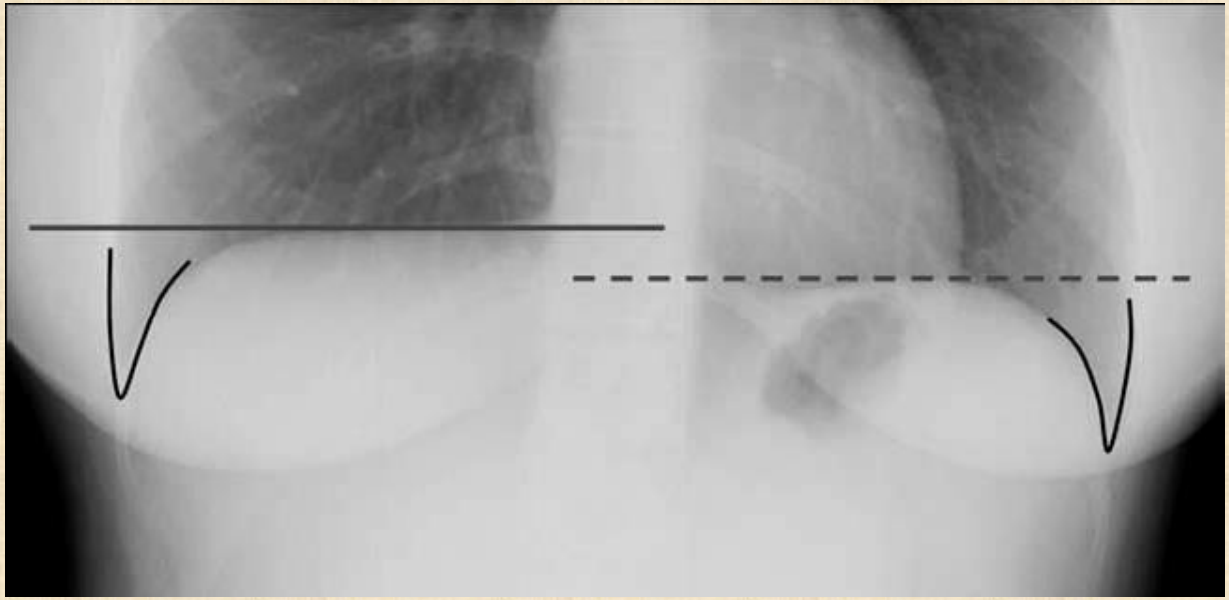


B

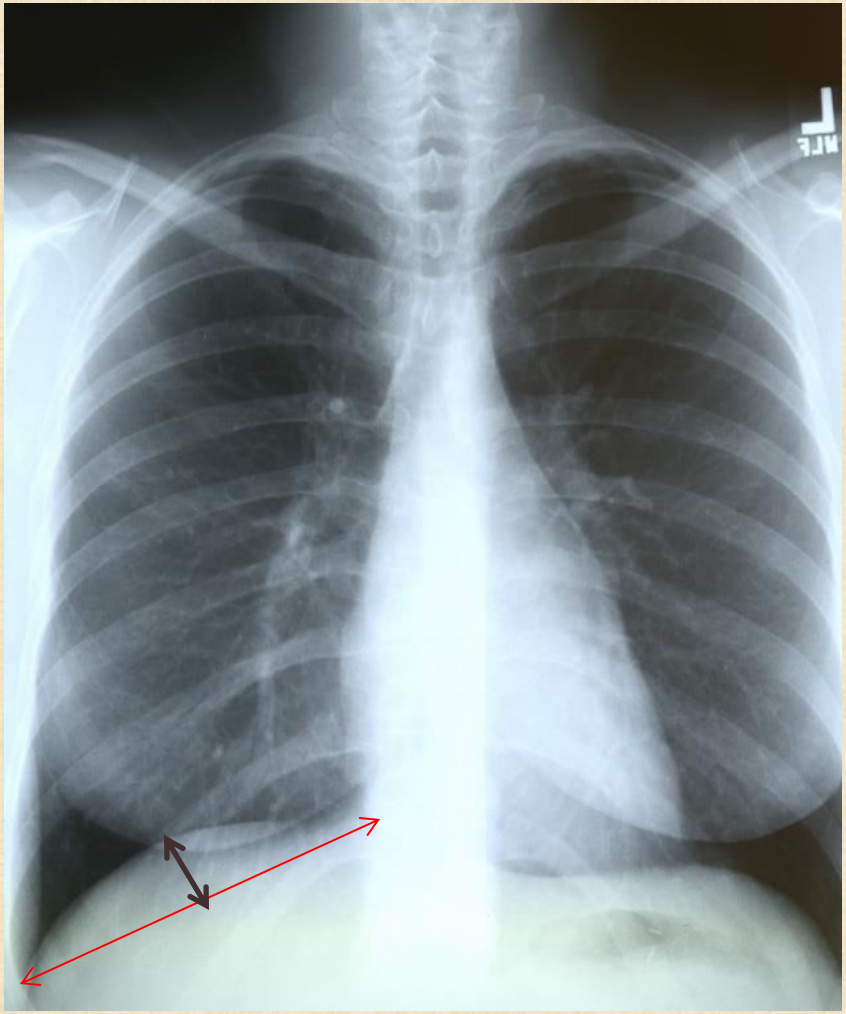
Findings

11. Diaphragm:

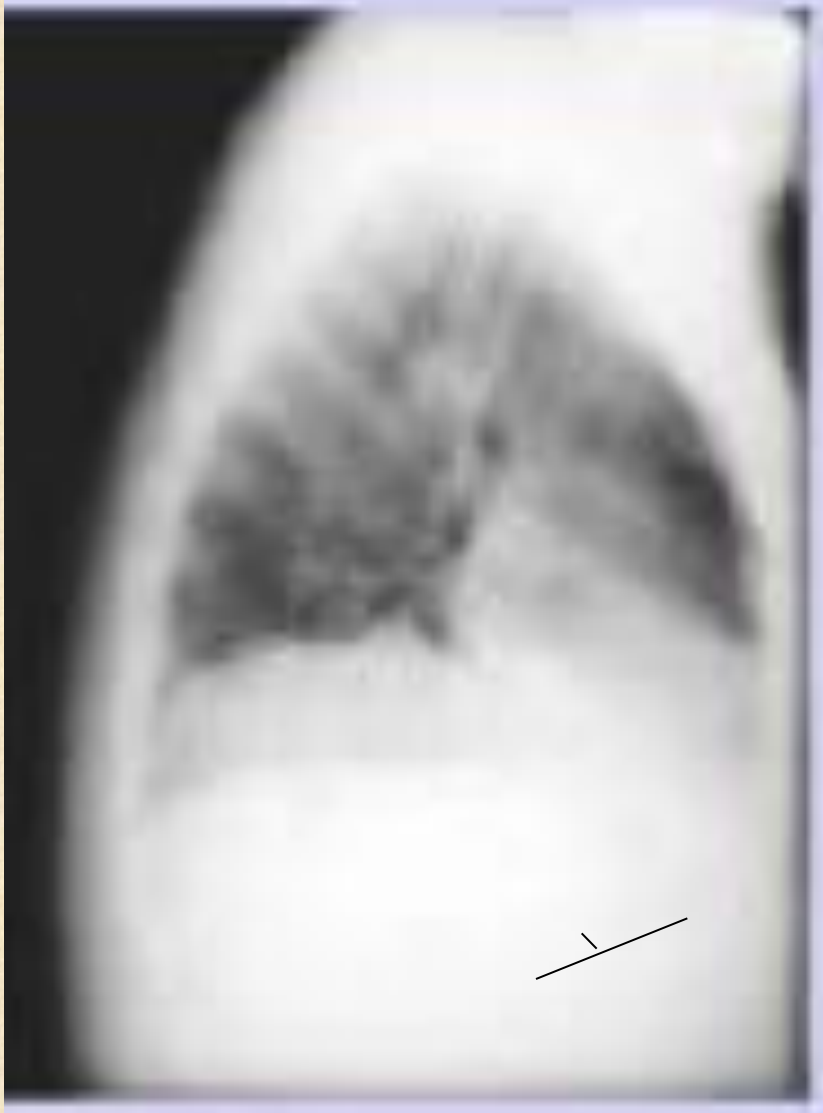
- The highest point of the right diaphragm is usually 1–1.5 cm higher than that of the left.
- Each costophrenic angle should be sharply outlined.



- Check convexity and domes.
- Check for low flat diaphragm with indentations.
- Check for free air, or fluid.



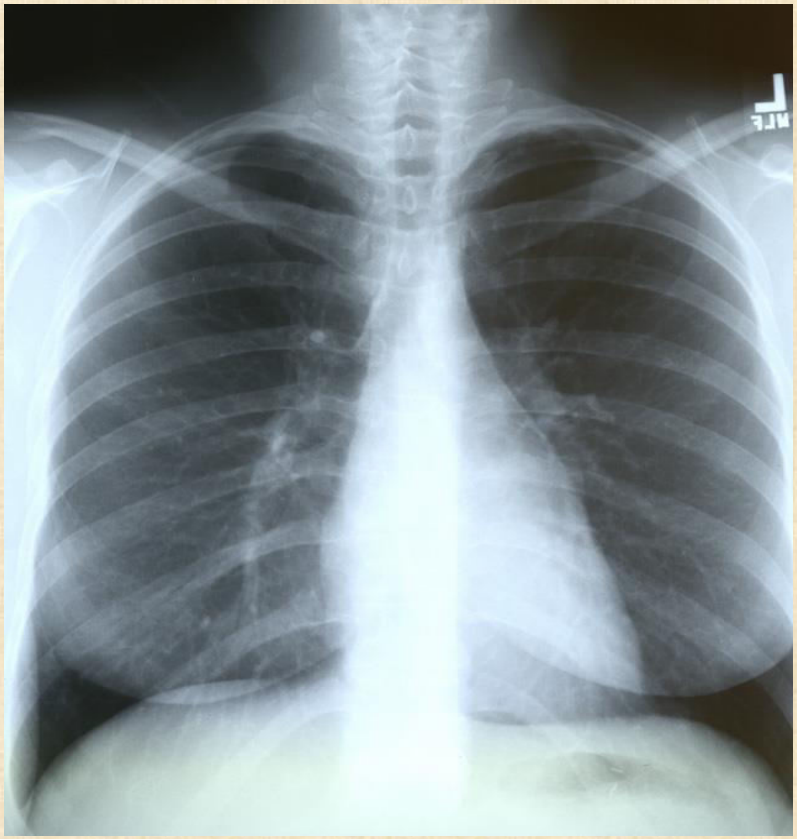
Unilateral Left Diaphragmatic Paralysis

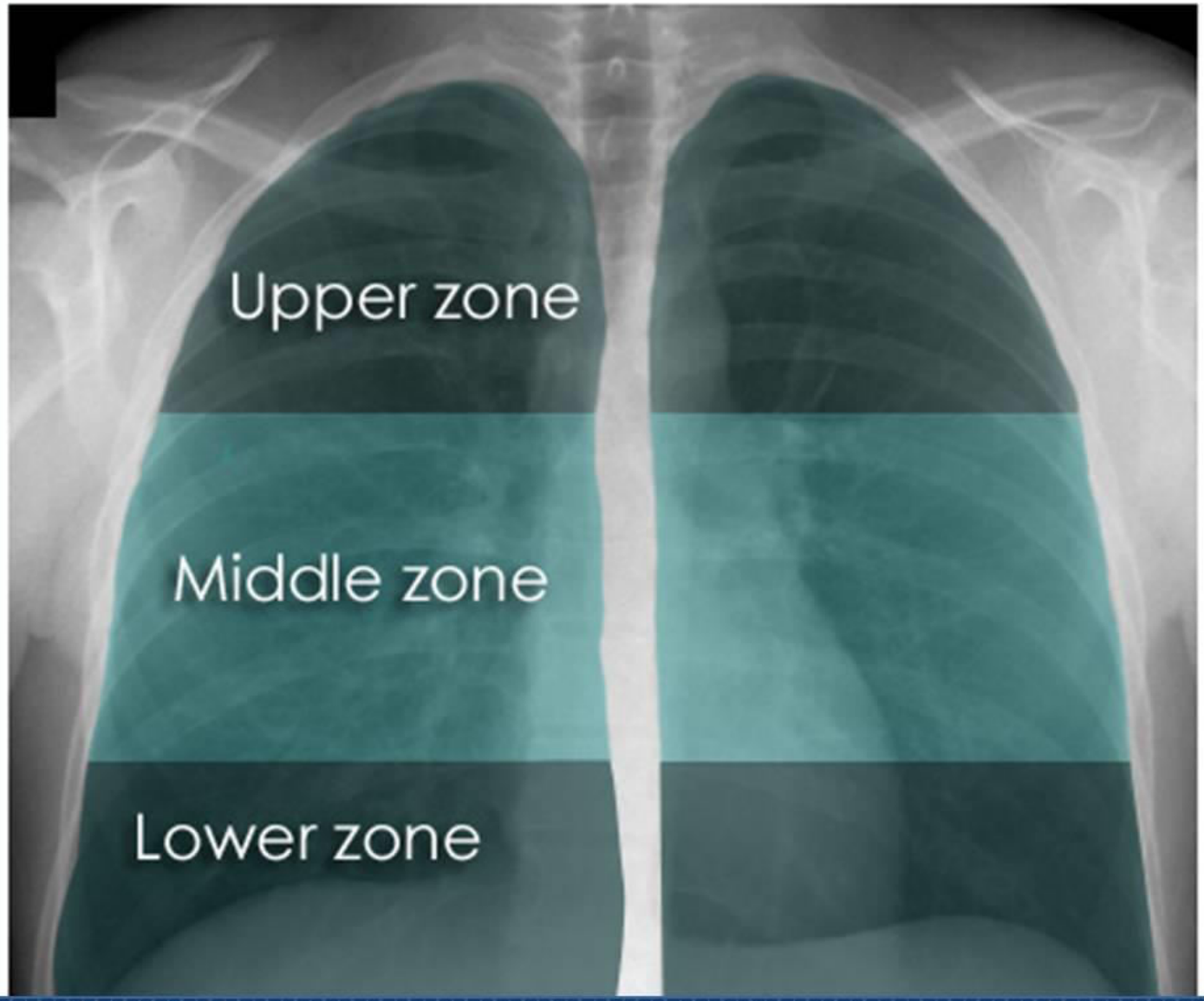


Findings

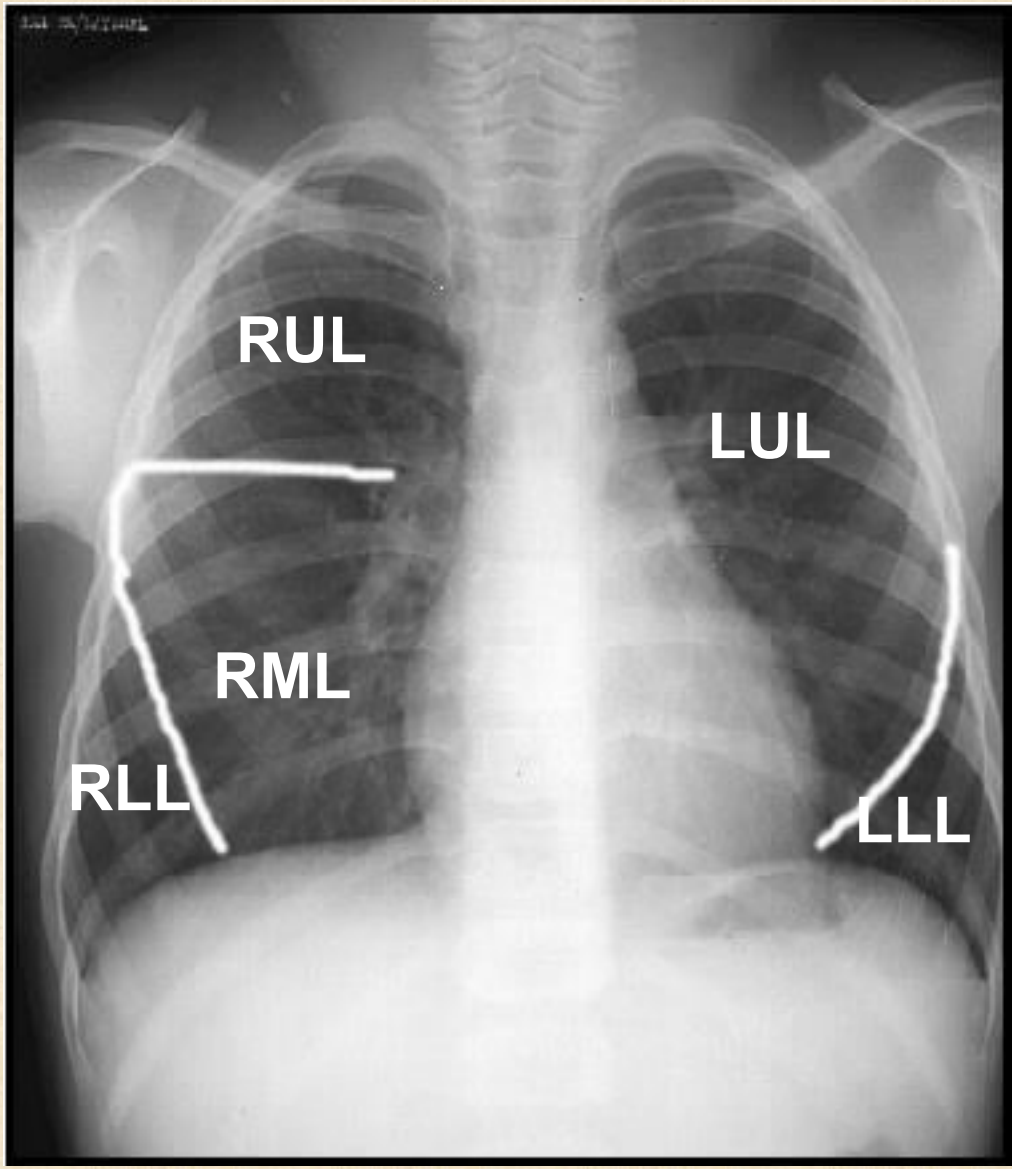
12. Lung Fields:

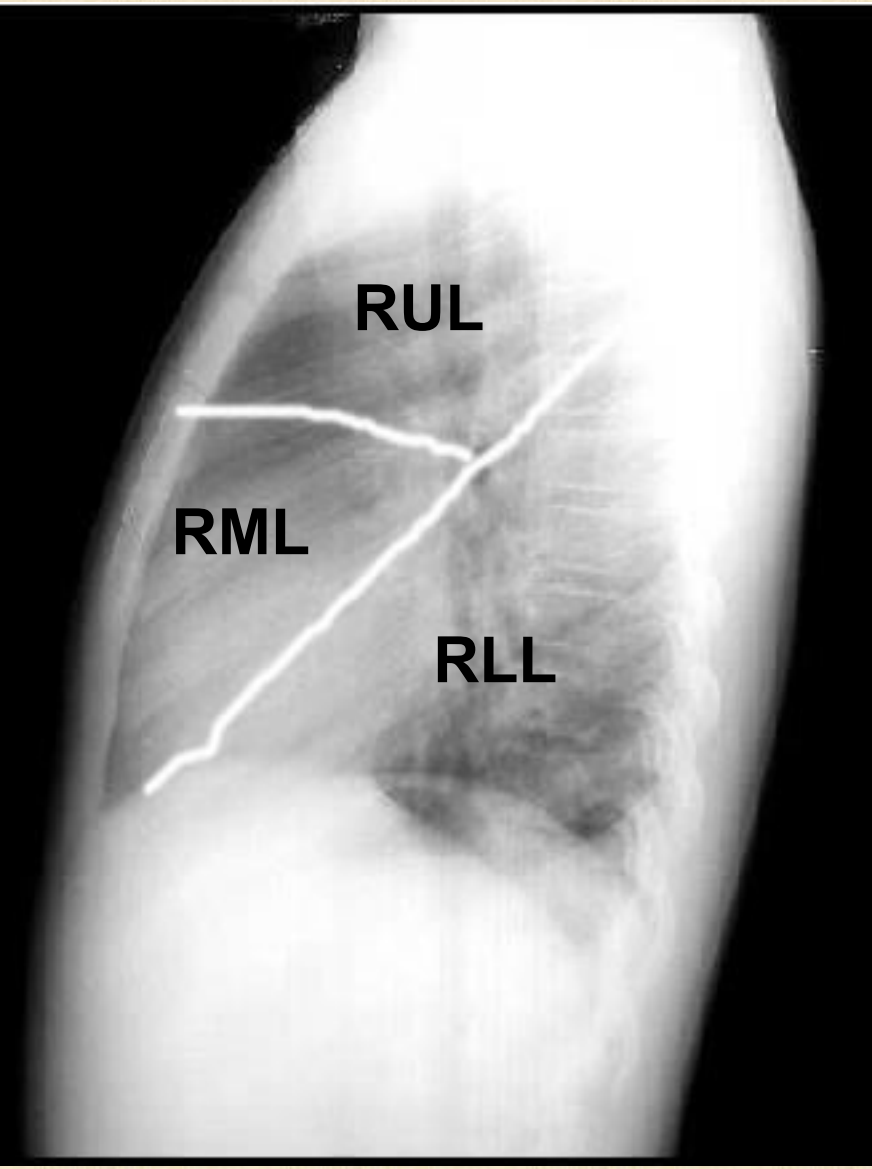
- **Pulmonary vascular markings (BVM)**
- **Opacities, localized or diffuse.**
- **To determine location of any abnormalities …**
  - Use radiologic lung zones.
  - Use fissures to define lung lobes

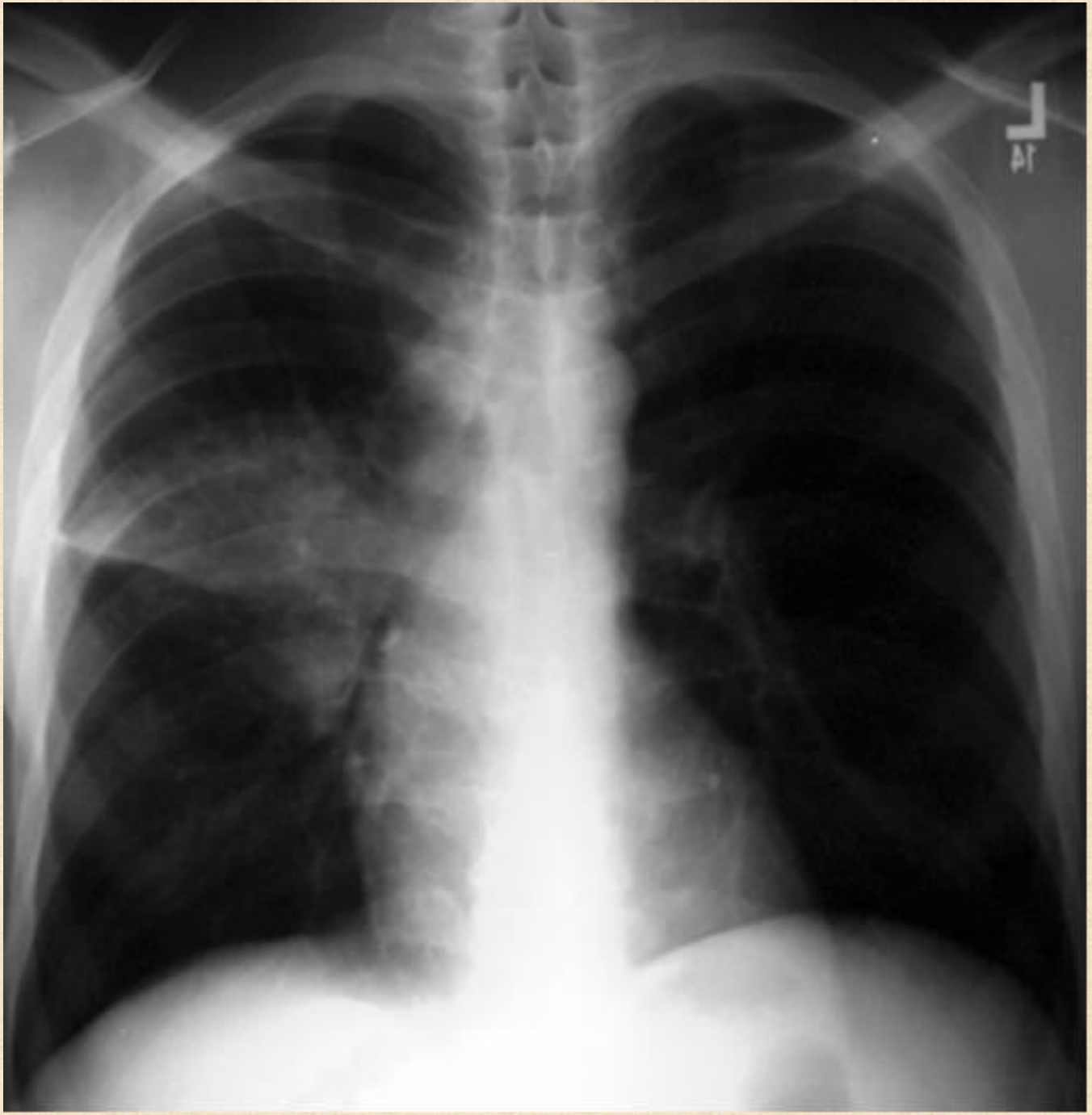


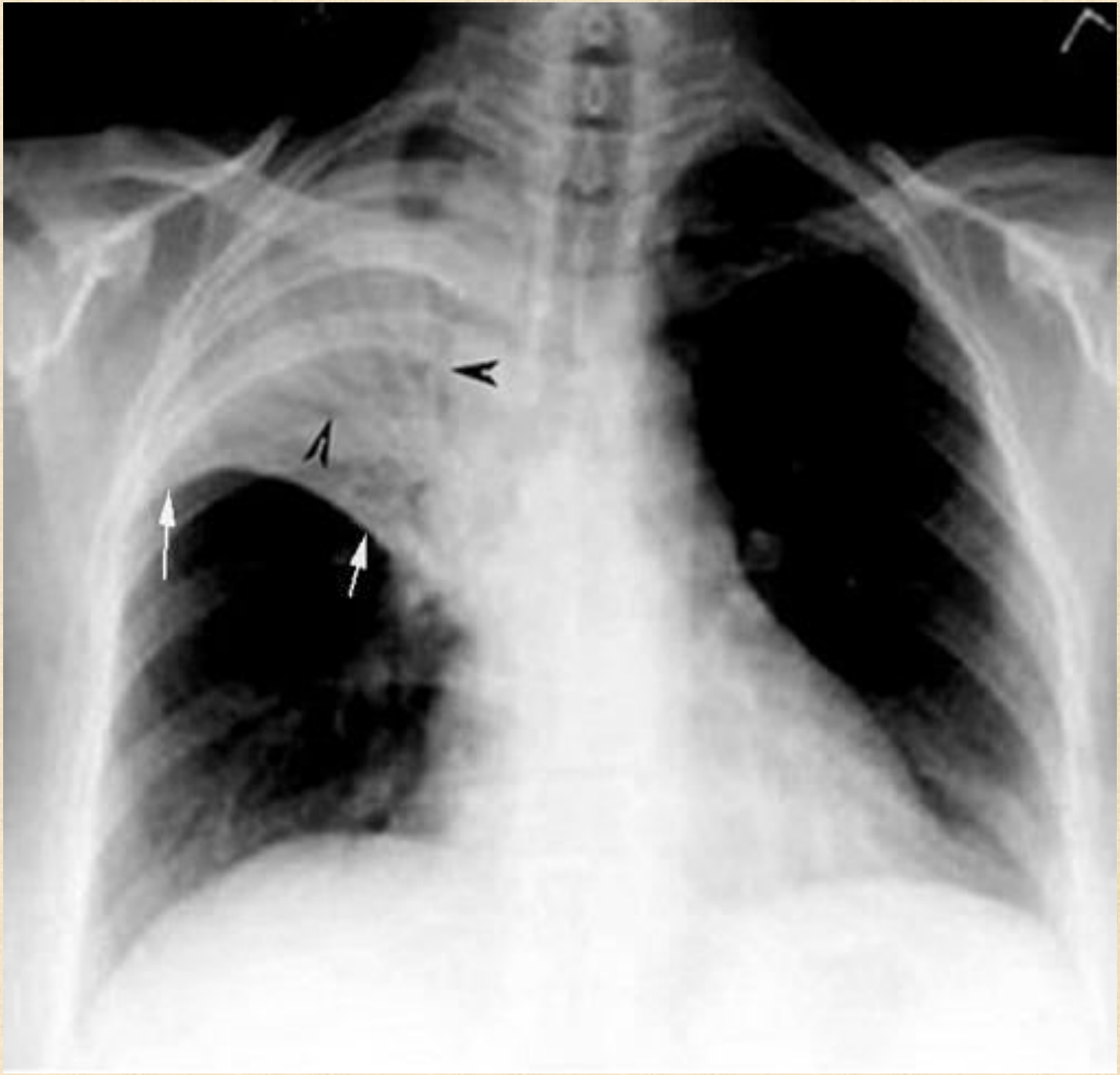


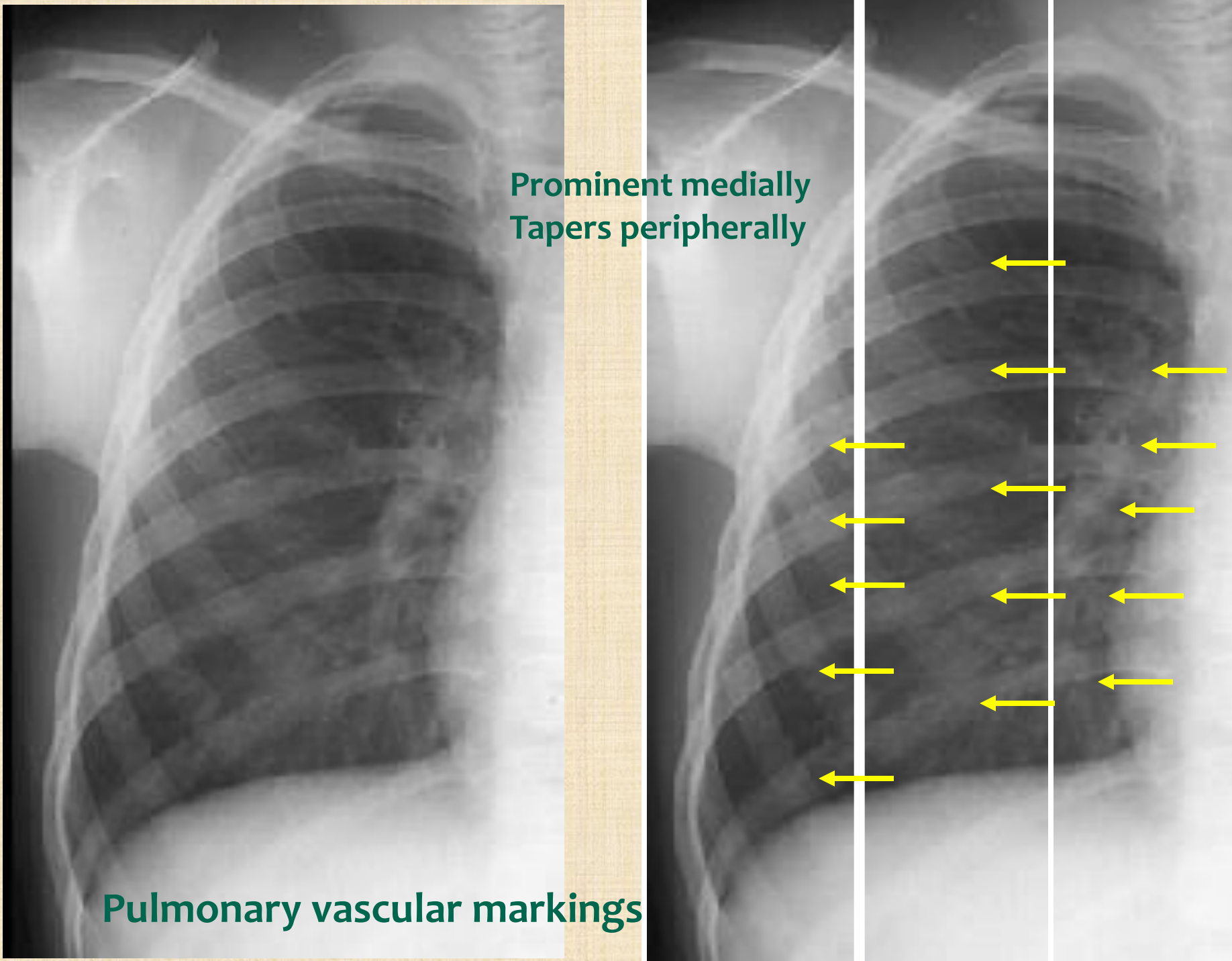
Each of these zones occupies approximately one third of the height of the lungs.

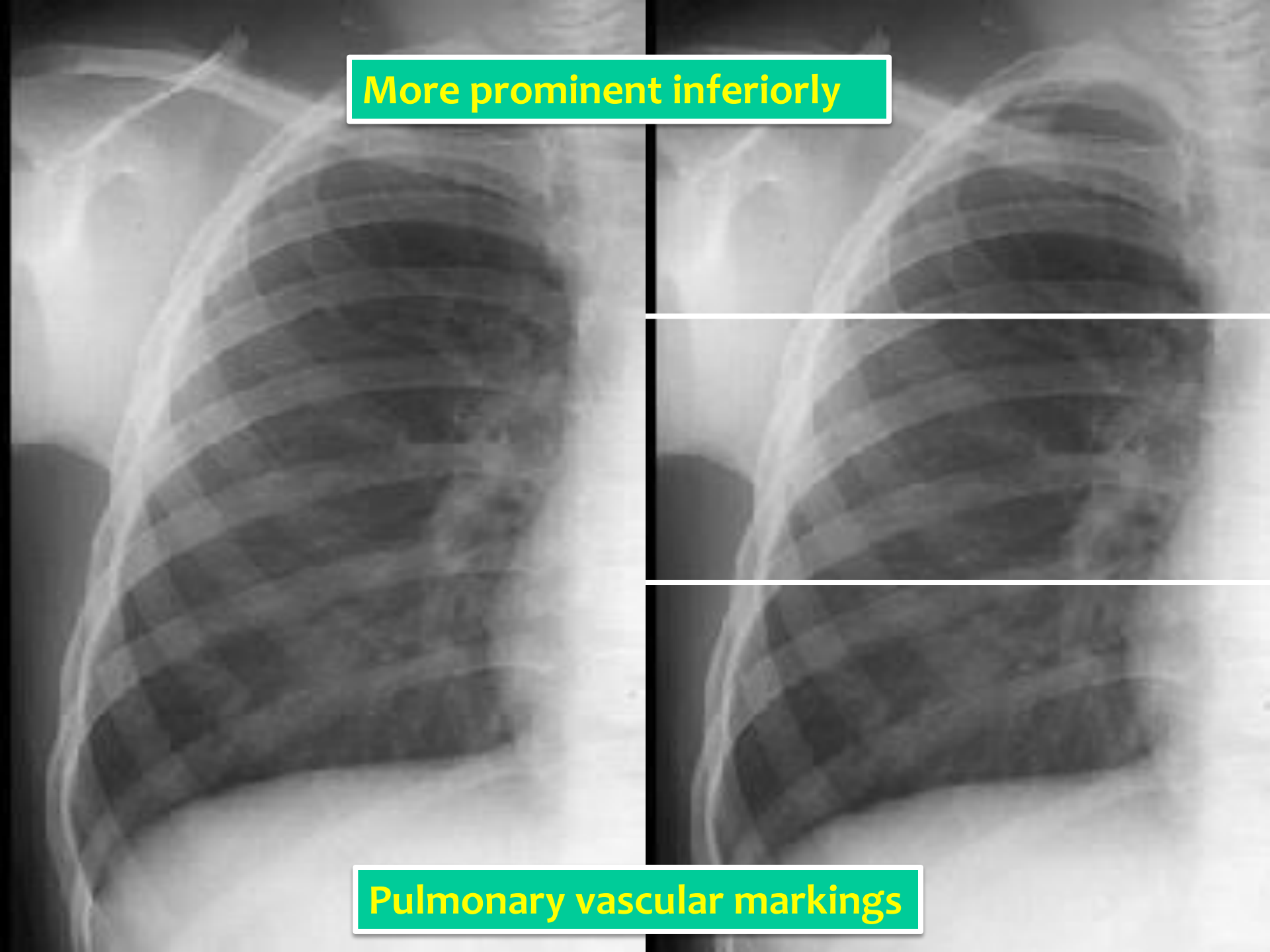

RUL
LUL
RML
RLL
LLL


RUL
RML
RLL






Prominent medially
Tapers peripherally
Pulmonary vascular markings


More prominent inferiorly
Pulmonary vascular markings

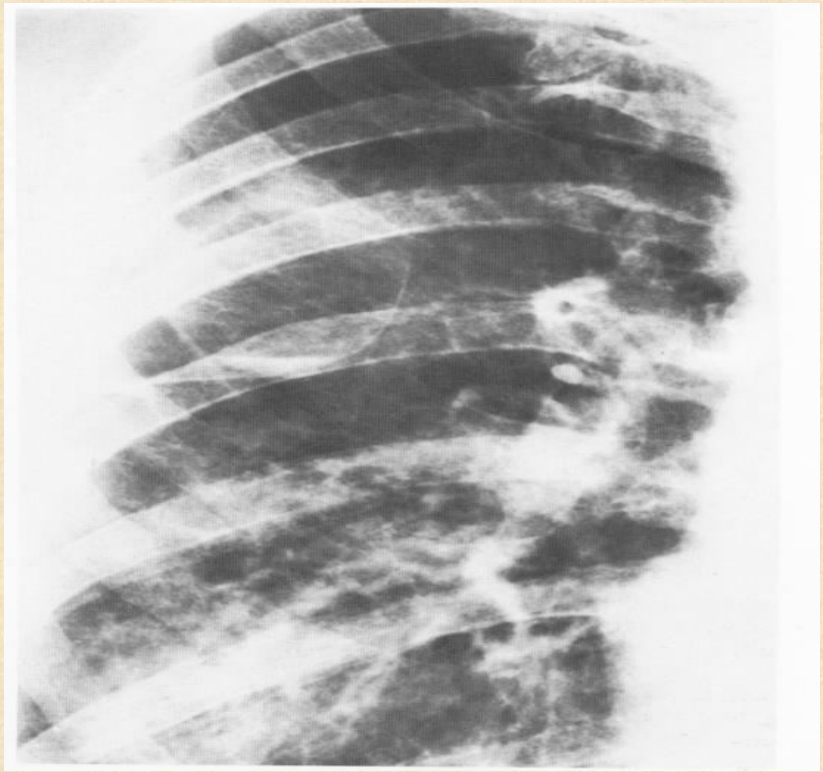
How to comment???????

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

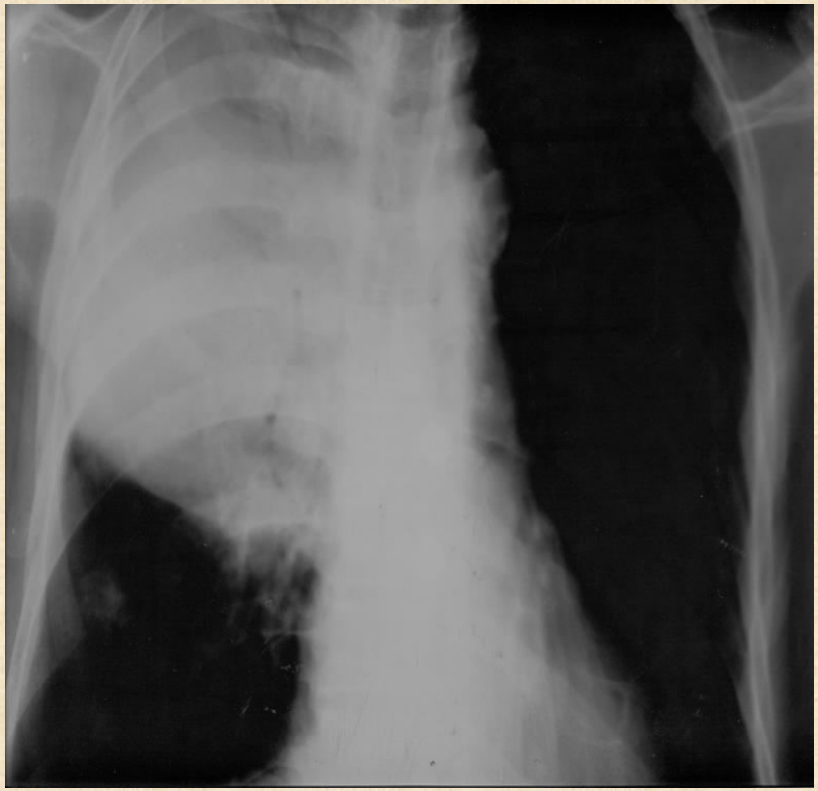
Opacity (Liquid or soft tissue density)		Hypertranslucency (Increased air density)
Diffuse	**Localized**	
• Diffuse alveolar • Diffuse interstitial • Mixed • Vascular	• Consolidation • Cavitation • Mass • Fibrosis • Atelectasis	• Bulla • Localized airway obstruction • Diffuse airway obstruction e.g. 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.

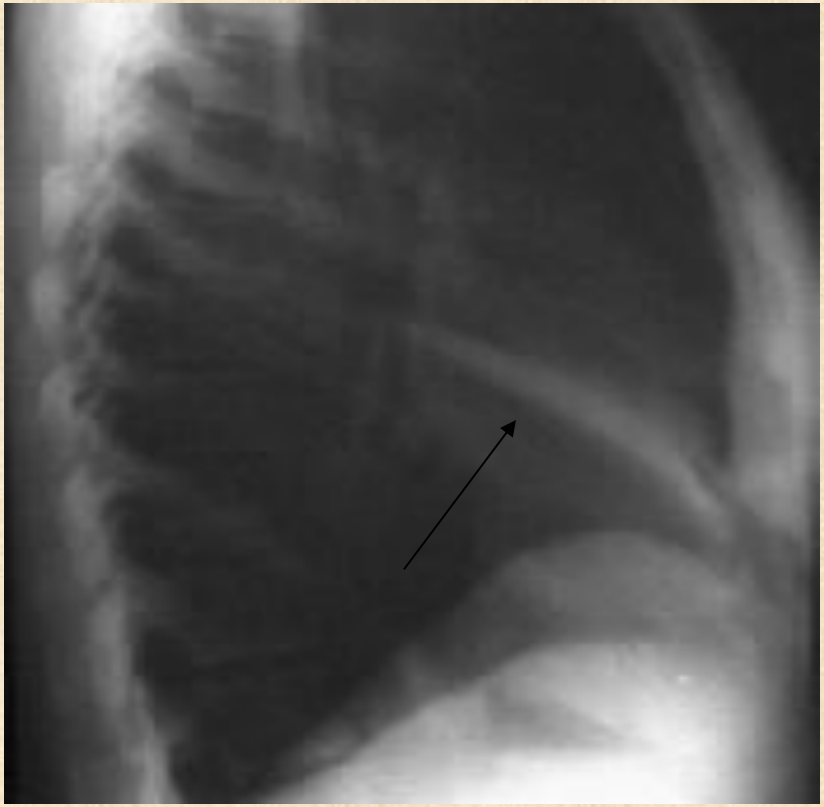
Radiological description:

Mass:

Pulmonary opacity 3 cm or more in diameter.

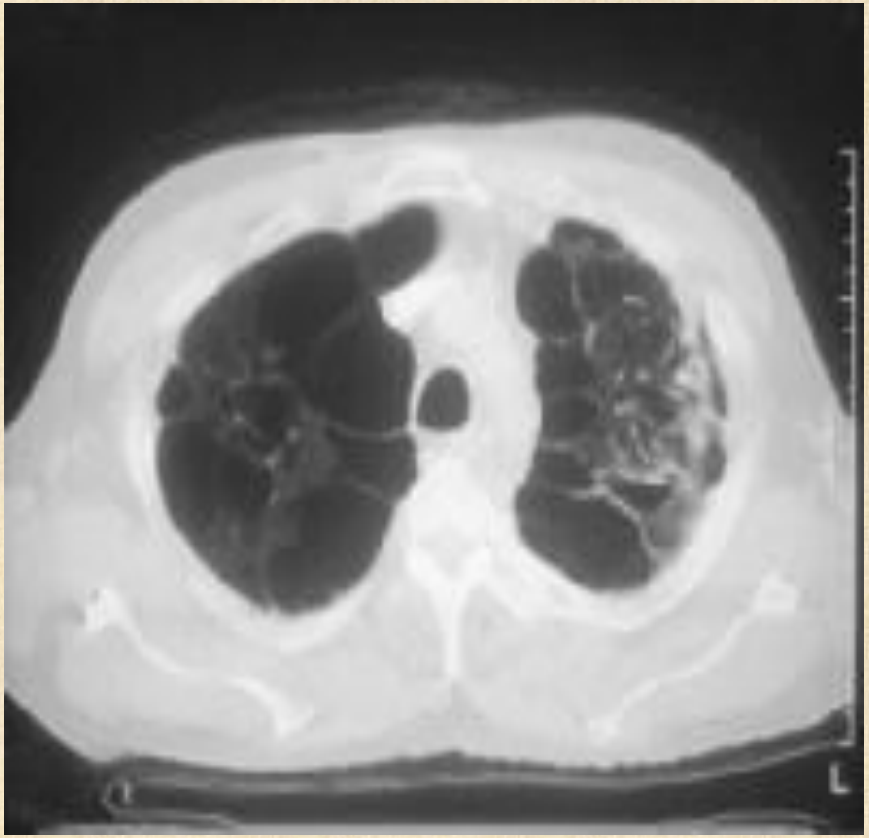
Radiological description:

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



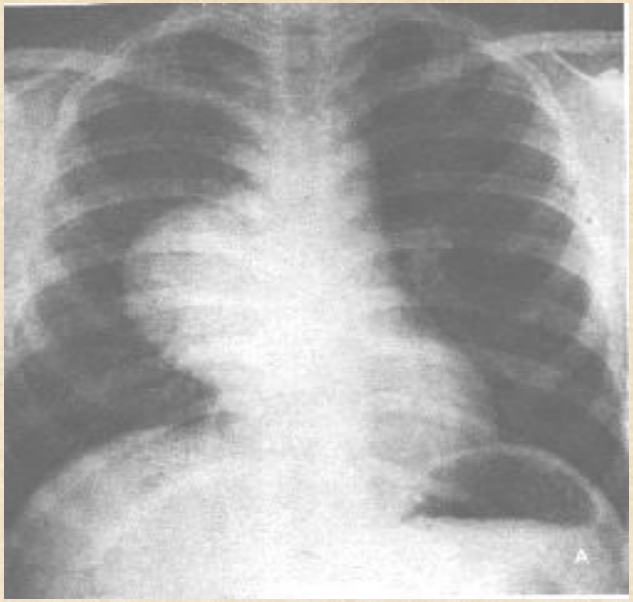
Radiological description:

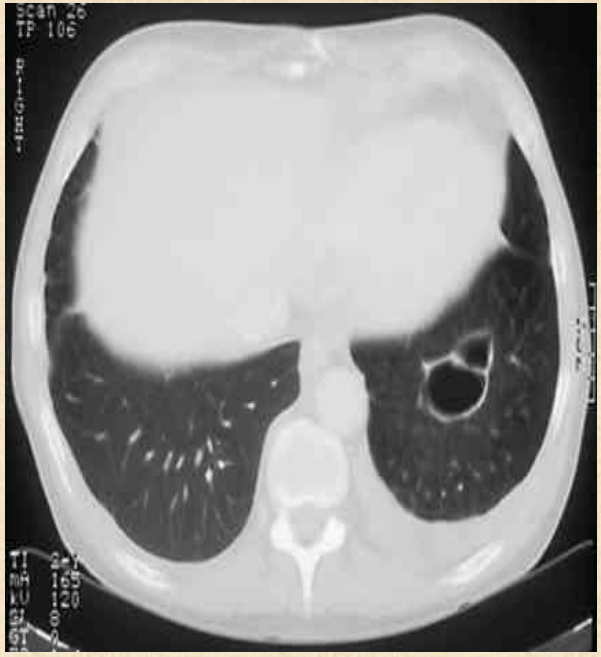
Bulla: Air filled space at least 1 cm in diameter and wall is hairline (<1 mm in thickness).



Radiological description:

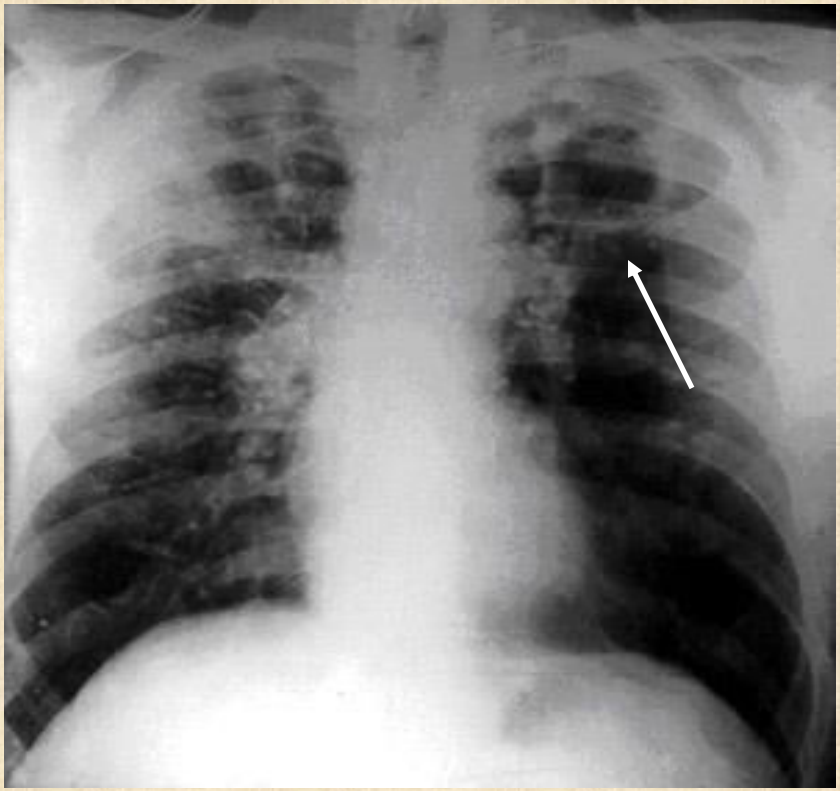
- **Cyst:** Air filled or fluid filled space at least 1 cm in diameter and wall is 1 - 3 mm in thickness.

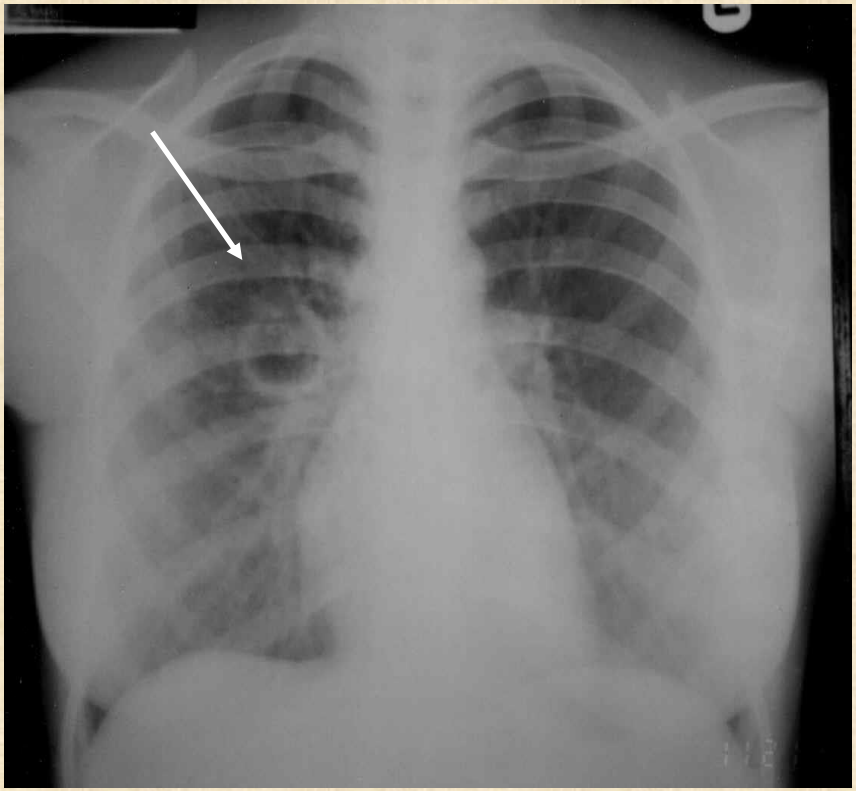




Radiological description:

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

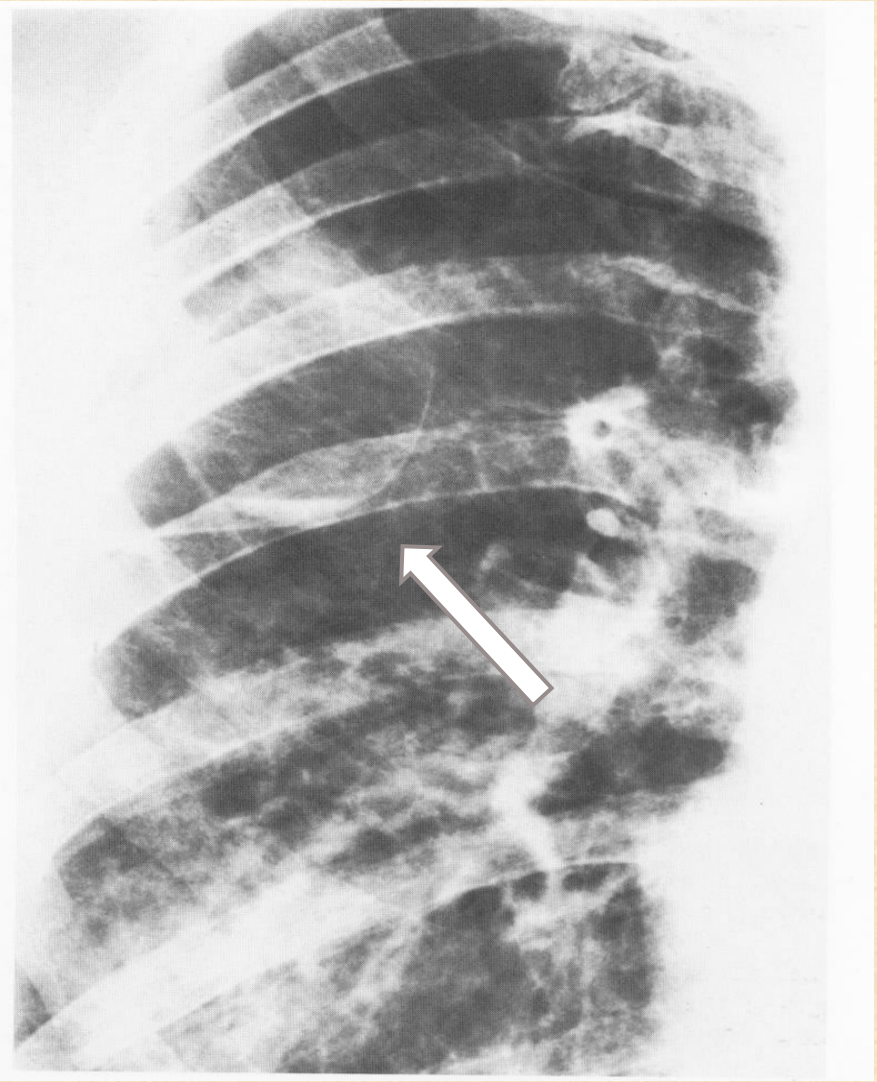




Radiological description:

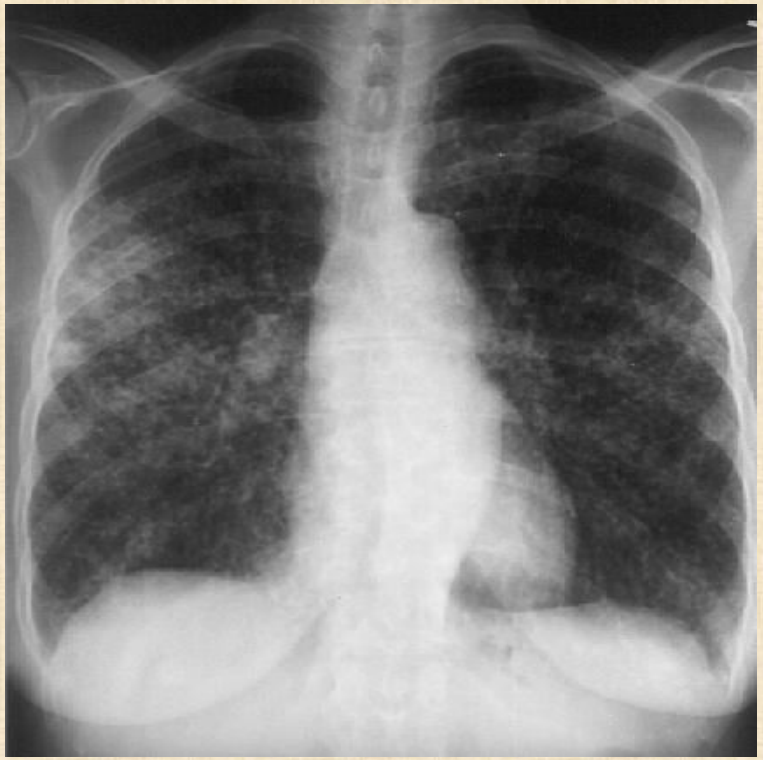
- **Pneumatocele:**

  Bulla resulting from pneumonic check-valve obstruction that rapidly ↑ in size.



Radiological description:

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



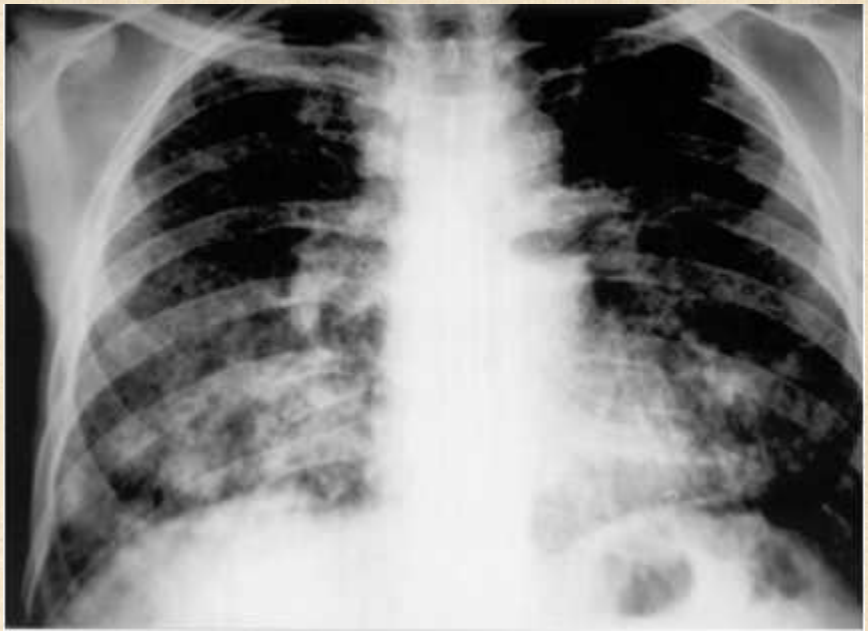
Radiological description:

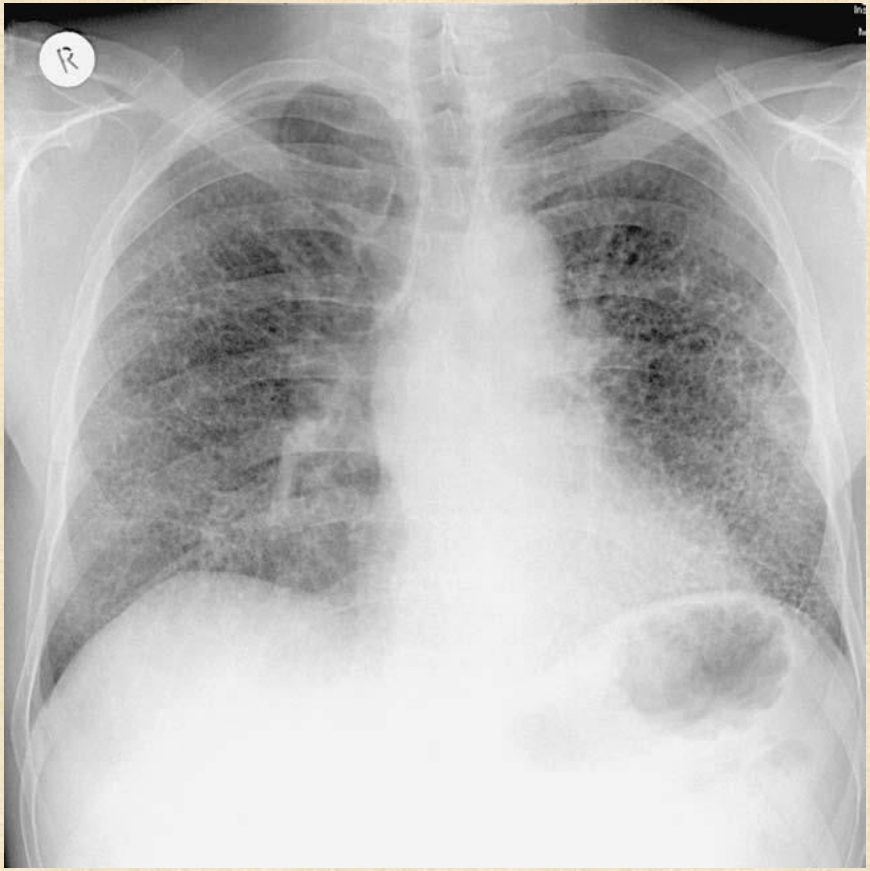
- **Reticular:**

  Linear streaks with mosaic appearance (1.5 - 10 mm thickness).

- **Reticulonodular:**

  Mixed reticular and miliary.

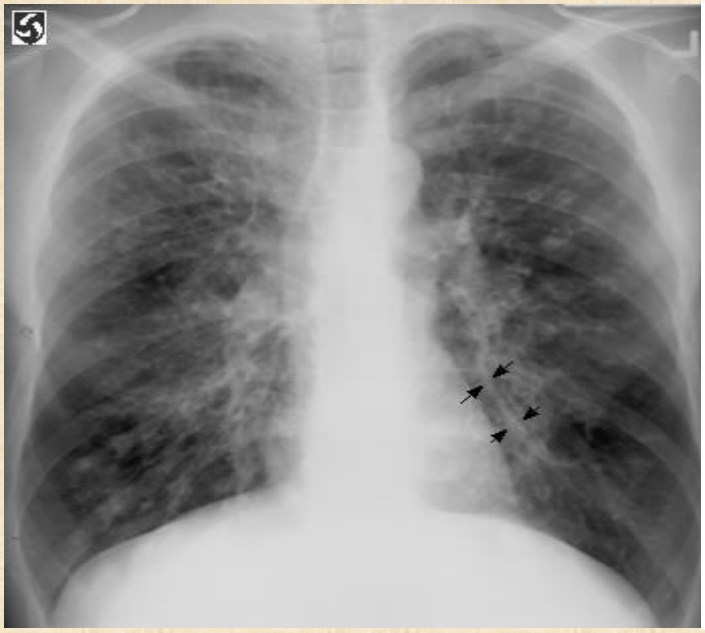


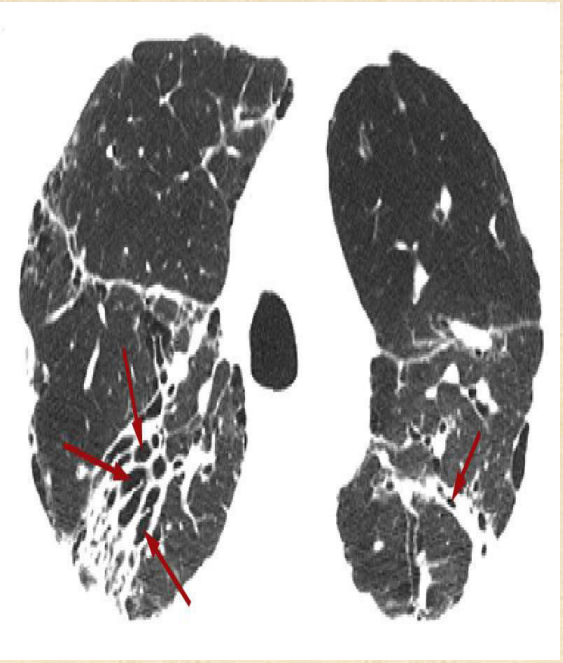


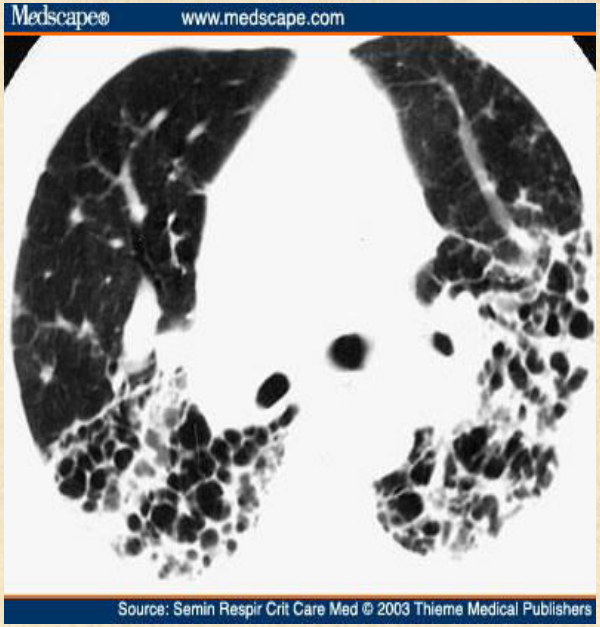
Radiological description:

Honeycomb shadowing:

Multiple Cysts 5-10 mm in size.







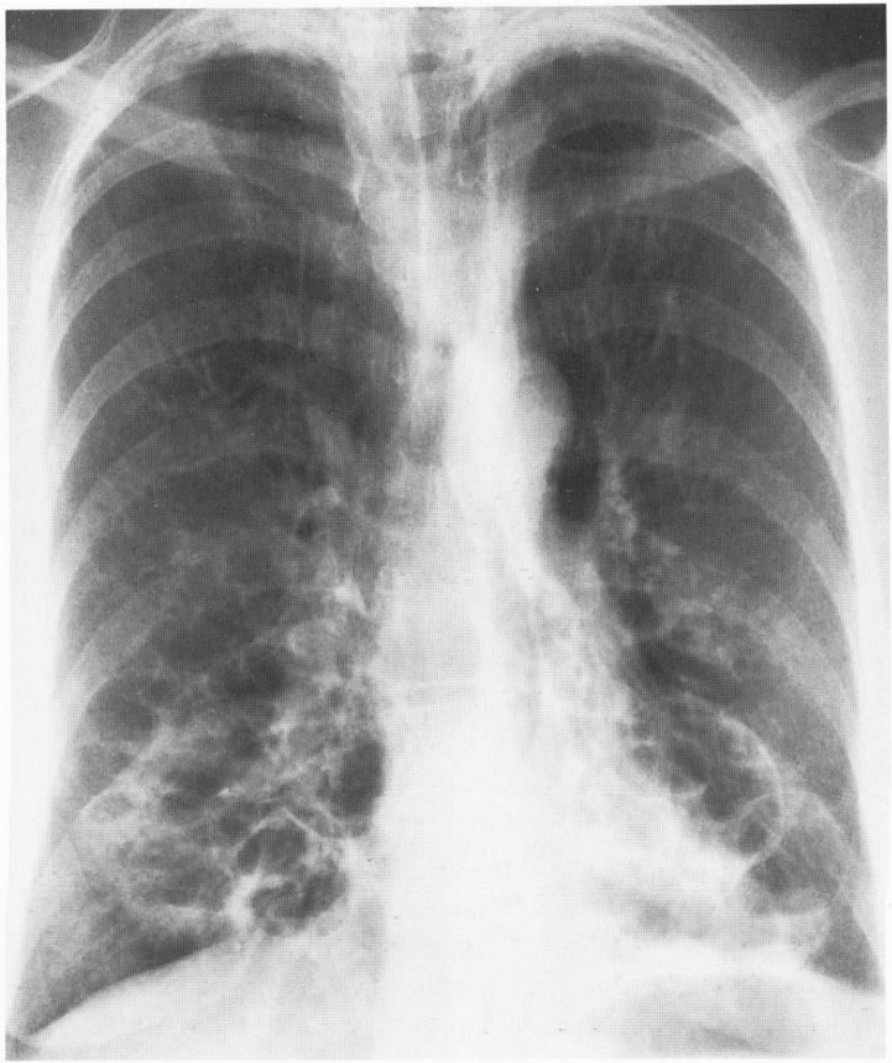
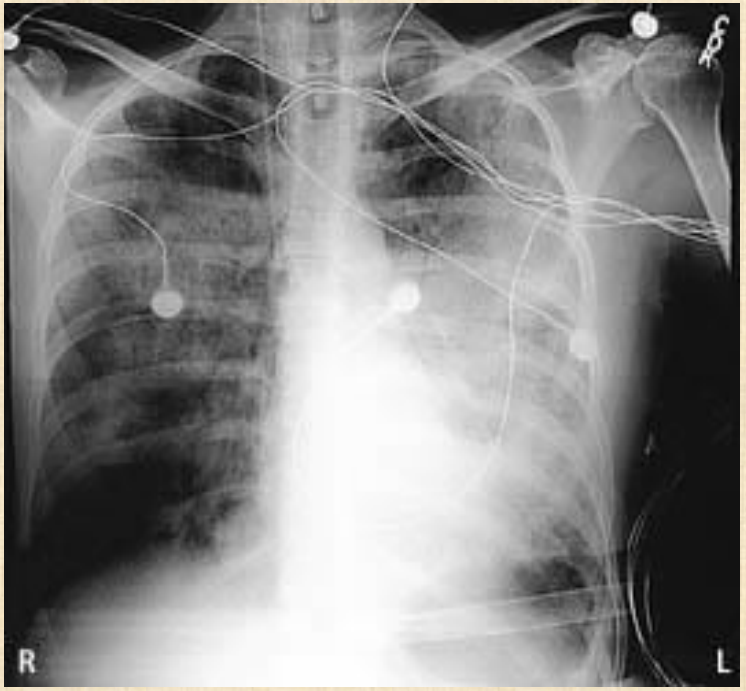


Fig. 6.9 Bronchiectasis. Multiple ring shadows, many containing air–fluid levels, are present throughout the lower zones of this patient with cystic bronchiectasis.

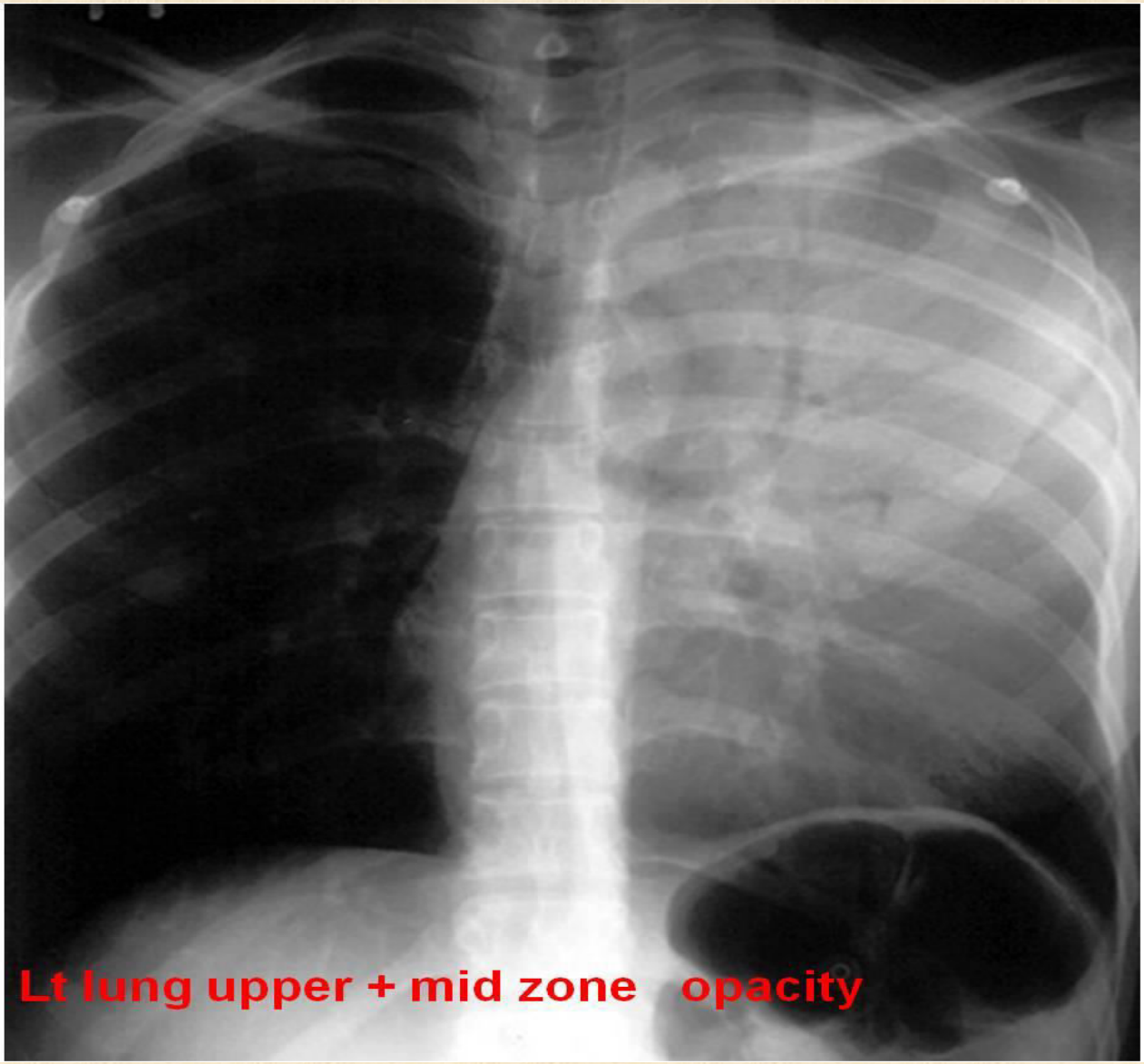
Fig. 6.11 Cystic bronchiectasis. A CT image through the upper lobes demonstrates multiple ring shadows. More caudal images reveal these to be due to irregularly dilated bronchi.

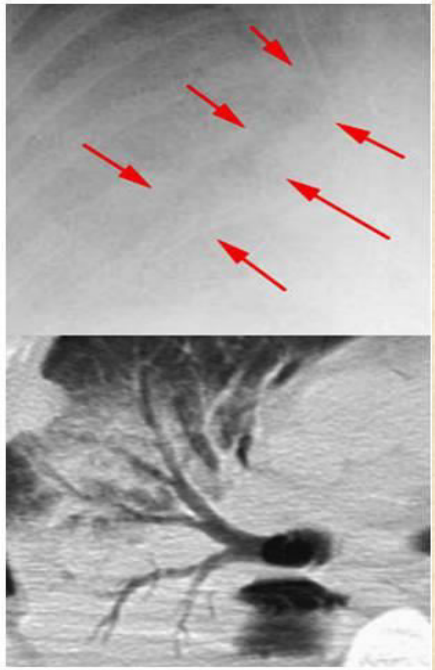
- **Ground-Glass Opacity "GGO":**

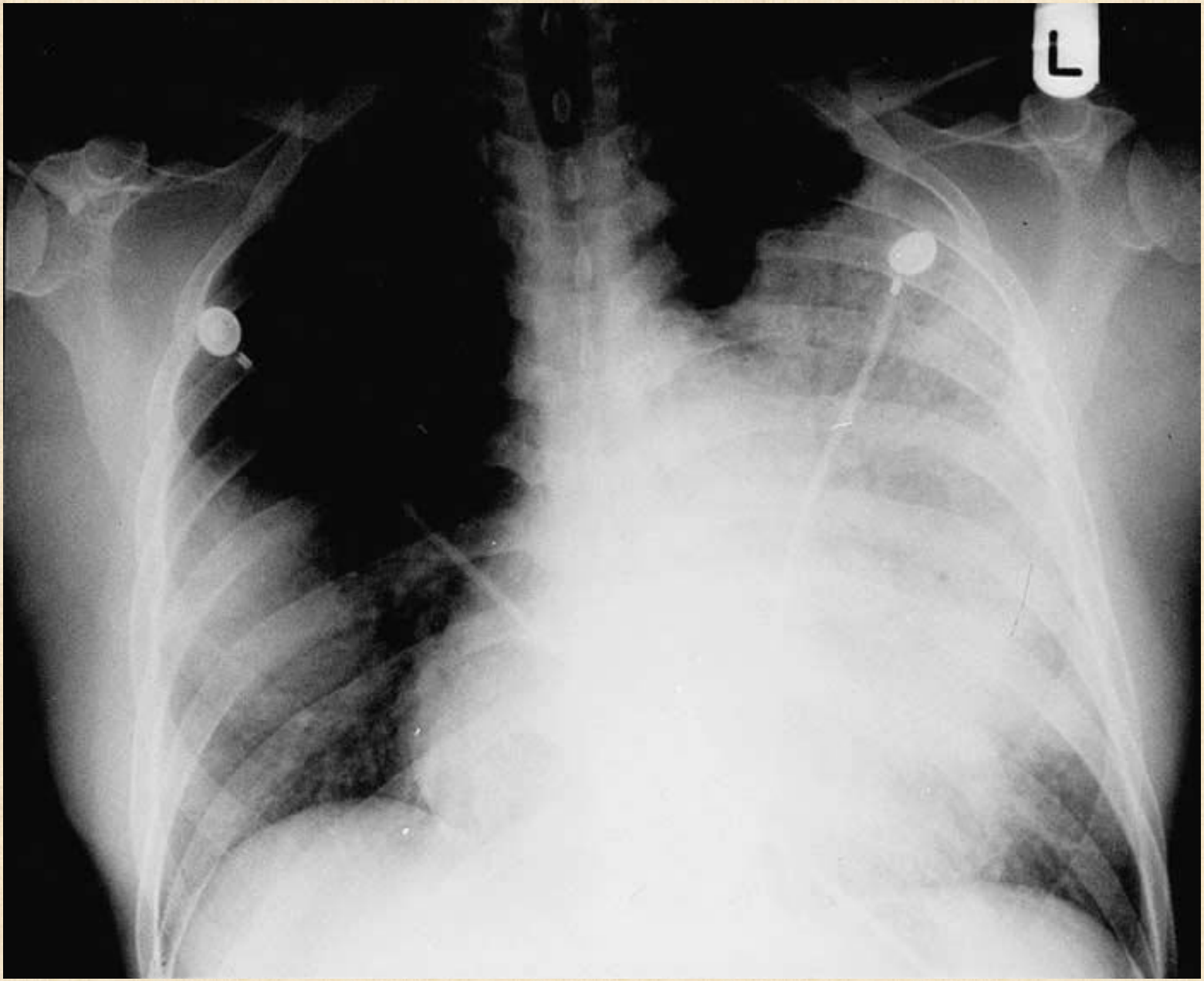
  Fine granular pattern which obscures the normal anatomic detail of the lung with preservation of BVM.



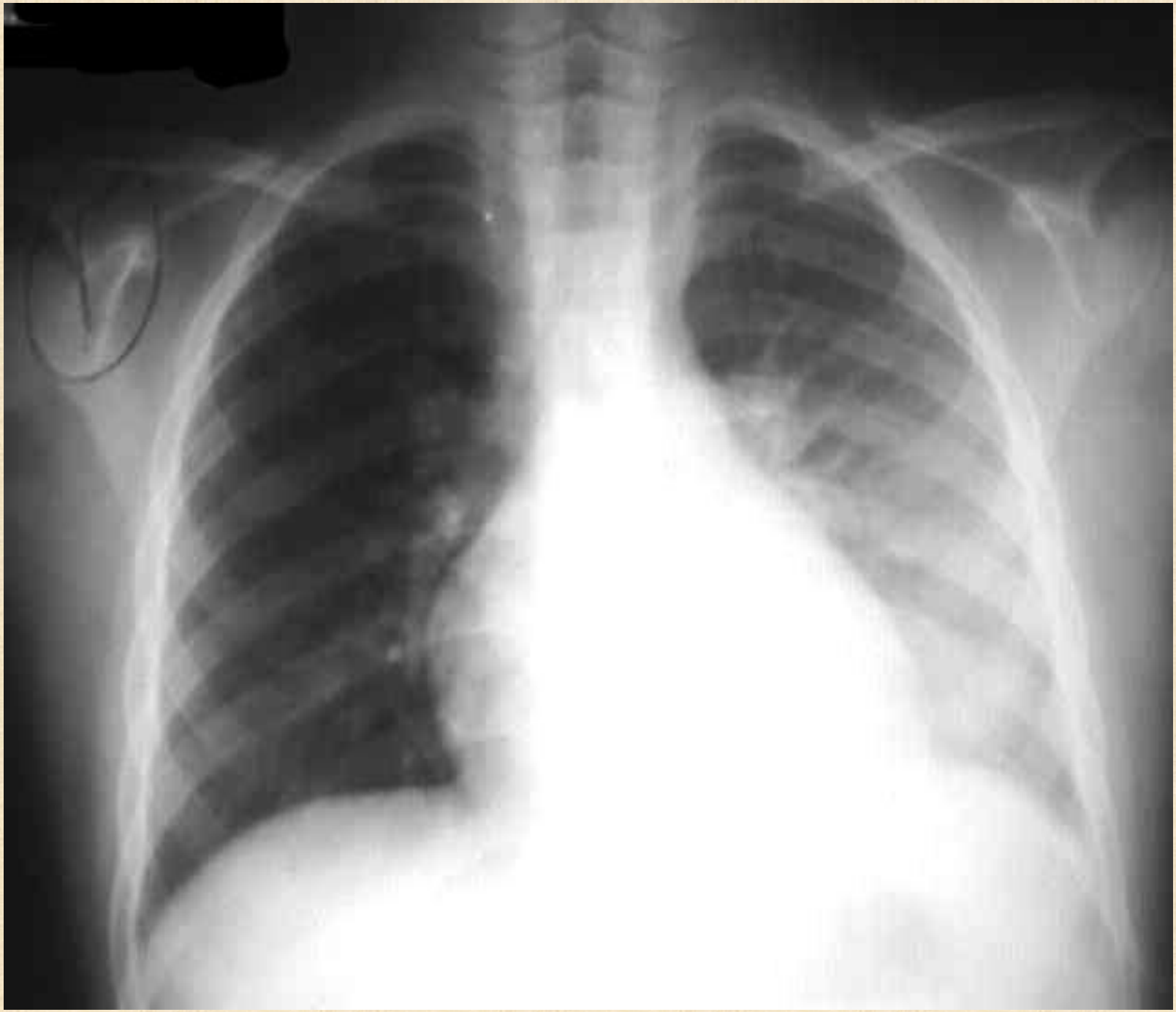
Air-Bronchogram Sign

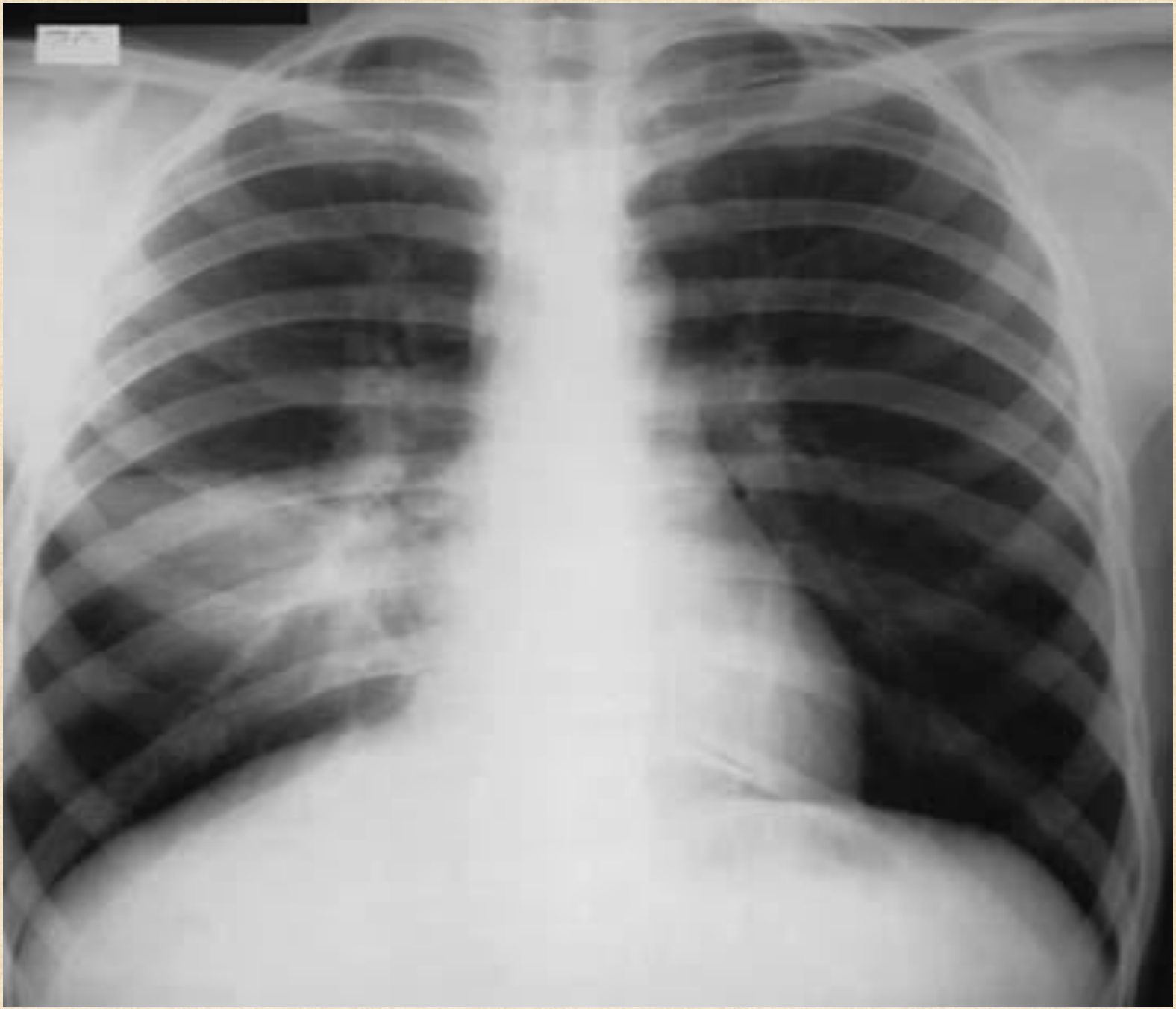




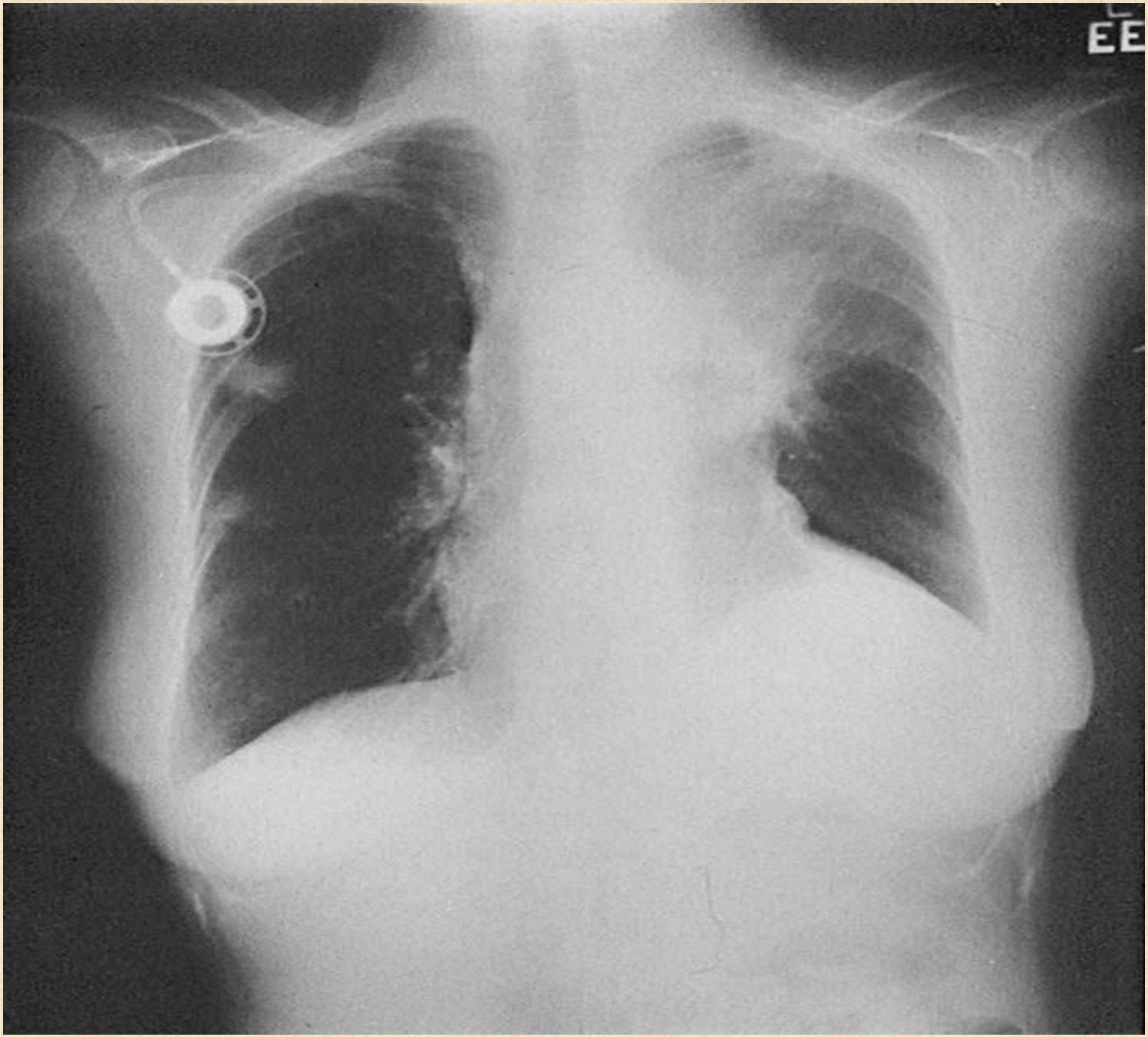


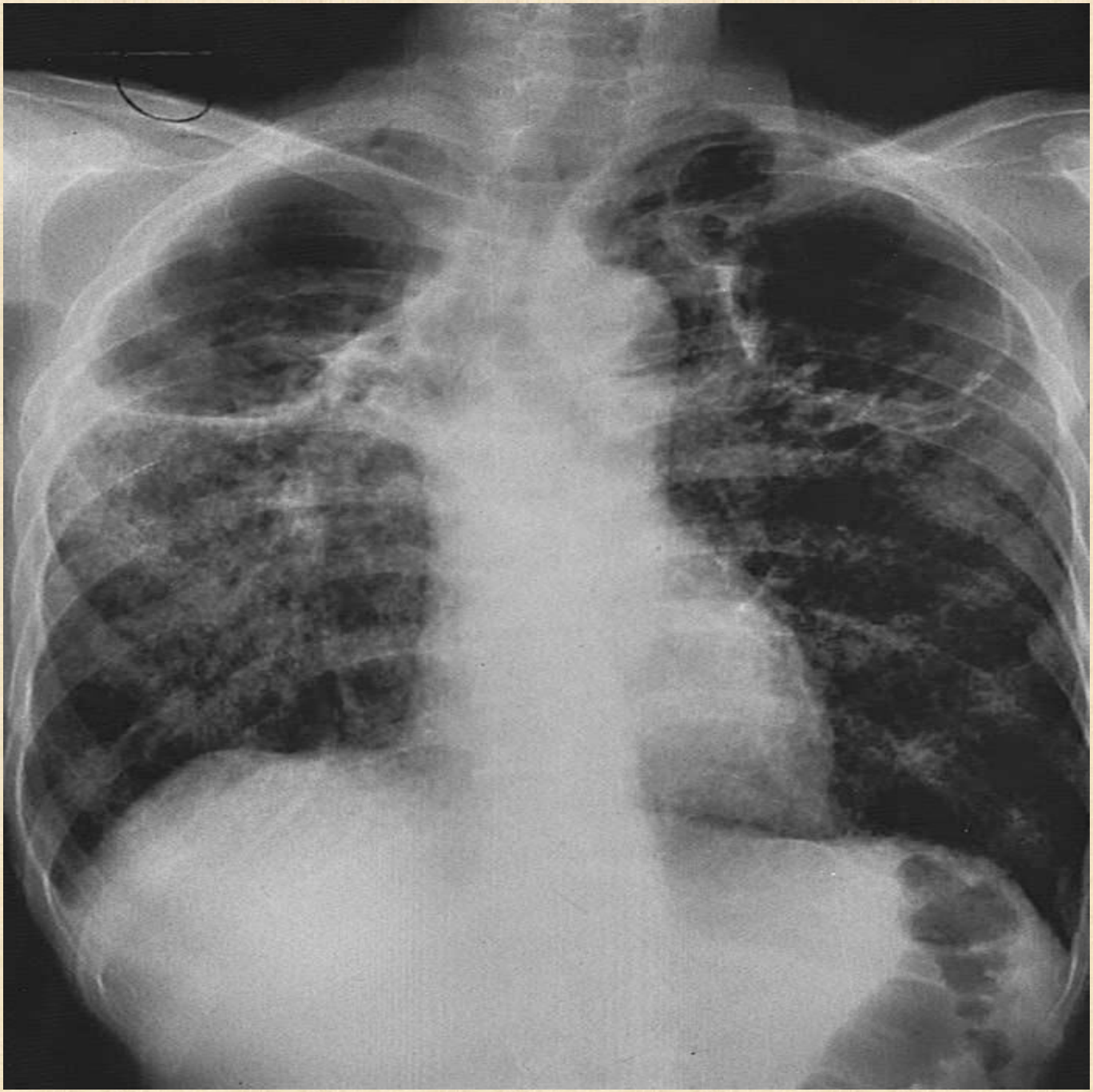
Severe pneumonia Multilobar involvement

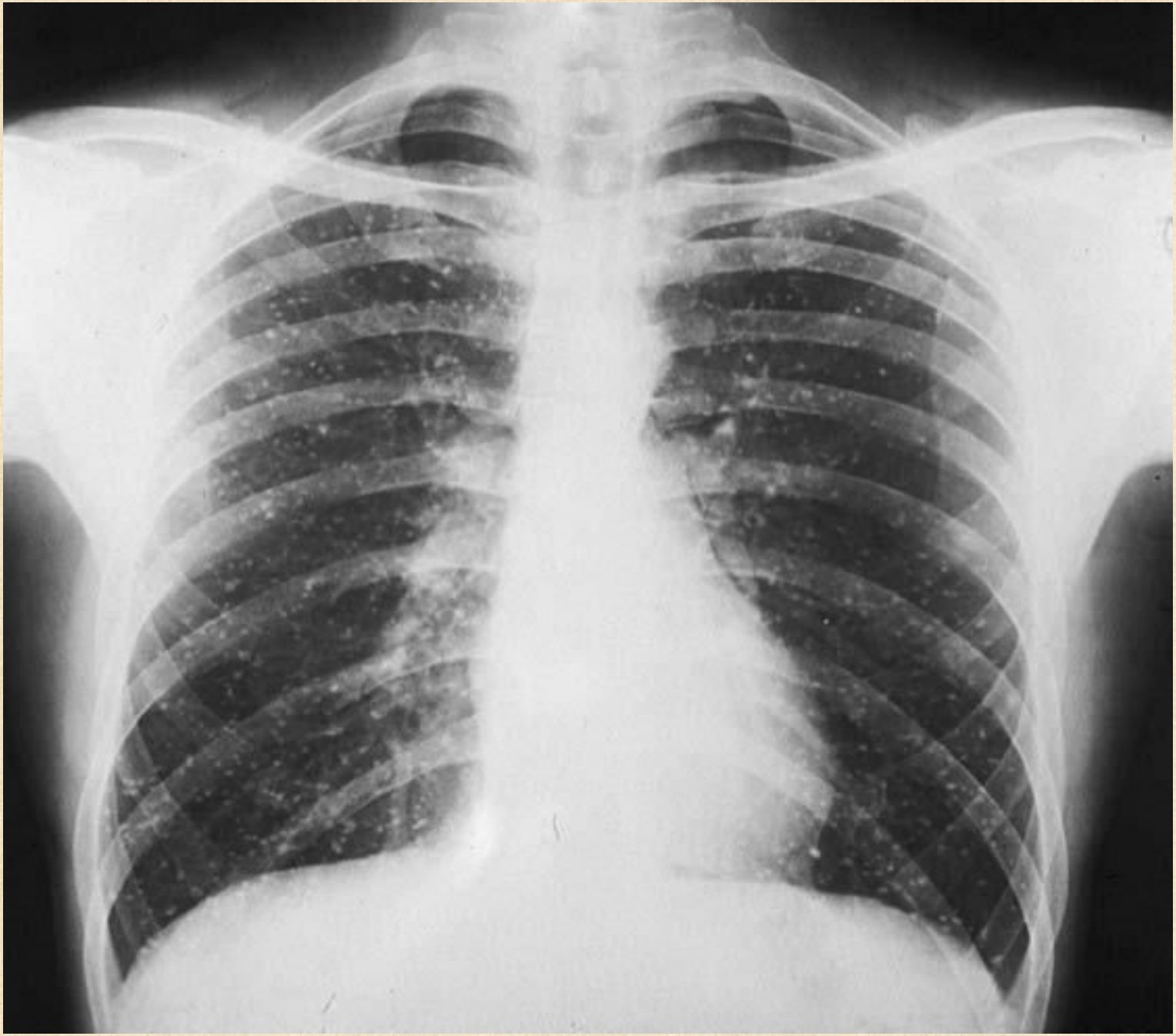


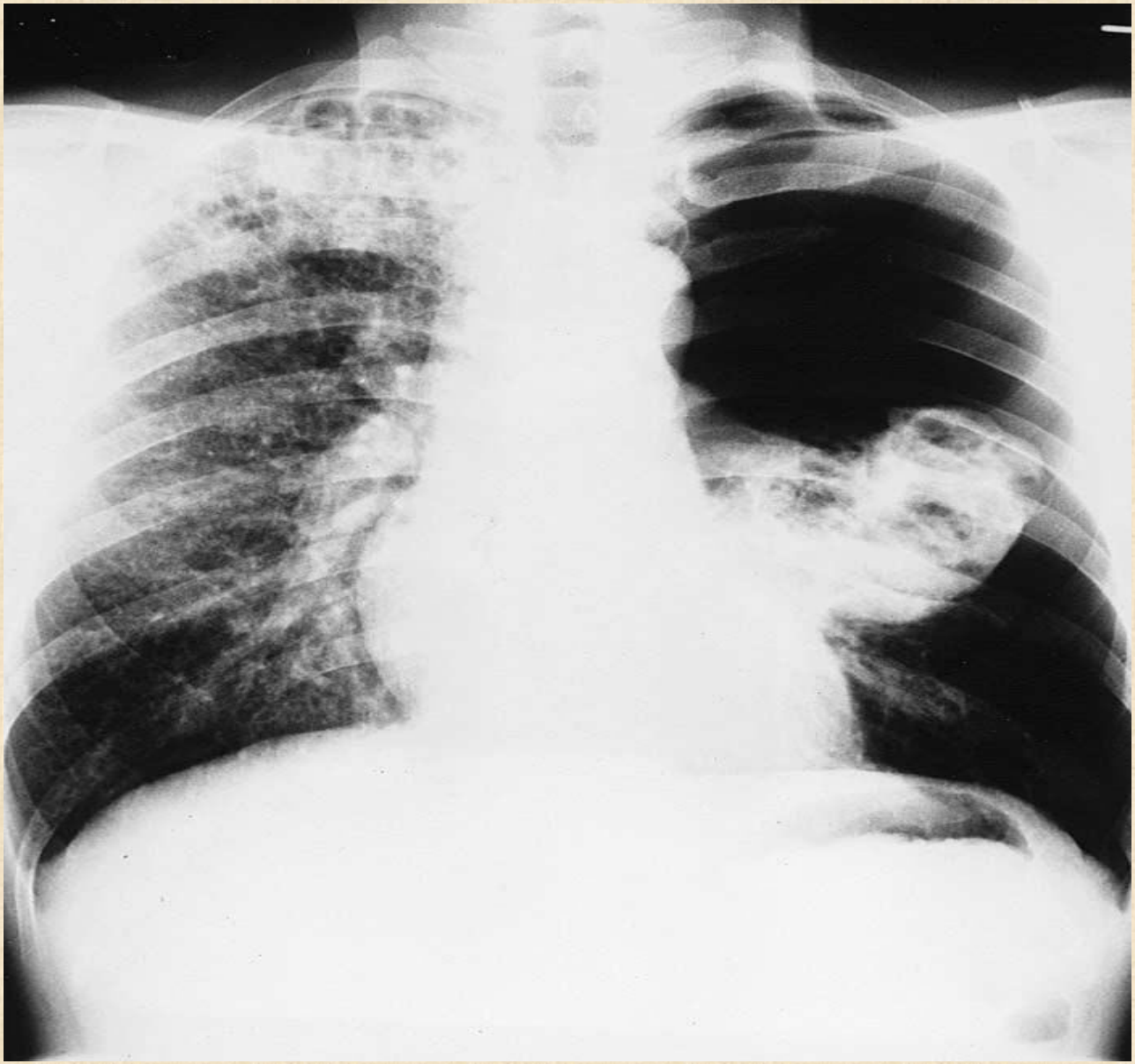



R

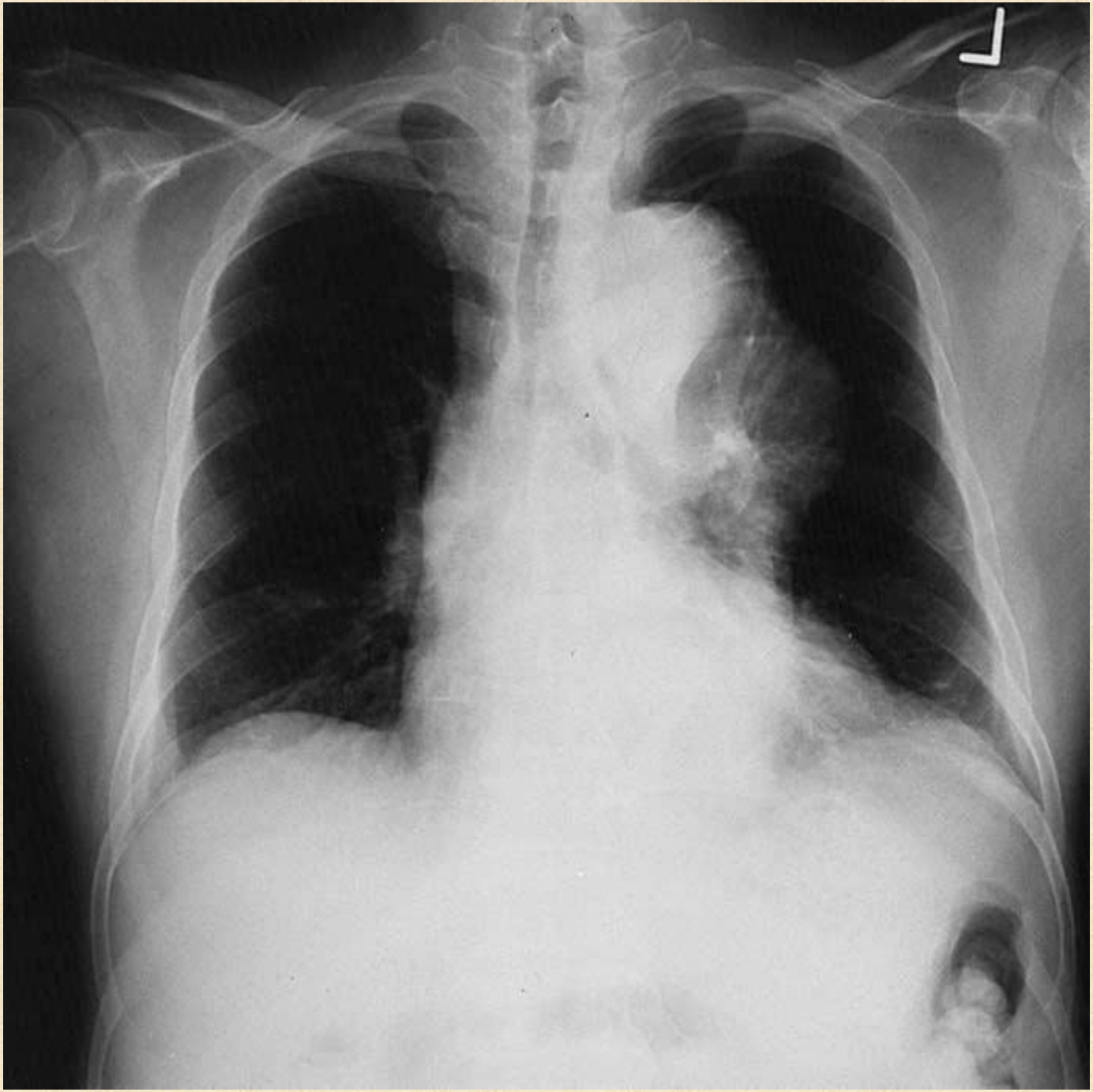

EE



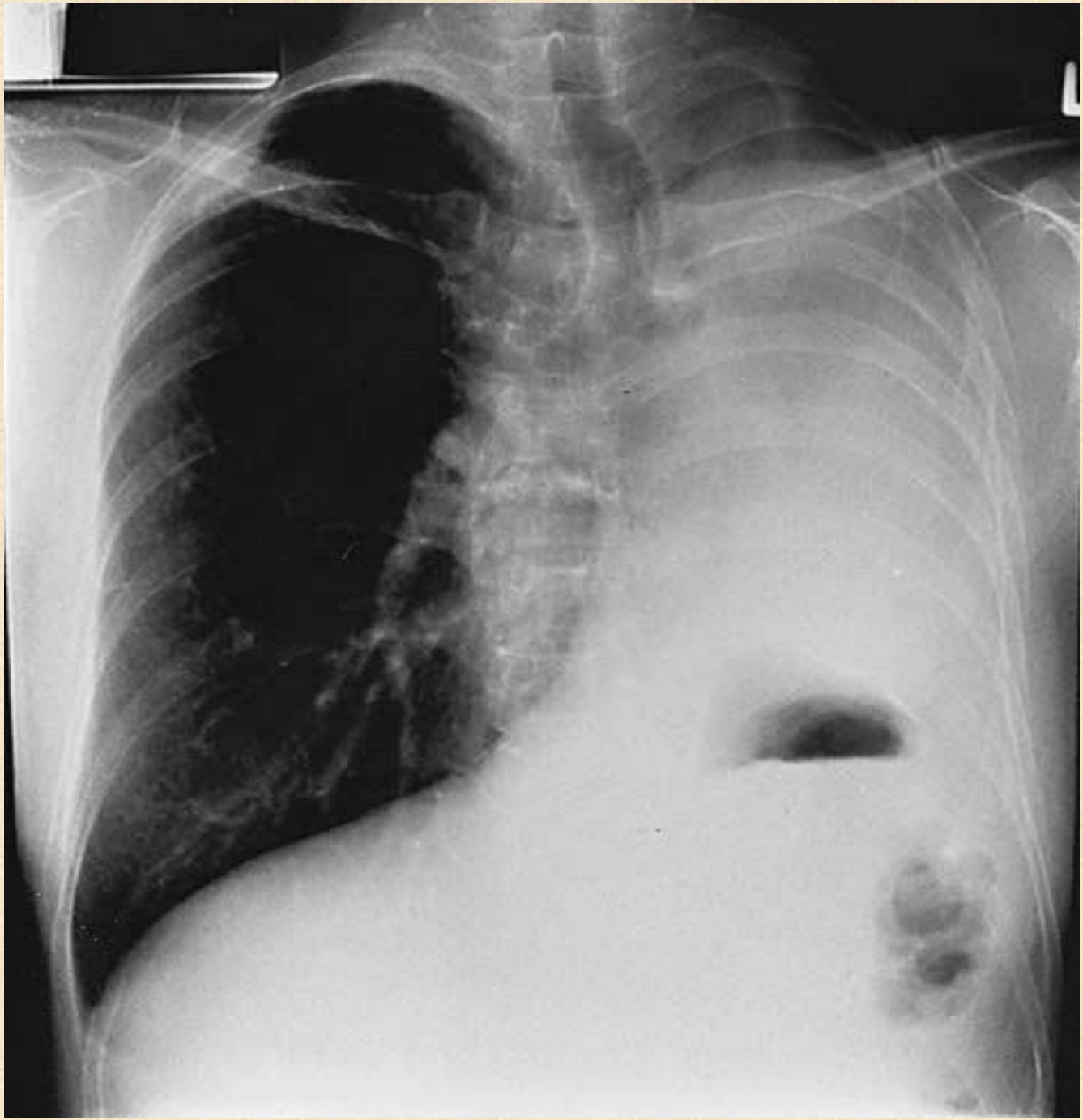




left pneumothorax right lung also shows cystic changes in the upper lobe



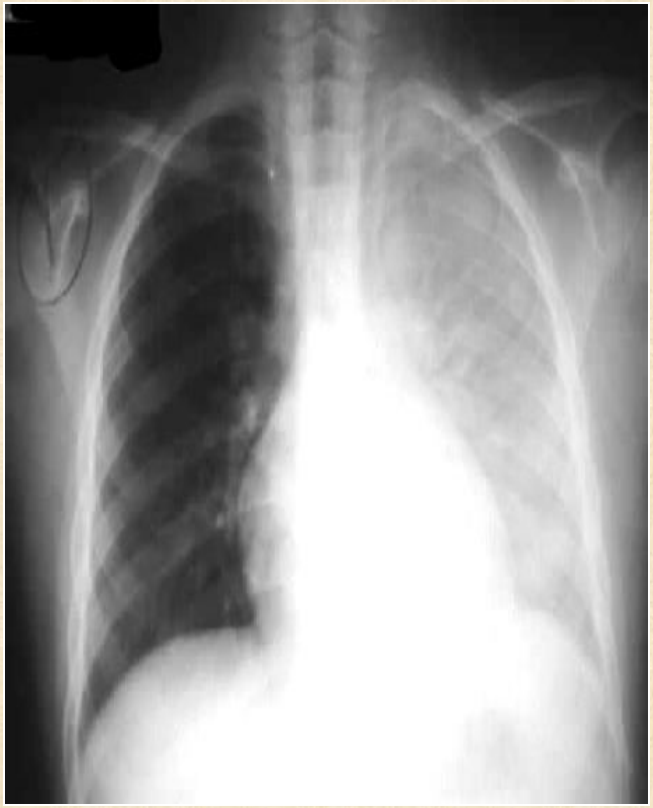
widening of superior mediastinum
well-defined mass inferior and contiguous with aorta arch.
Dissection of the arch of the aorta has to be excluded.



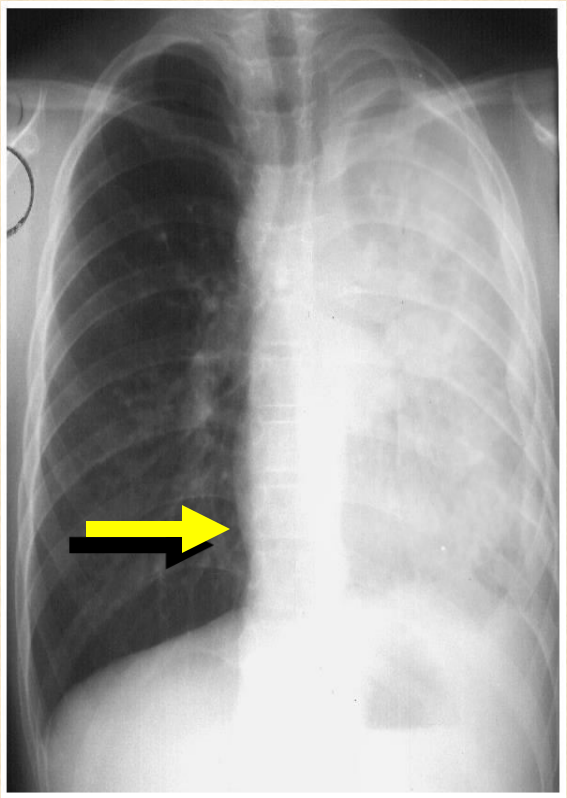
homogenous opacification of the left hemithorax.

DD:

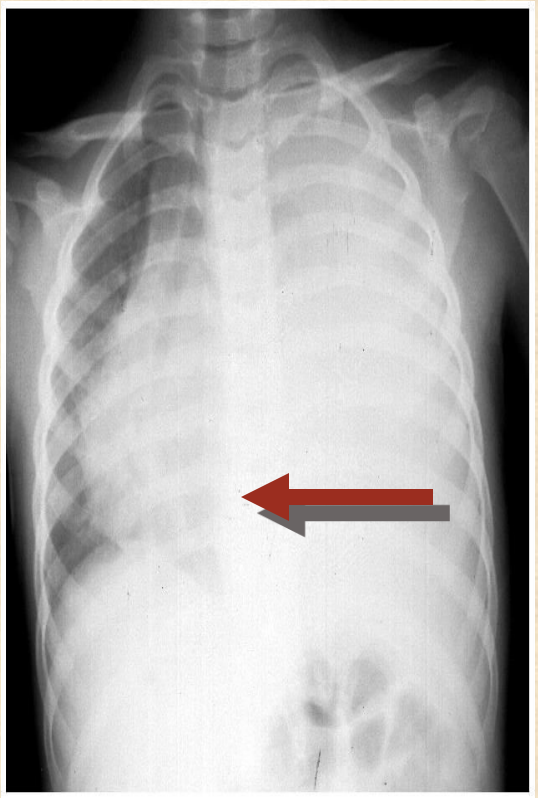
1. Collapse
2. Fibrosis
3. Pneumonectomy
3. Consolidation
4.Effusion
5.Mass



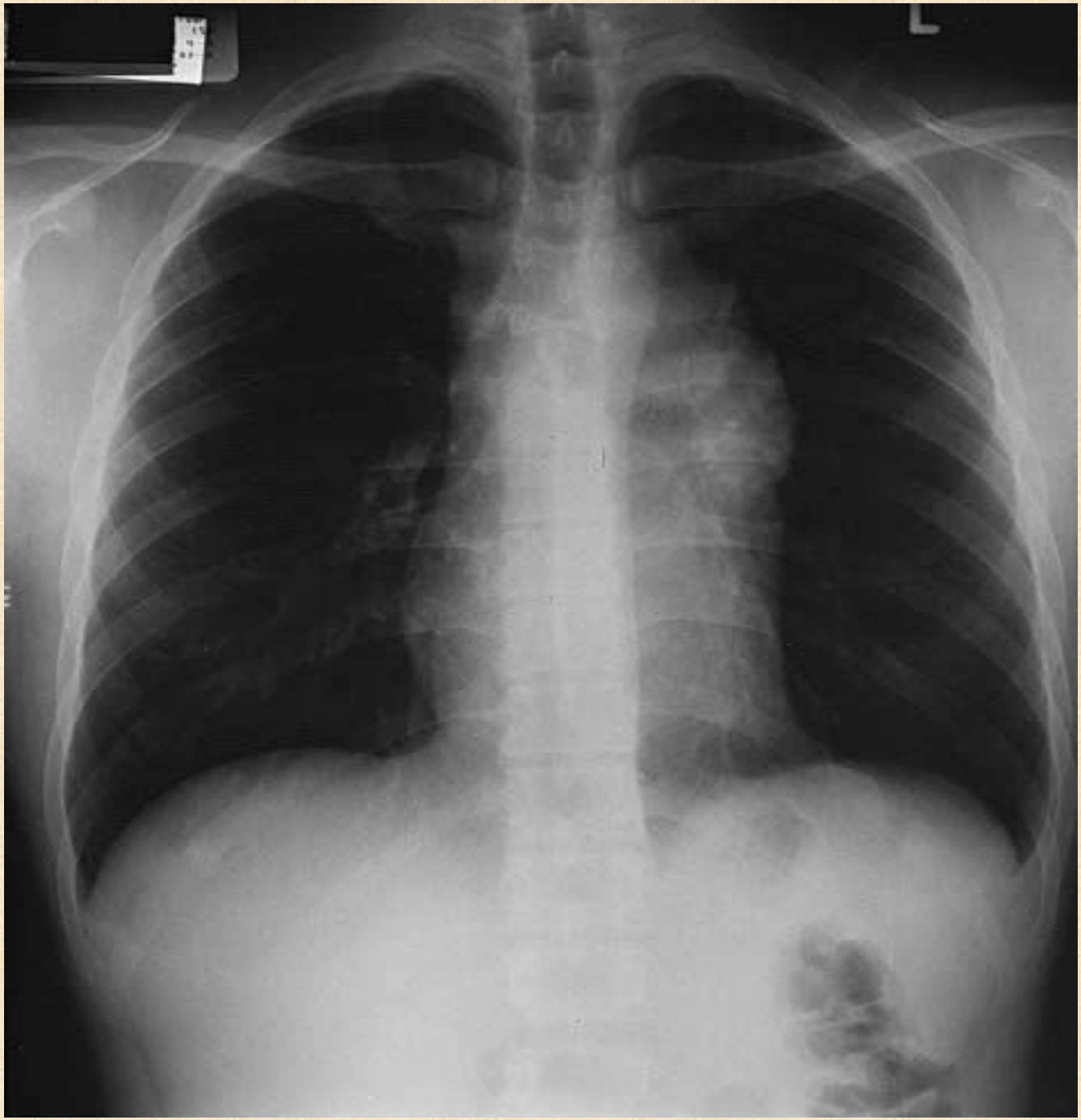
Consolidated Pneumonia



Massive Atelectasis



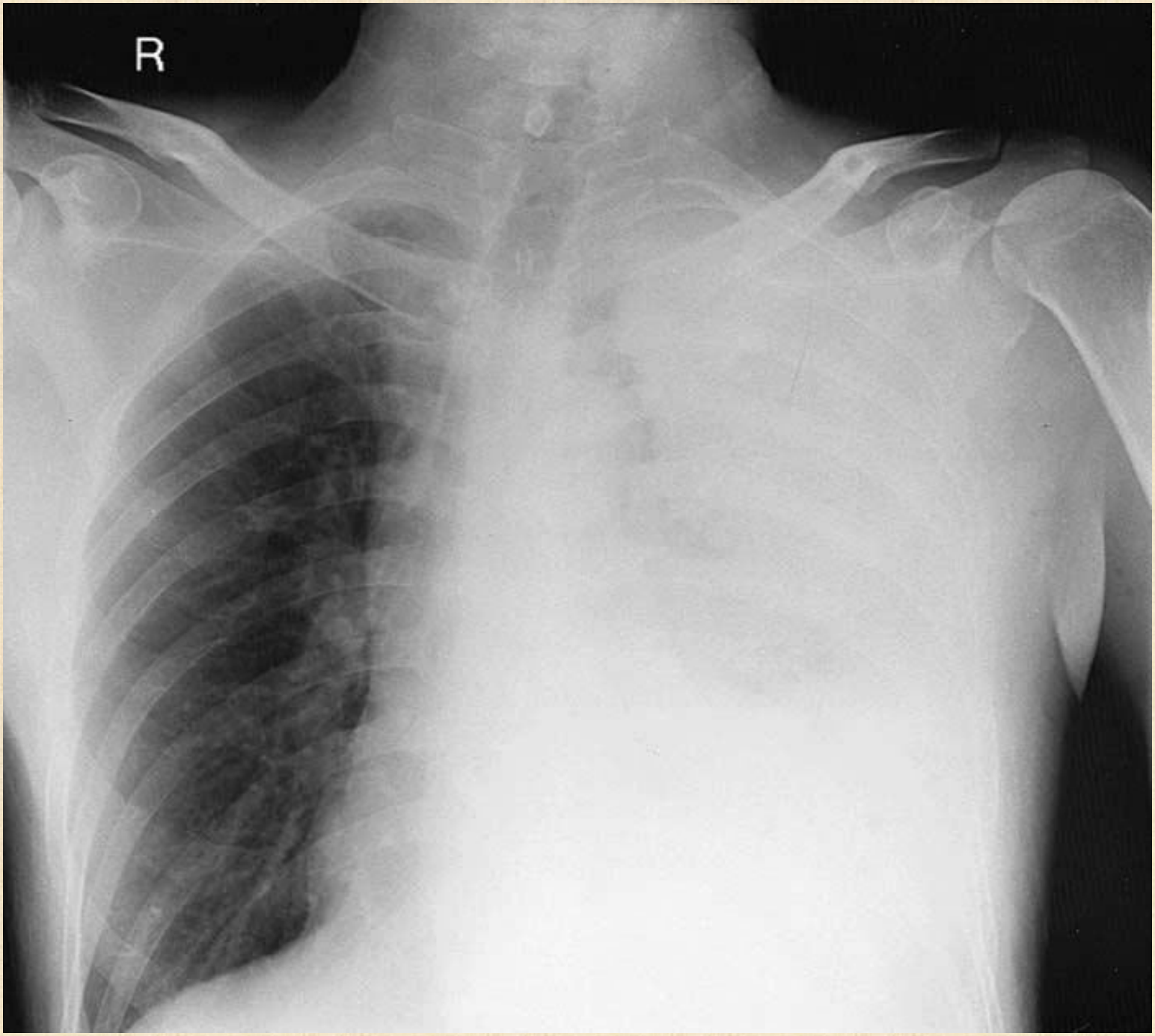
Massive Pleural Effusion

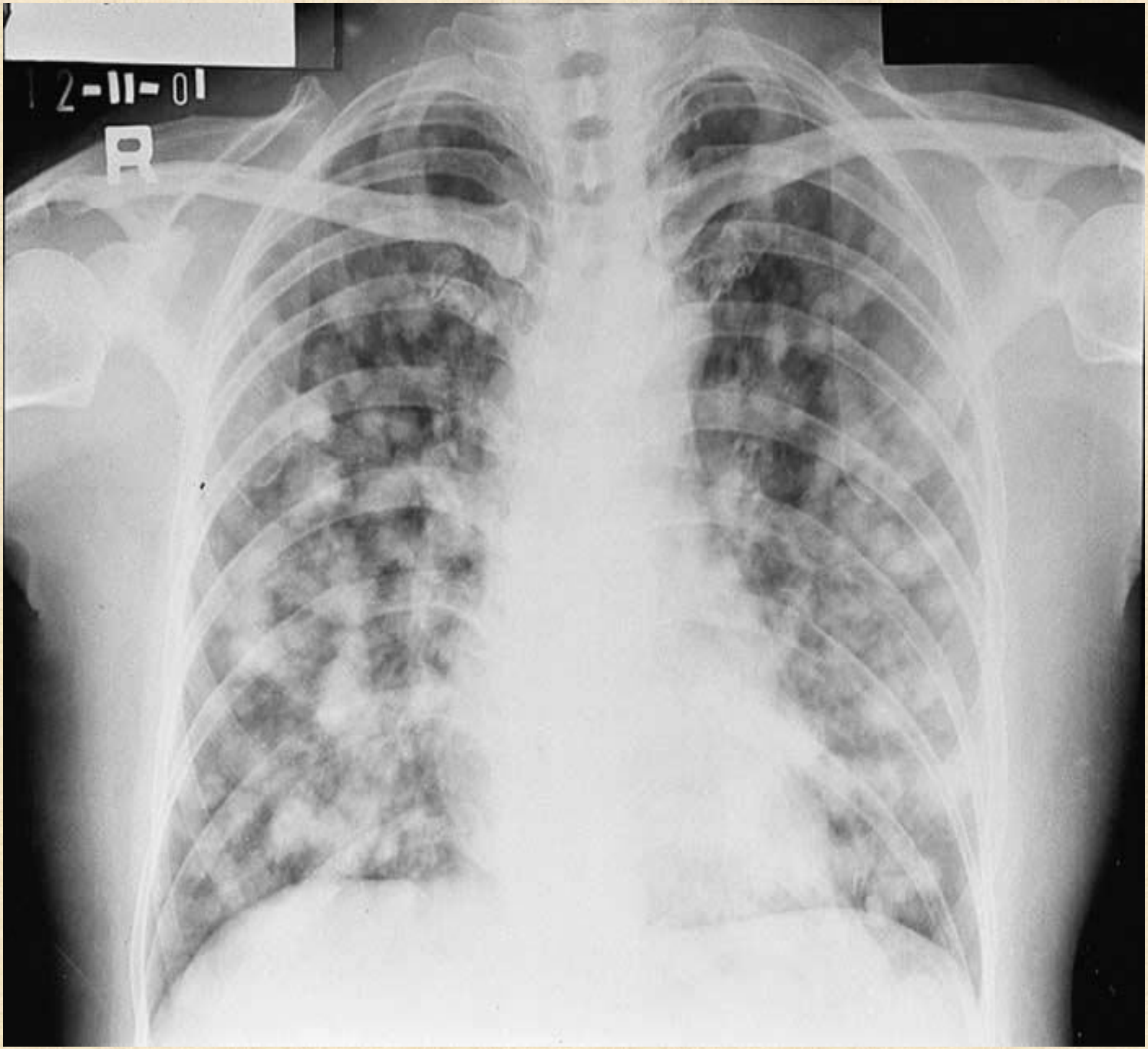


Homogenous opacity , rounded, well defined border, overlying the left hilum

DD:

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

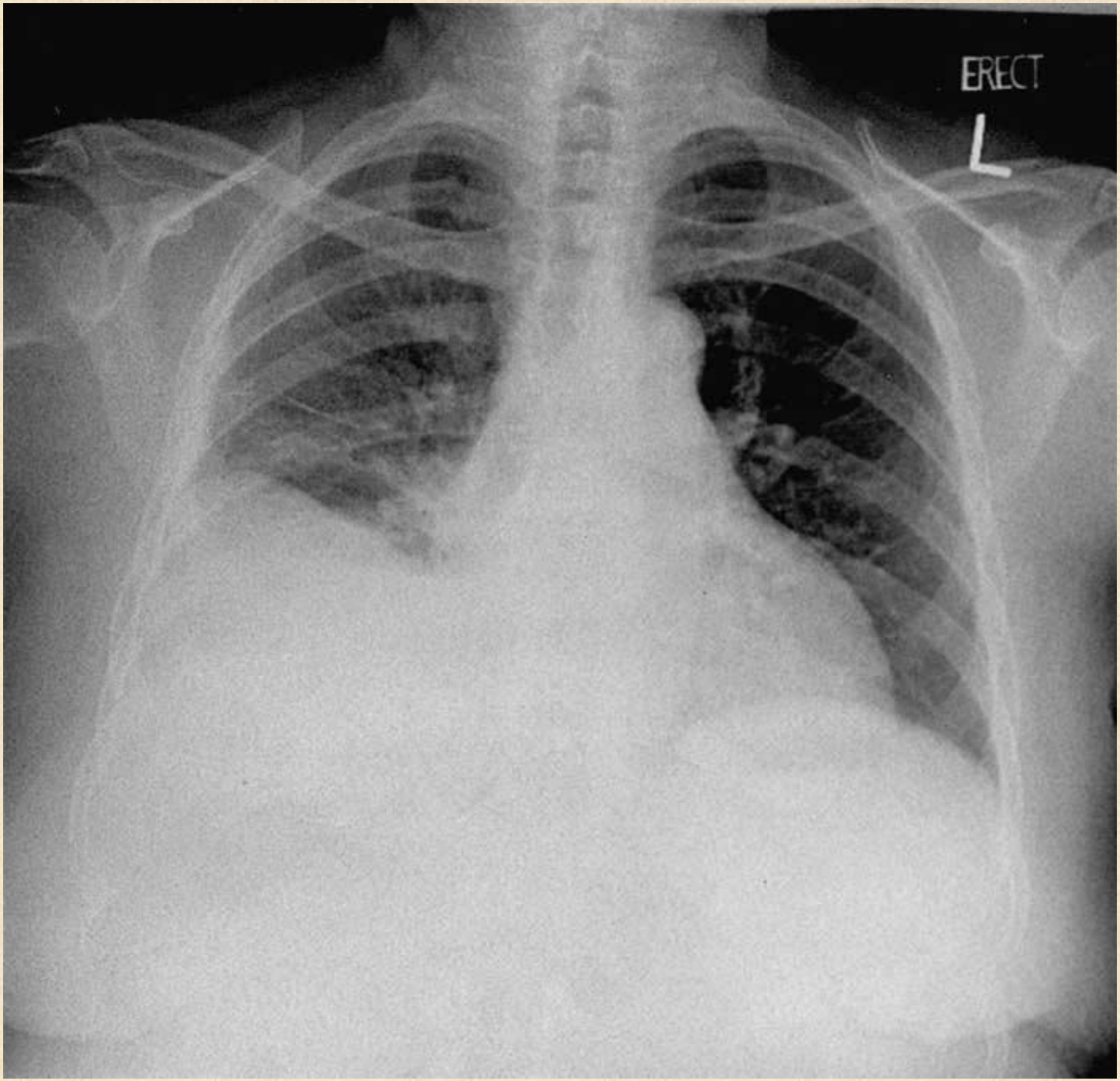

R



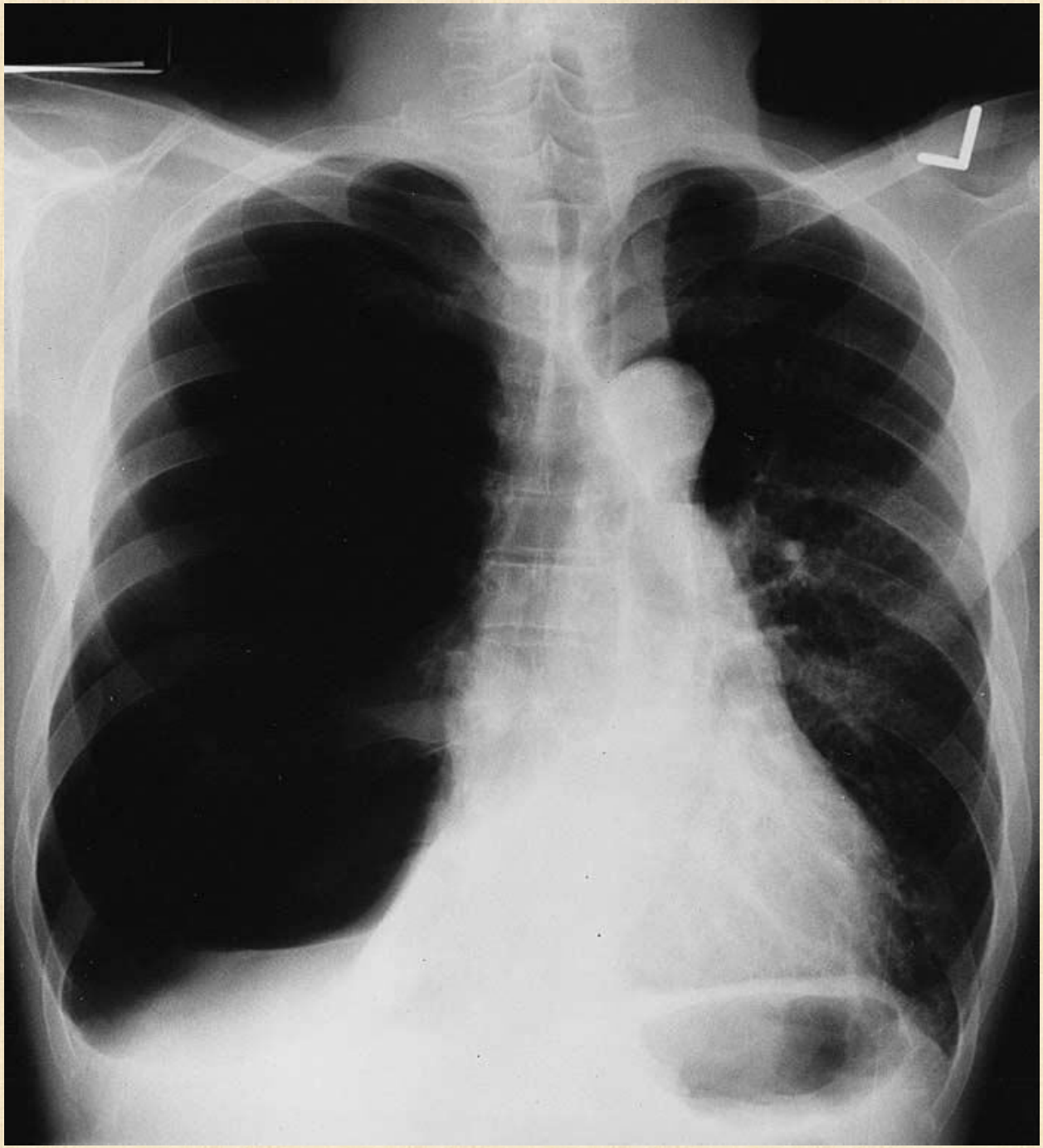
Bilateral lung nodules
DD

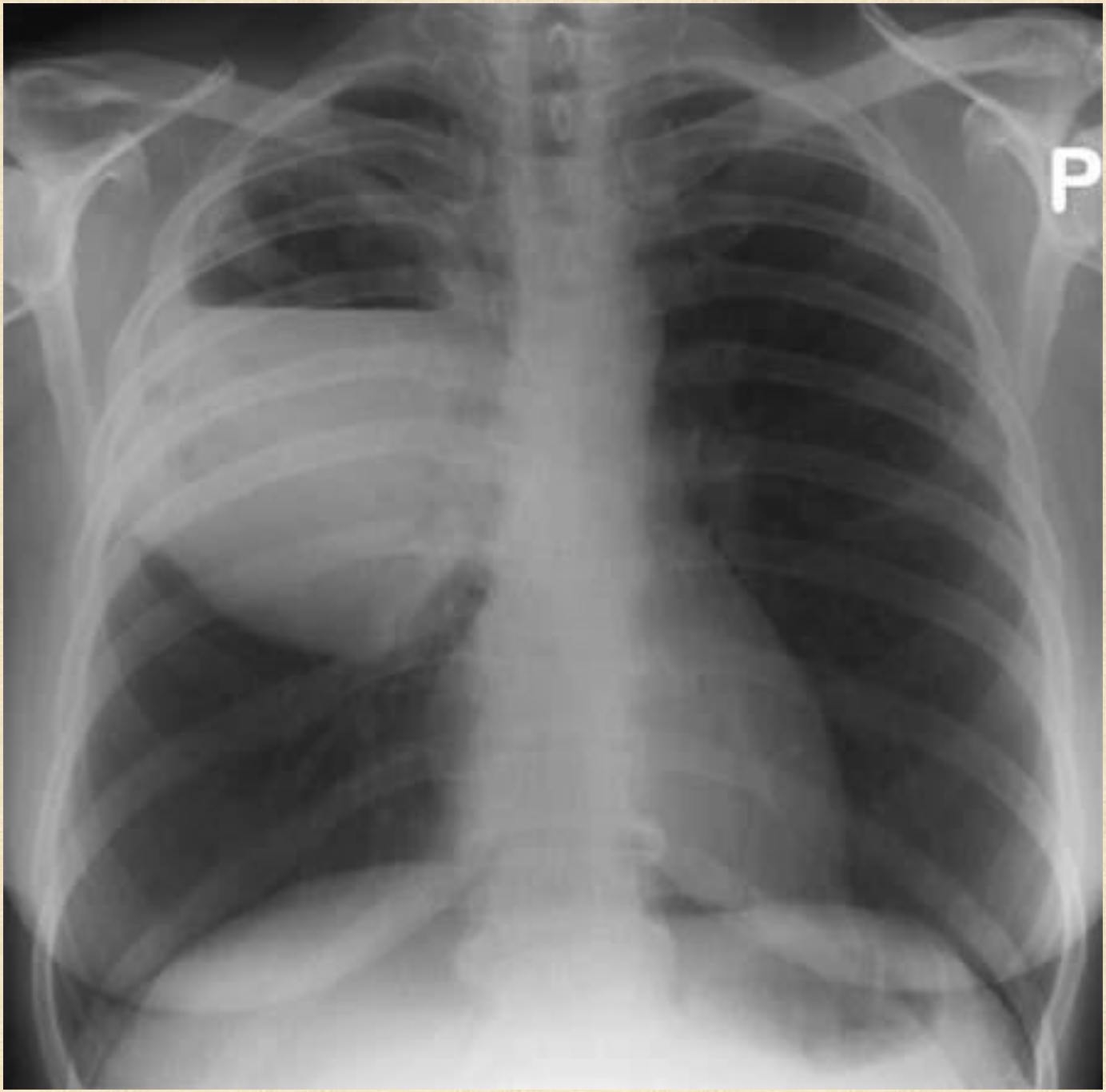
- **Metastases from cancers:**
  - **Breast**
  - **Colon**
  - **Rectum**
  - **Kidney.**

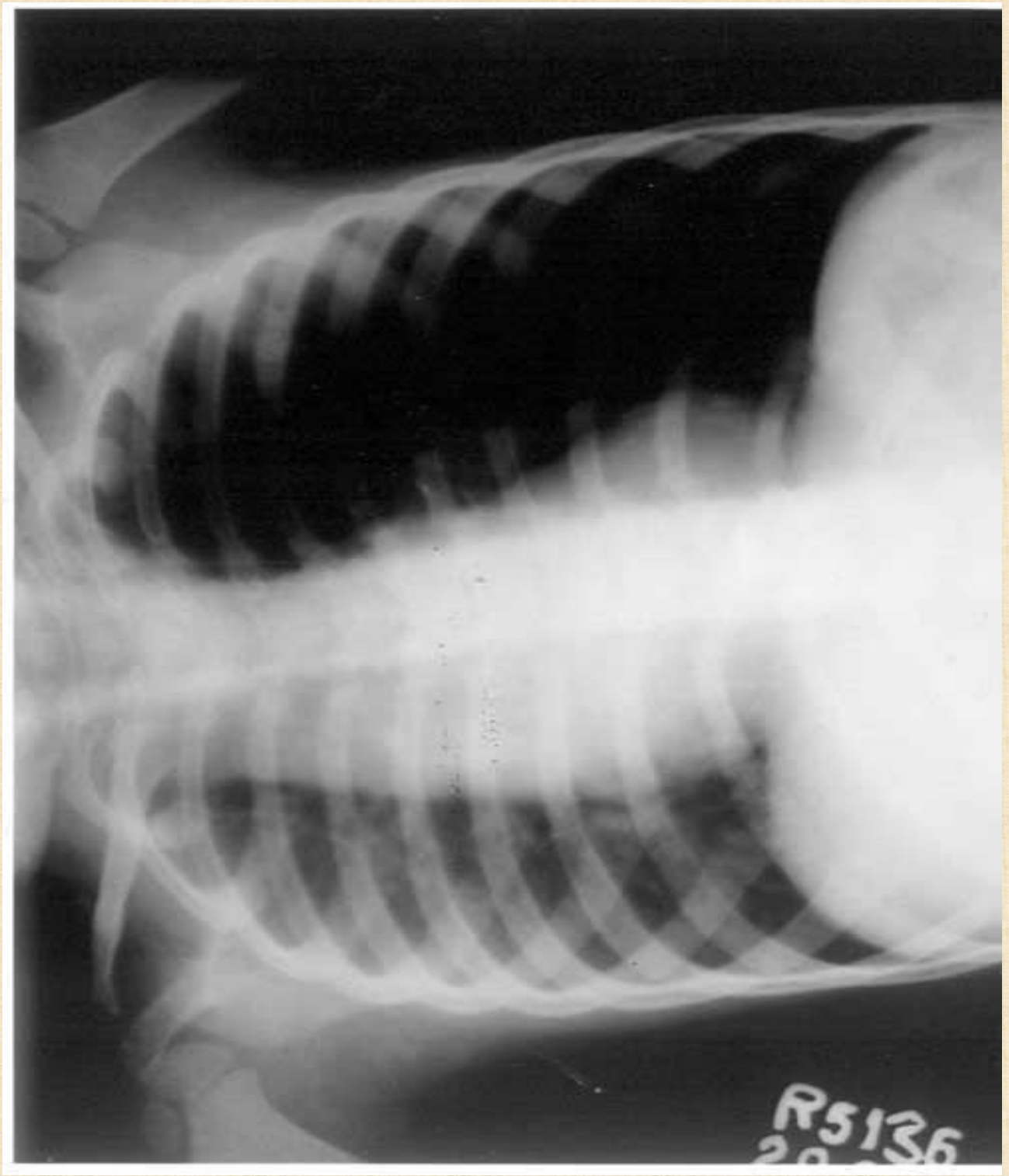
- **Bronchopneumonia**
- **TB**
- **Rheumatoid**

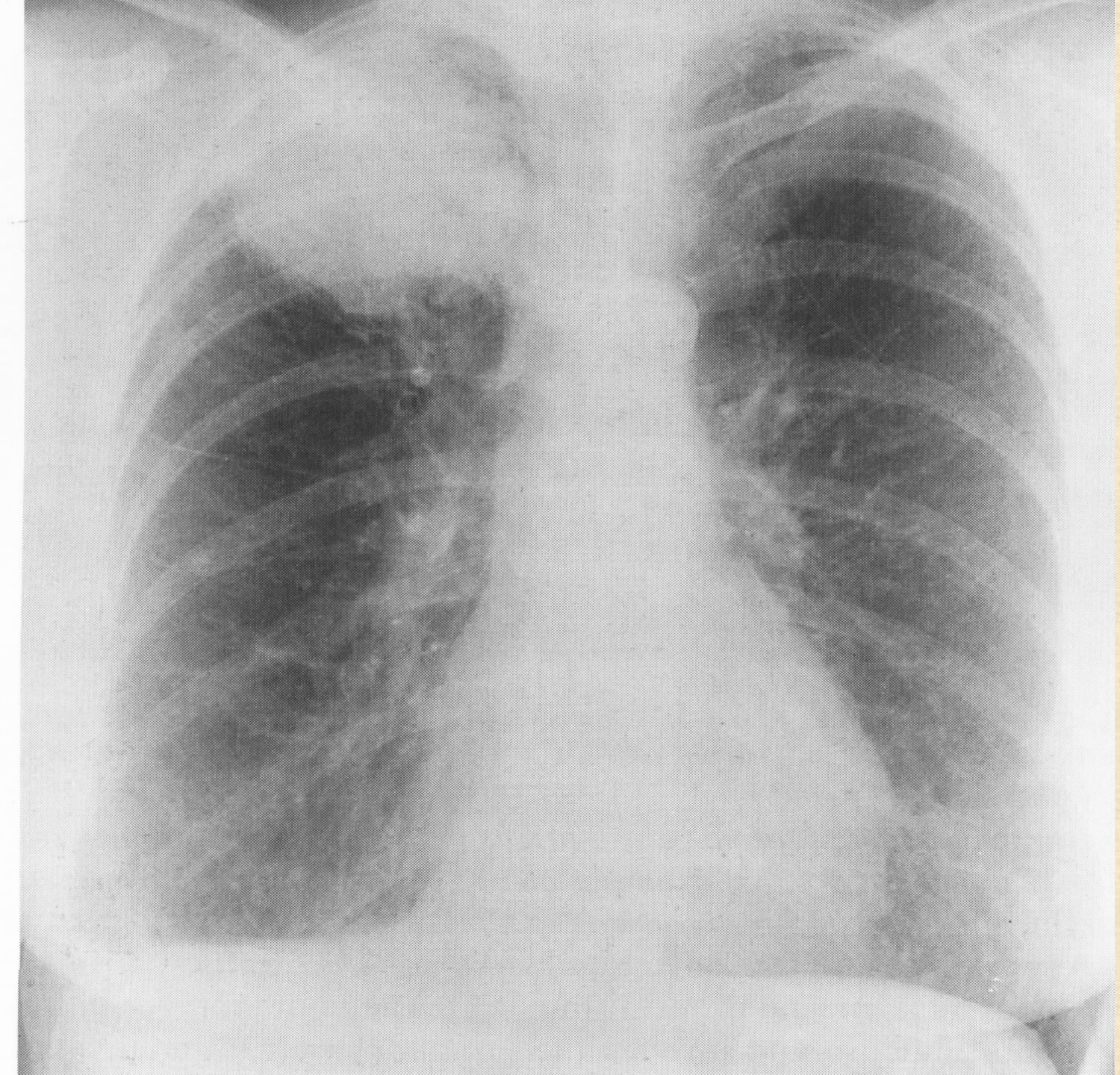


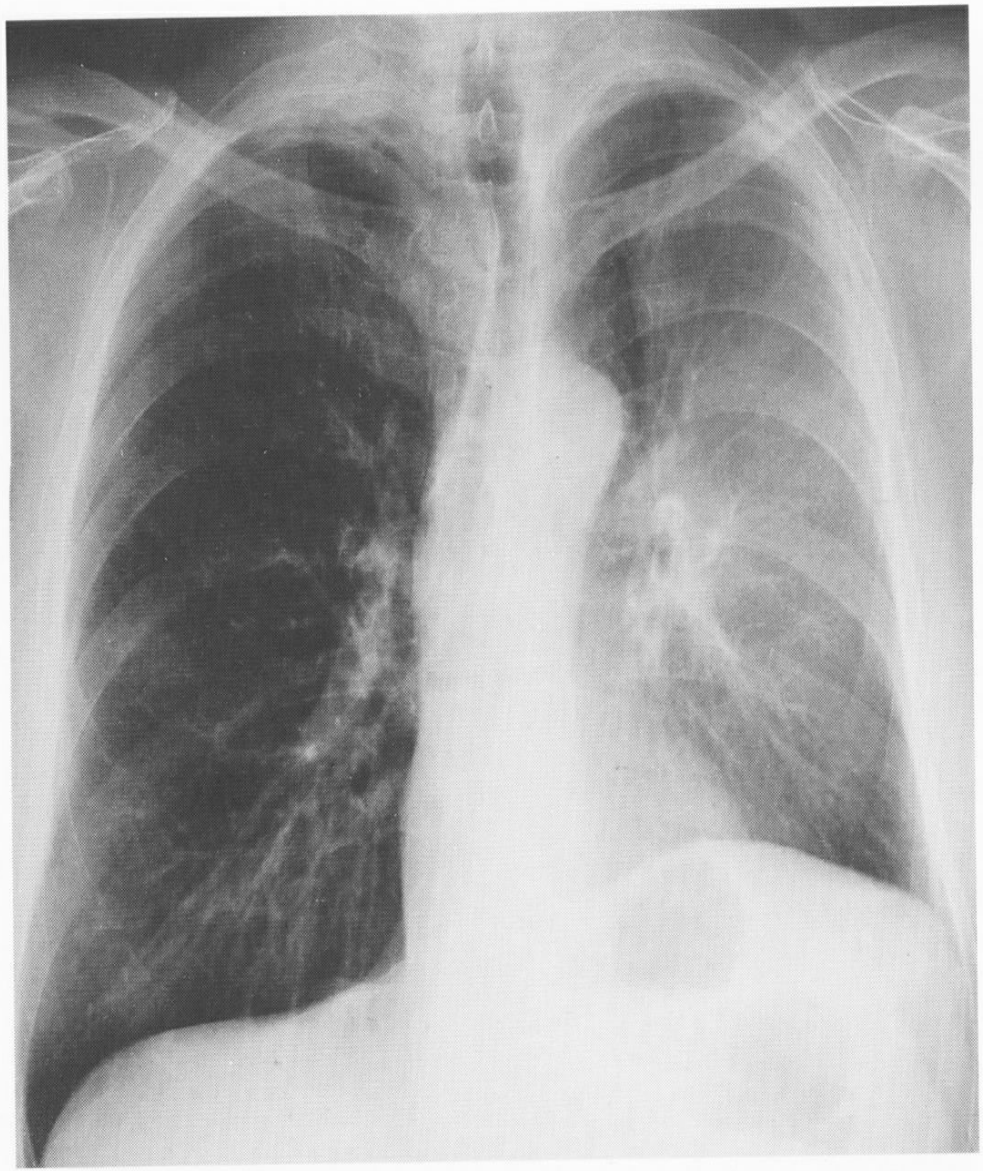
This patient gave history of liver cirrhosis and ascites. Pleural effusion.




P


R5136

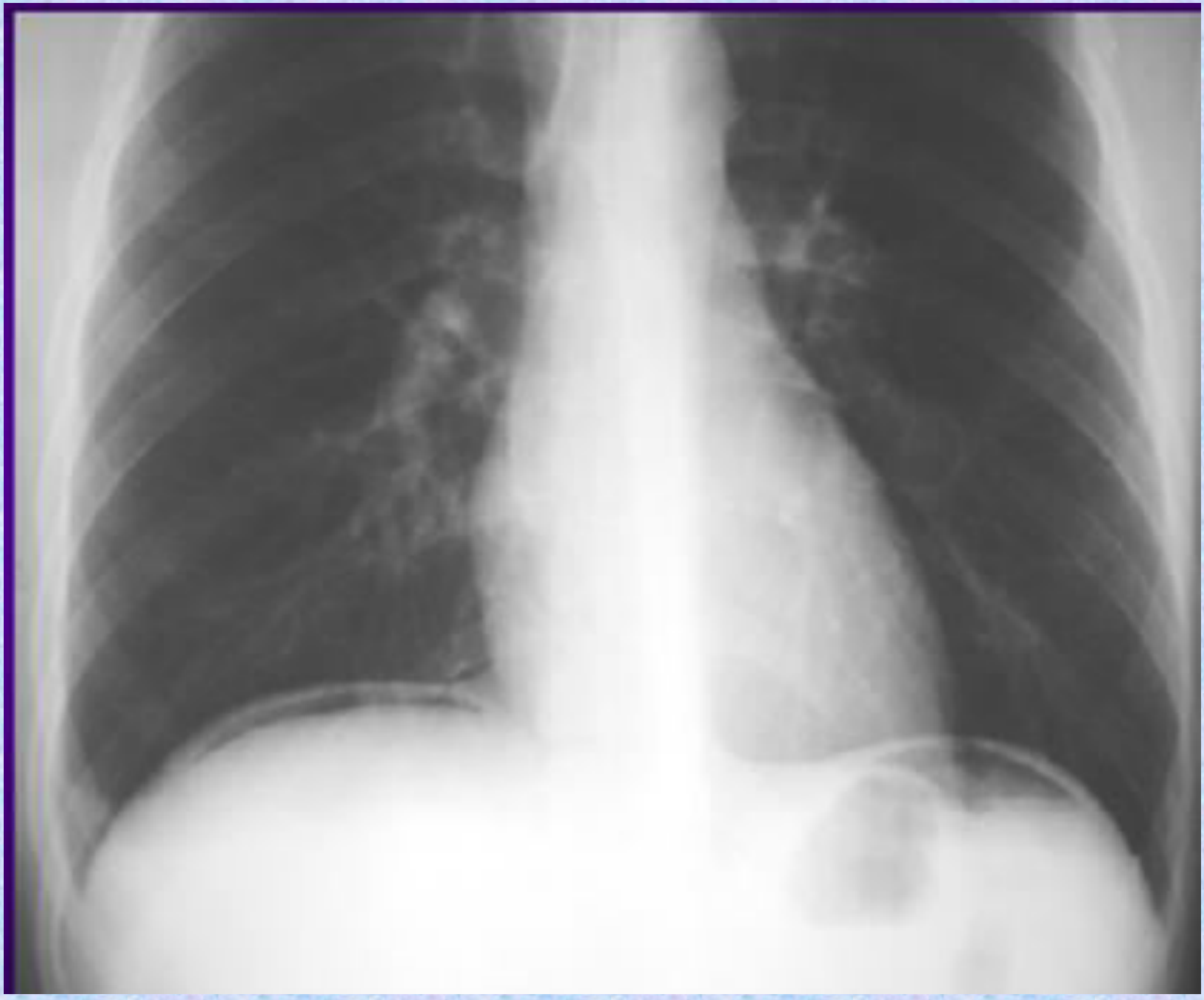


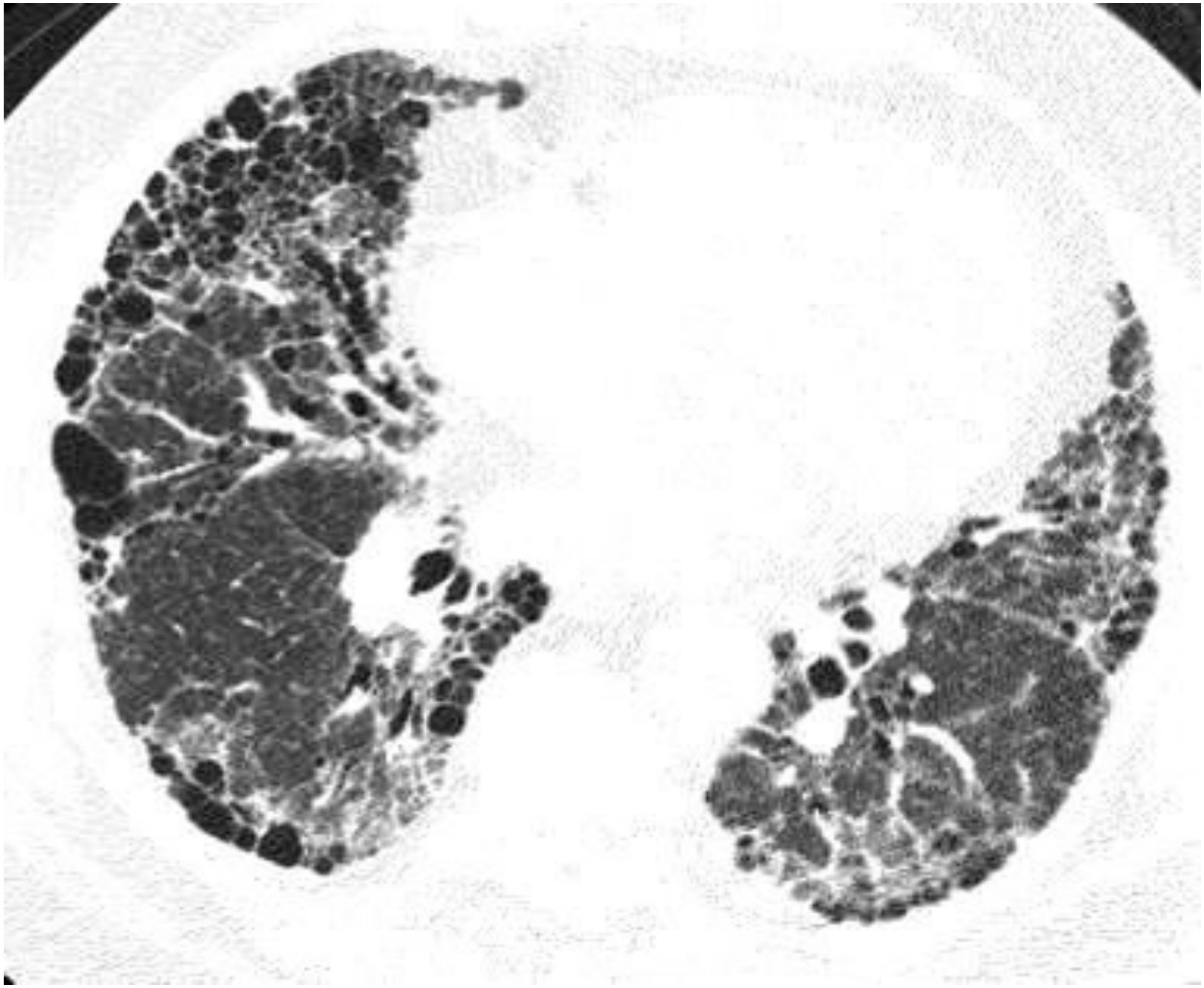


D

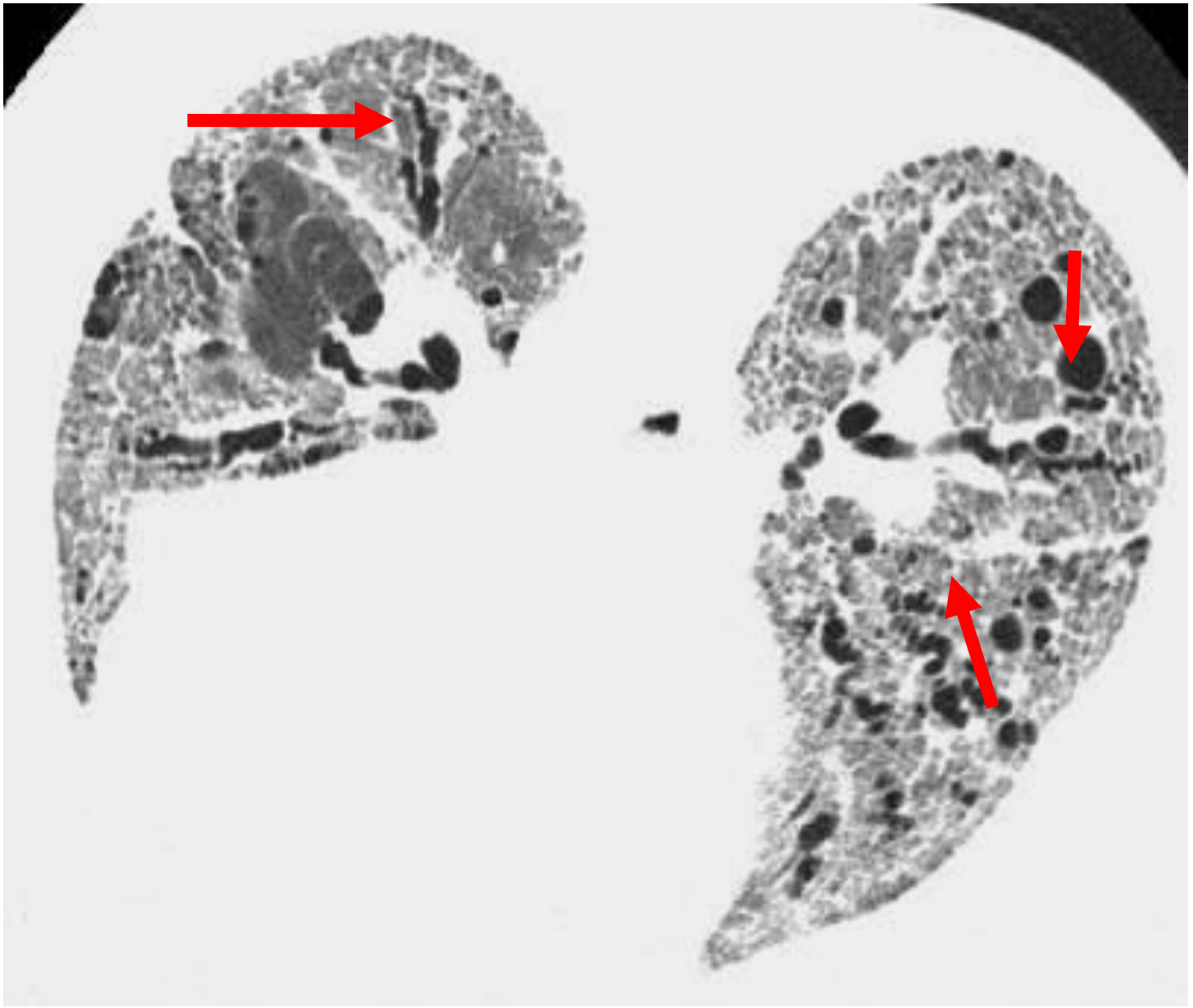
E

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 el
phrenic nerve involvement.

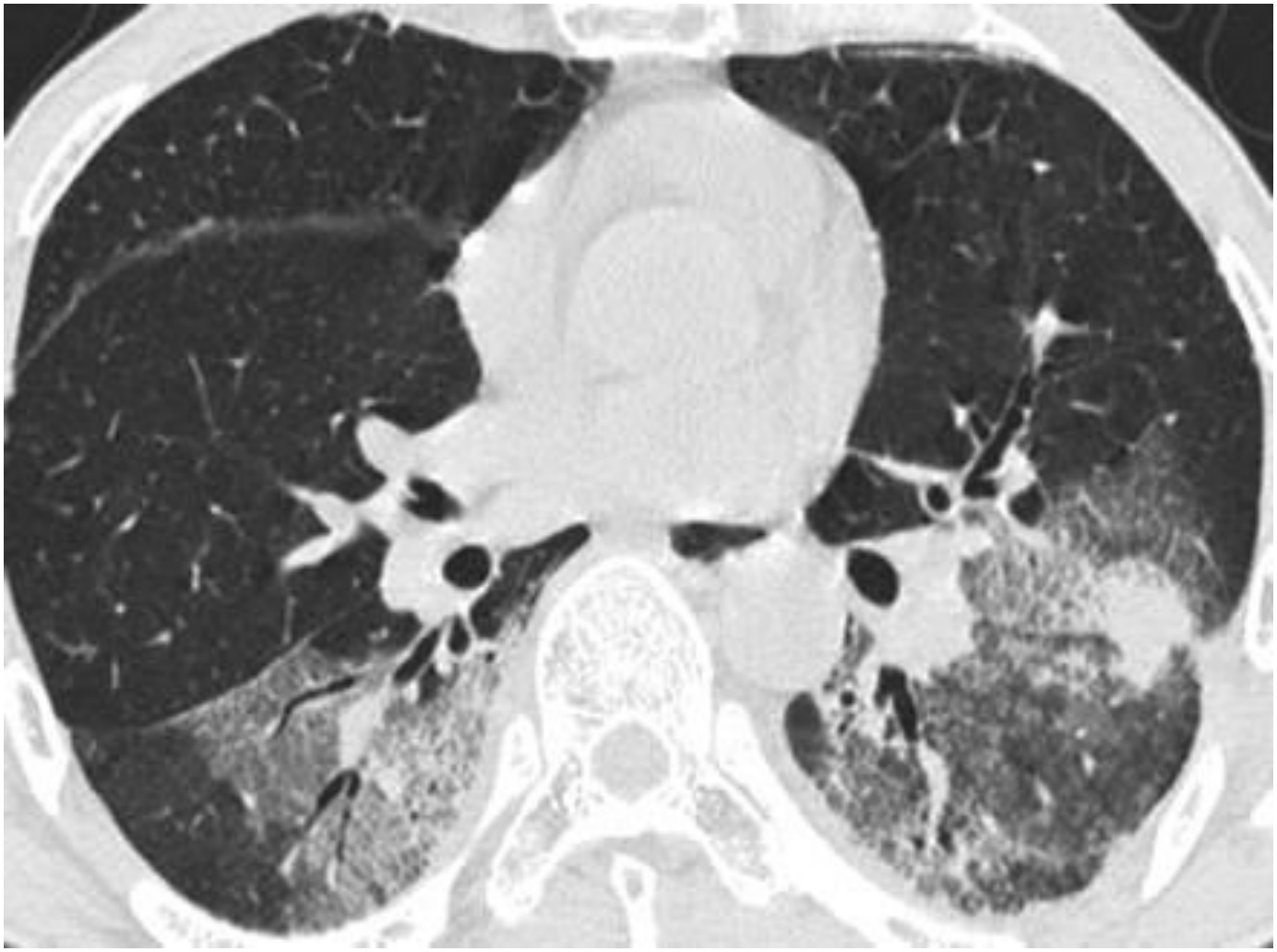




UIP: Traction Bronchiectasis

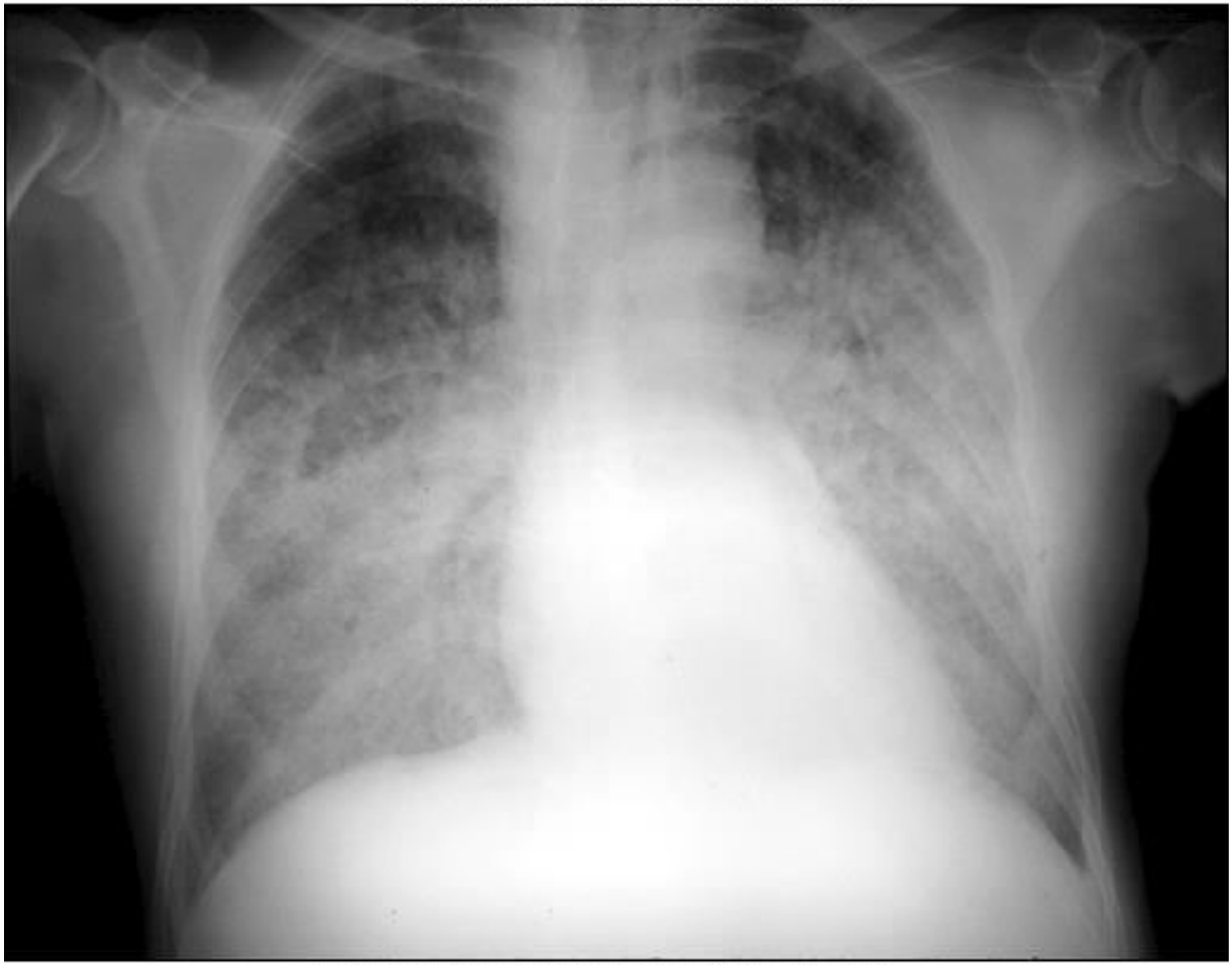


Chest radiograph shows airspace consolidation confined mainly to the peripheral lung (photographic negative shadow of pulmonary edema).

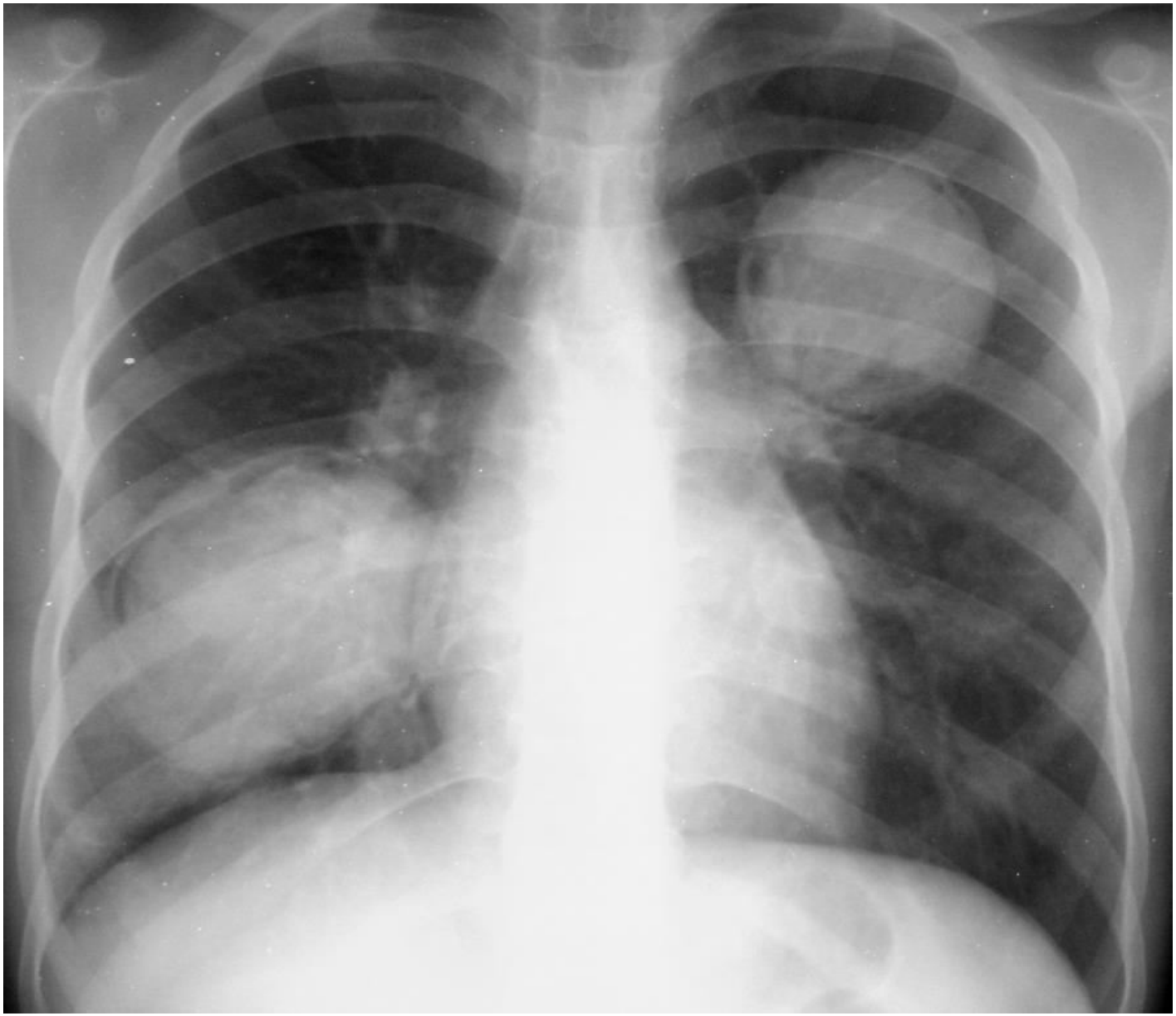


CT scan (lung windowing) shows ground-glass opacities with intralobular interstitial thickening in both lower lobes.

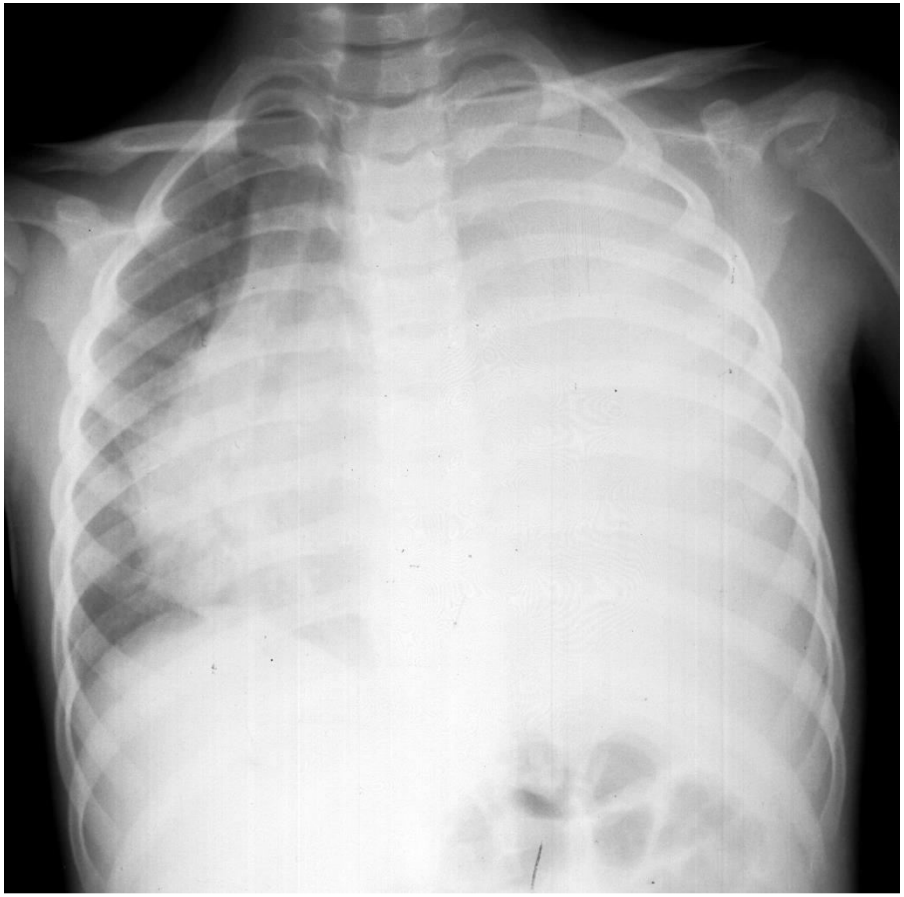
Bilateral Interstitial Infiltrate

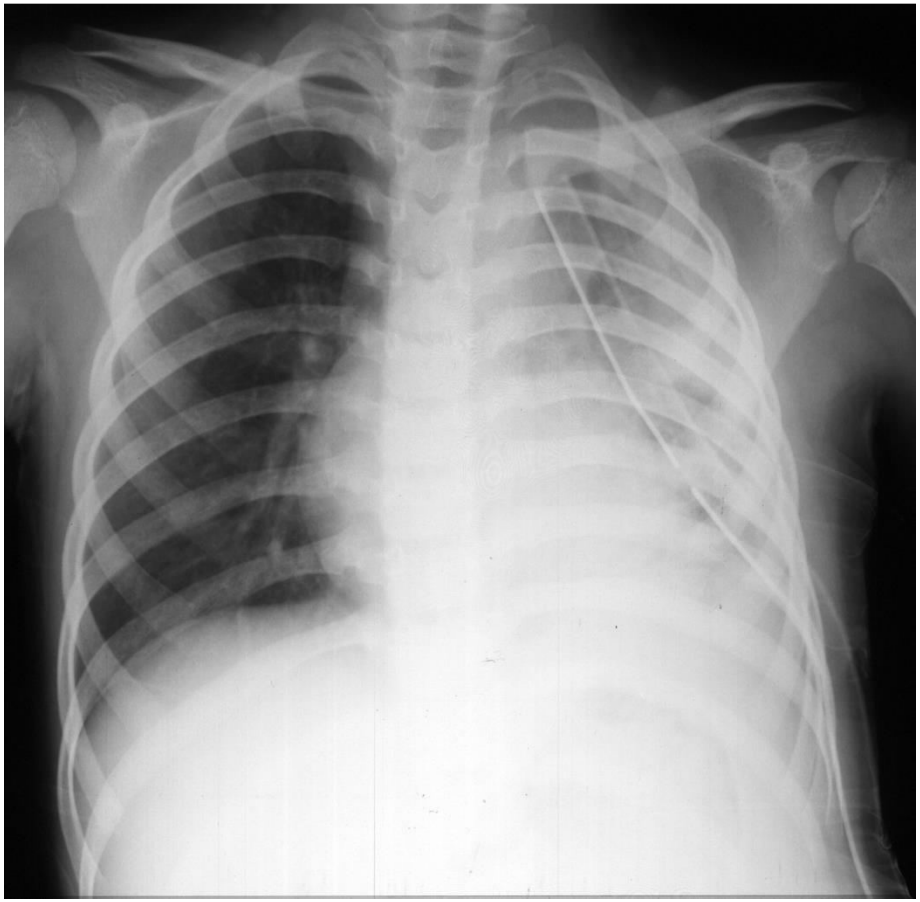


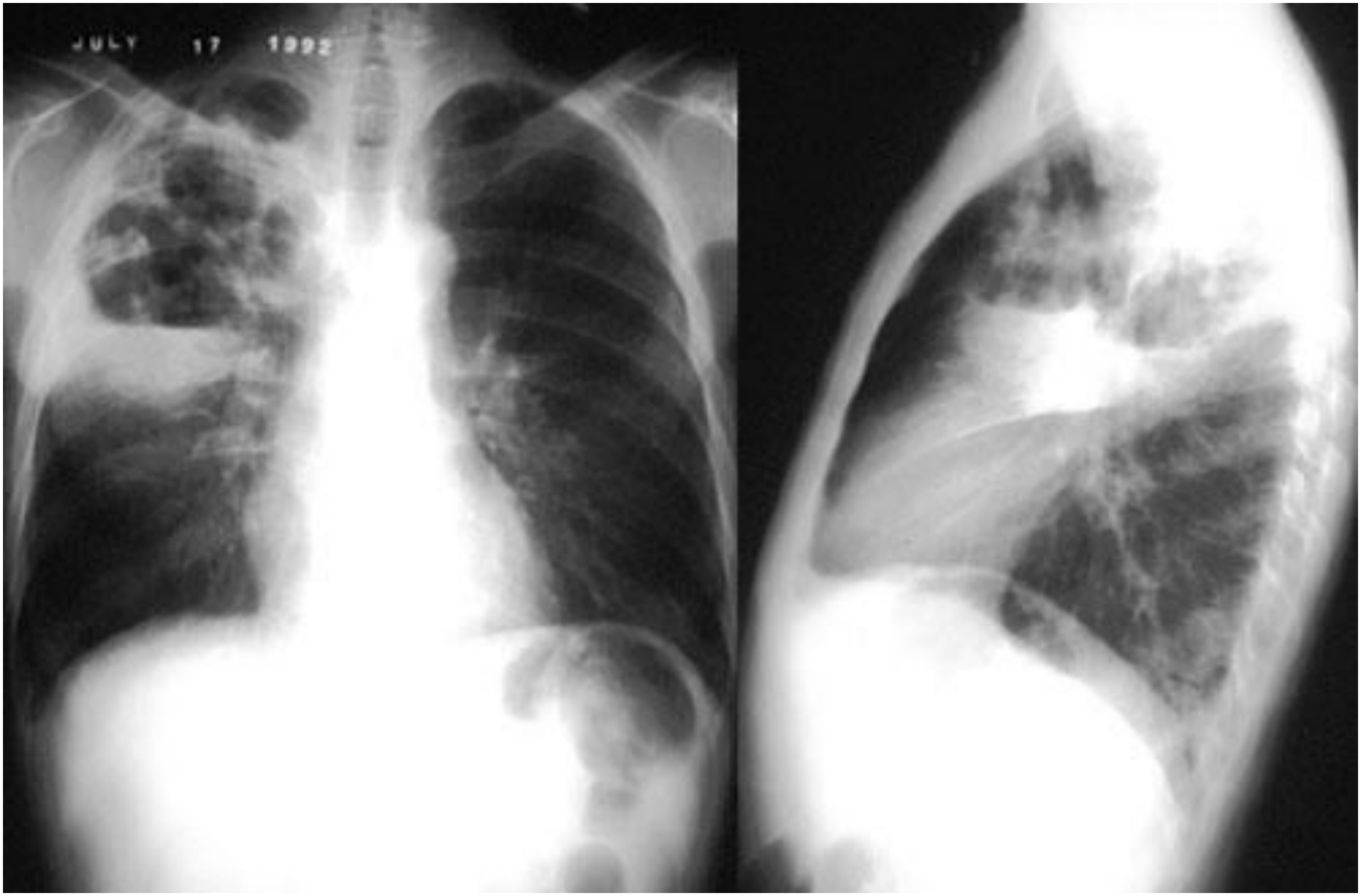
There is an interstitial infiltrate throughout both lung fields. Hilar lymphadenopathy is also present. The impression of the radiologist included pneumonia, tuberculosis, or other granulomatous disease.

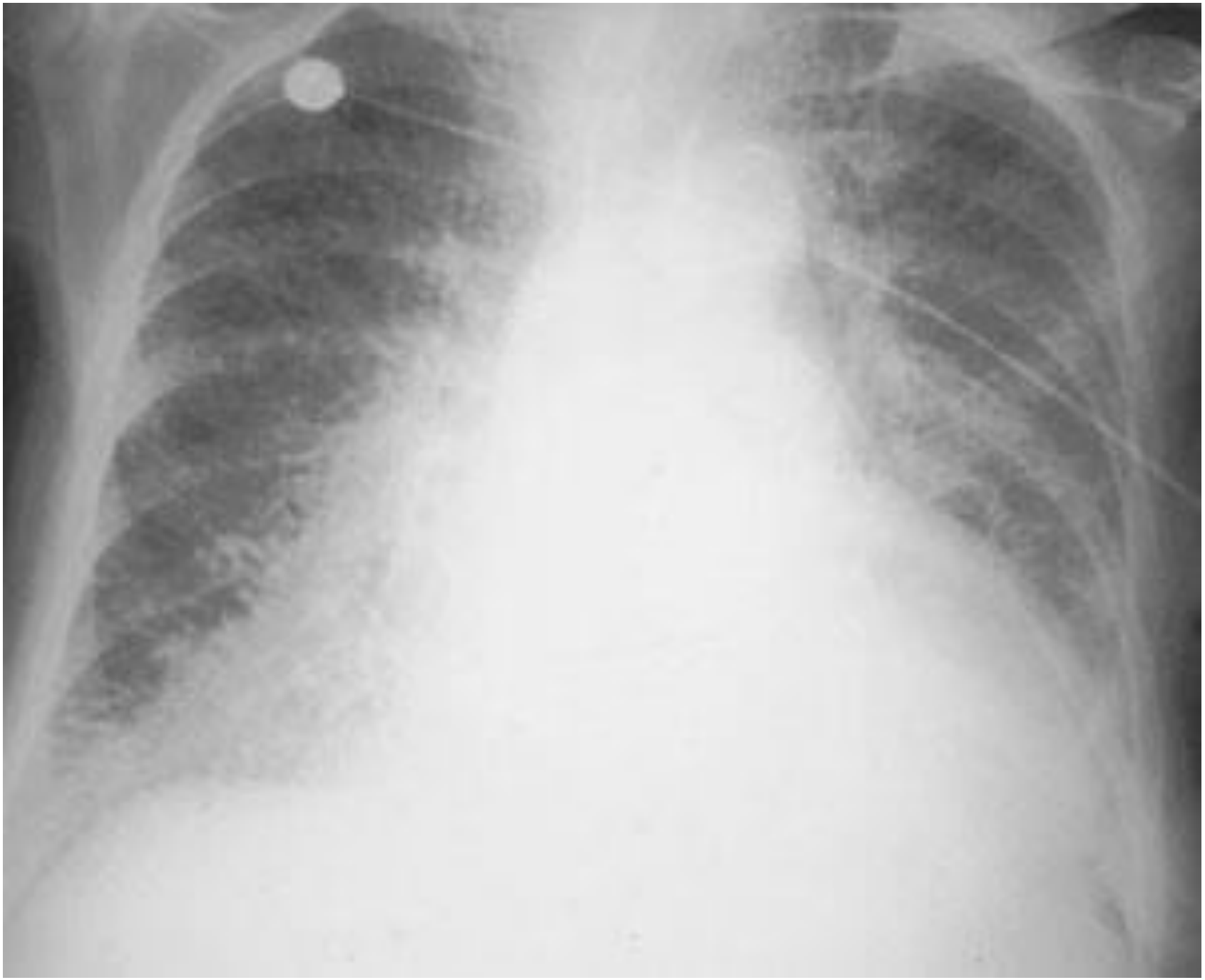


Air in the wall – air crescent






JULY 17 1992




PRIGHT

THANK YOU

سبحانك اللهم

وبحمدك

نشهد أن لا اله الا انت