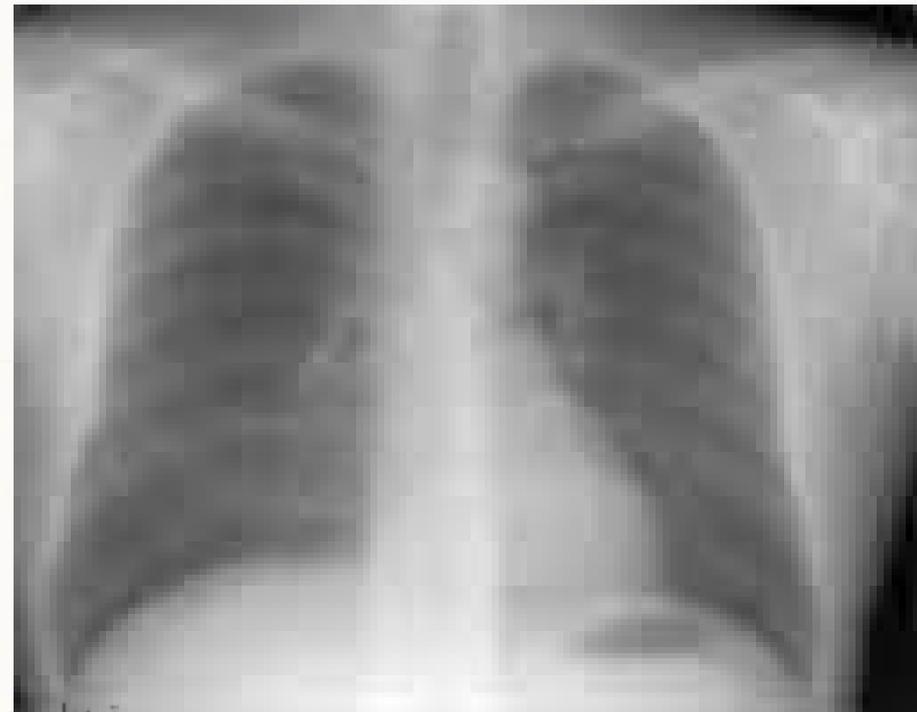




Chest Radiography

By
DR MAHA ALSADIK
Associate Professor of
respiratory medicine



- **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.**



Common Uses of the procedure

A 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**

BONE

**SOFT
TISSUES**

WATER

FAT

AIR



The 12-Step Program

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



Pre-
read

1. Penetration
2. Inspiration
3. Rotation
4. Angulation
5. Soft tissues / bony structures
6. Mediastinum
7. Diaphragms
8. Lung Fields



Quality
Control



Finding
s

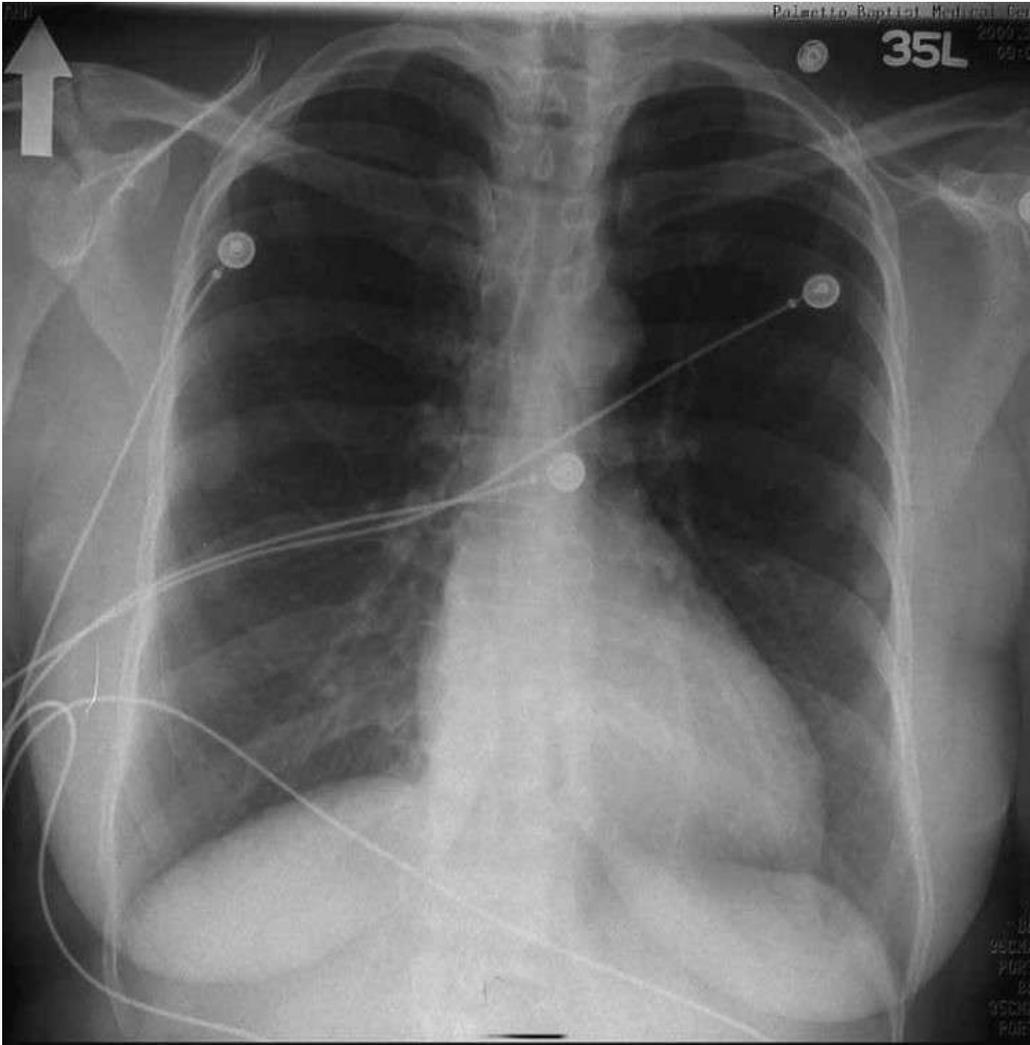


Pre-Reading

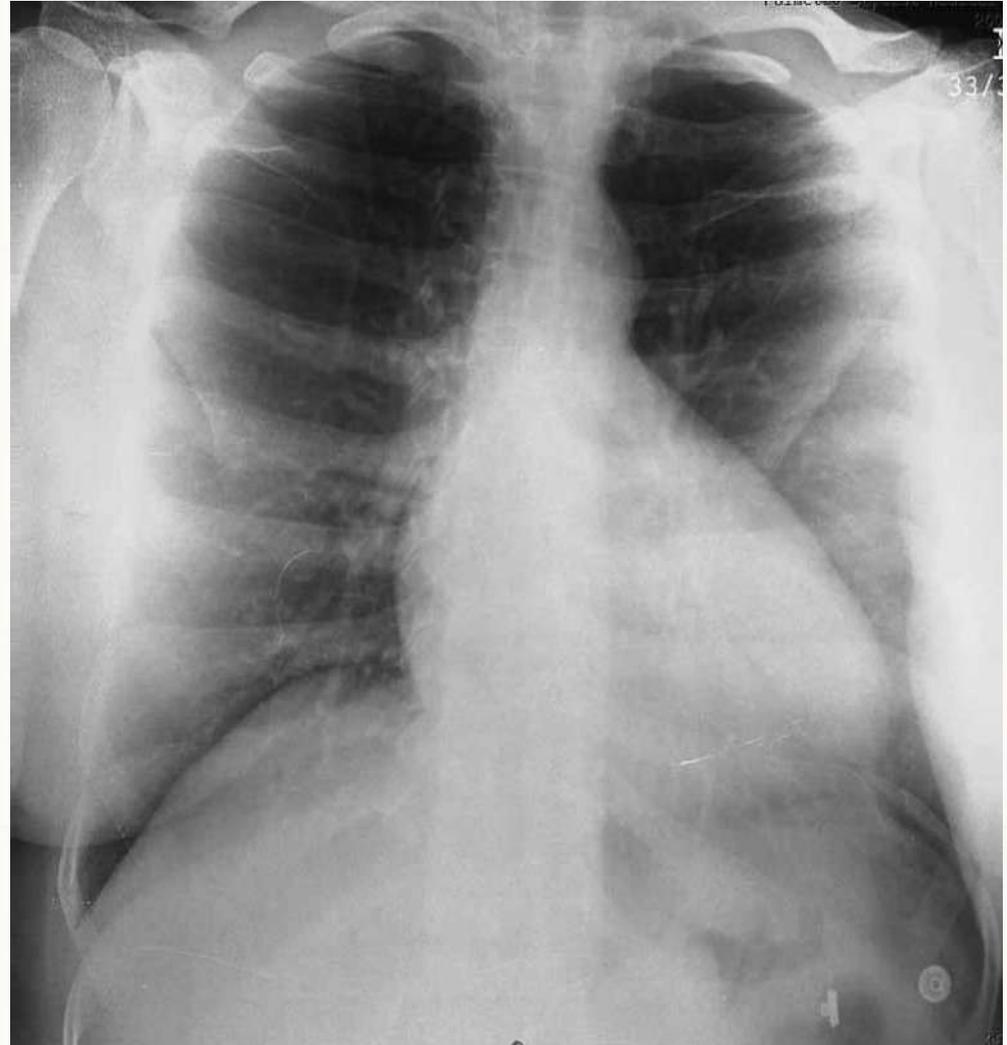
1. Check the name,
~~sex~~ Check the date
3. Obtain old films if available
4. Which view(s) do you have?
 1. PA & lateral view.
 2. AP view.
 3. Lateral Decubitus,
 4. Oblique view.
 5. Lordotic view.
 6. Kyphotic view.



Types of views

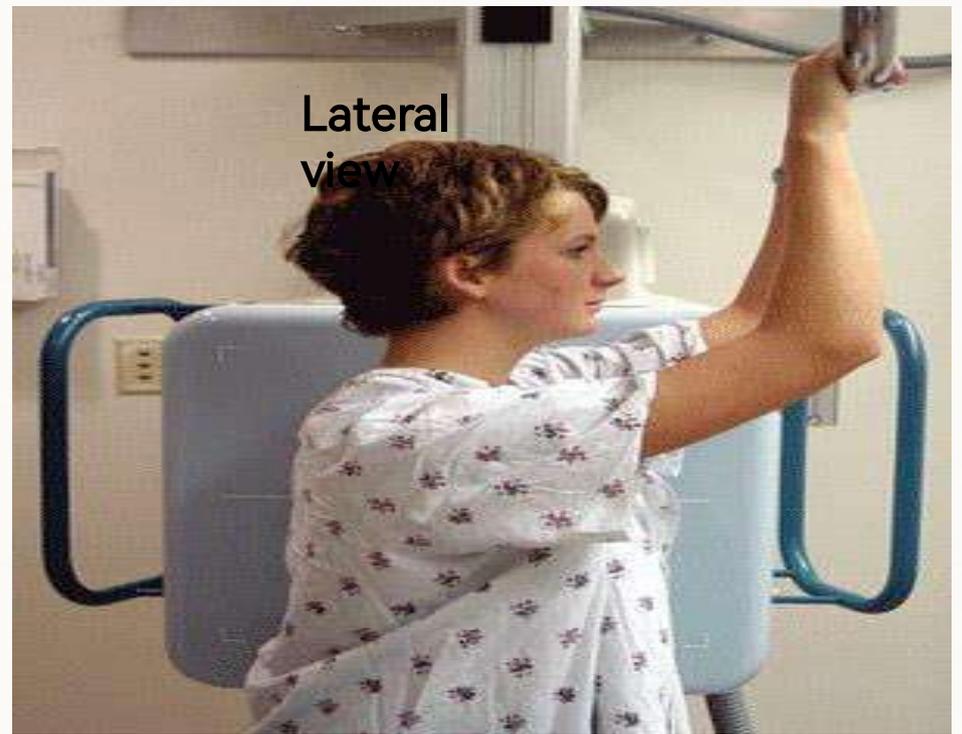
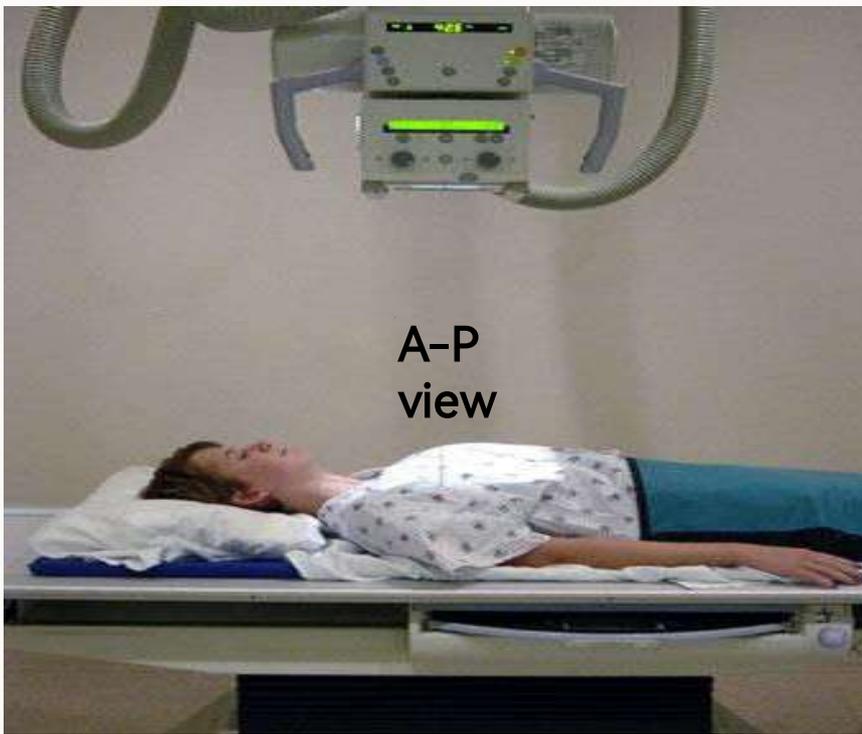


PA



AP



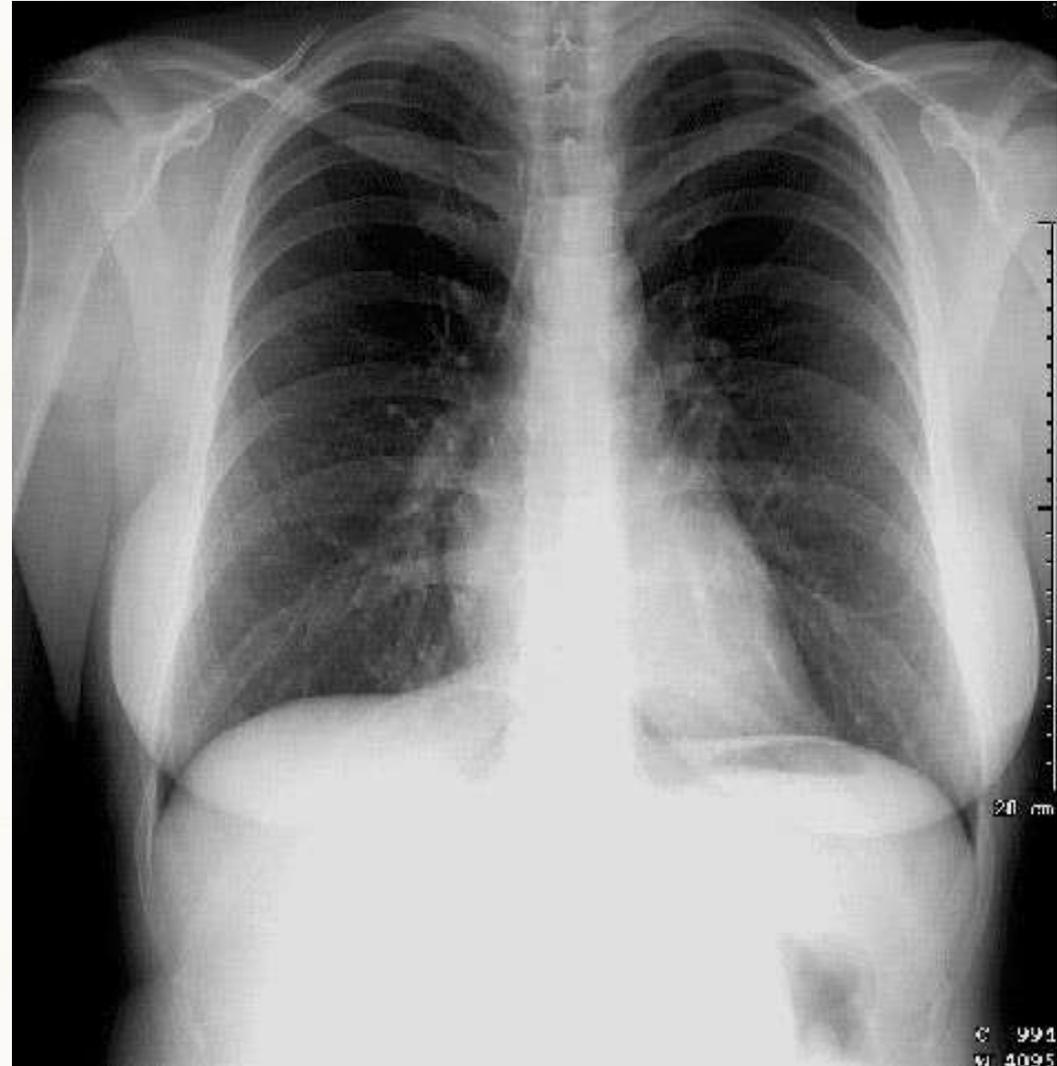


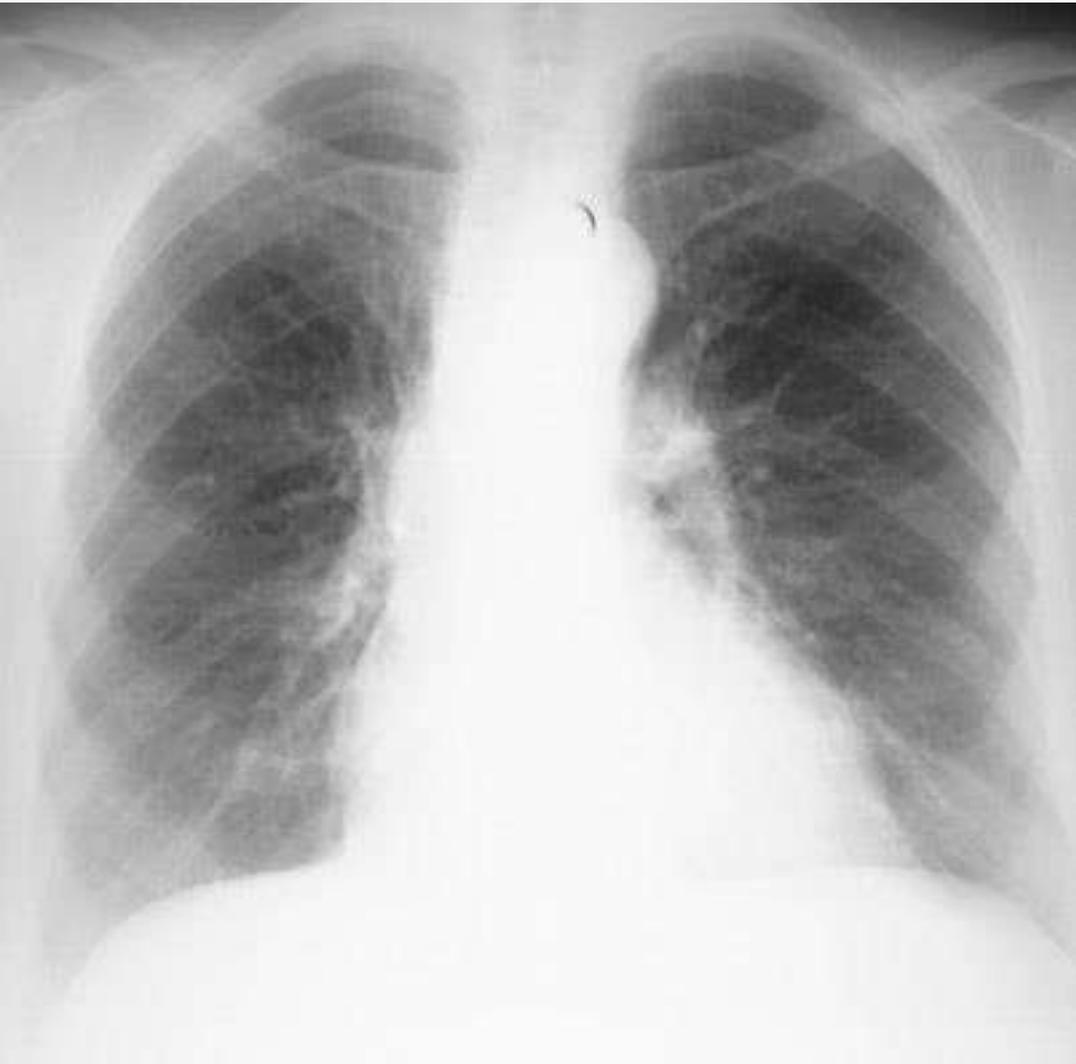
Quality Control

5. Penetration (dose of X-Ray)

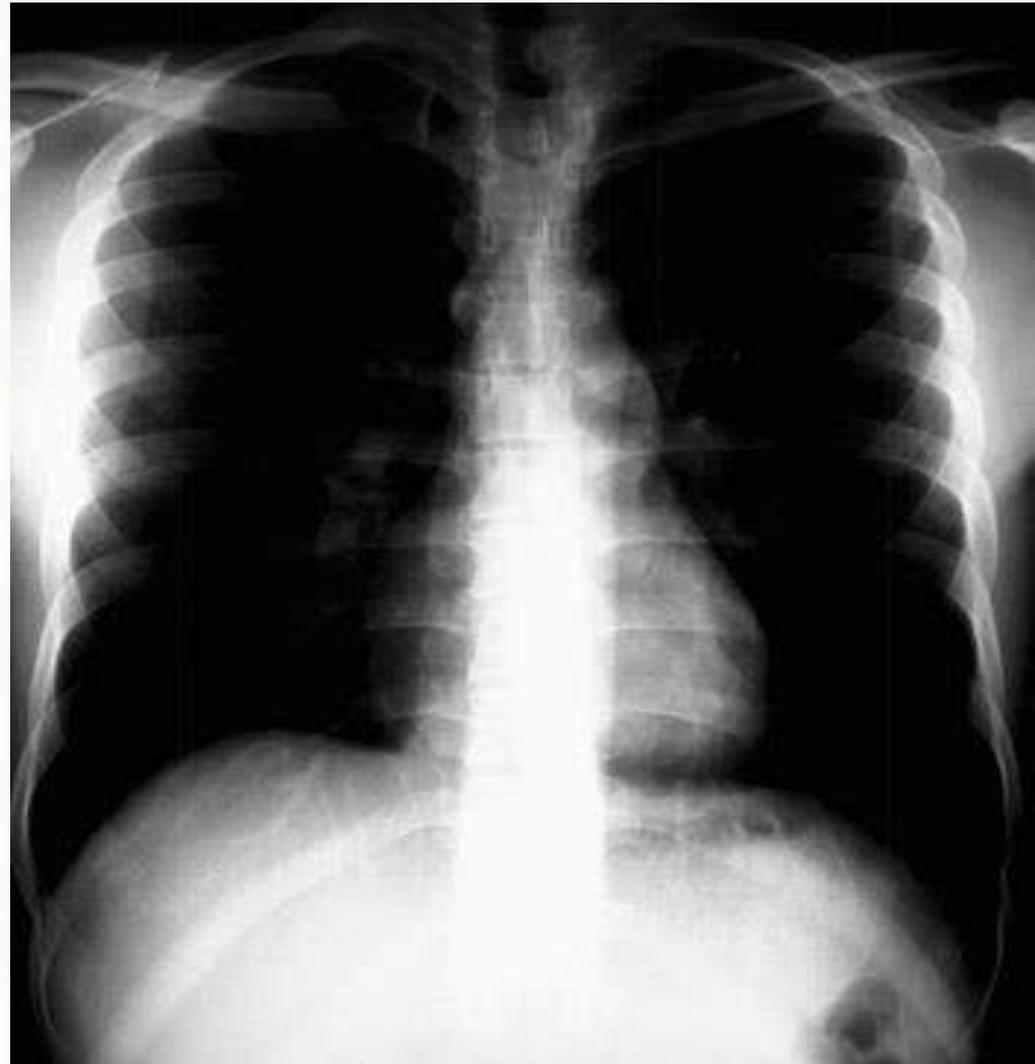
Ideal chest x-ray film:

- 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

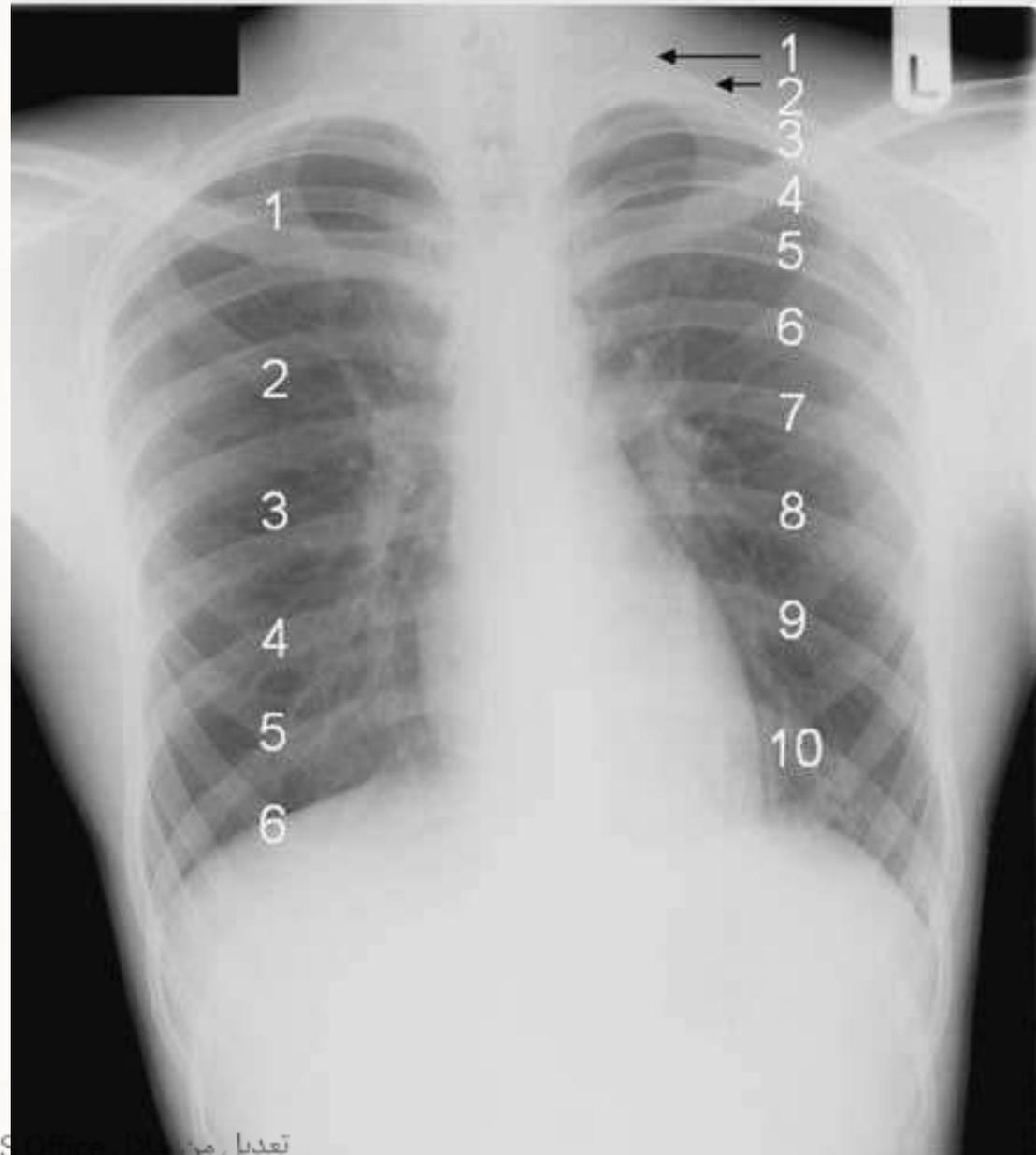


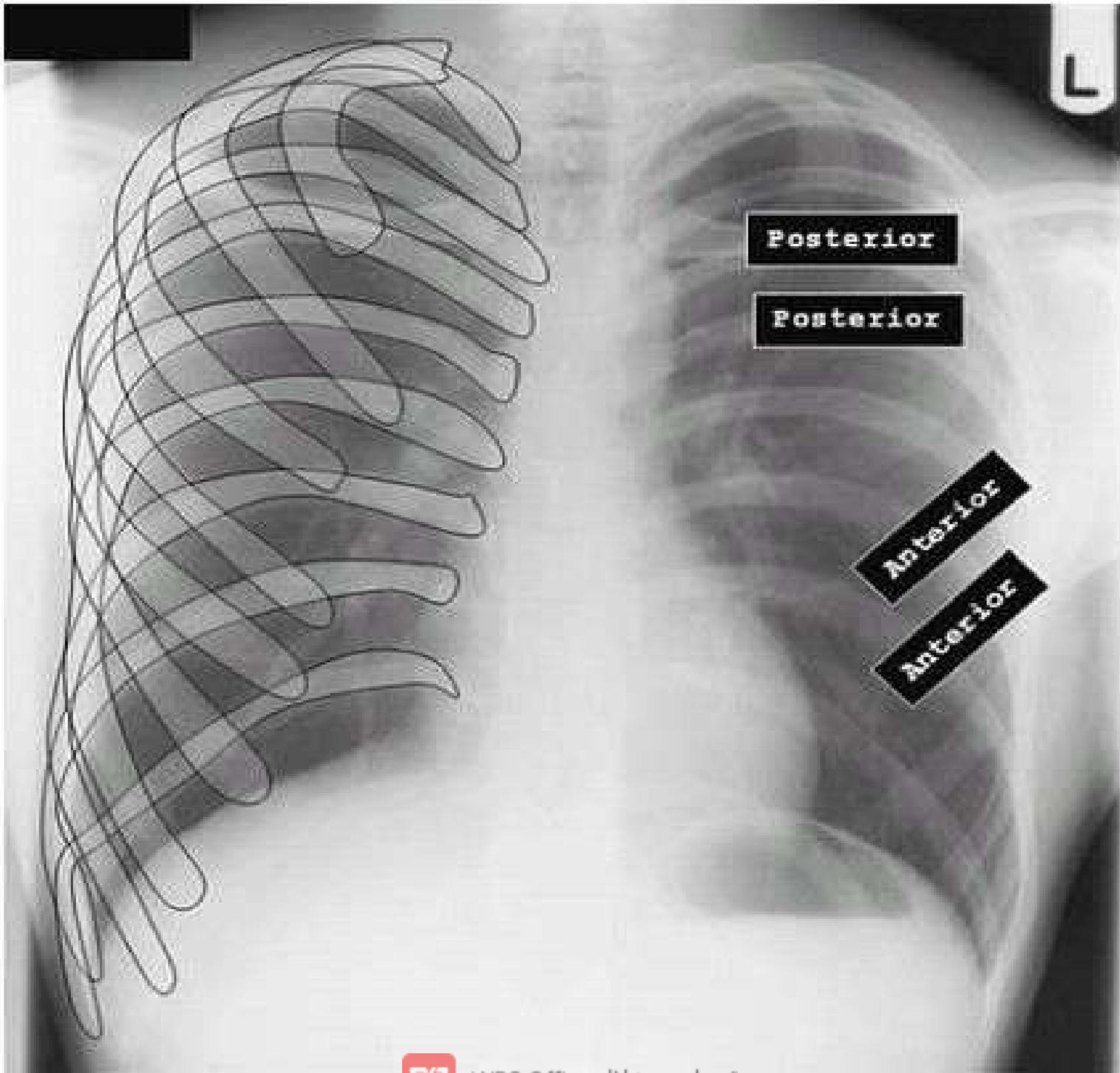
Hard

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

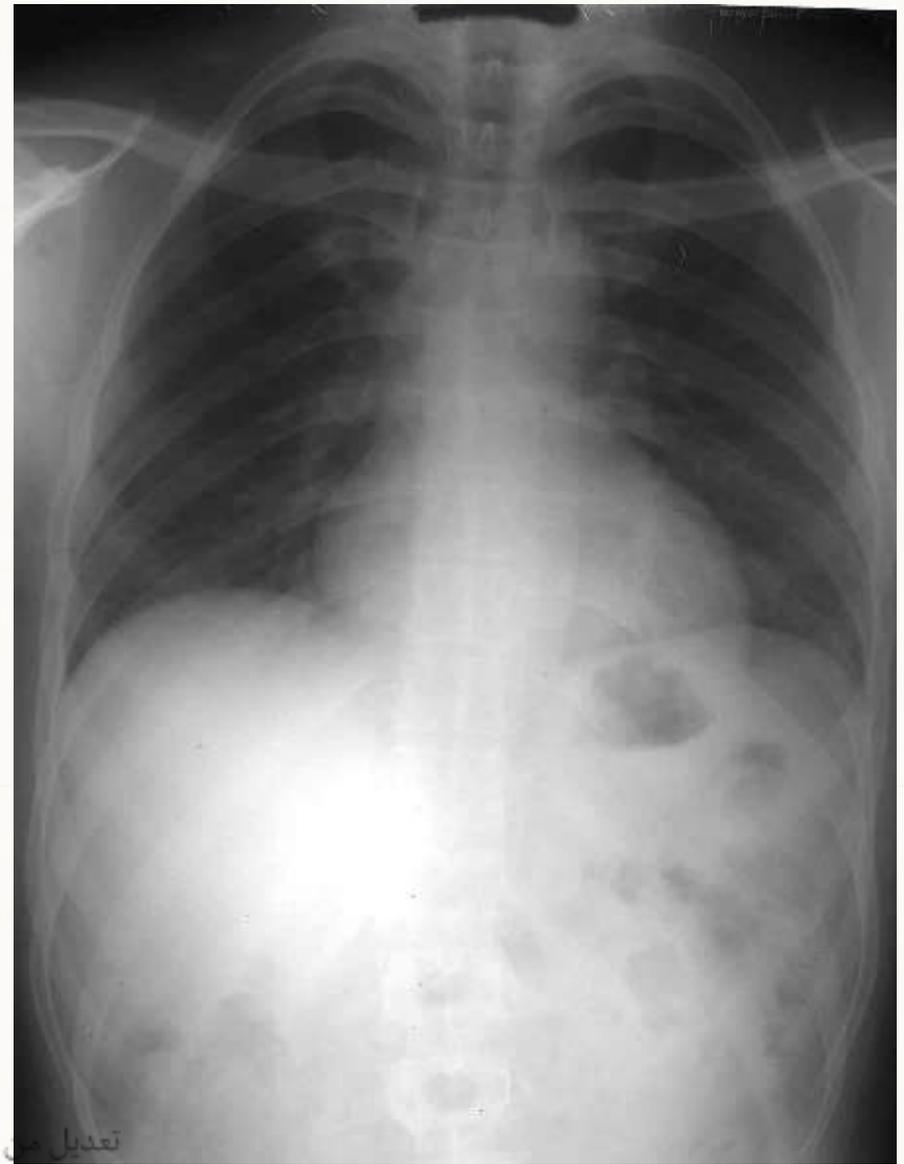




Inspiratio



Expiratio

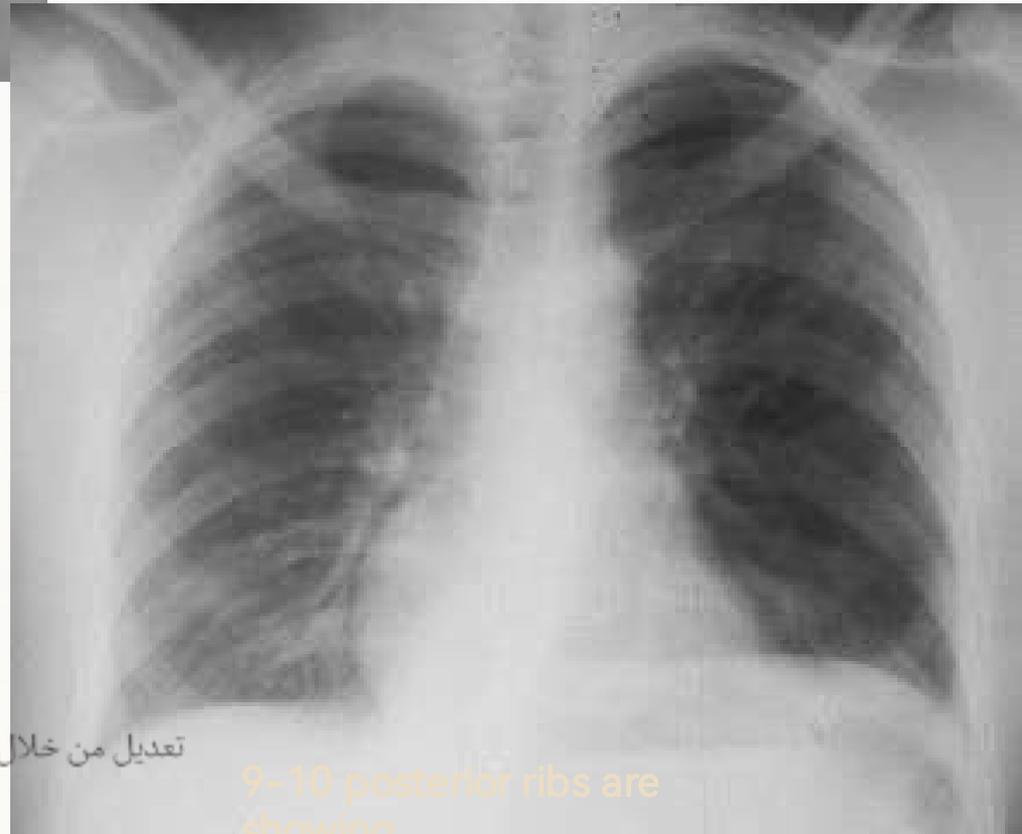




About 8 posterior ribs are showing

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

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

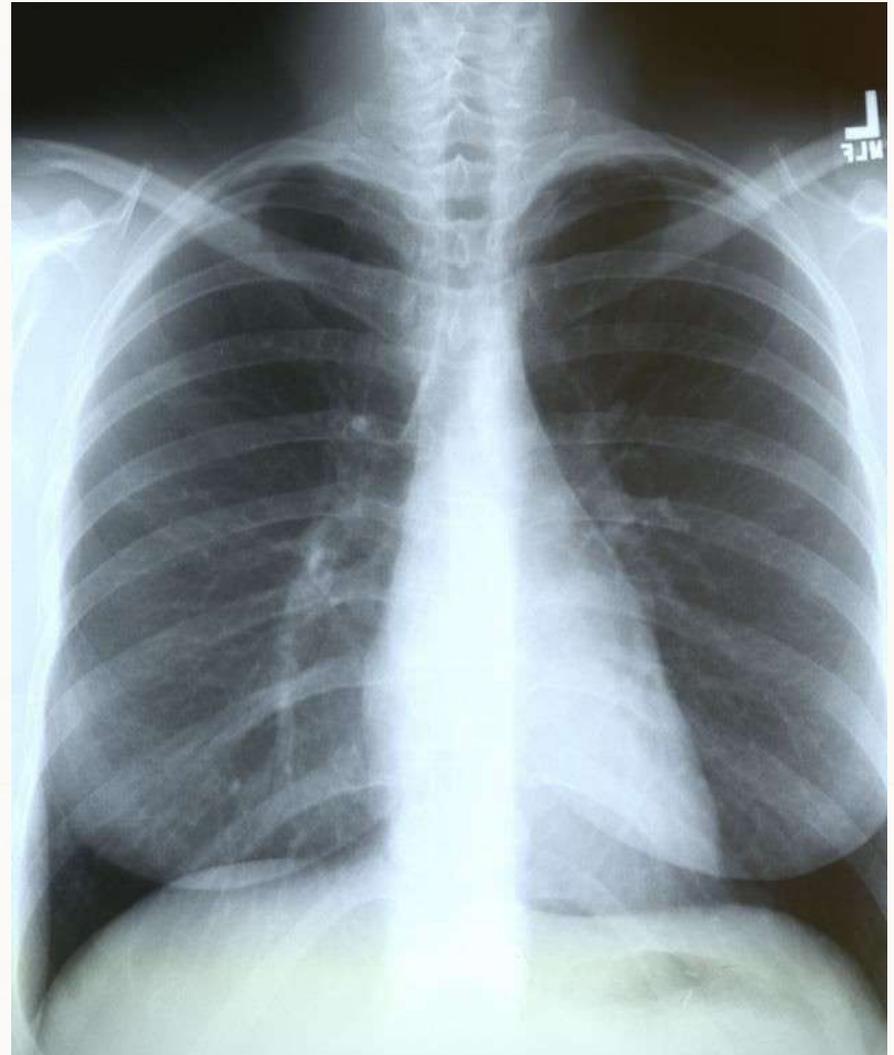


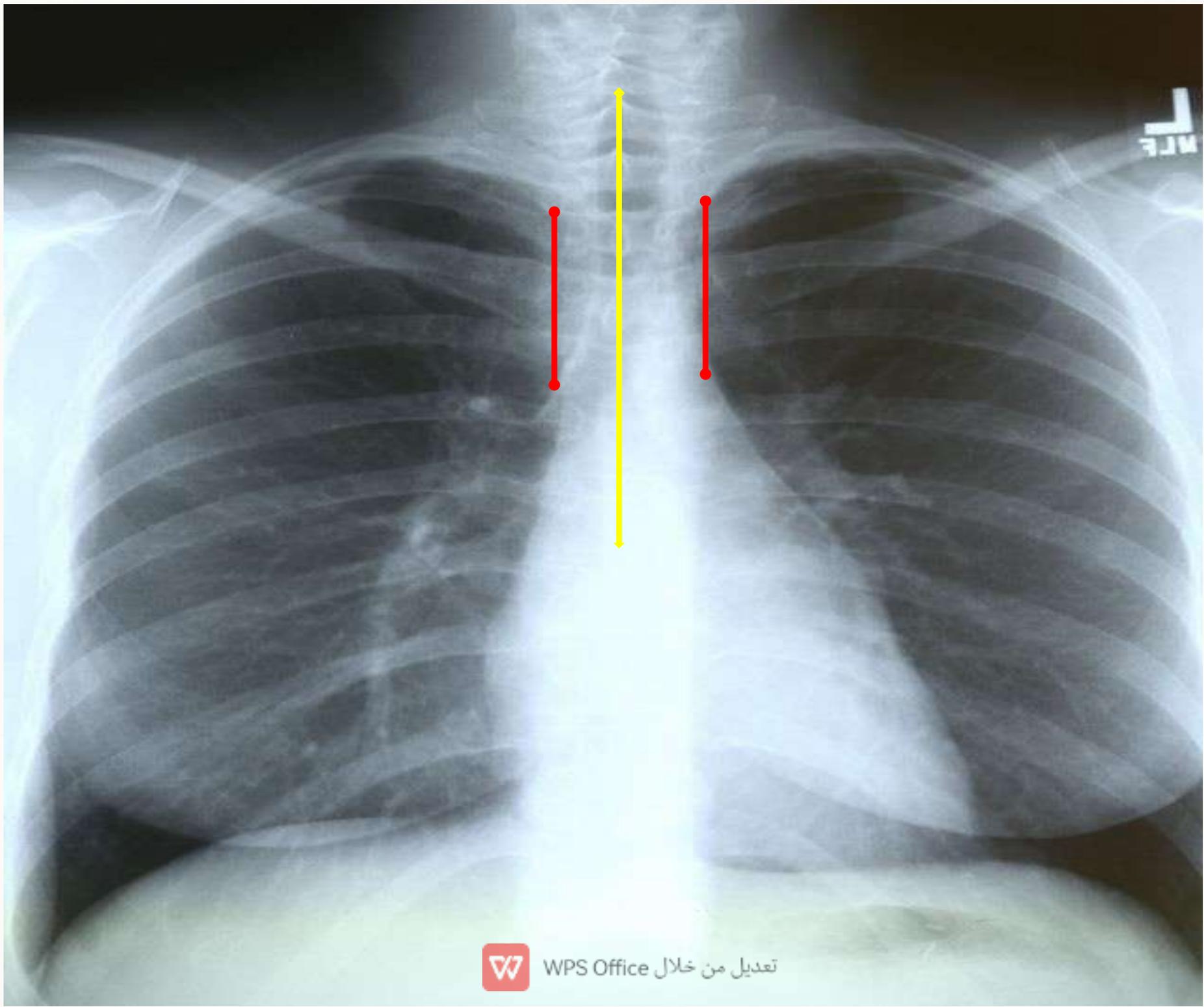
9-10 posterior ribs are showing

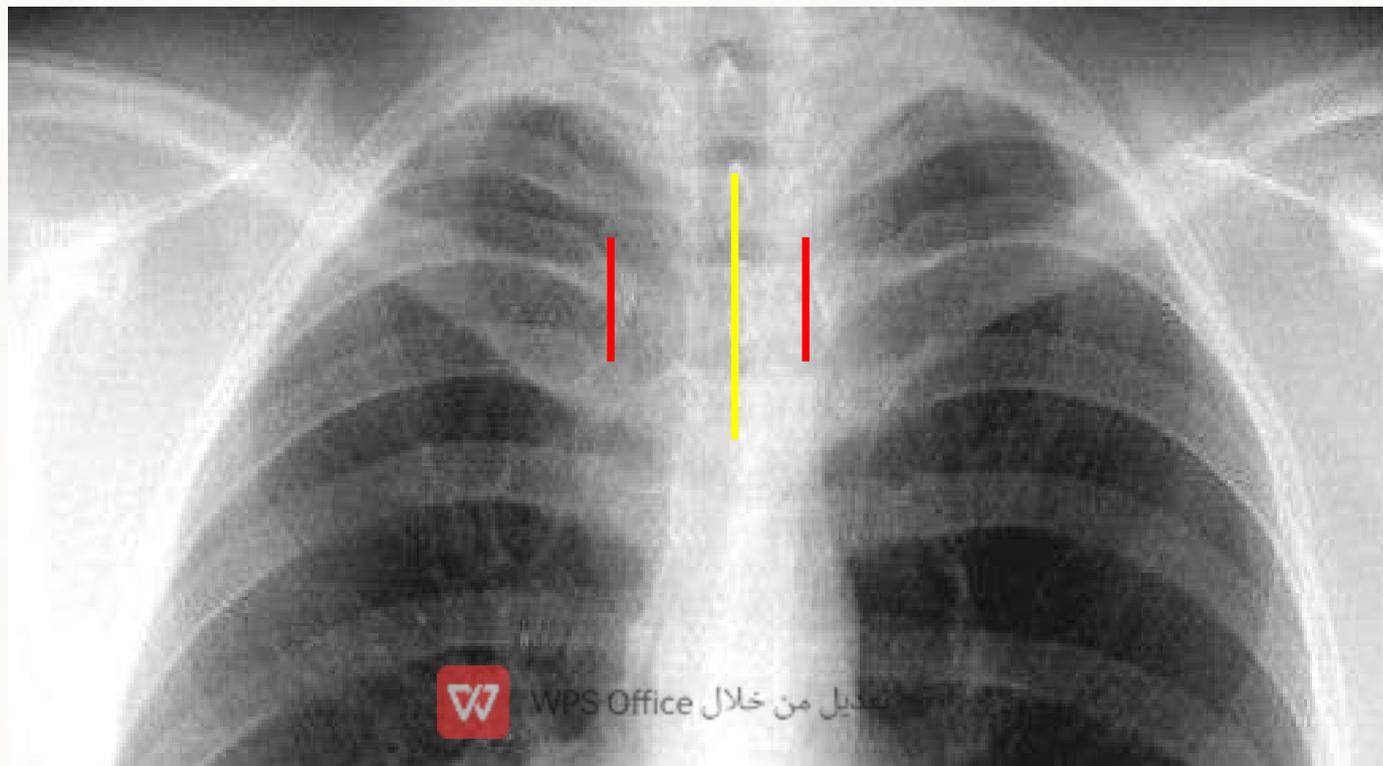
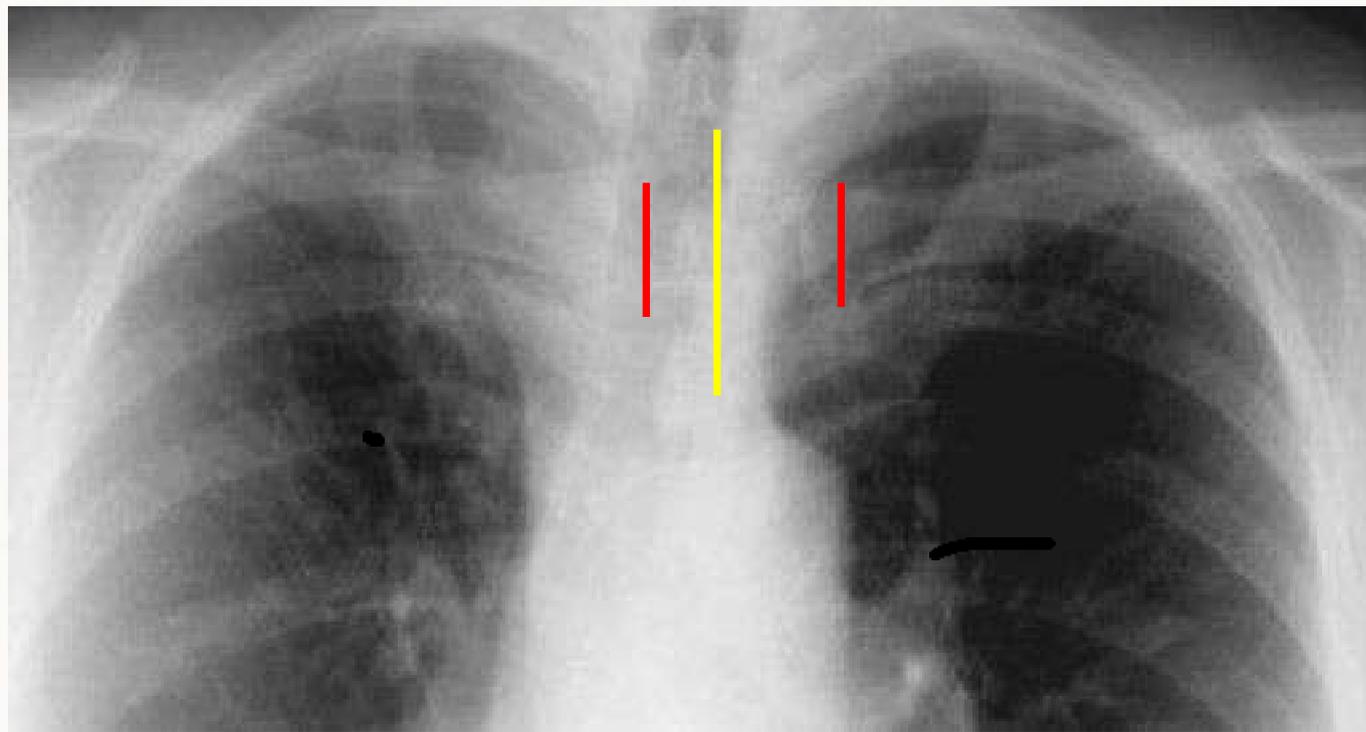
Quality Control

7. Rotation

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





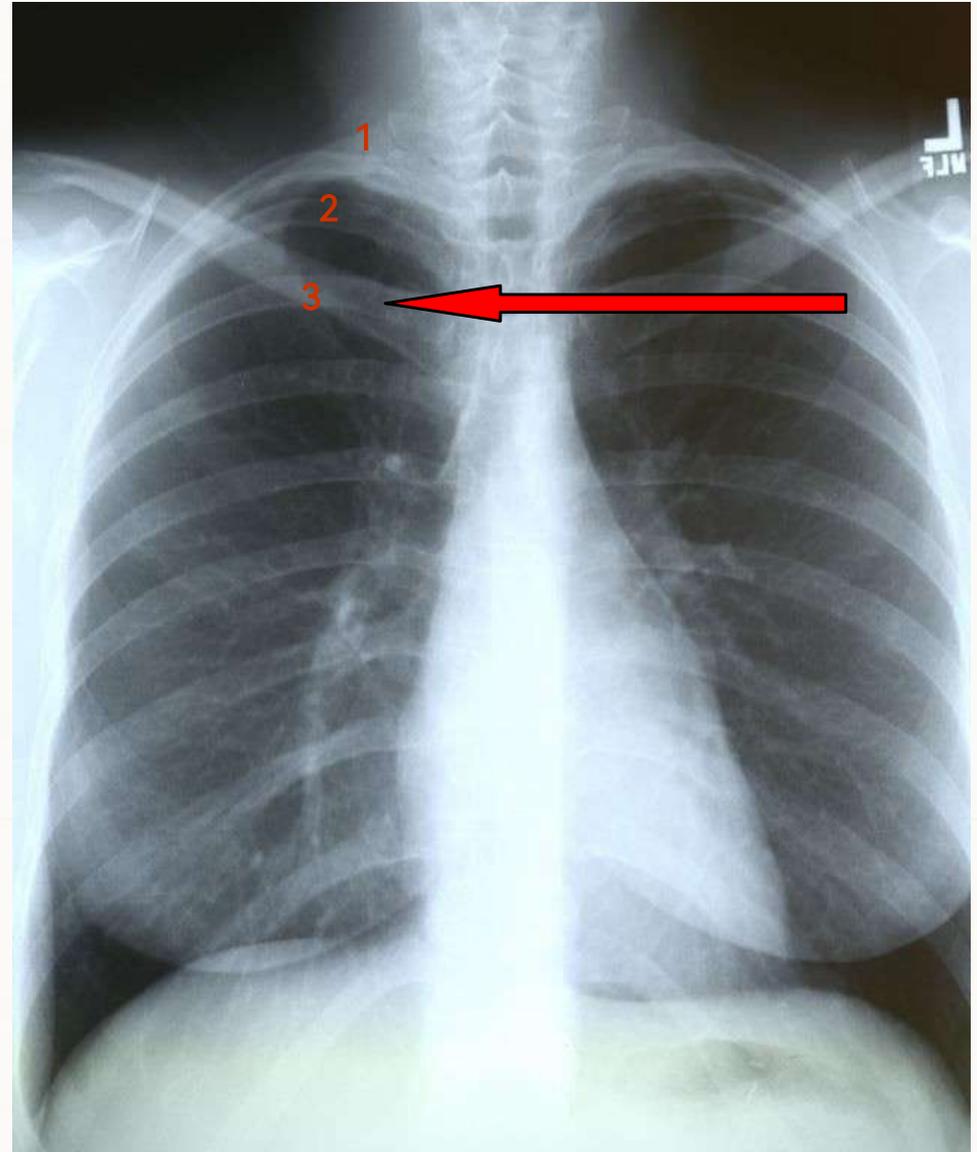


Quality Control

8. Angulation

n

- Clavicle should lay over 3rd rib or 4th posteriorly.



Findings

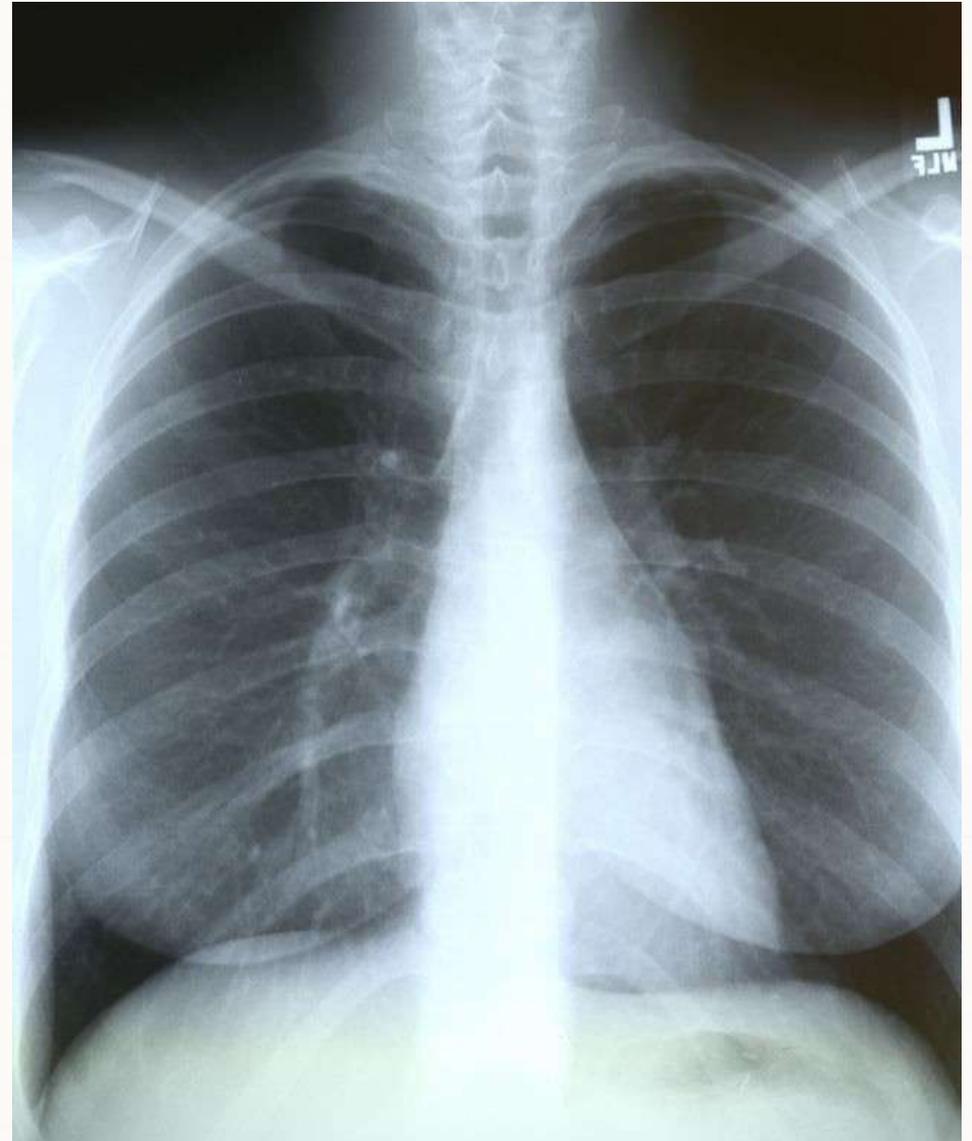
9. **Soft tissue** (Breast shadows, Supraclavicular areas, Axilla) **and bony structures**

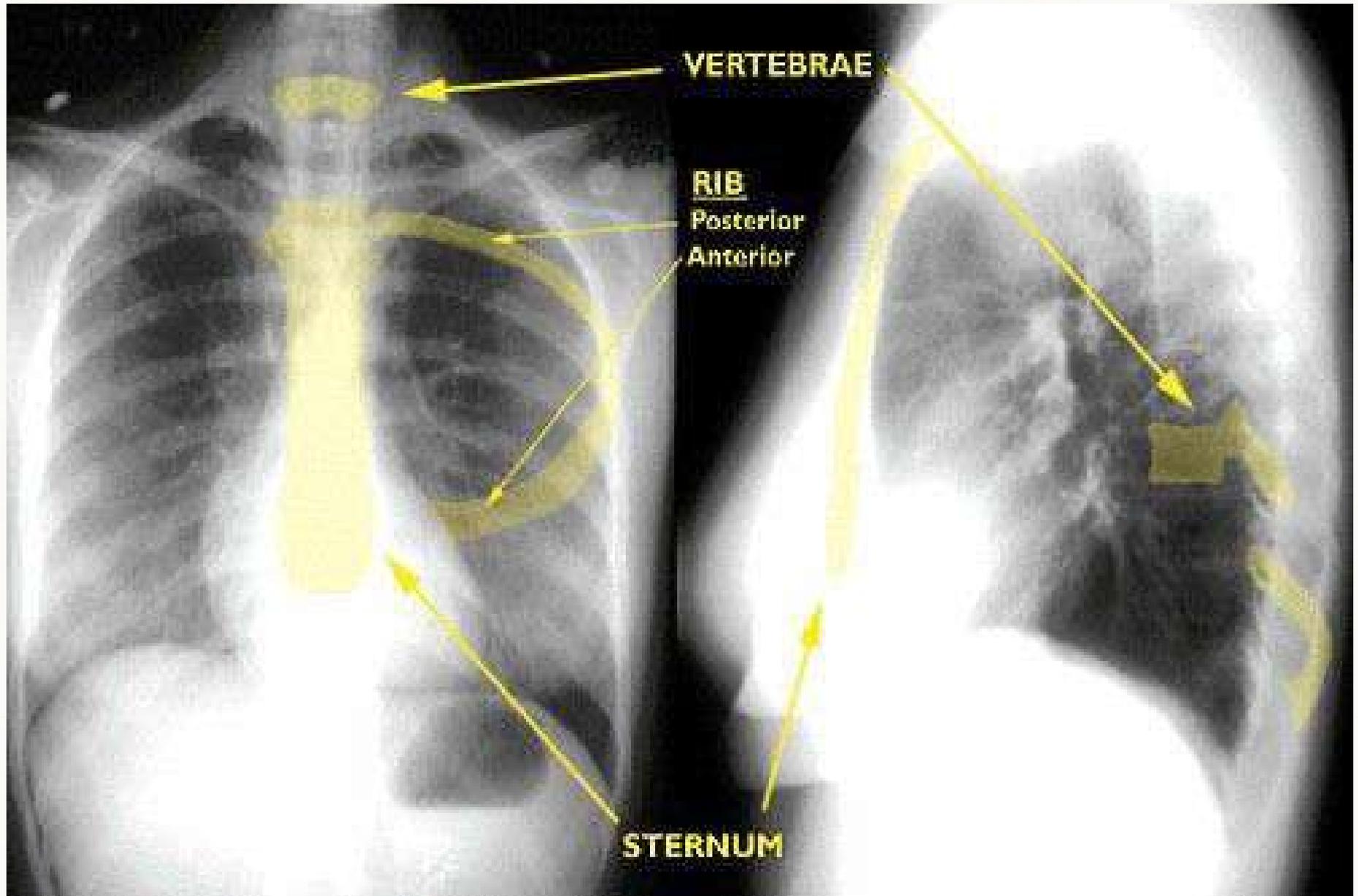
Bony structures:

- Ribs
- Sternum
- Spine
- Shoulder girdle

Check for

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



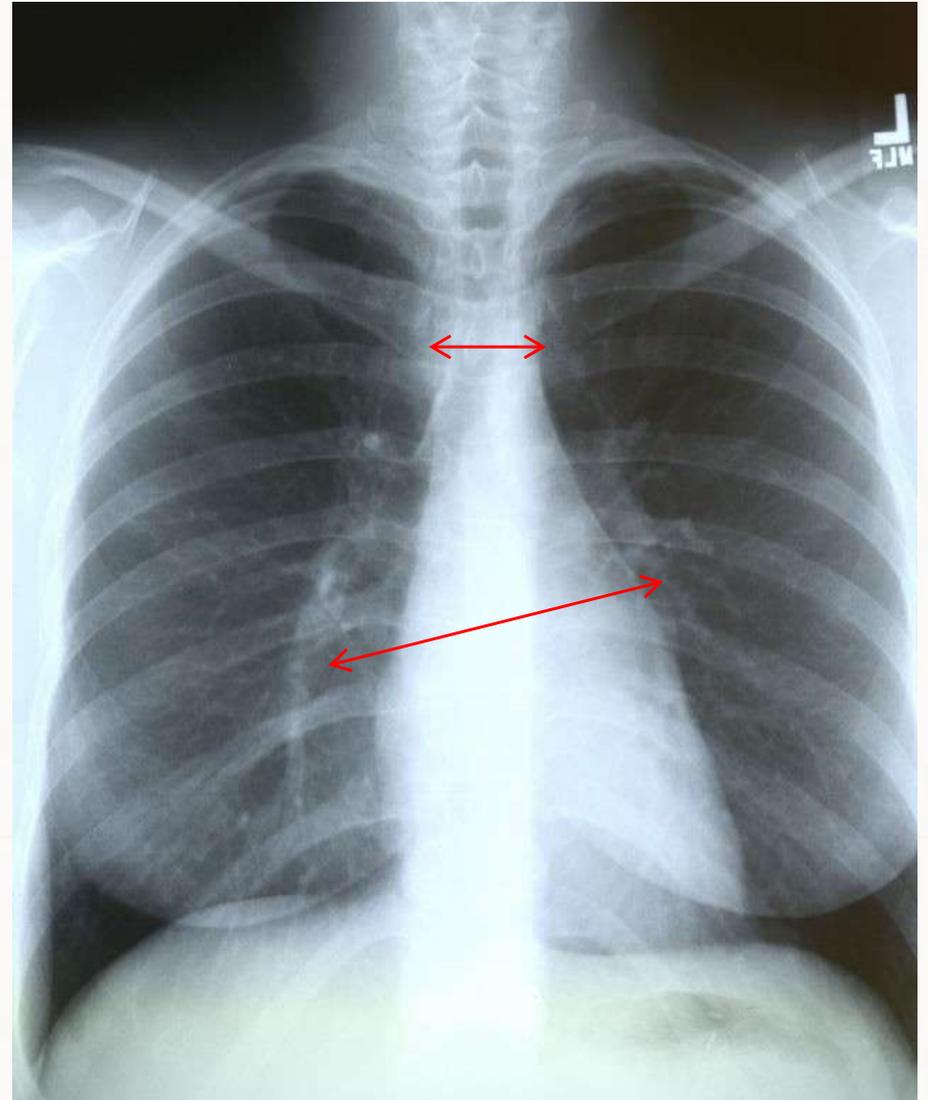


Findings

10. Mediastinum

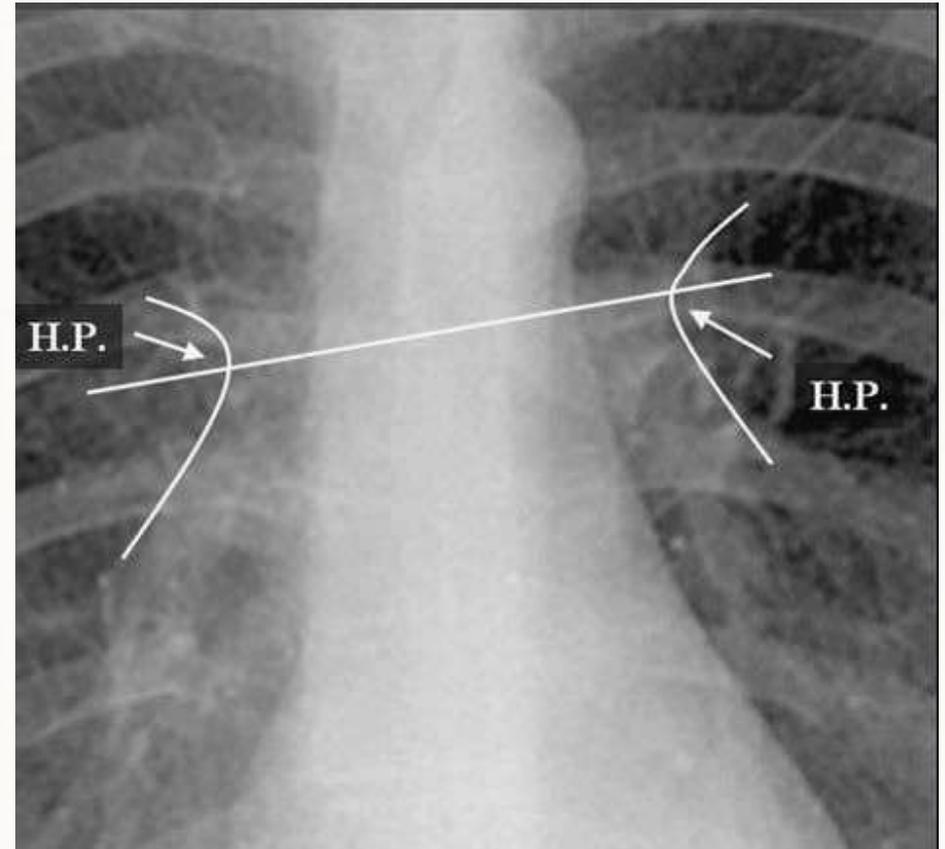
Check for

- Upper mediastinum
- Hilar contours for 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.



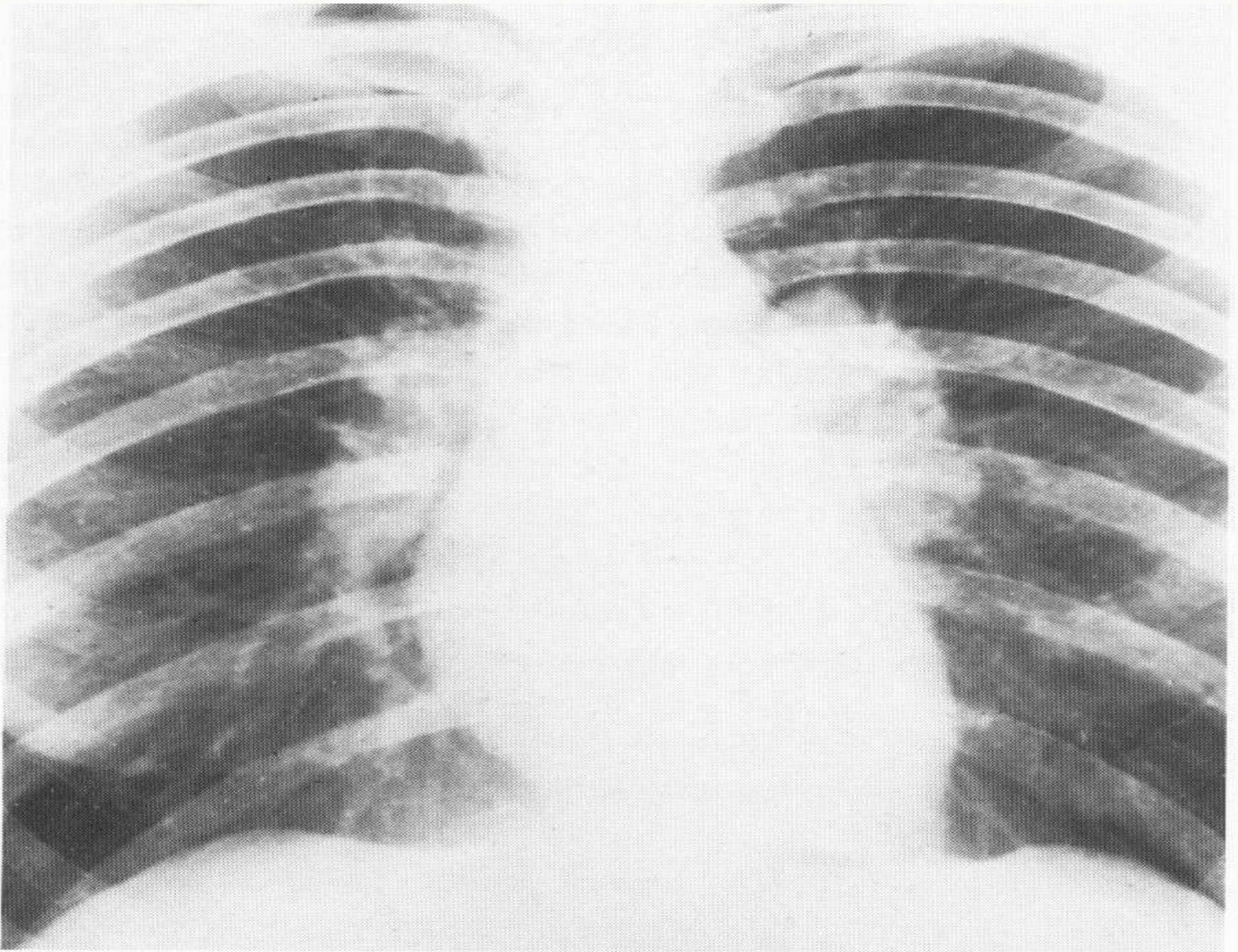
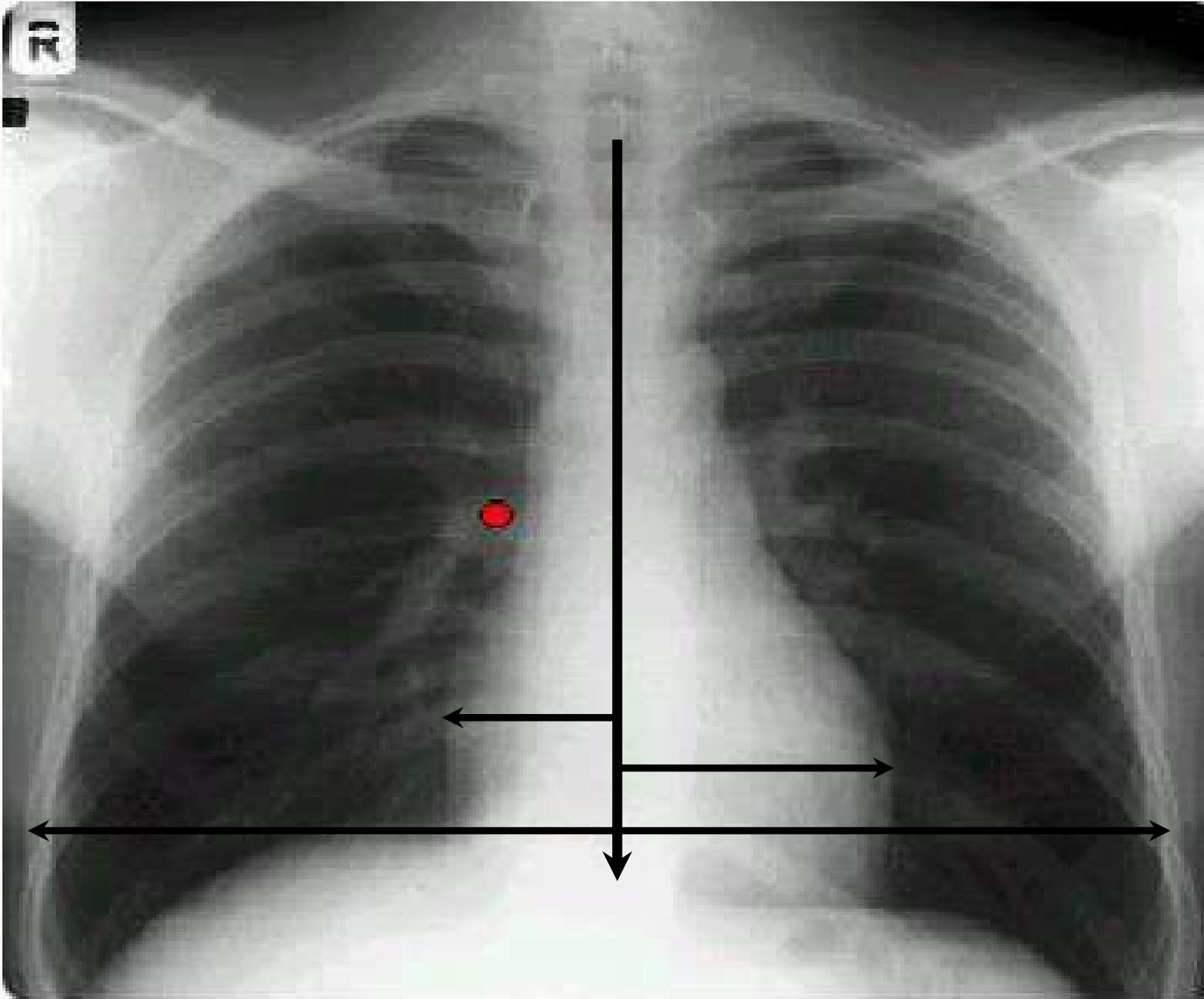
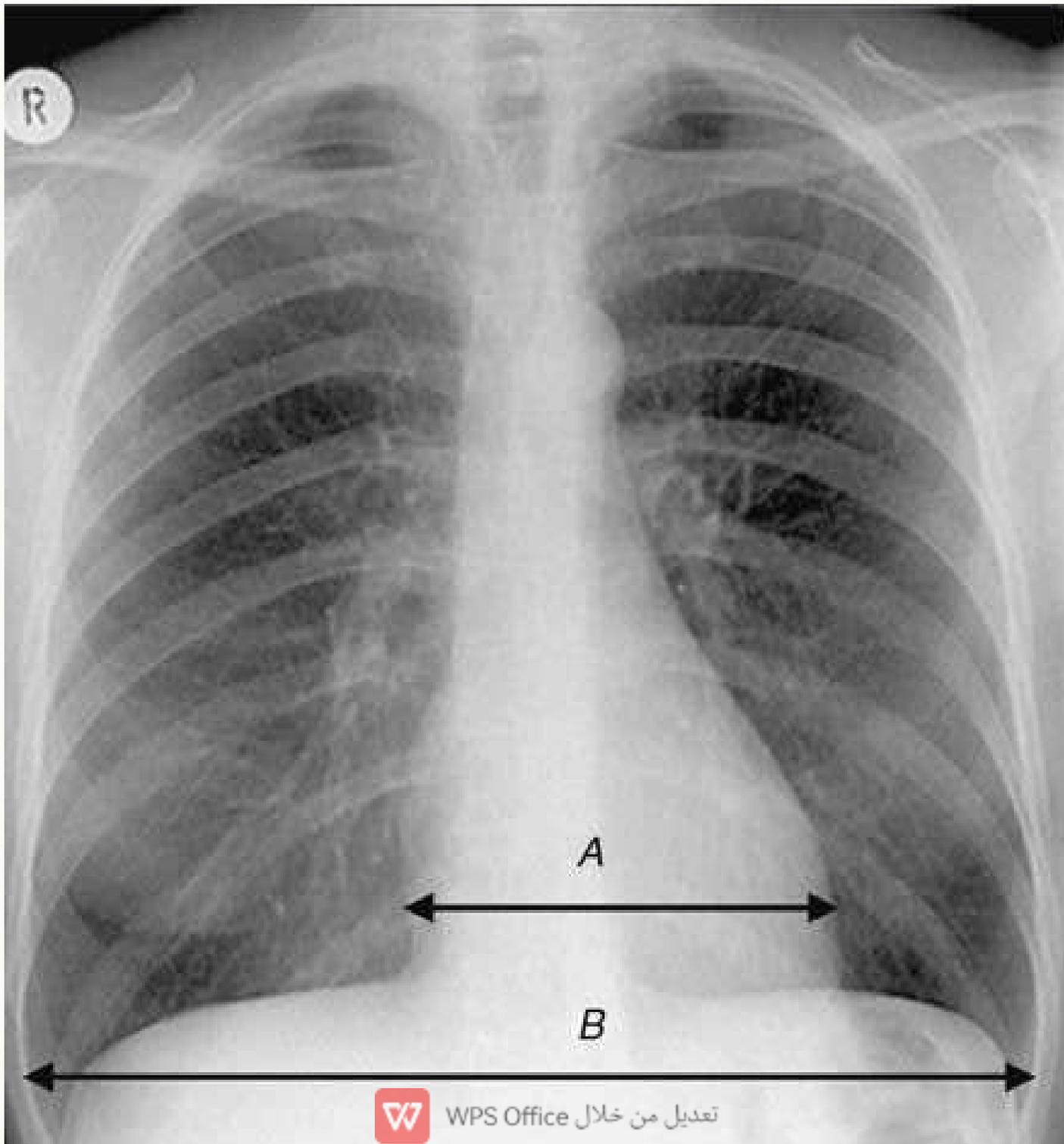
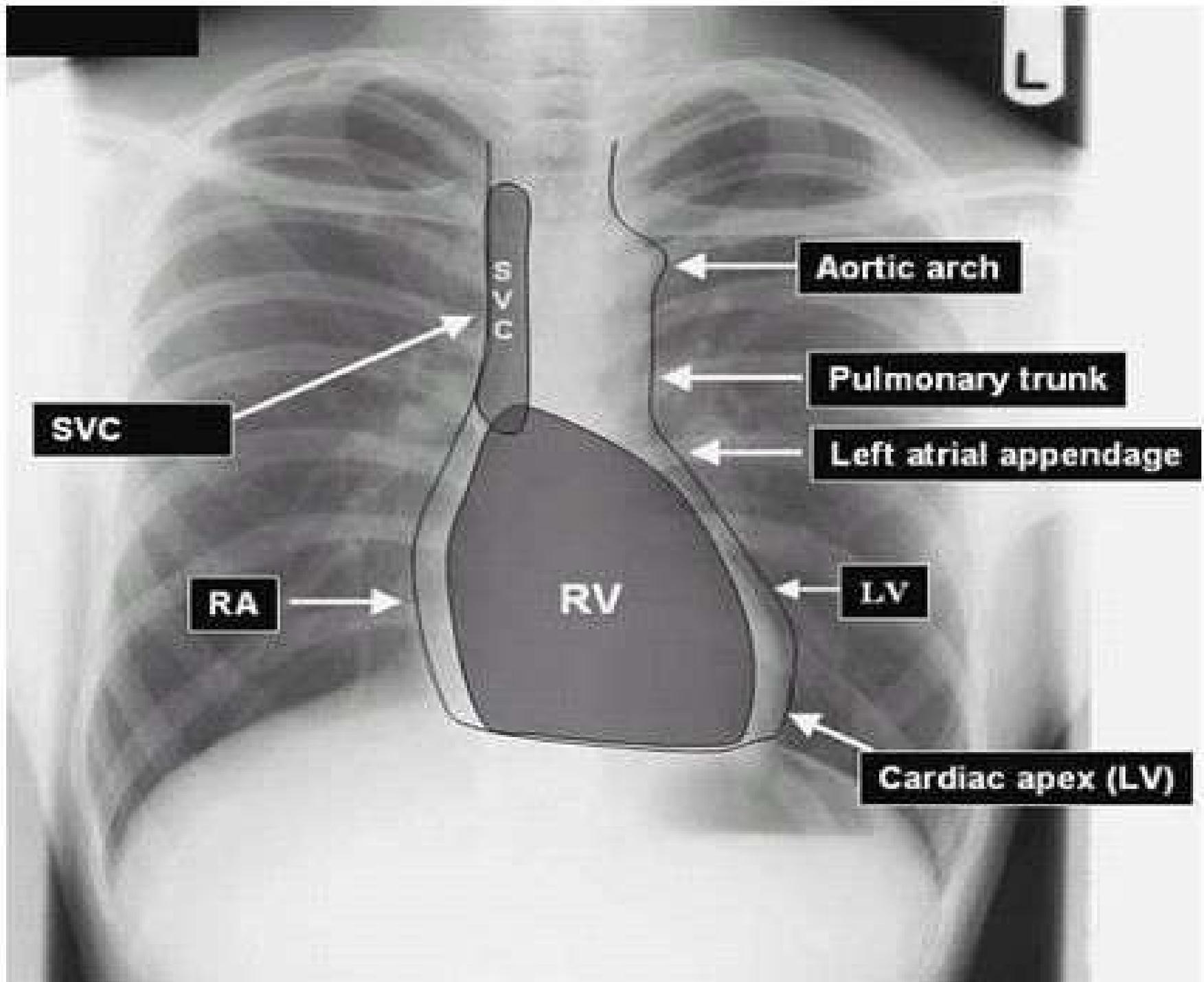
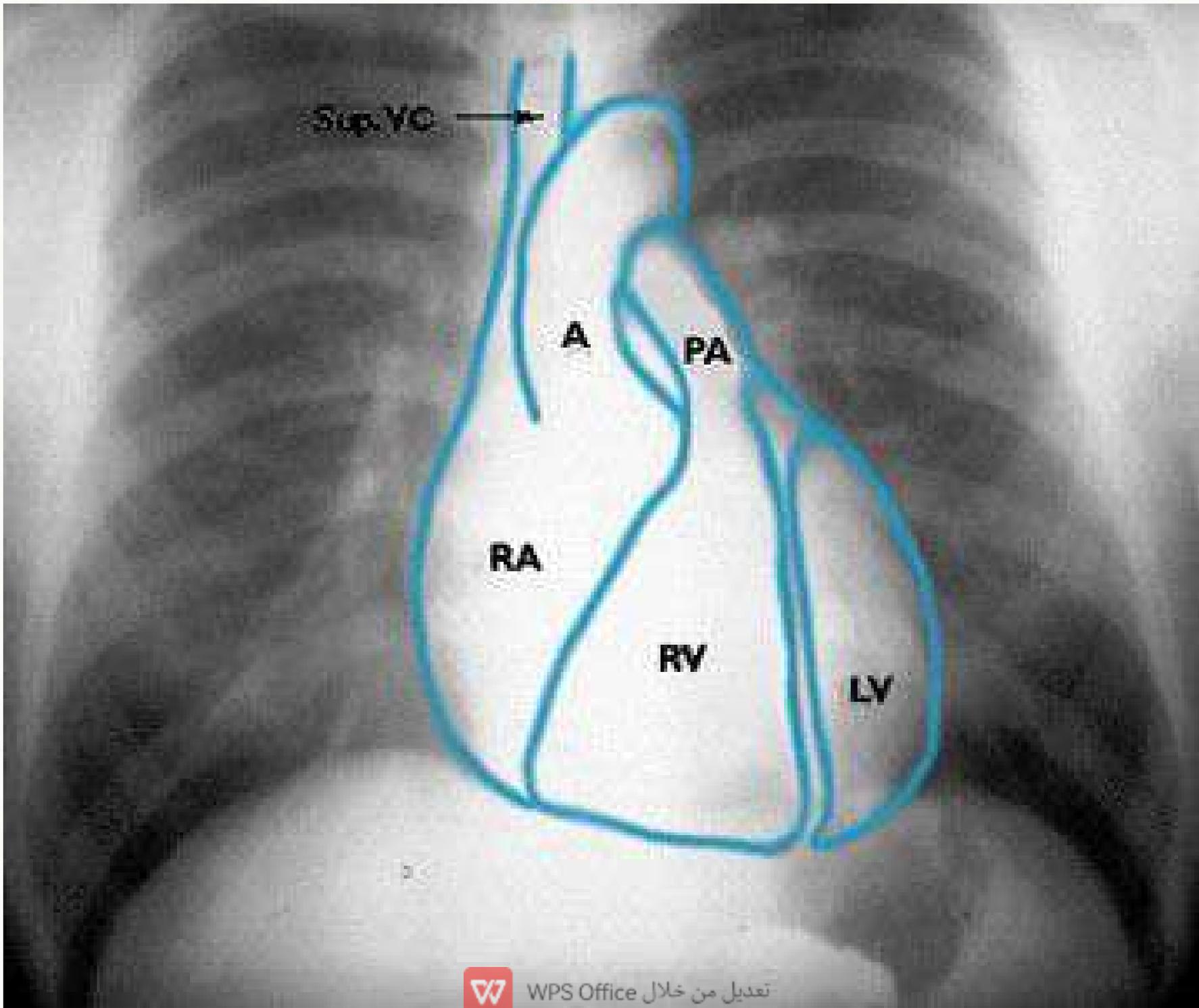


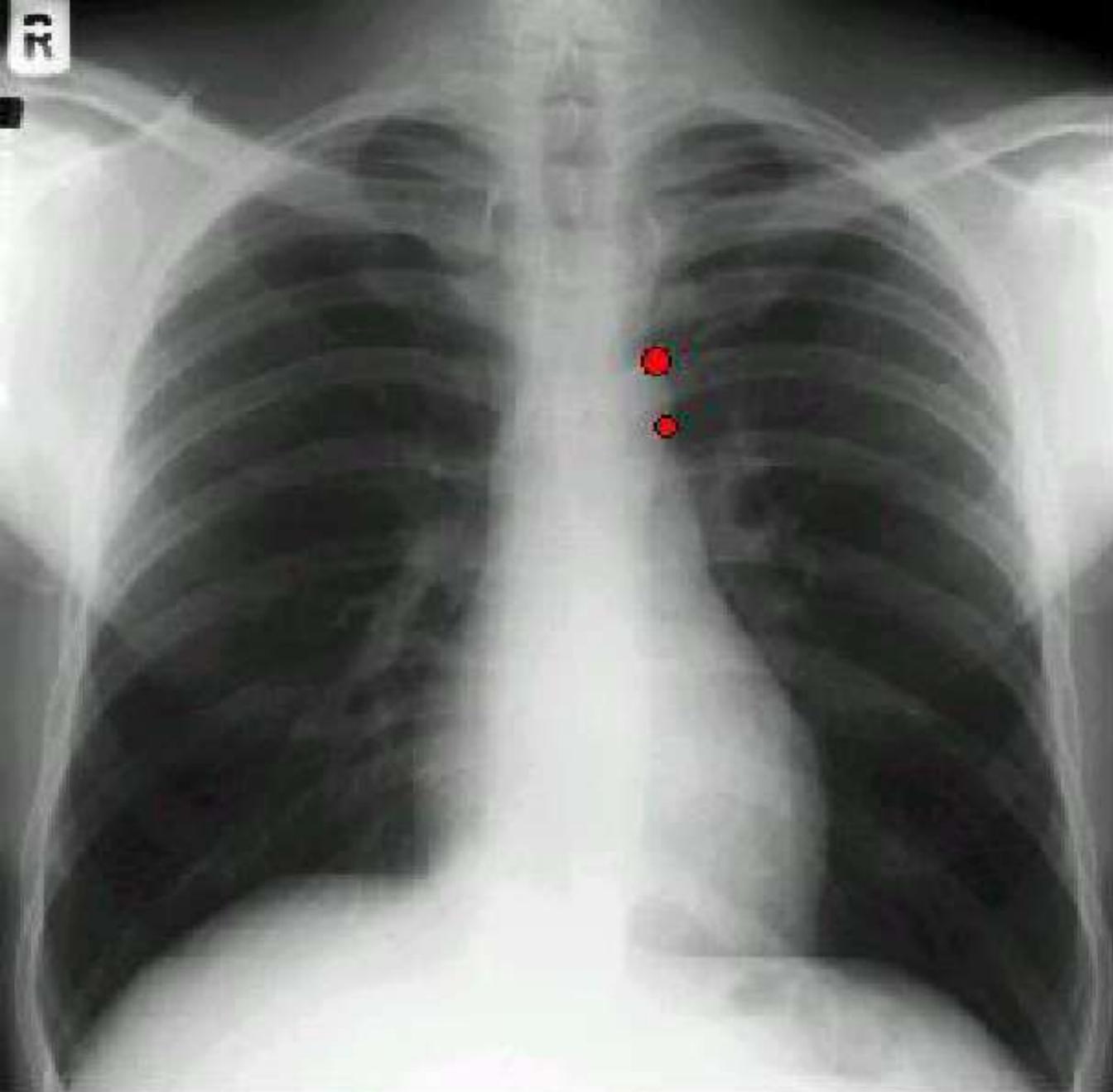
Fig. 7.1 Sarcoidosis. Bilateral hilar node enlargement.







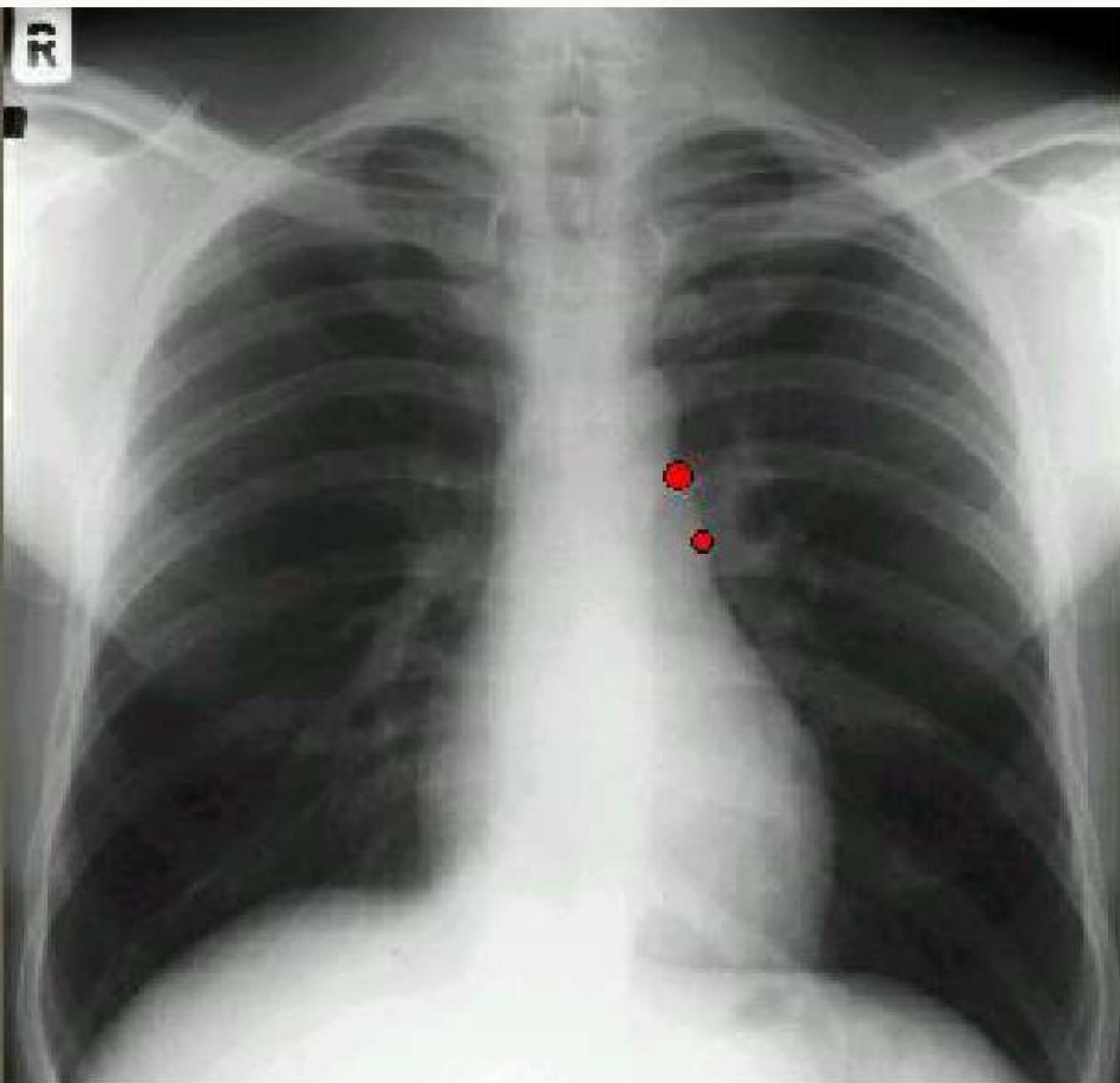




Heart & Vessels

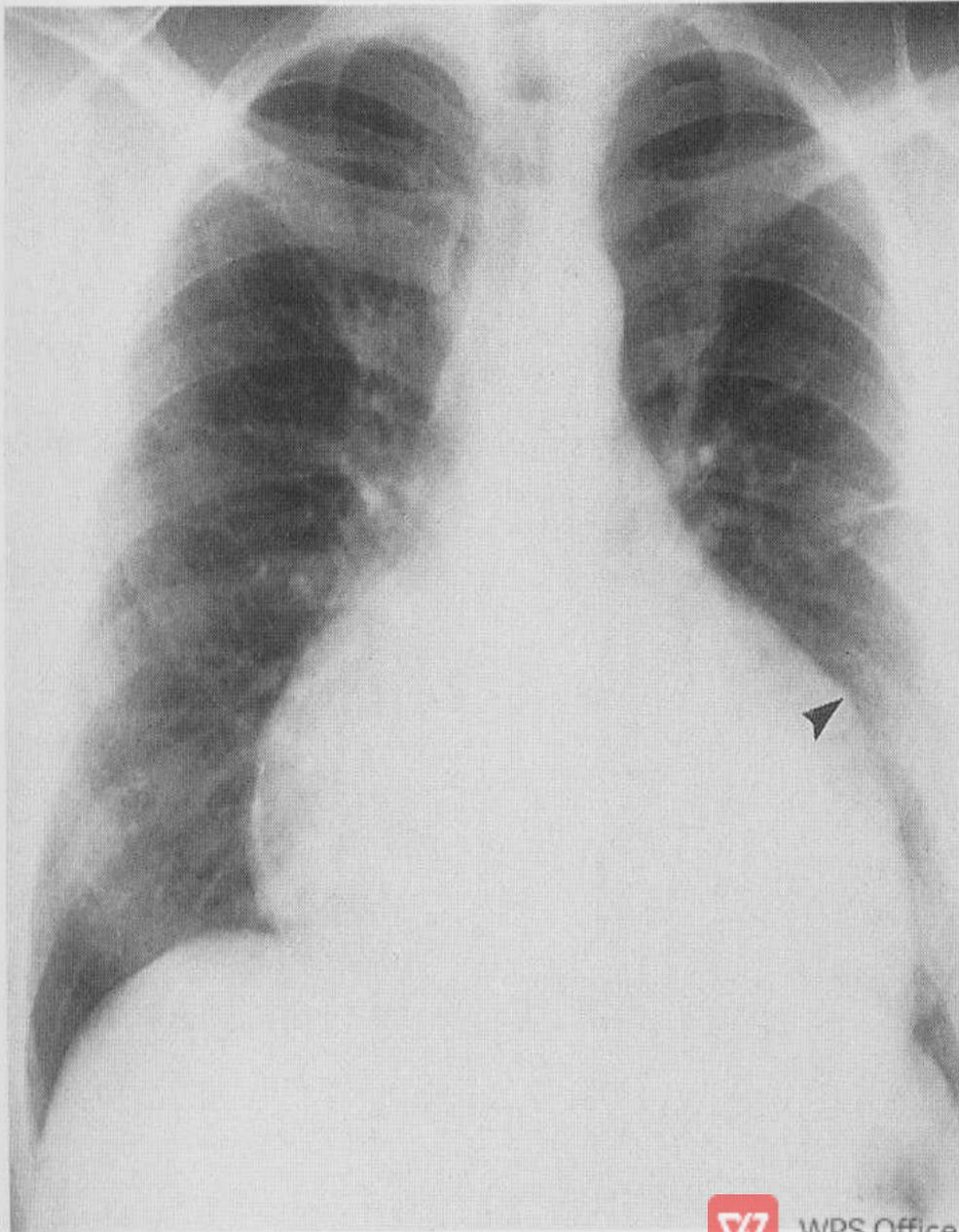
Prominent
Knuckle
Indicate
systemic
hypertension
mostly

Arch of Aorta
(Aortic knuckle)

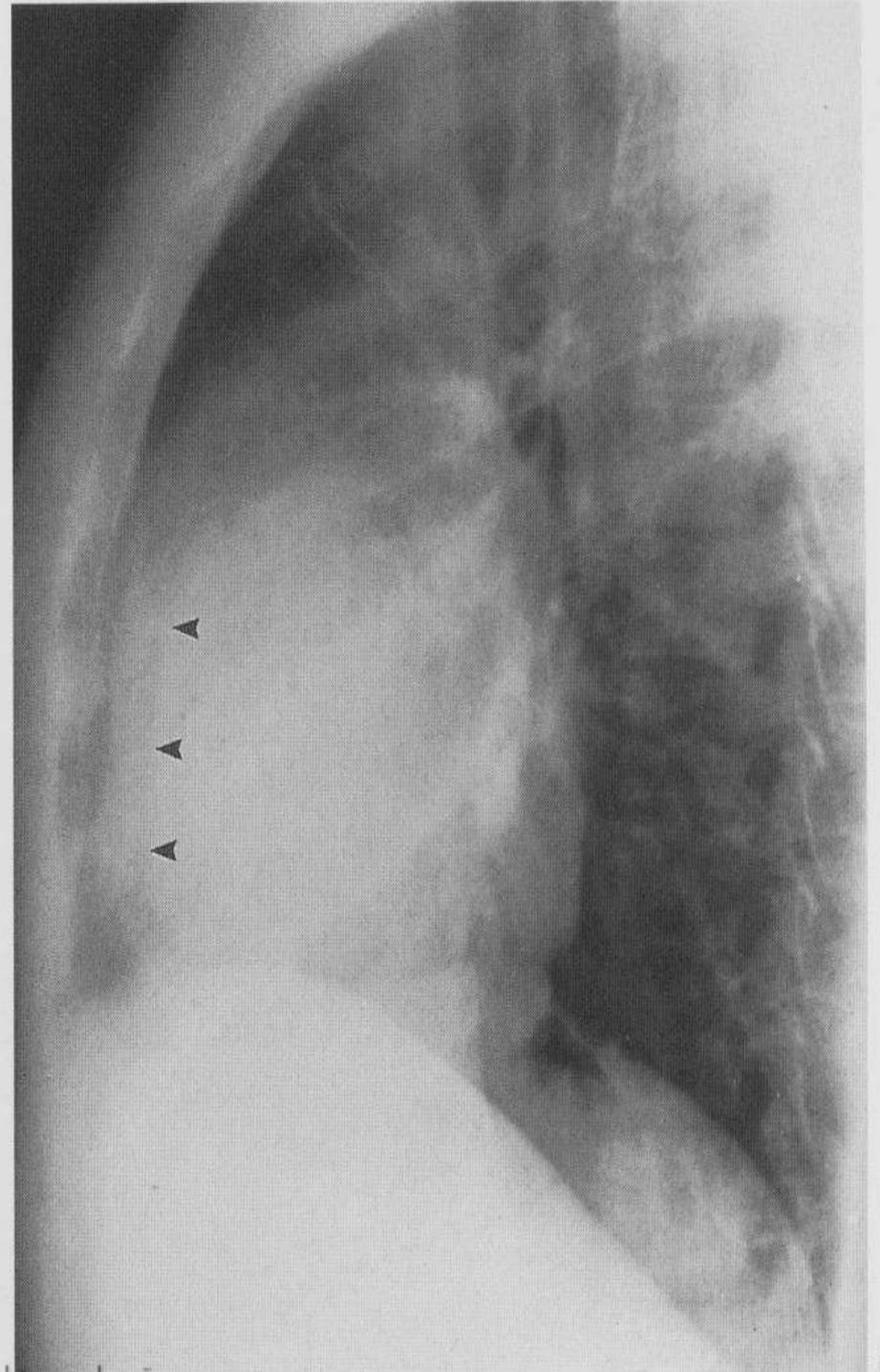


Heart & Vessels

Pulmonary Trunk



A



B

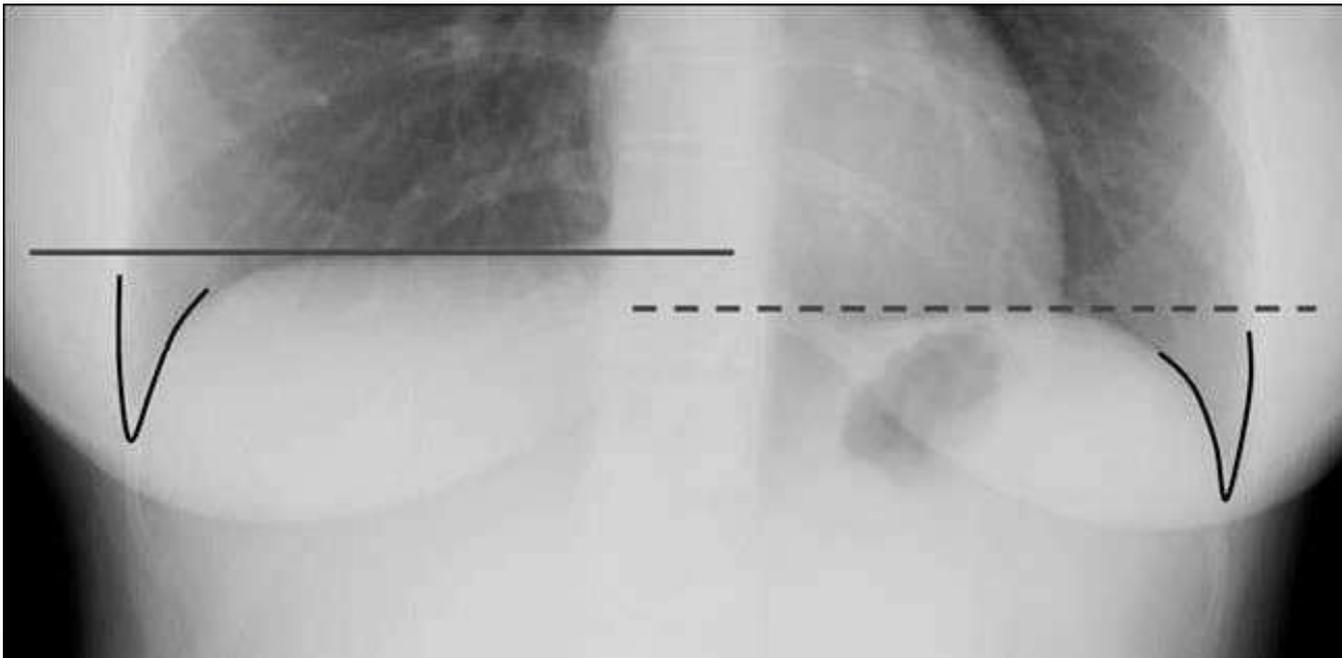


Findings

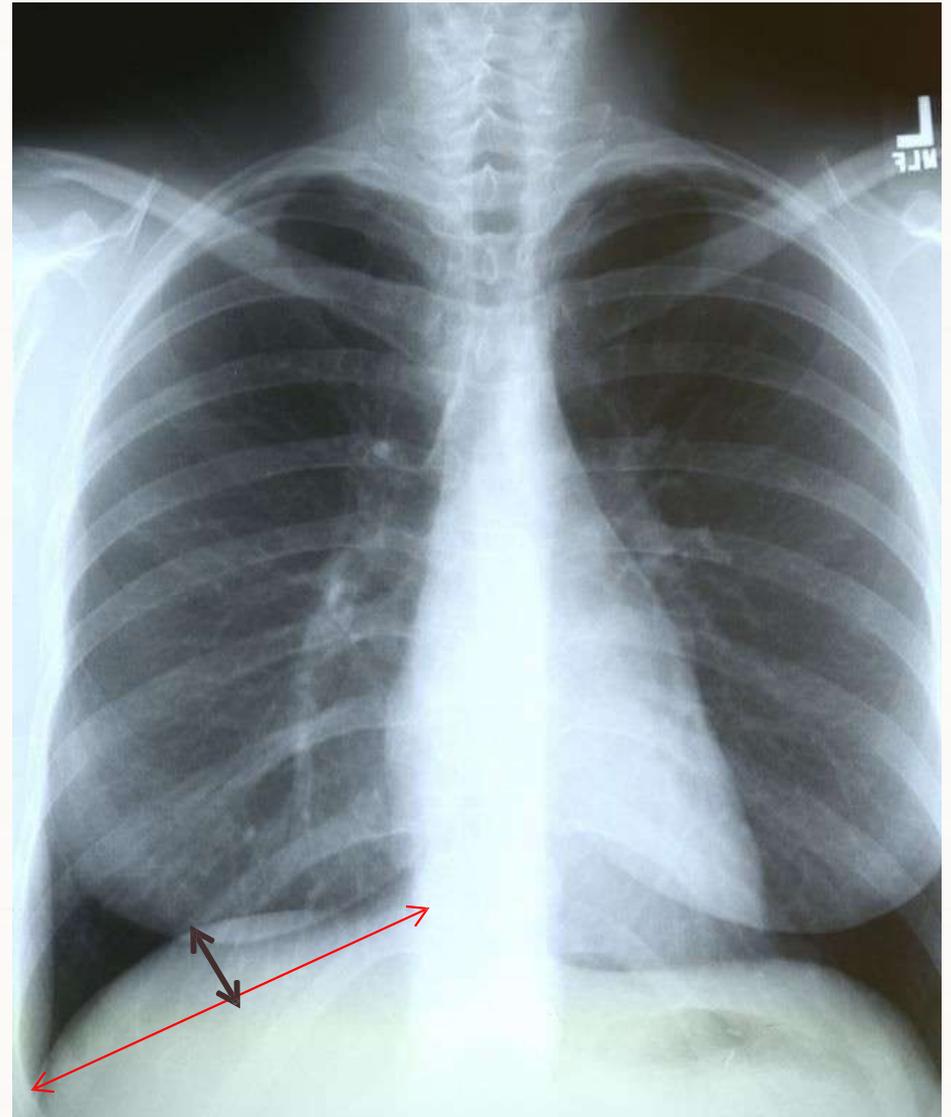
11.

Diaphragm:

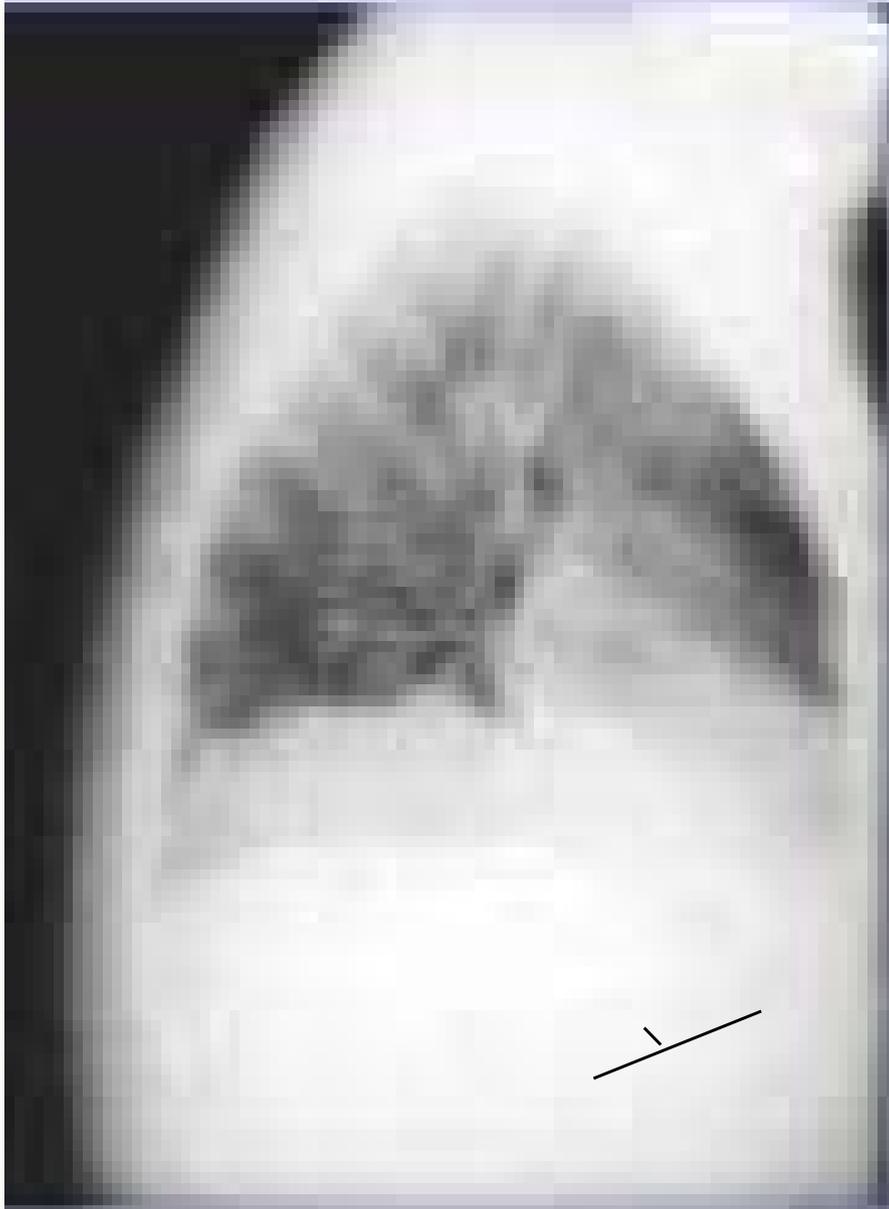
- The highest point of the right diaphragm is usually 1–1.5 cm higher than that of the left.
- Each costophrenic angle should be sharply outlined.



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



Unilateral Left Diaphragmatic Paralysis

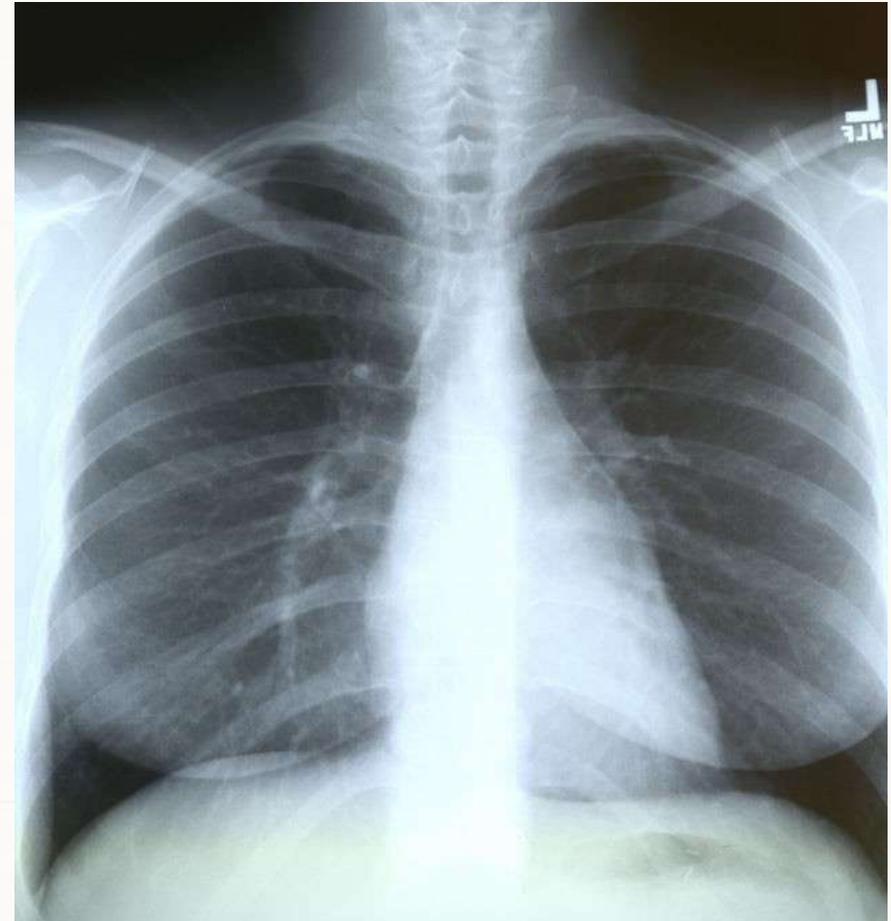


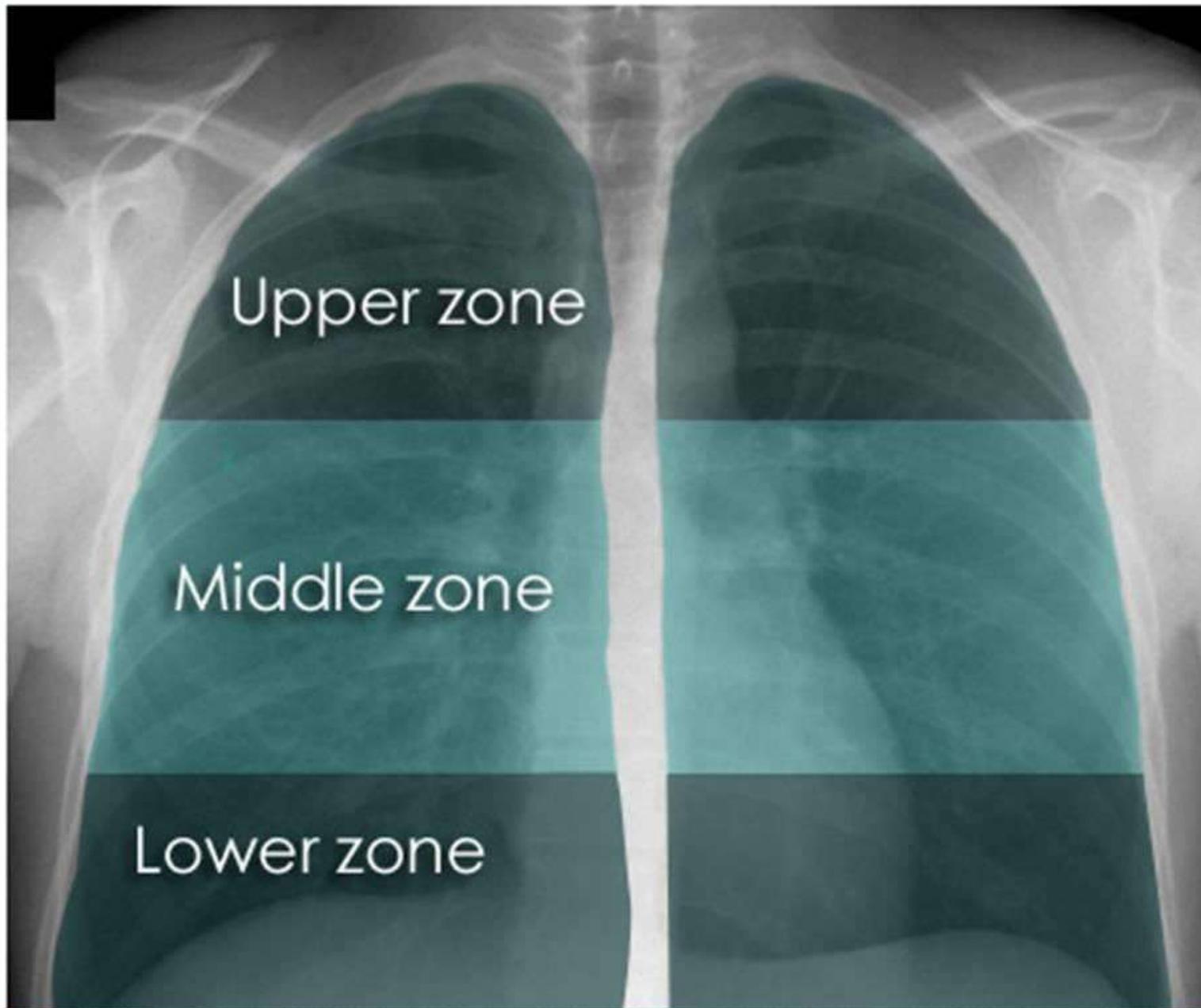
Findings

12. Lung

Fields Pulmonar wascular markings (BVM)

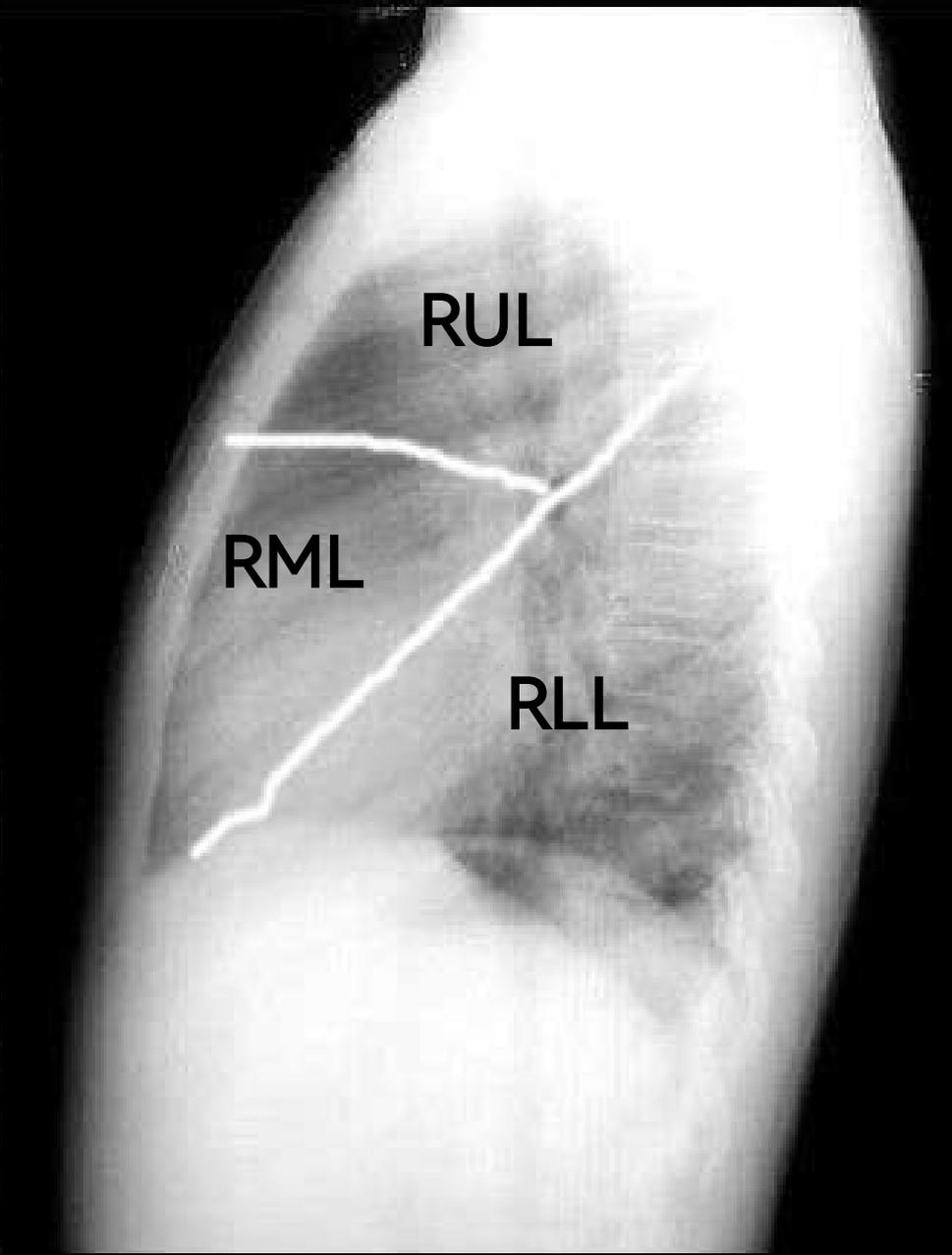
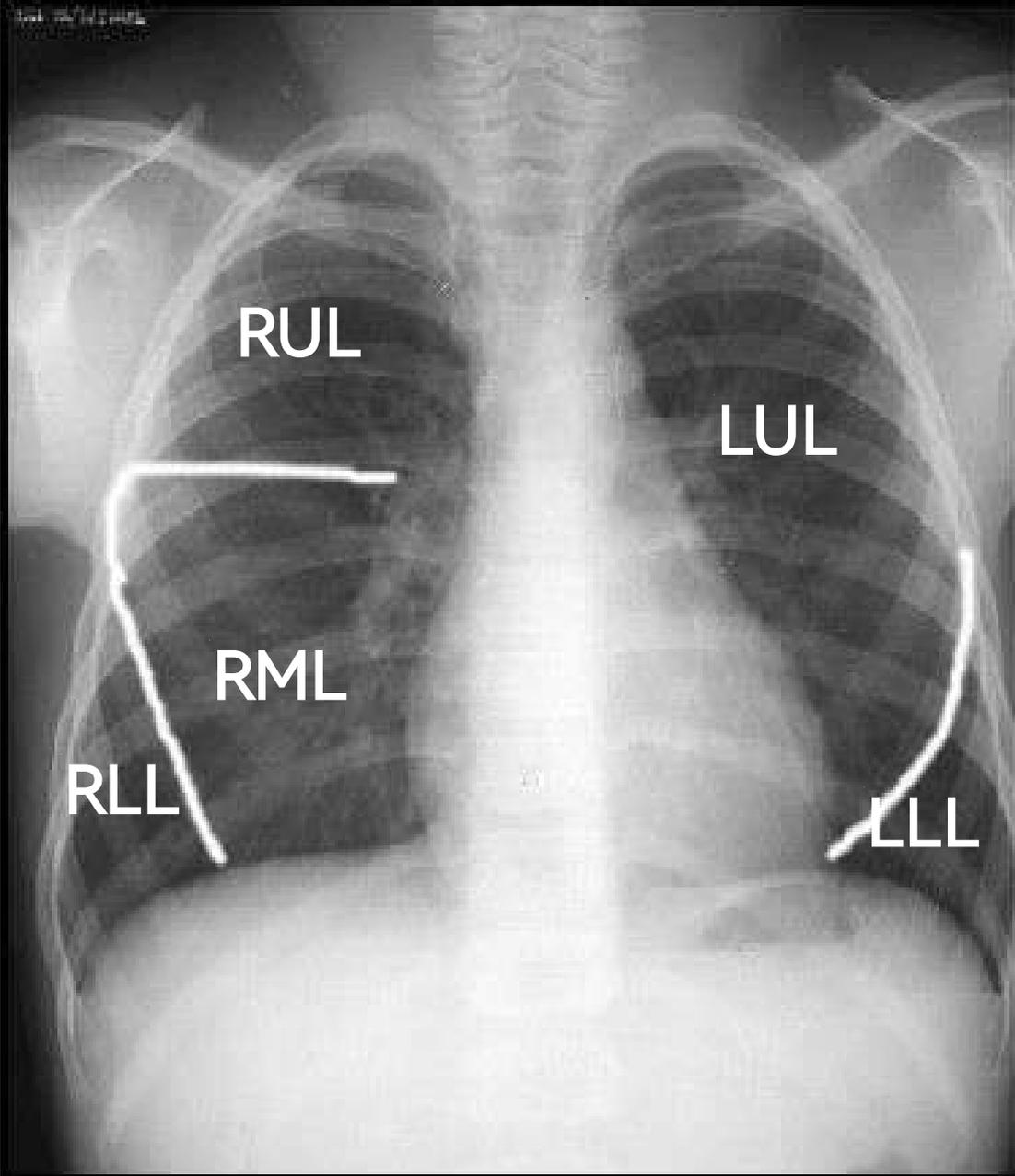
- Opacities, localized or diffuse.
- To determine location of any abnormalities ...
 - Use radiologic lung zones.
 - Use fissures to define lung lobes

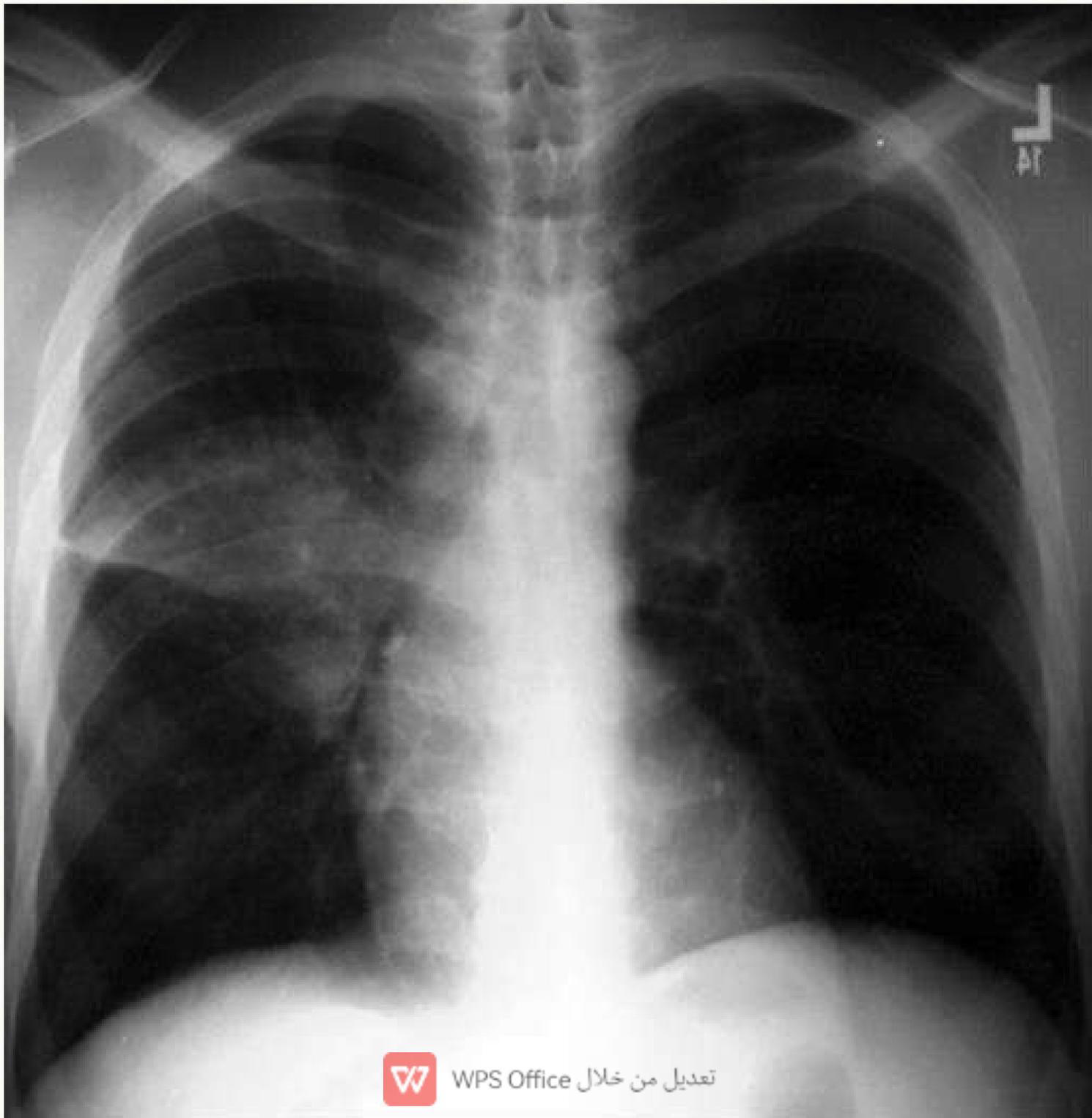


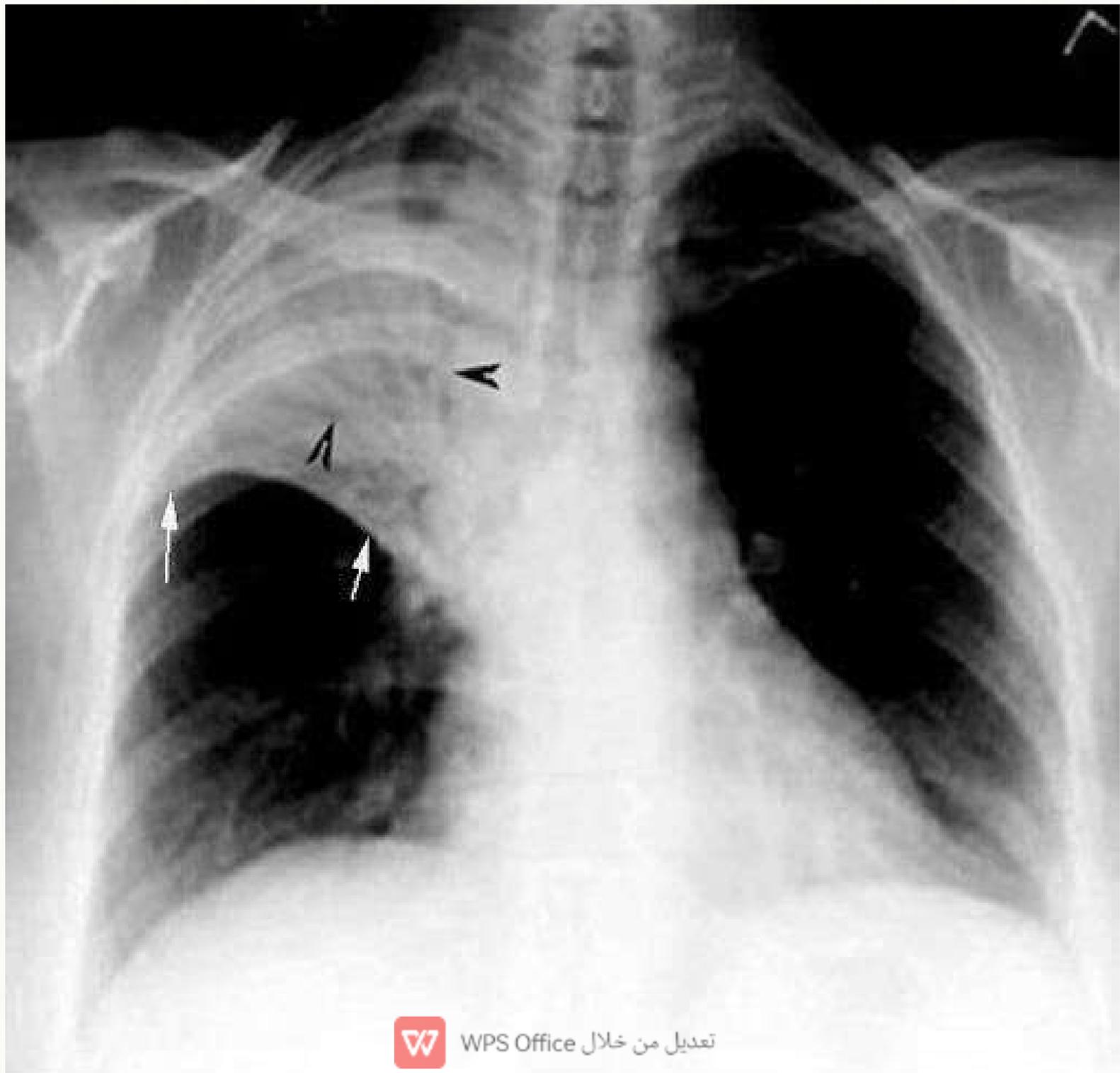


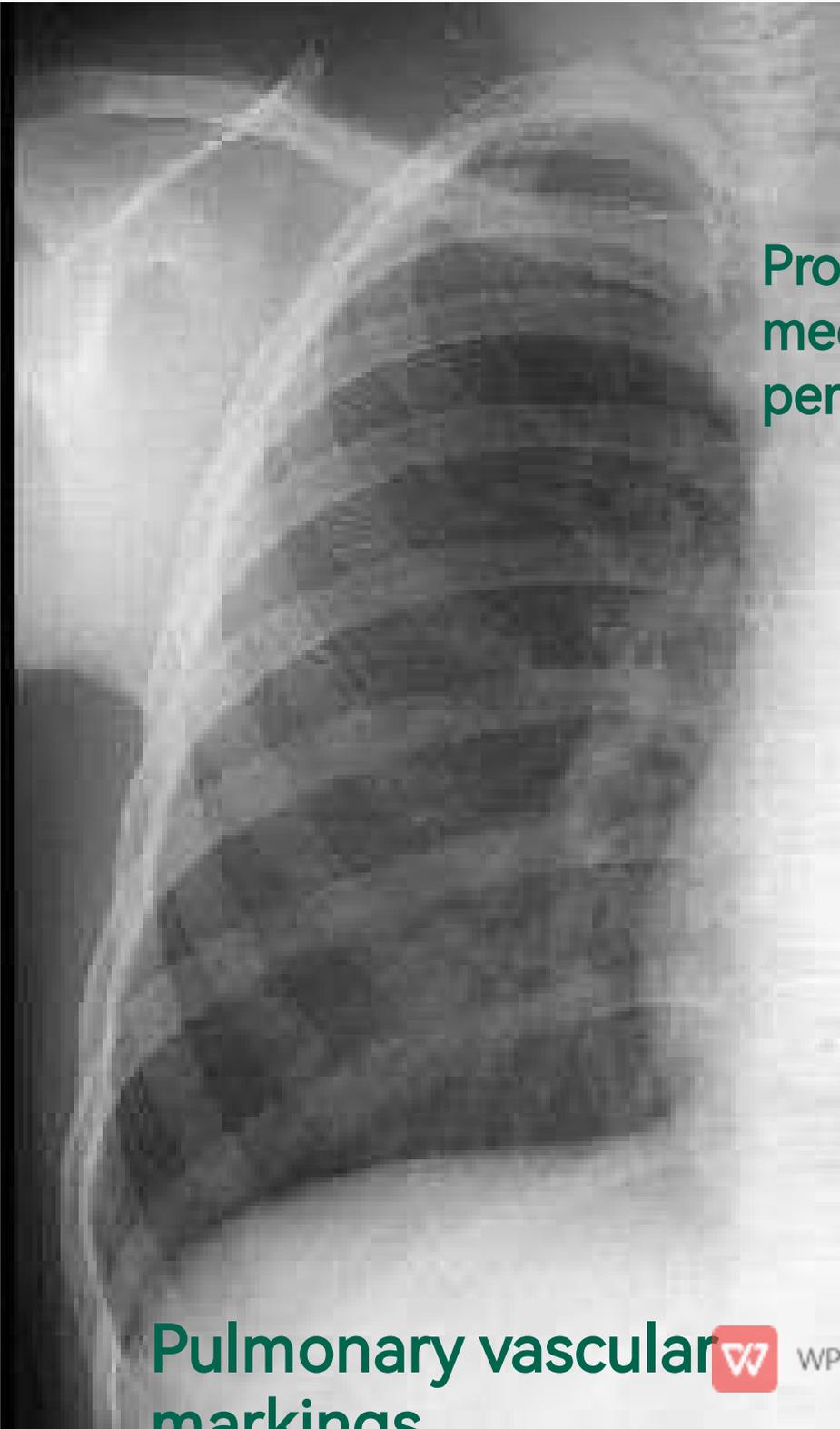
Each of these zones occupies approximately one third of the height of the lungs.





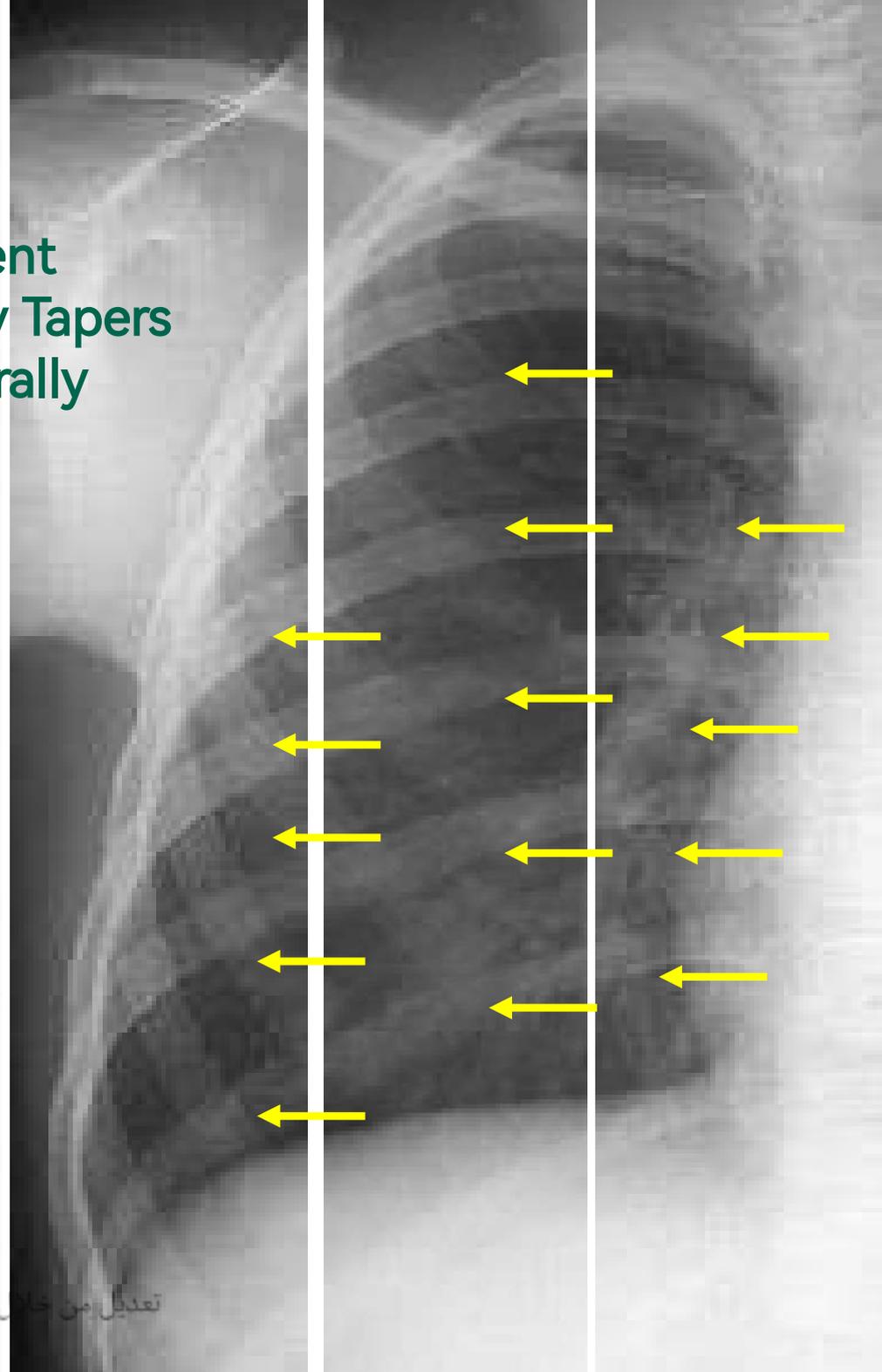






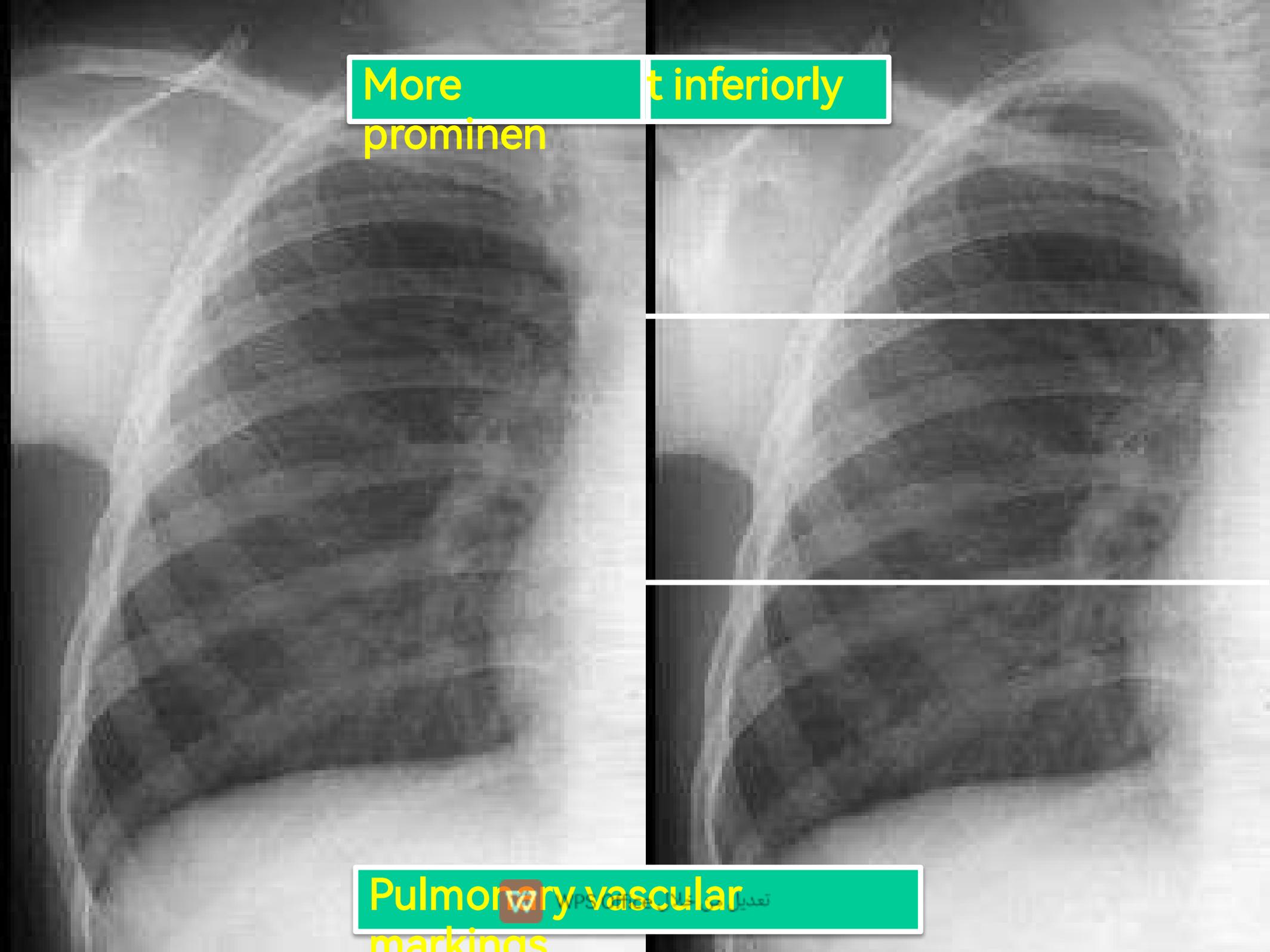
Prominent medially Tapers peripherally

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

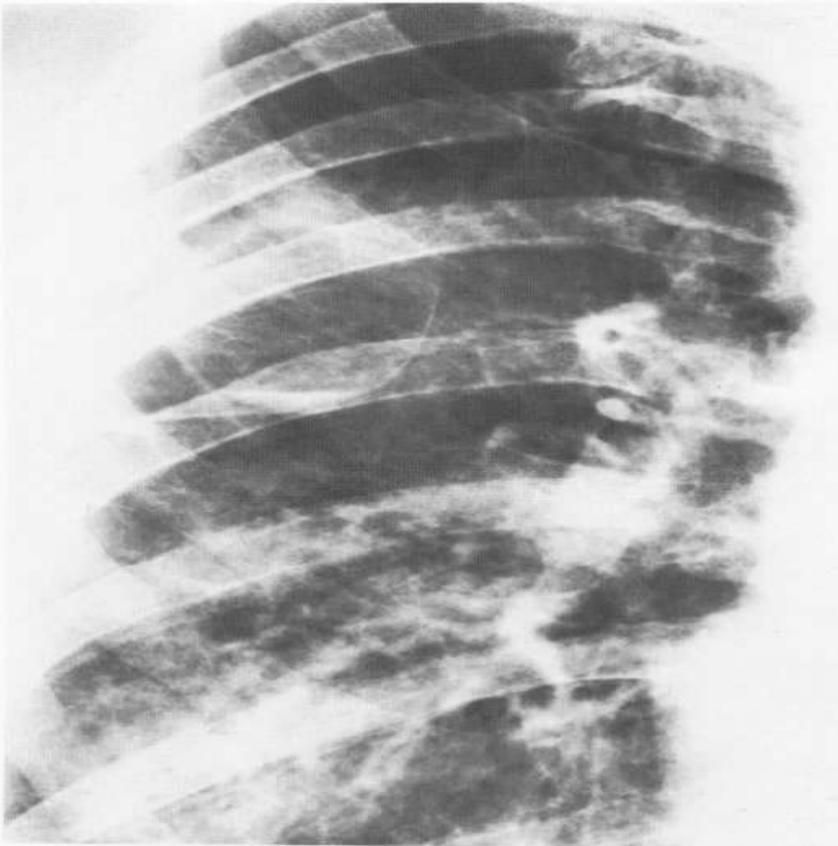
- Consolidation
- Cavitation
- Mass
- Fibrosis
- Atelectasis

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



Radiological description:

Heterogenous opacity.



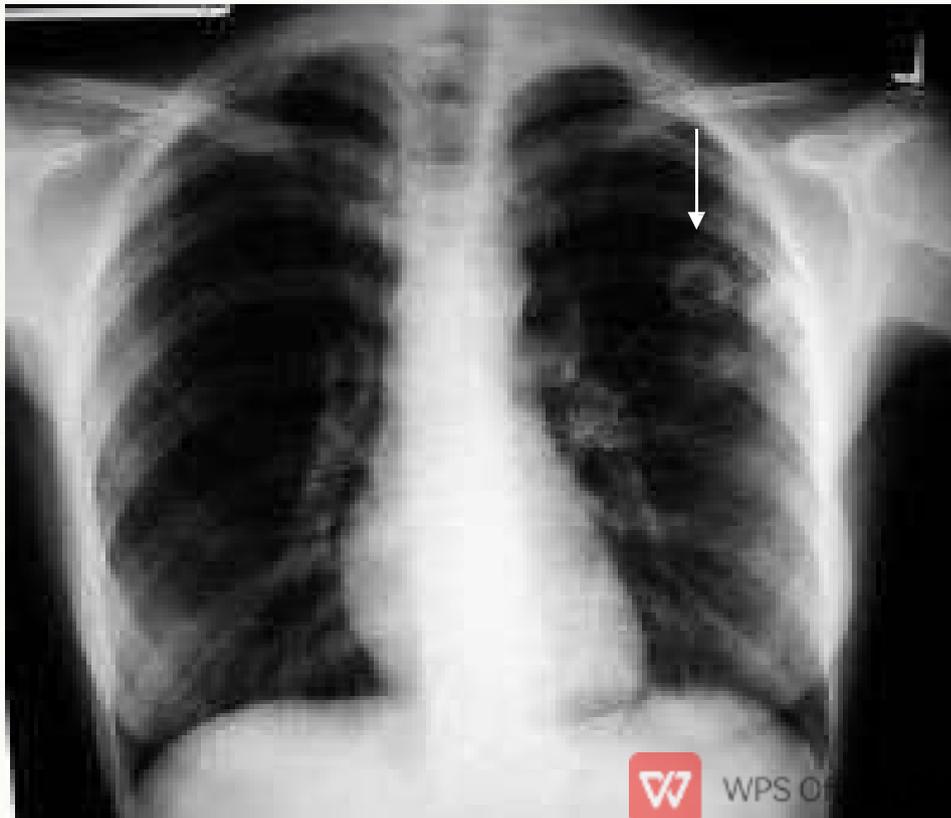
Homogenous opacity.



Radiological description:

- **Nodule:**

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



Radiological description:

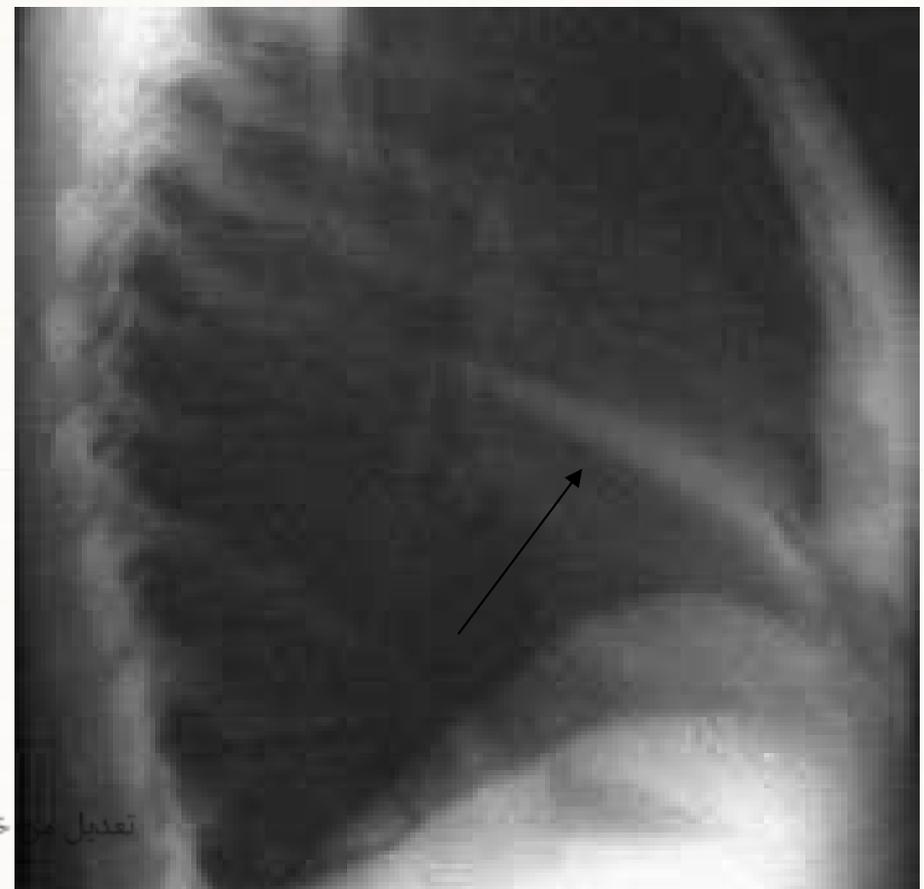
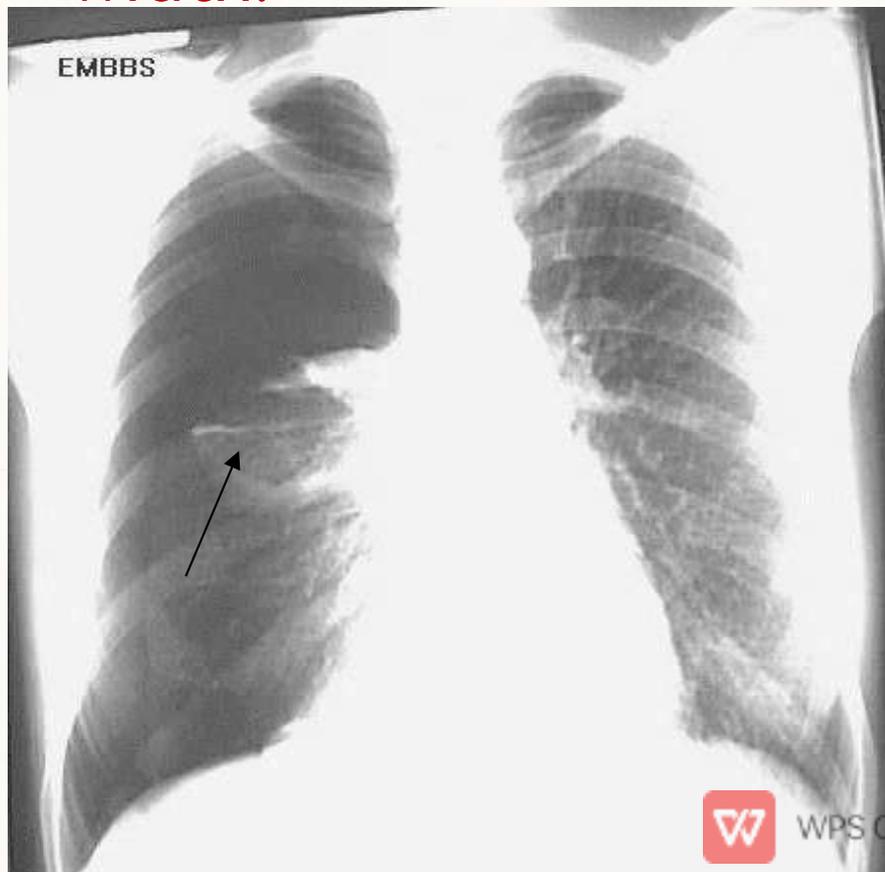
Mass:

Pulmonary opacity 3 cm or more in diameter.



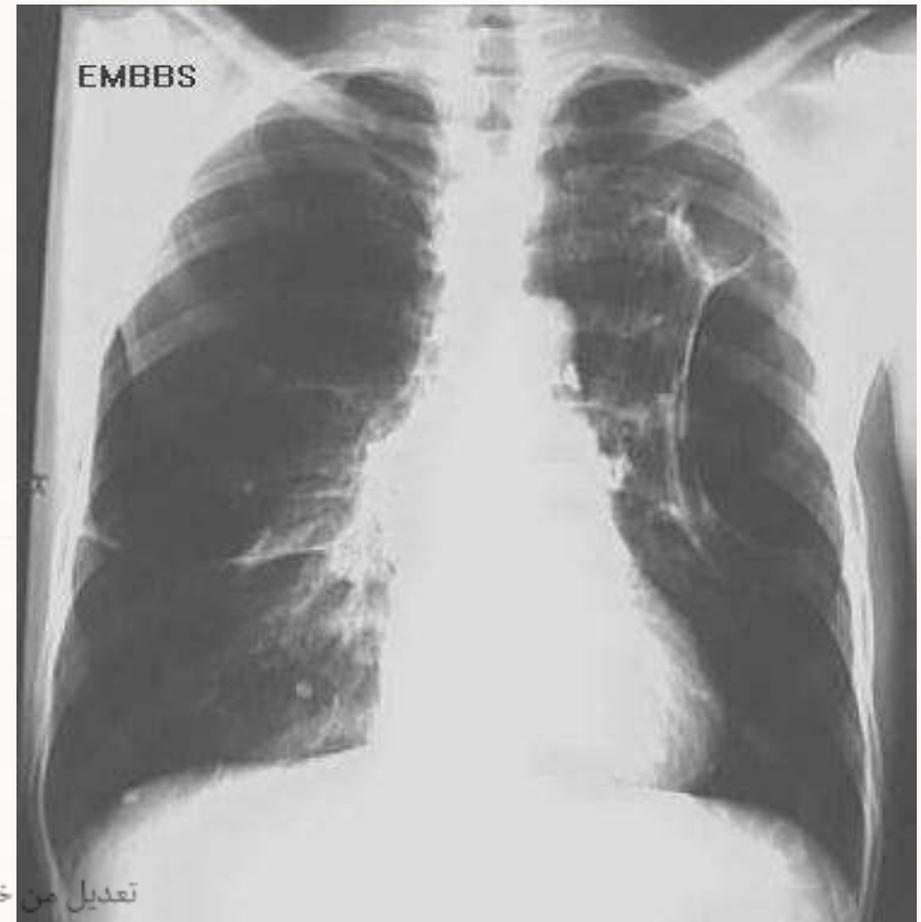
Radiological description:

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



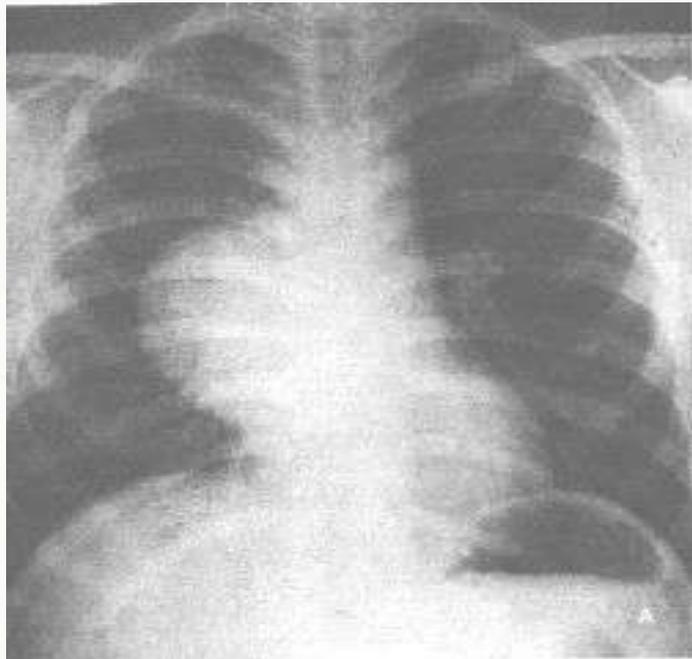
Radiological description:

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



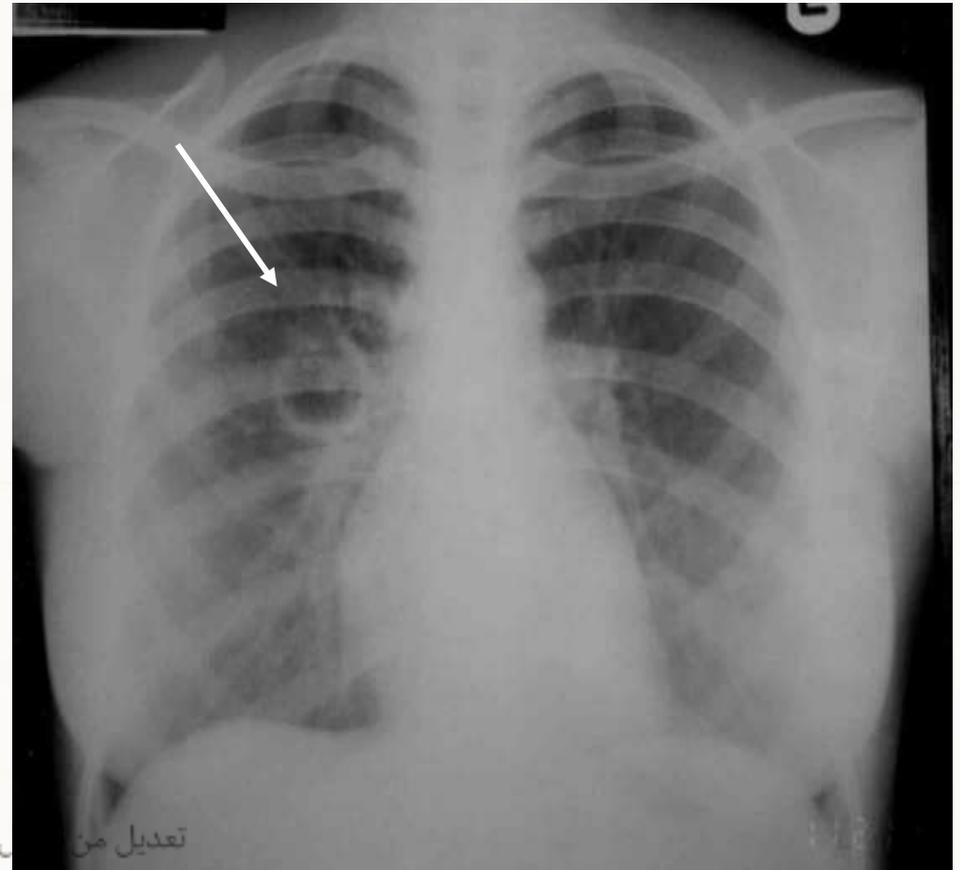
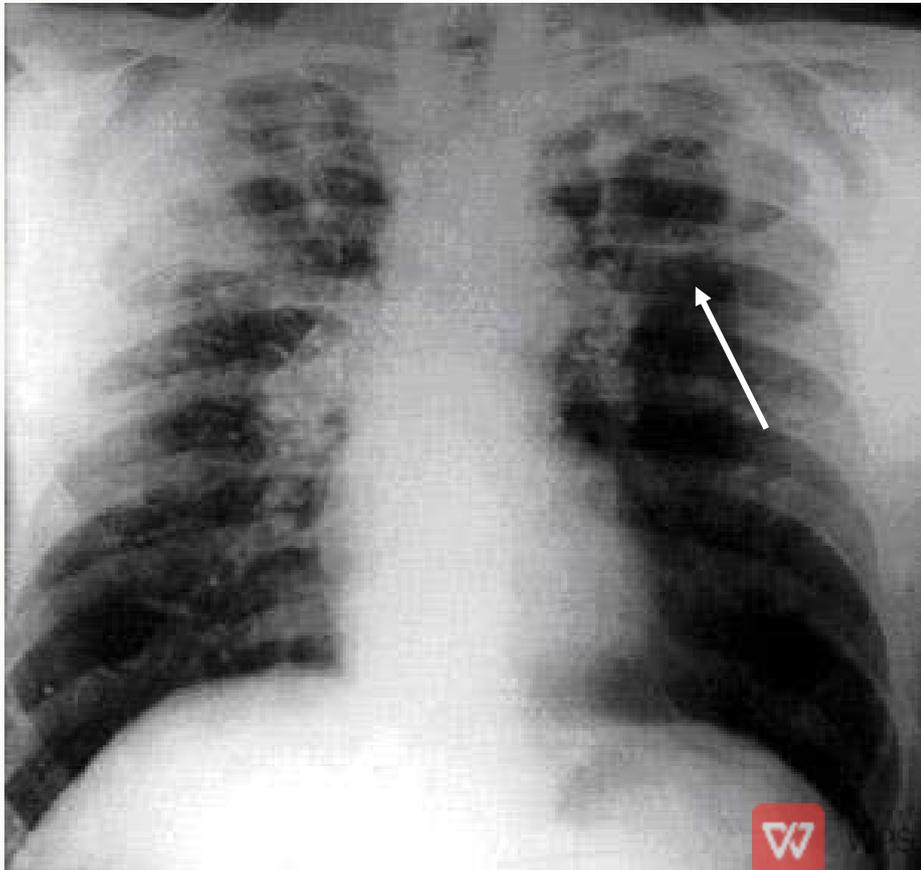
Radiological description:

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



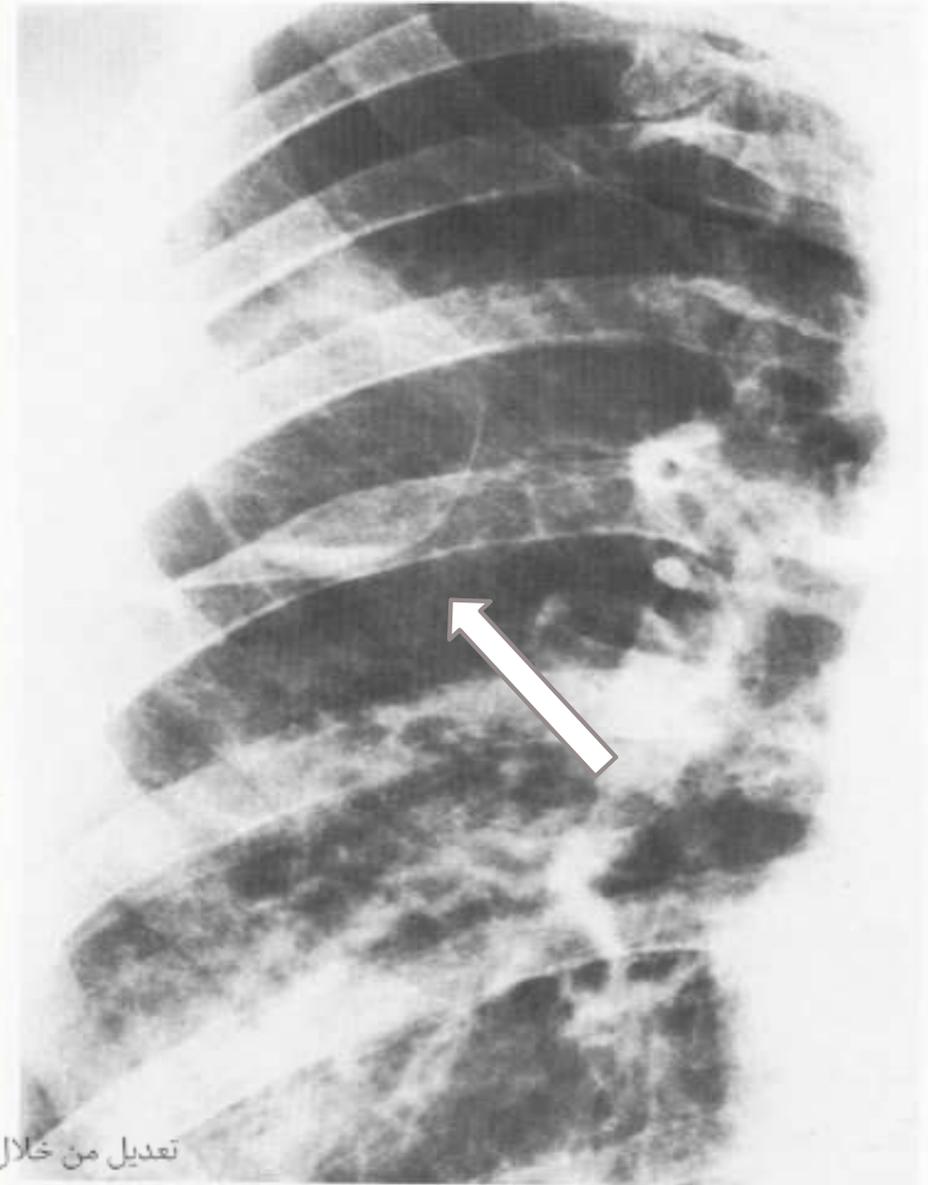
Radiological description:

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



Radiological description:

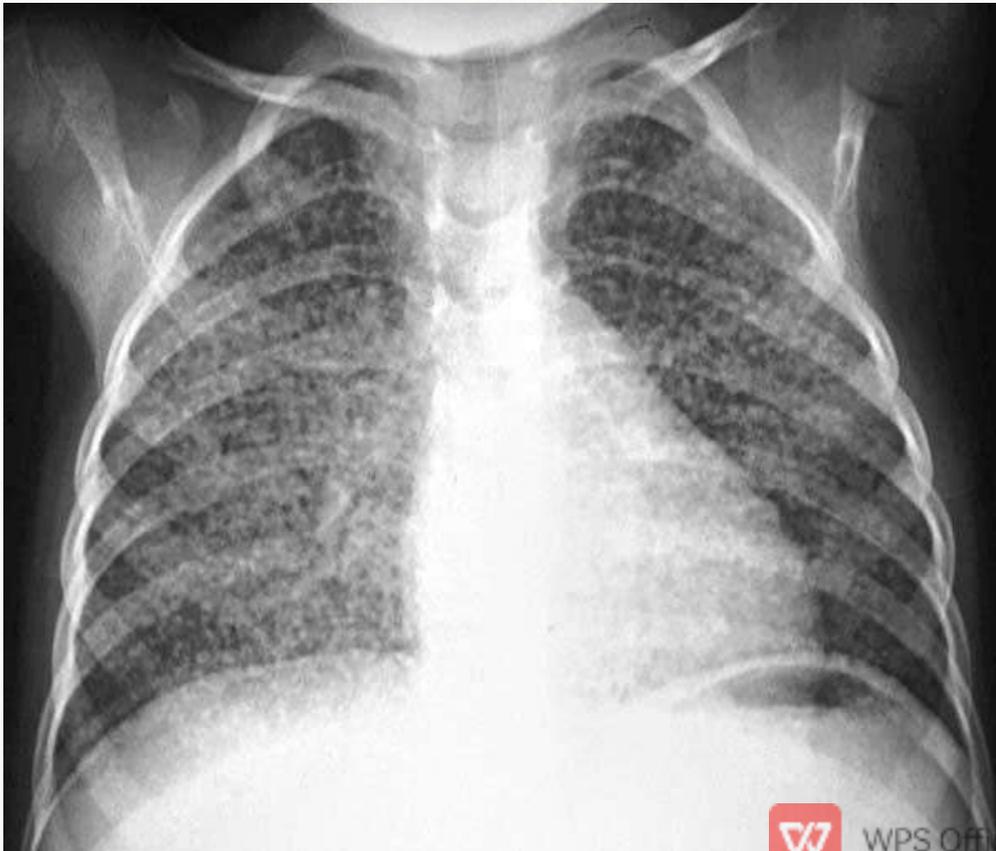
- **Pneumatocele:**
Bulla resulting from pneumonic check-valve obstruction that rapidly
↑ in size.



Radiological description:

Miliar shadows:

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



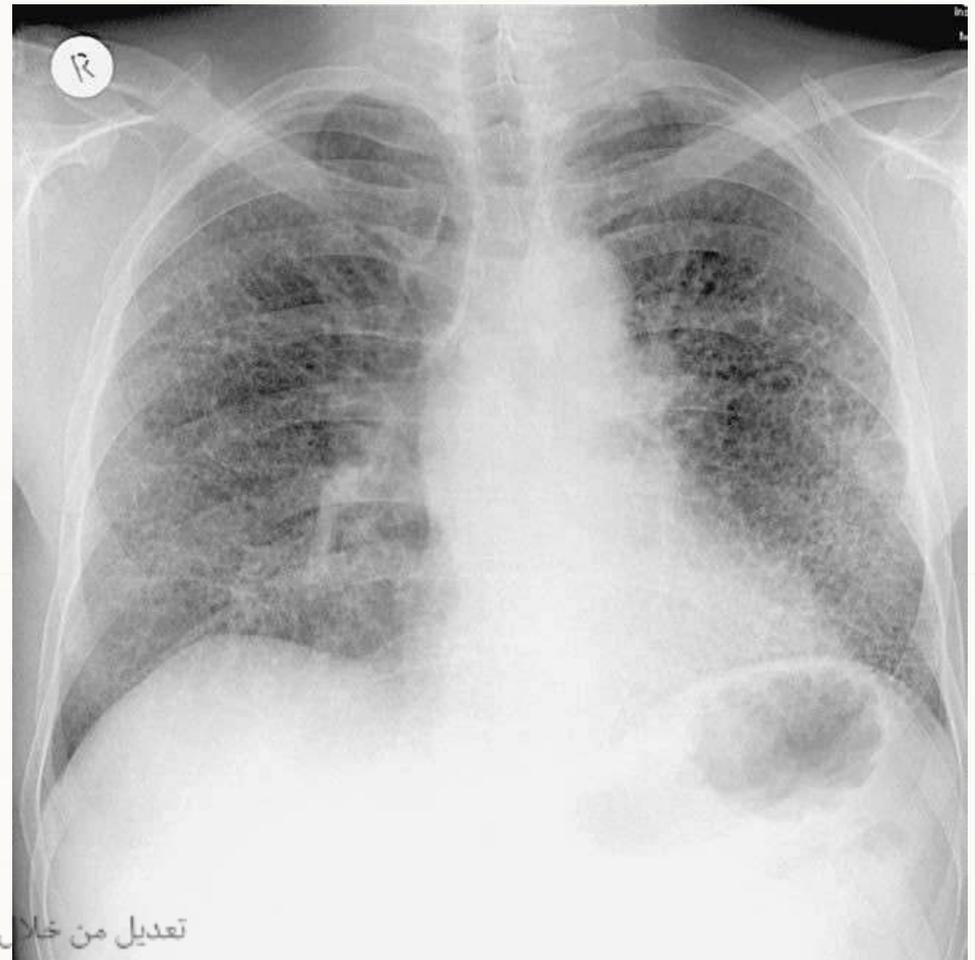
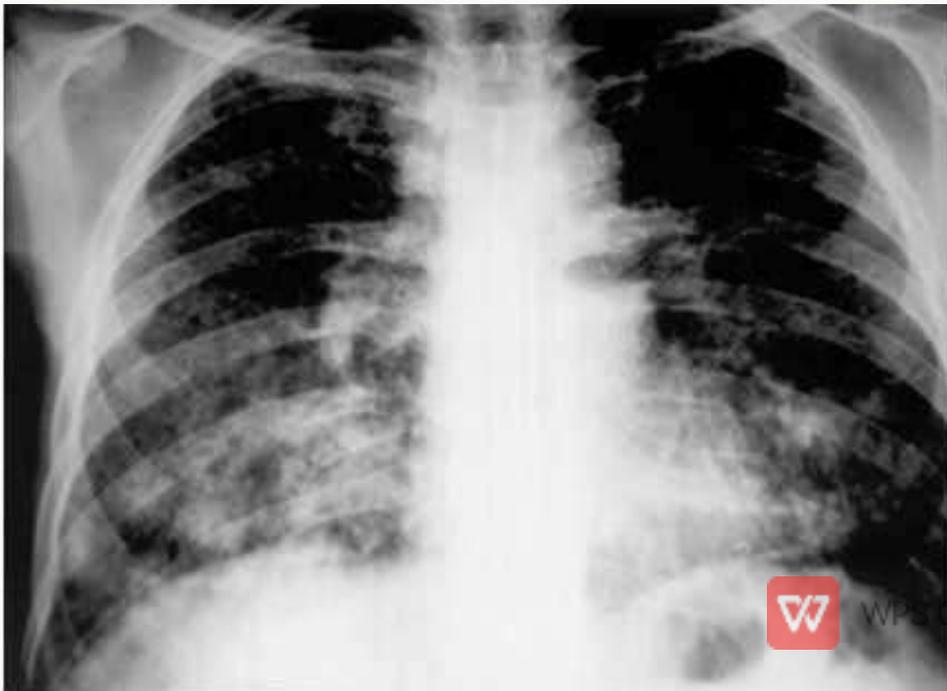
Radiological description:

- **Reticular:**

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

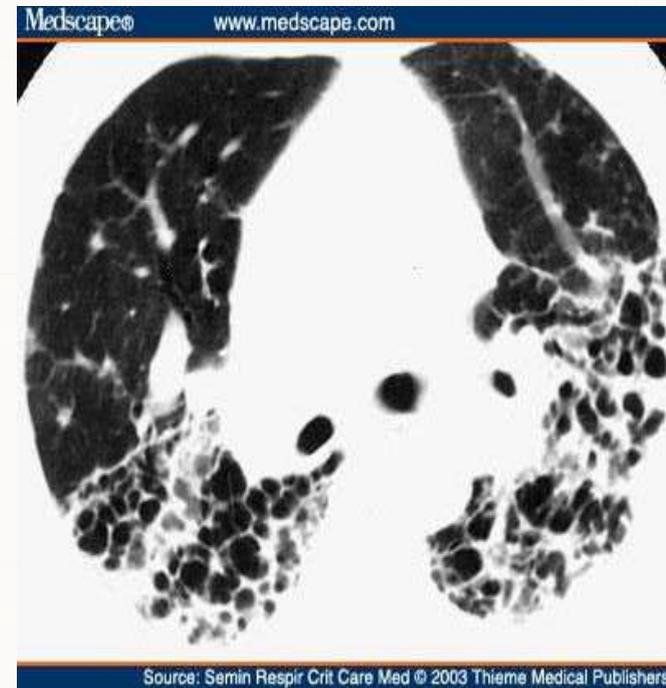
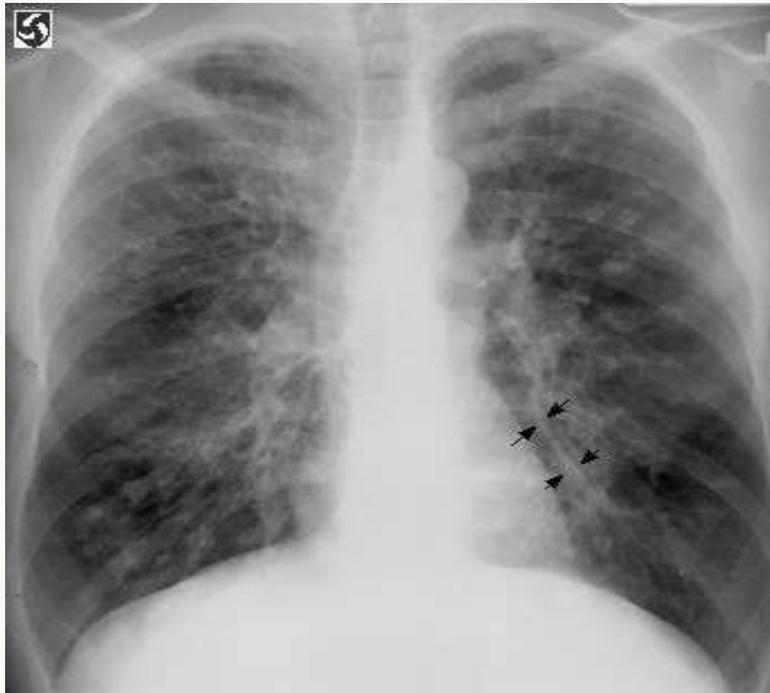
- **Reticulonodular:**

Mixed reticular and miliary.



Radiological description:

Honeycomb shadowing:
Multiple Cysts 5-10 mm in size.



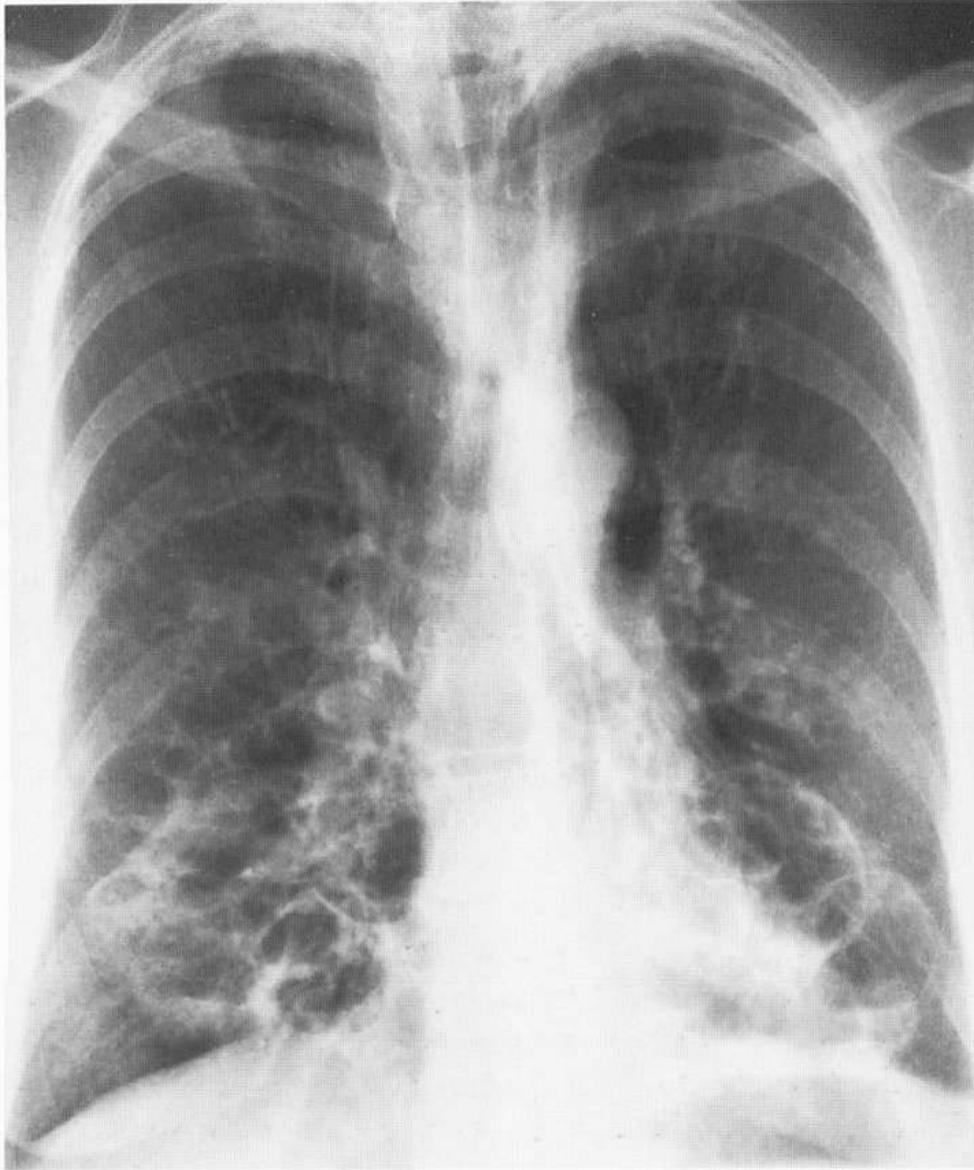


Fig. 6.9 Bronchiectasis. Multiple ring shadows, many containing air–fluid levels, are present throughout the lower zones of this patient with cystic bronchiectasis.

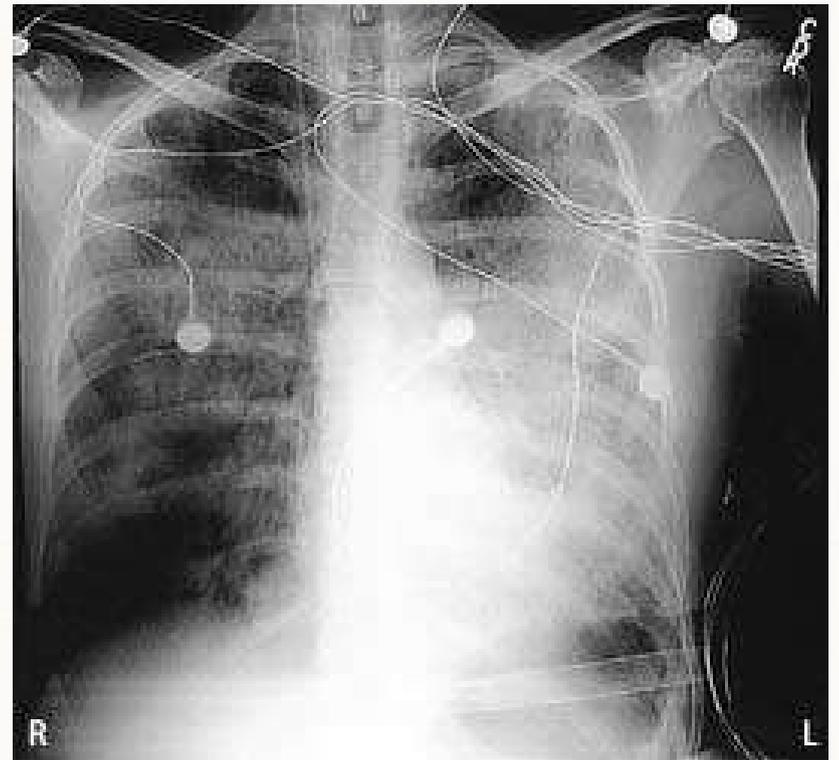


Fig. 6.11 Cystic bronchiectasis. A CT image through the upper lobes demonstrates multiple ring shadows. More caudal images reveal these to be due to irregularly dilated bronchi.

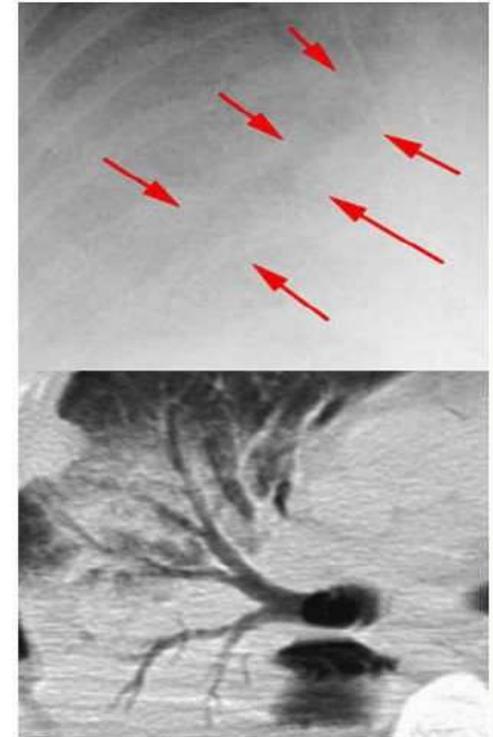


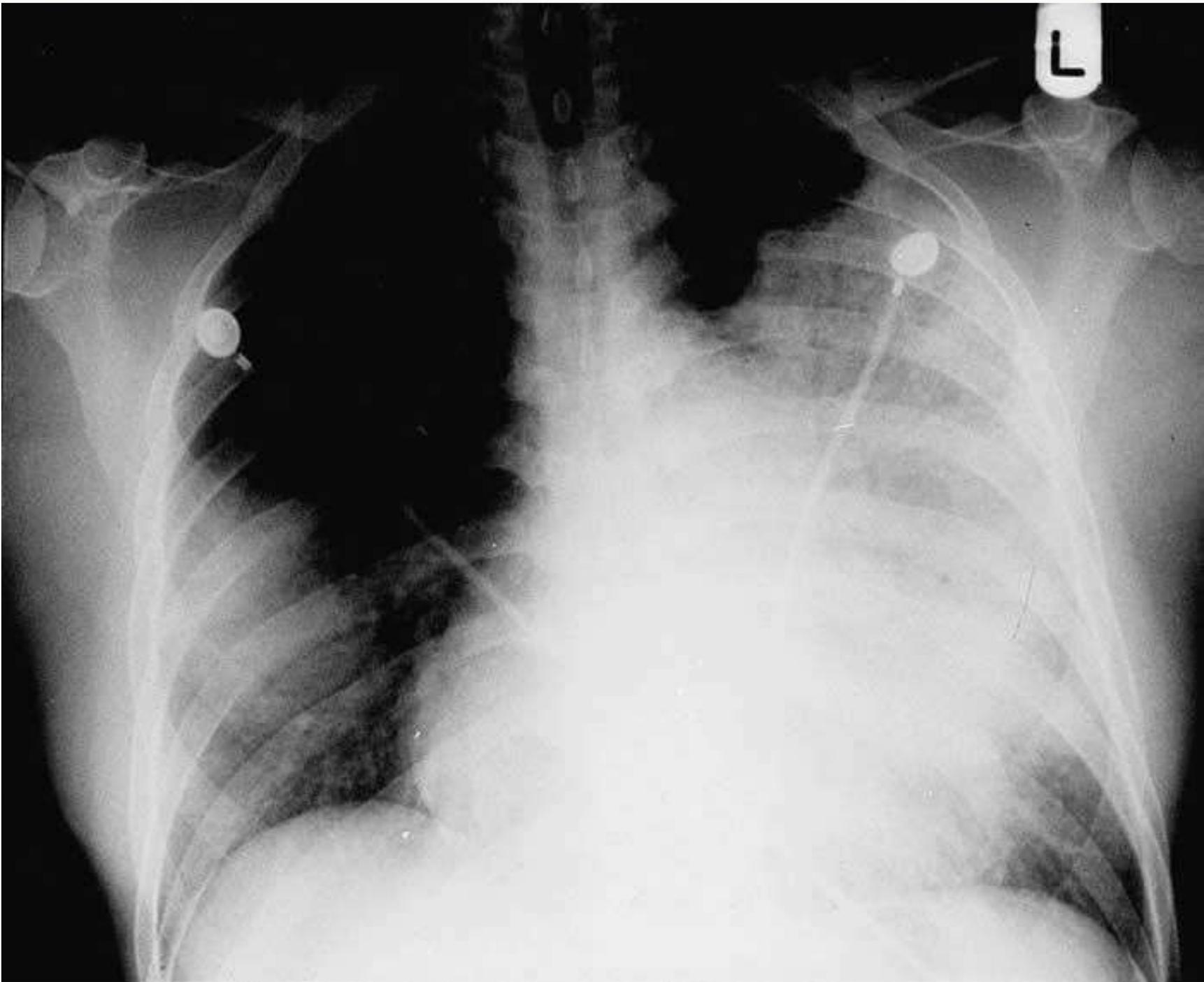
□ **Ground-Glass Opacity
“GGO”:**

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

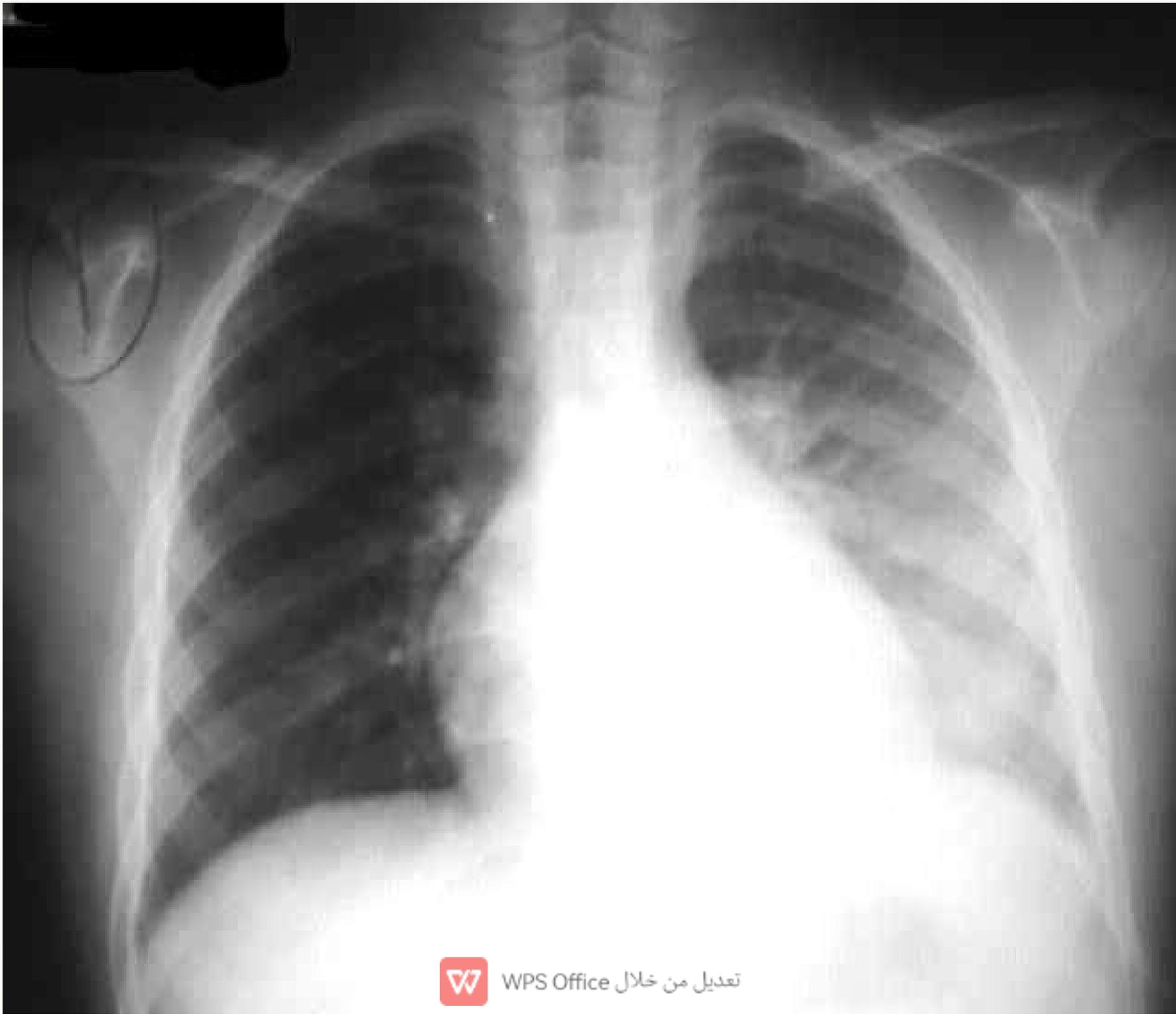


Air-Bronchogram Sign



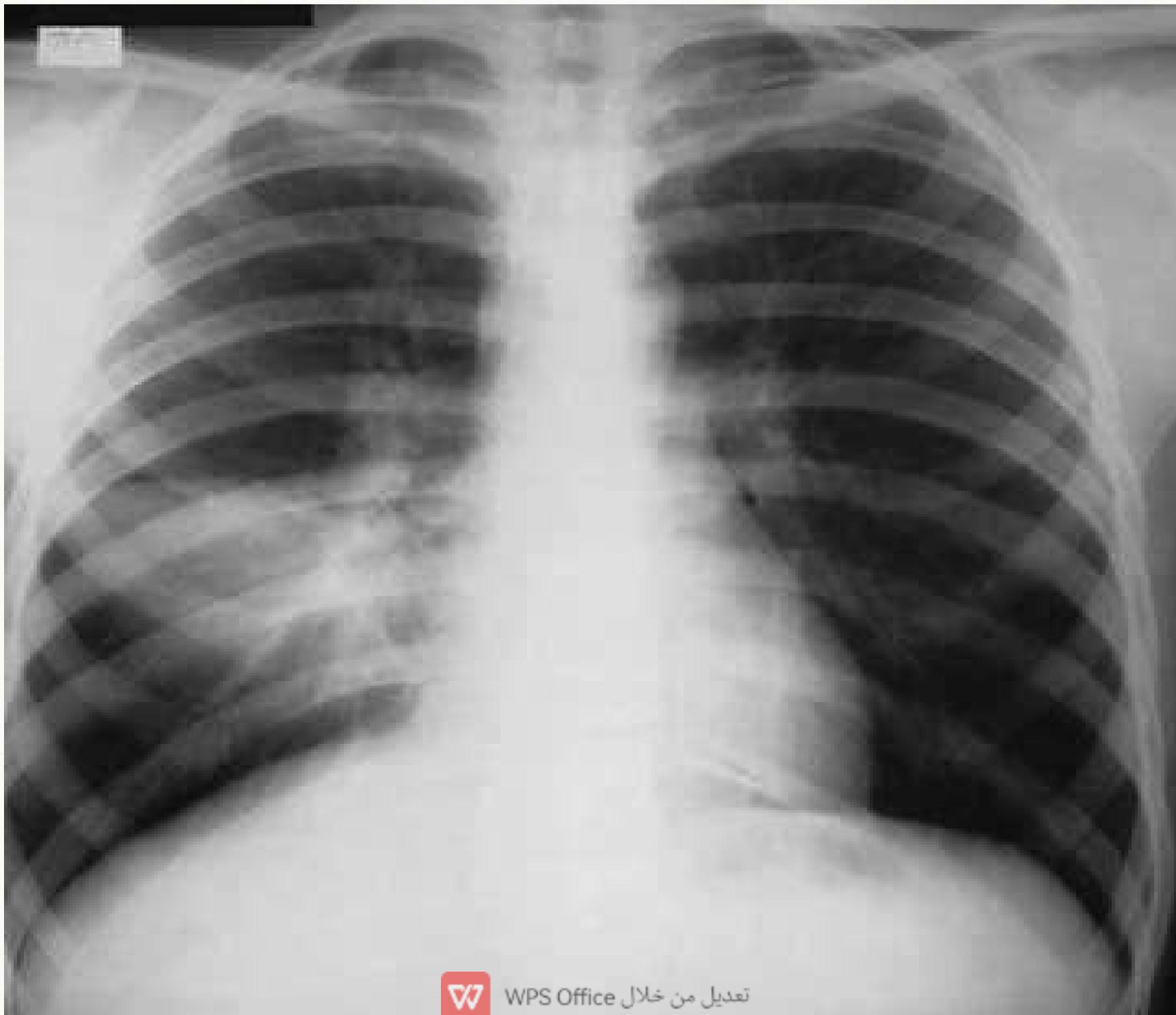


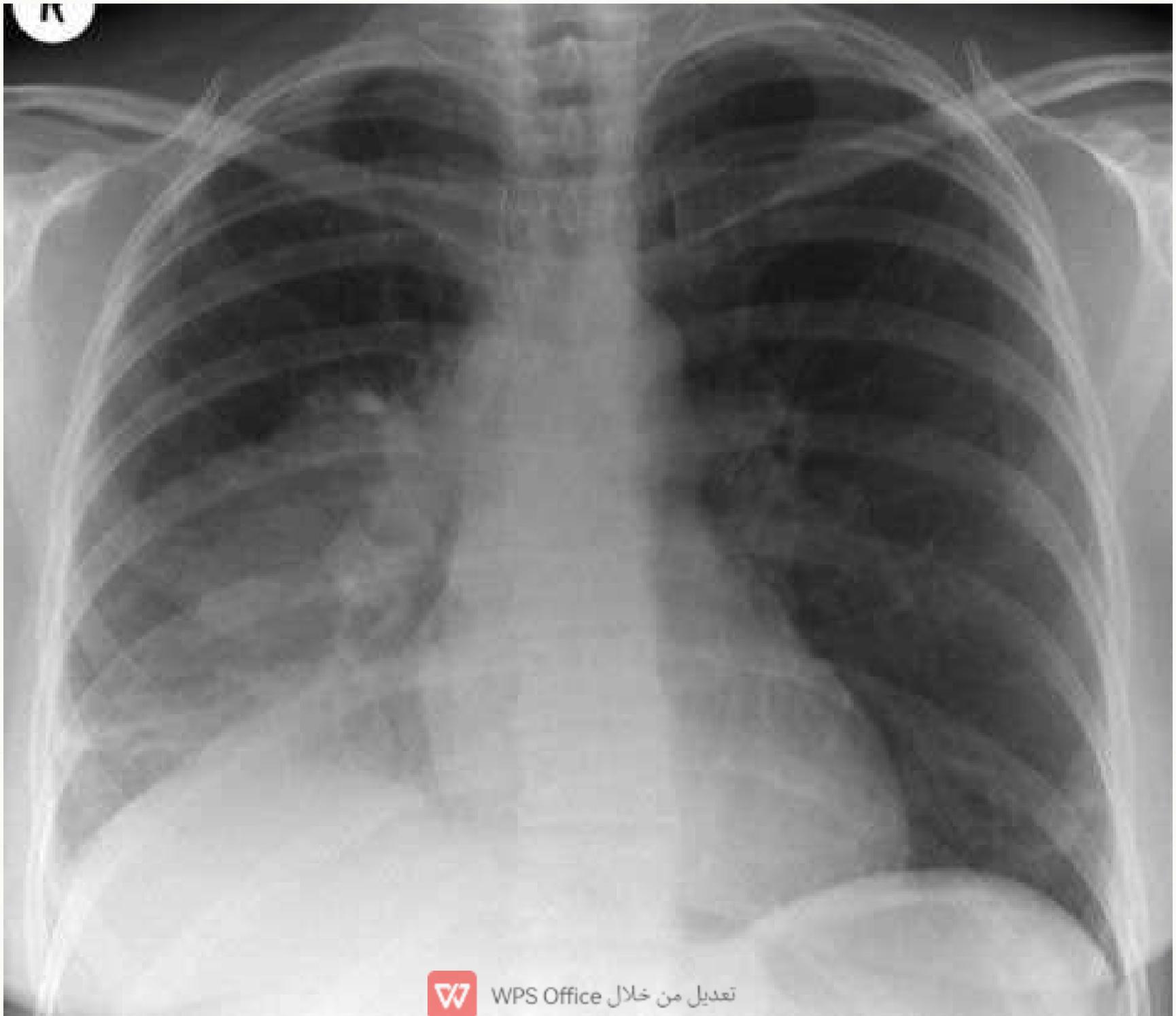
Severe pneumonia Multilobar involvement



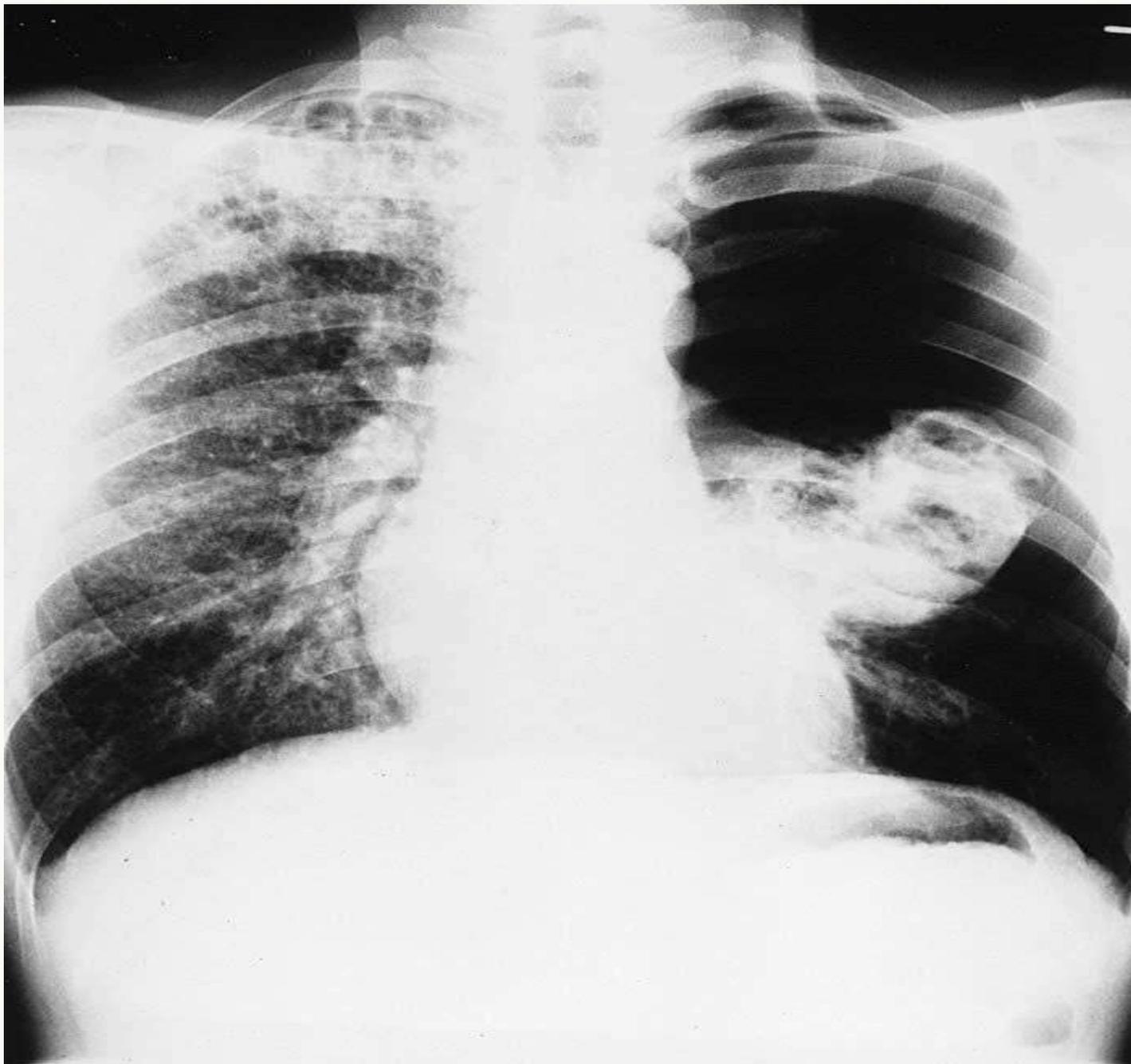


تعديل من خلال WPS Office





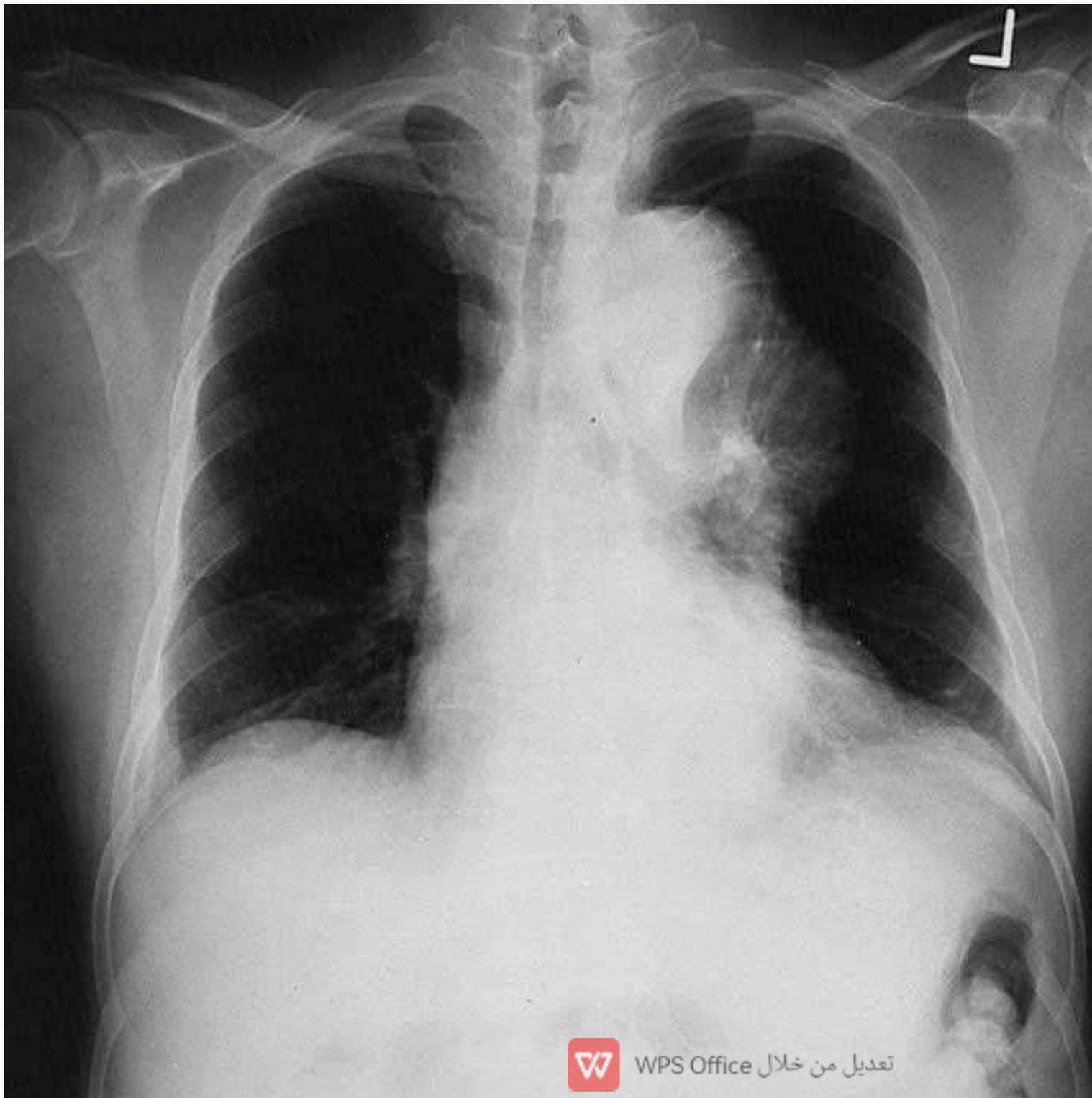
تعديل من خلال WPS Office



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

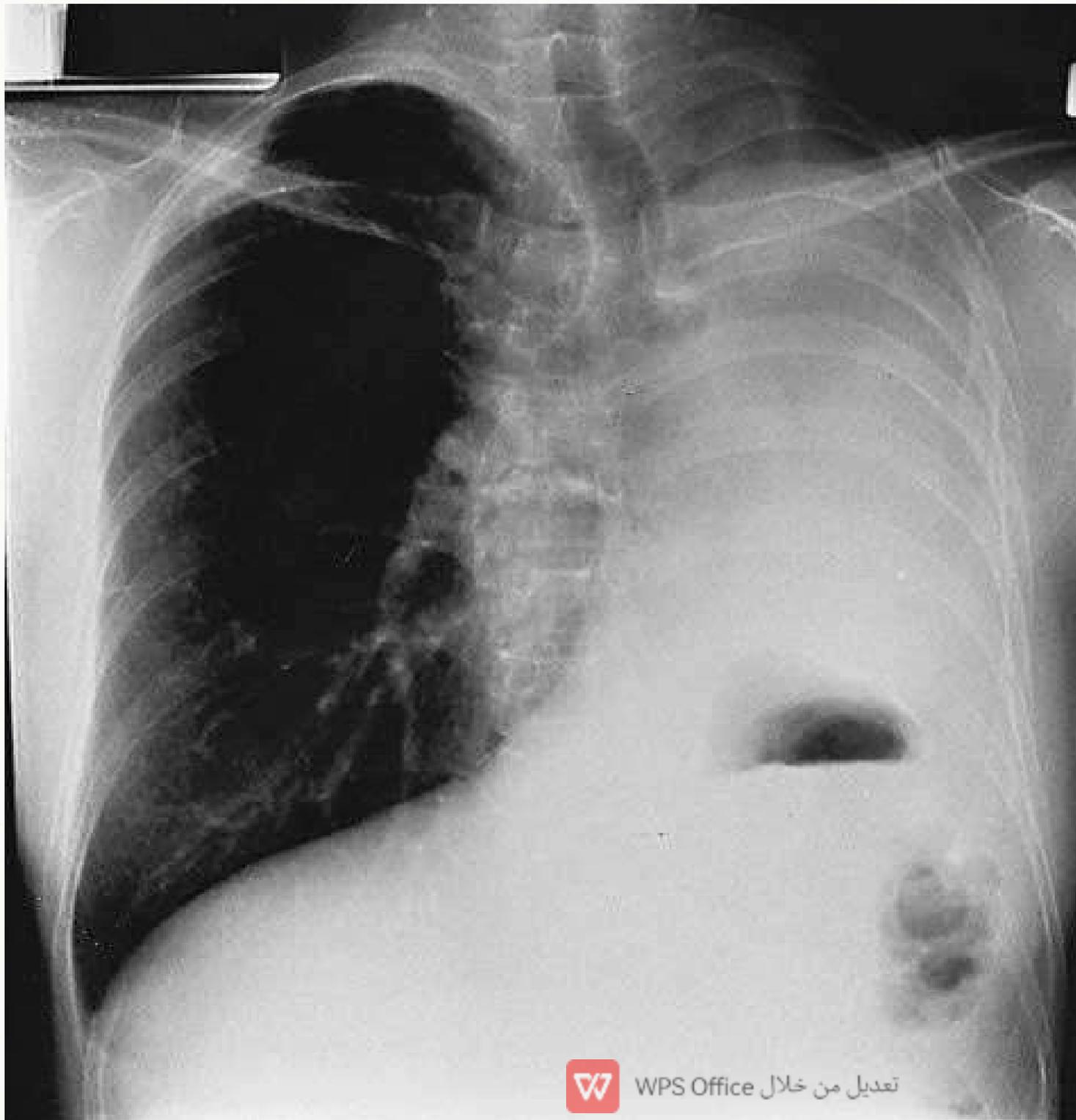


WPS Office تعديل من خلال



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



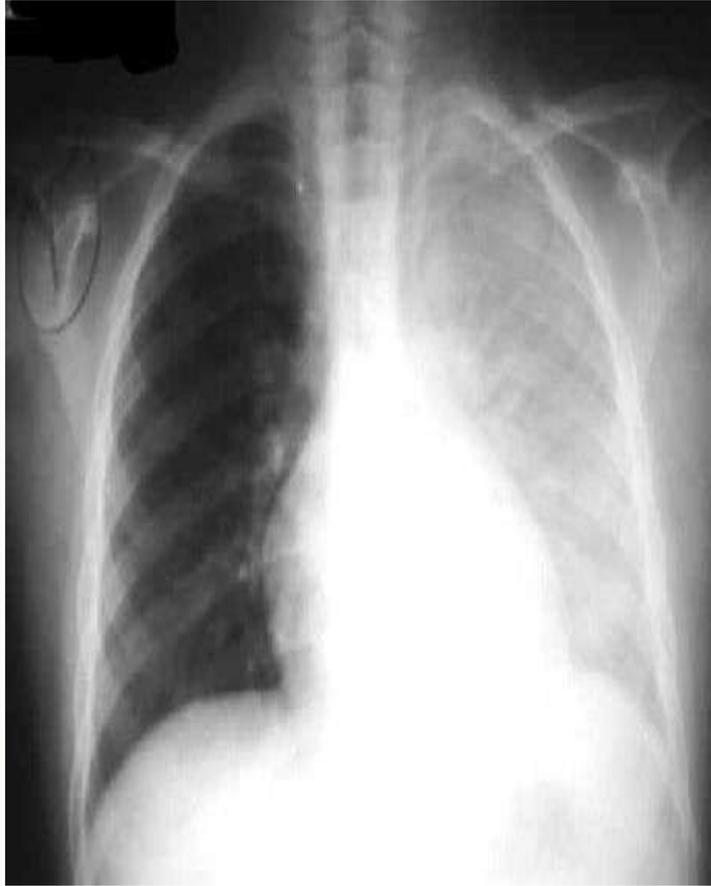


homogenous
opacification of
the left
hemithorax.

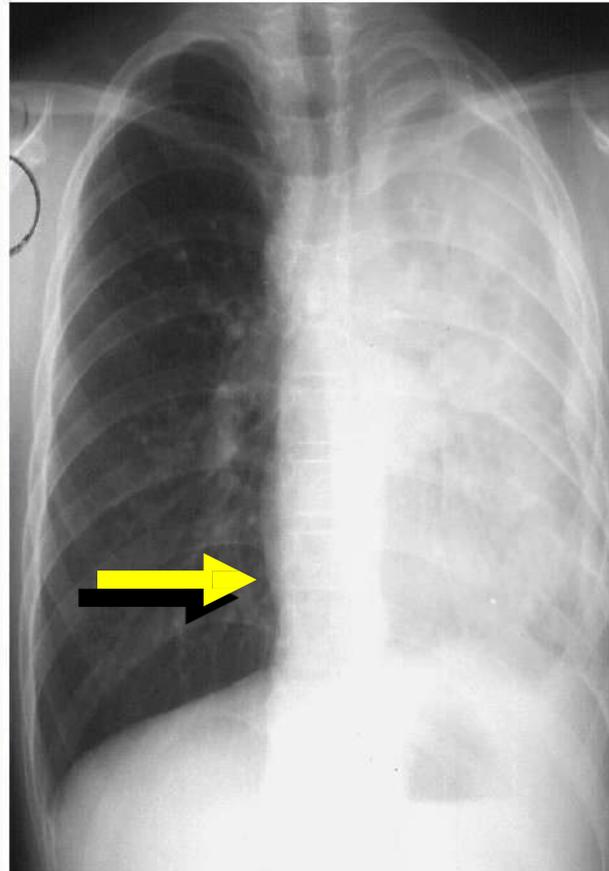
DD:

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

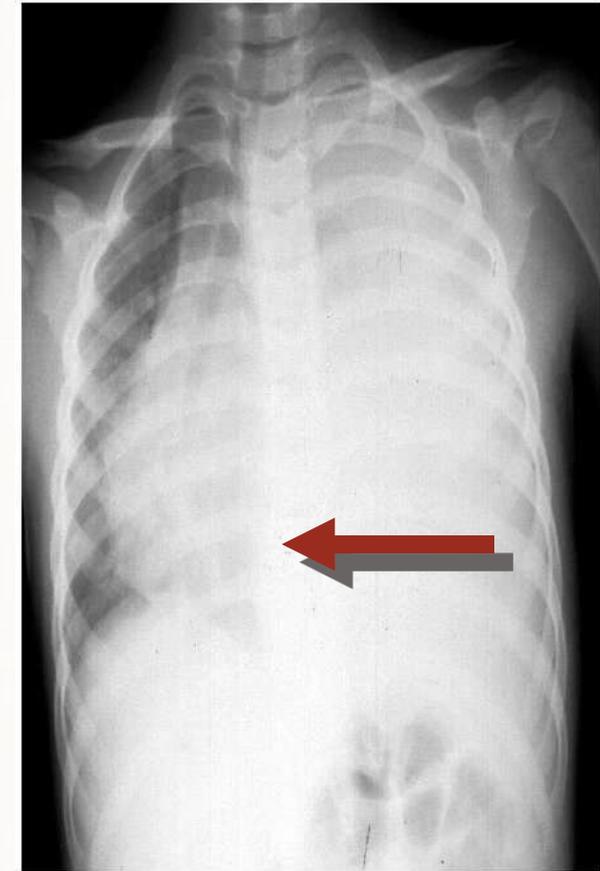




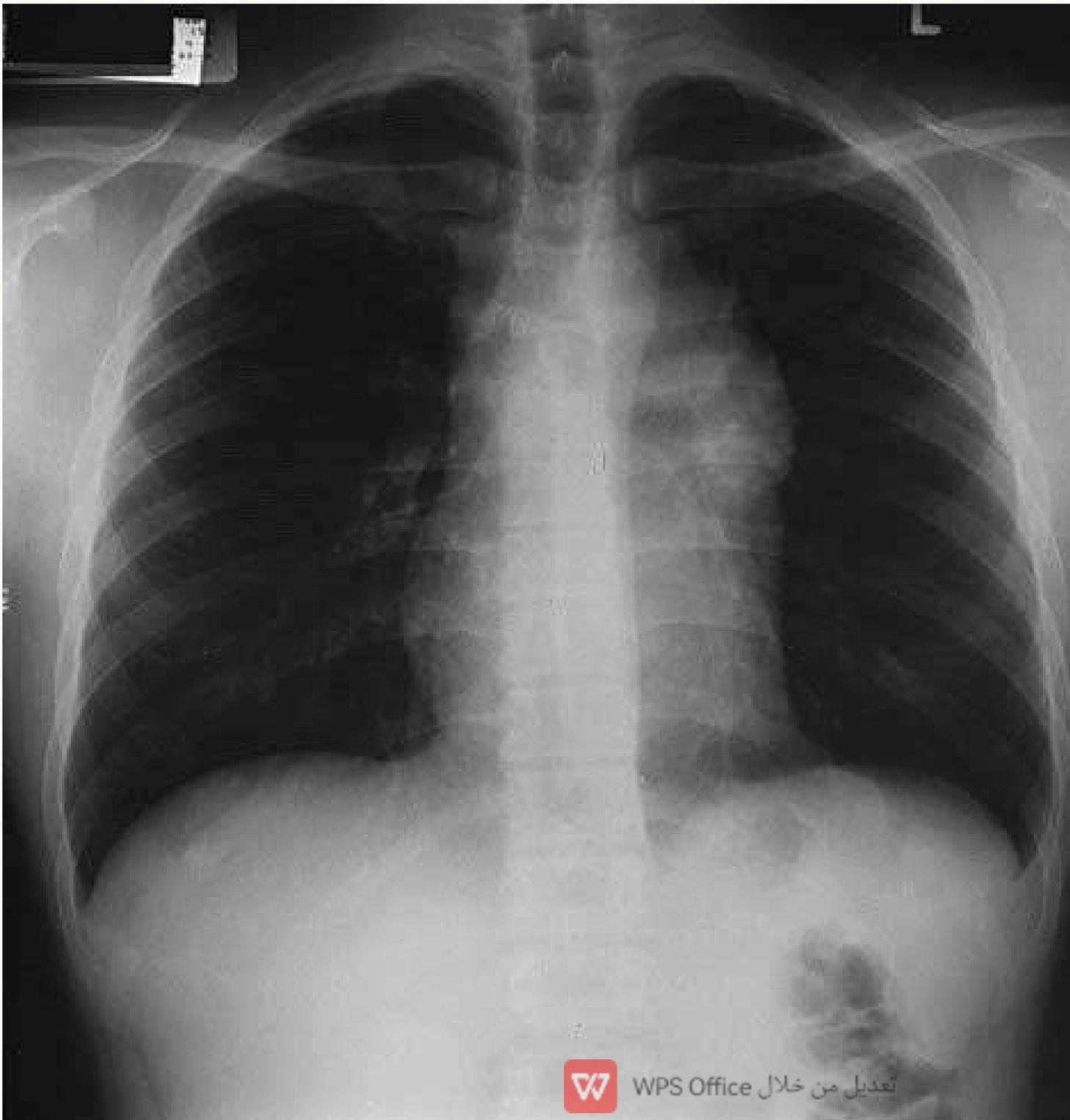
**Consolidate
d Pneumon
ia**



**Massive
Atelectasi
s**



**Massive
Pleural
Effusion**



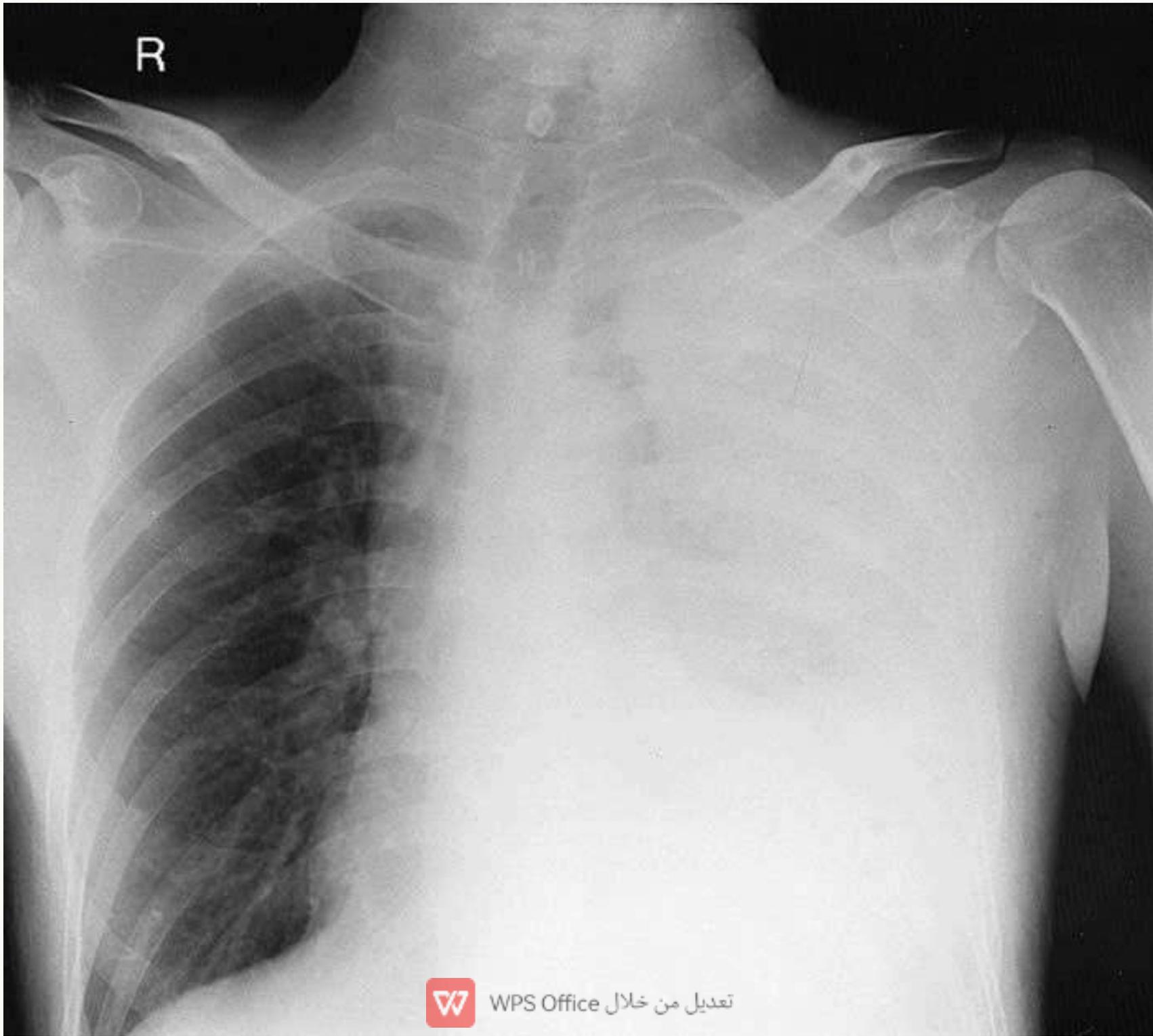
Homogenous opacity , rounded, well defined border, overlying the left hilum

DD:

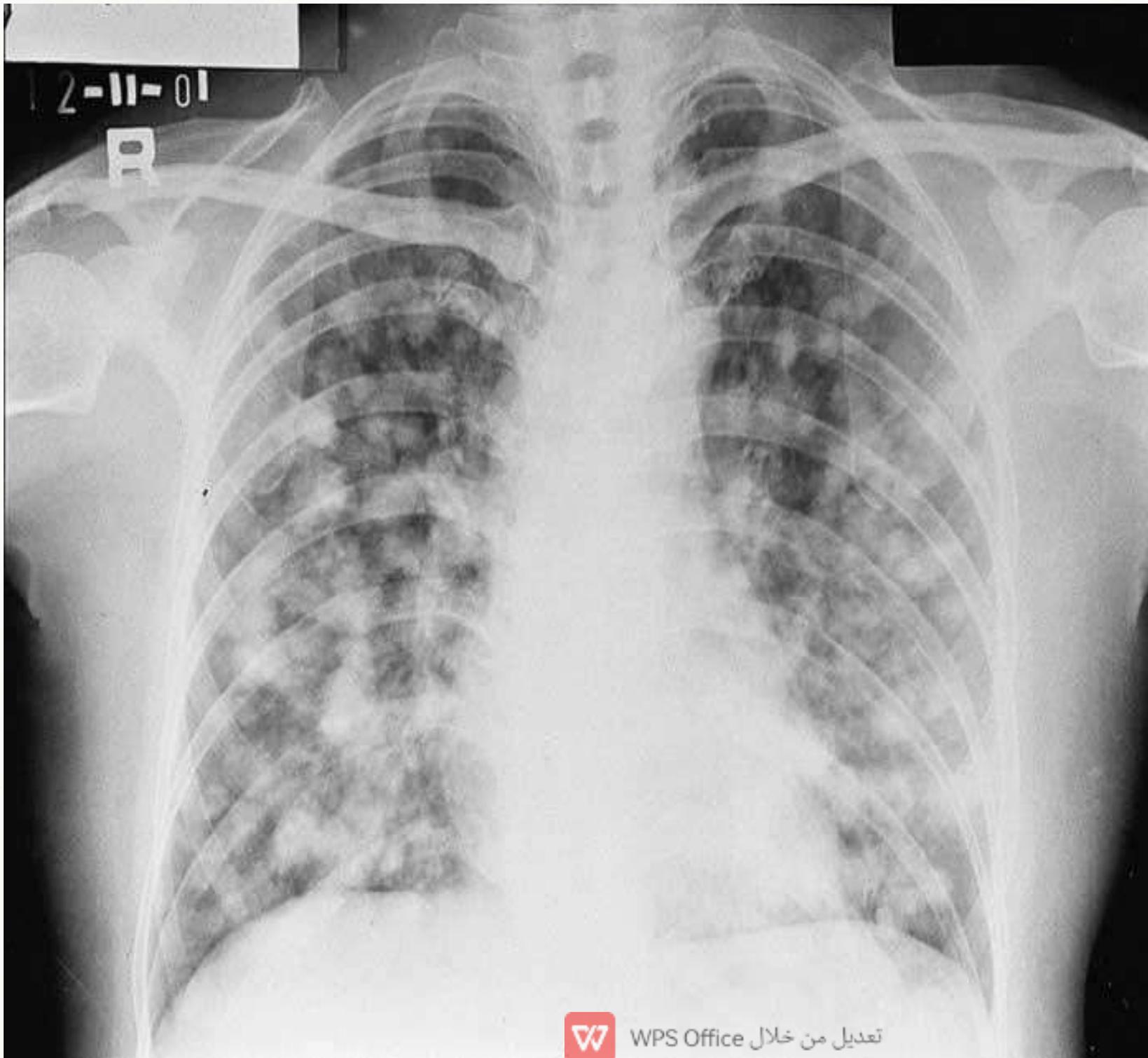
- ▶ Pulmonary artery dilatation.
- ▶ Lymphoma
- ▶ Mediastinal mass
- ▶ Sarcoidosis



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Bilateral lung nodules

DD

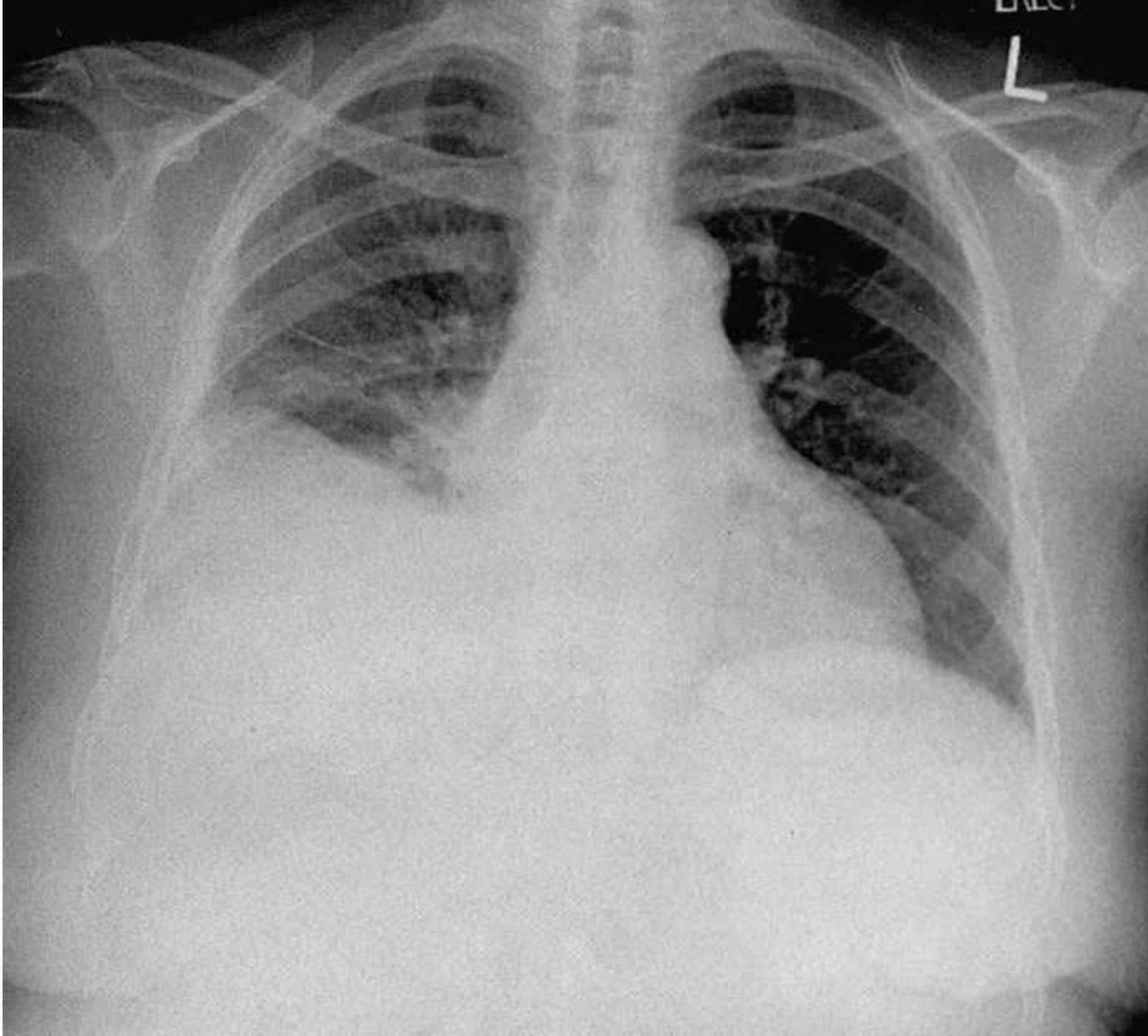
➤ **Metastases from cancers:**

- Breast
- Colon
- Rectum
- Kidney.

➤ **Bronchopneumonia**

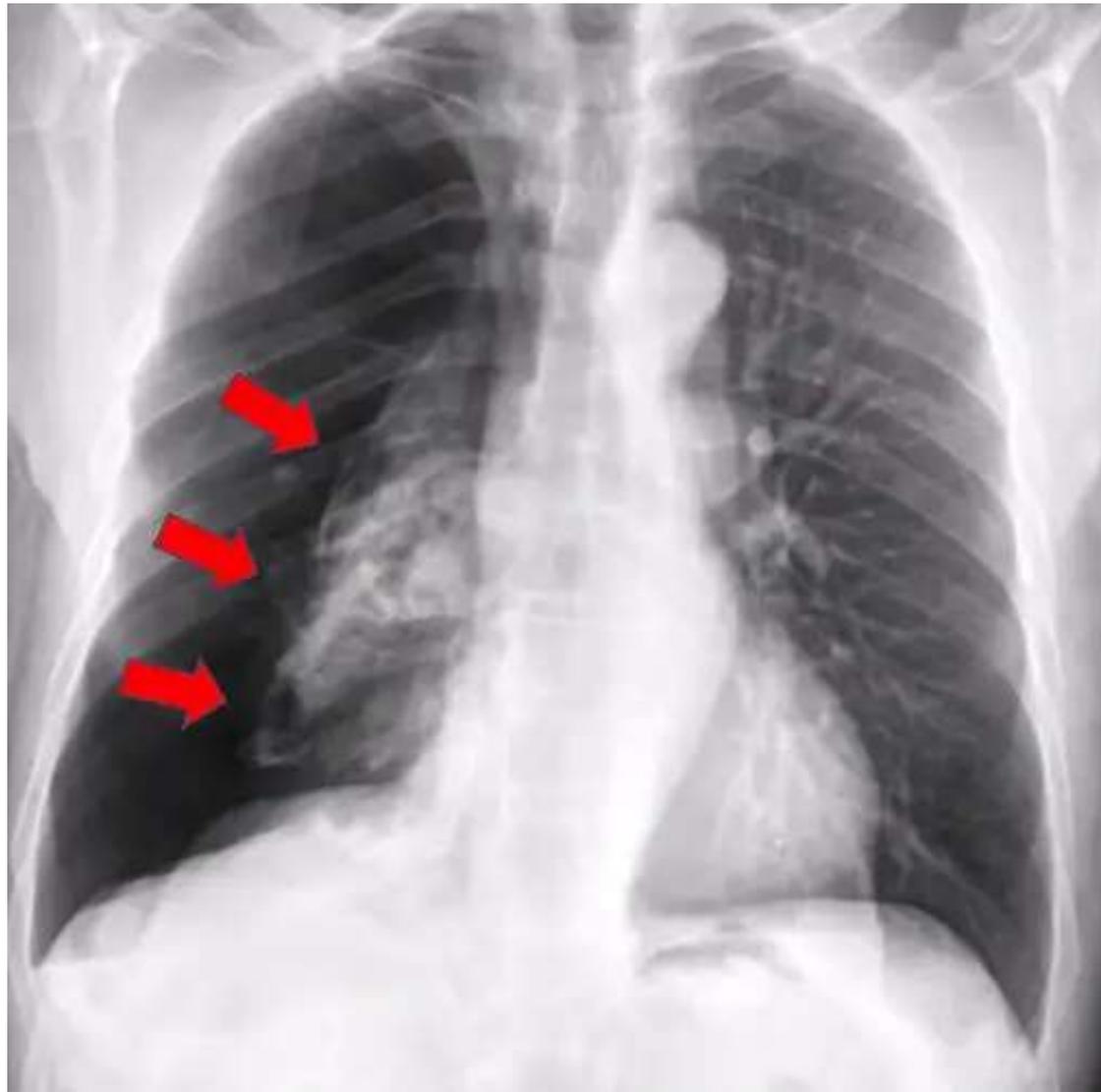
➤ **TB**

➤ **Rheumatoid**

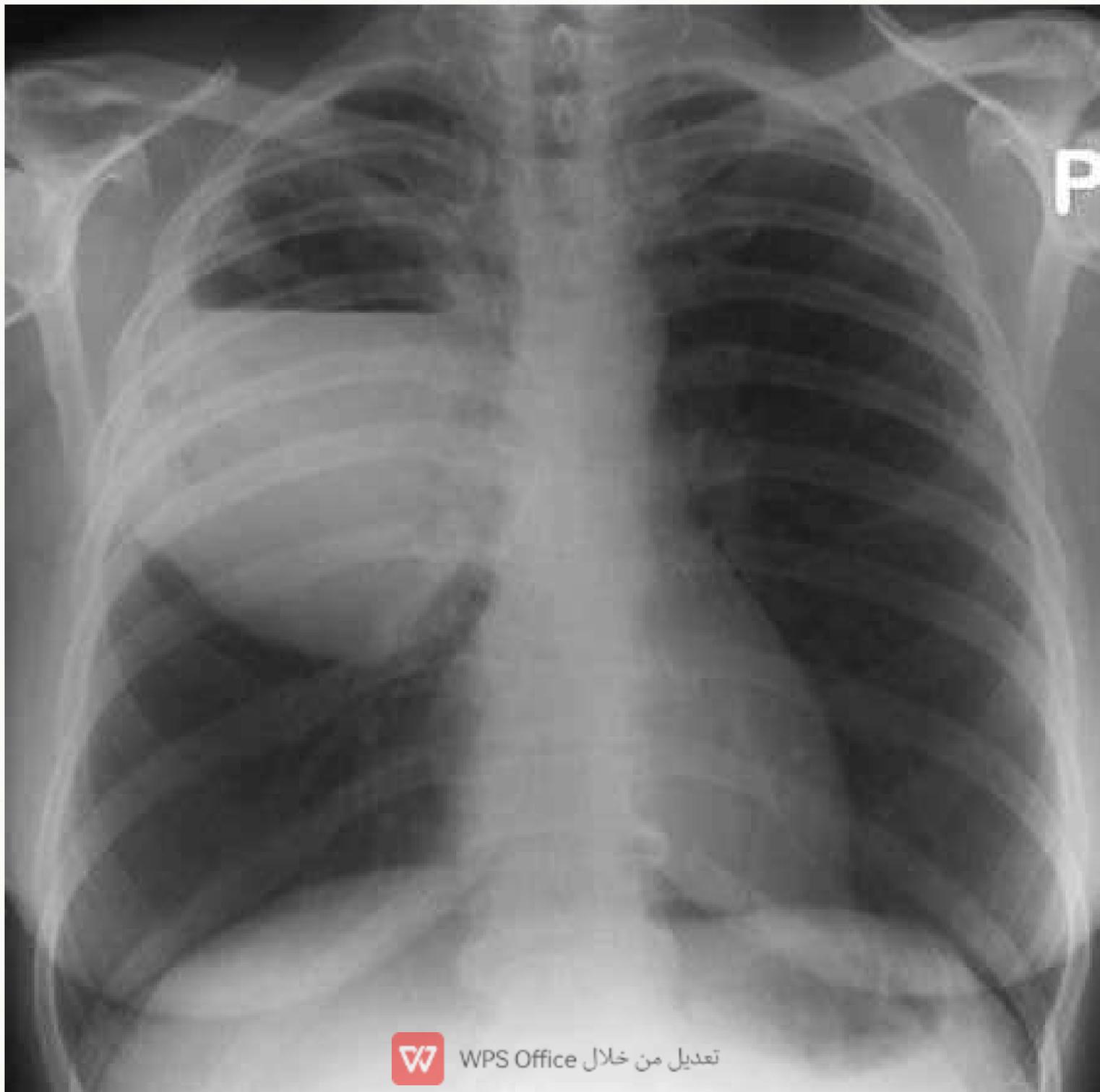


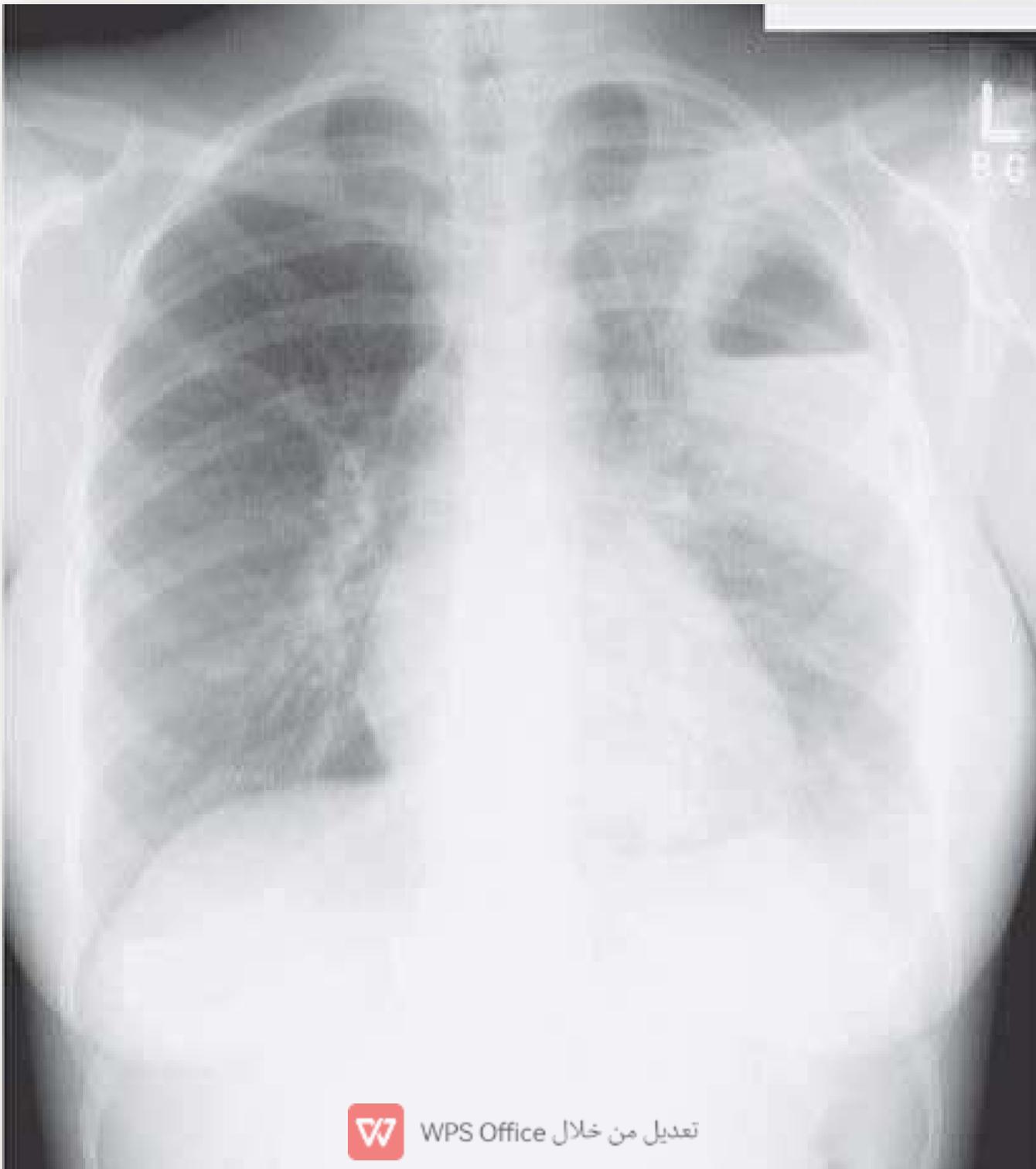
This patient gave history of liver cirrhosis and ascites. Pleural effusion.

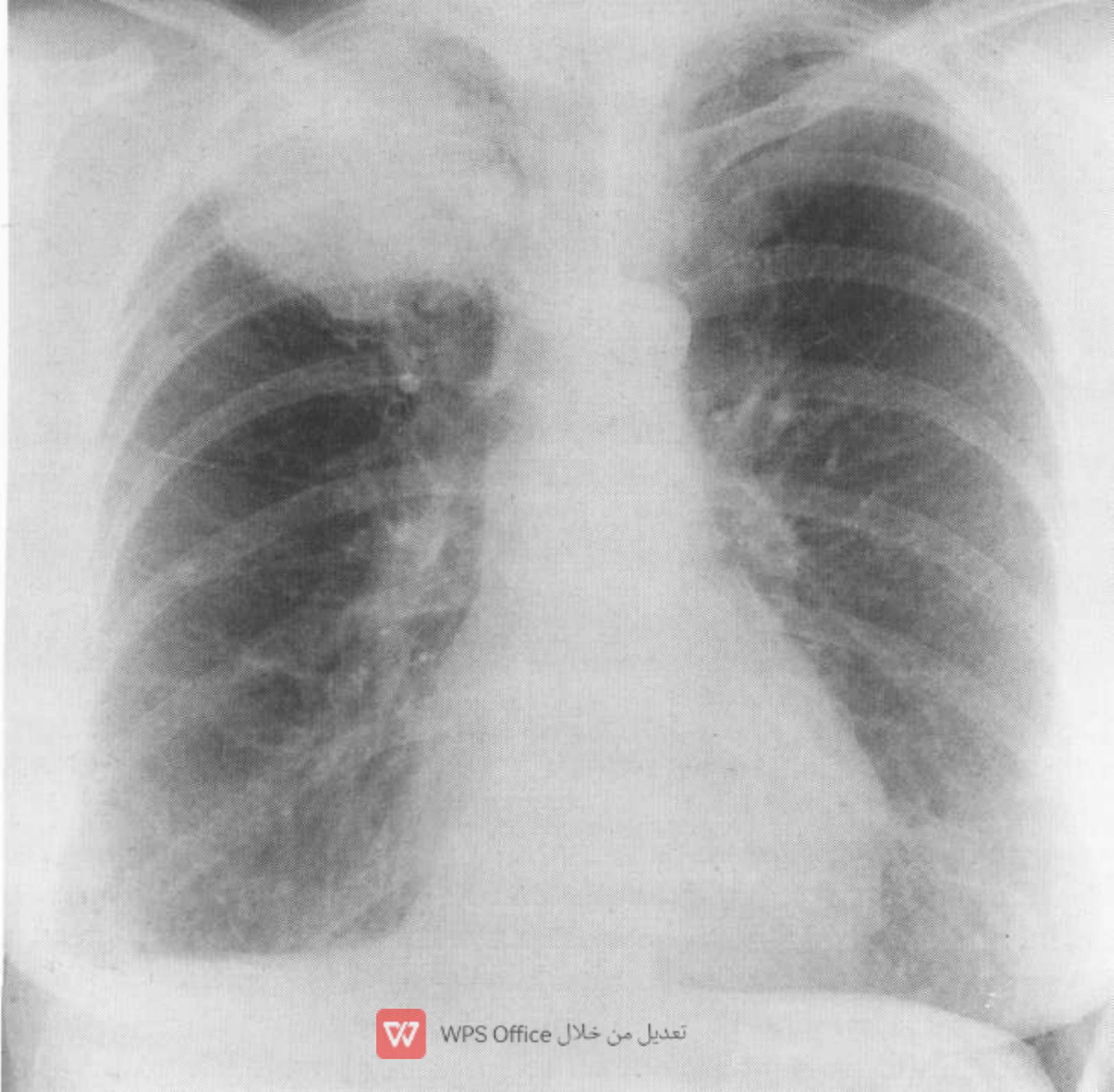










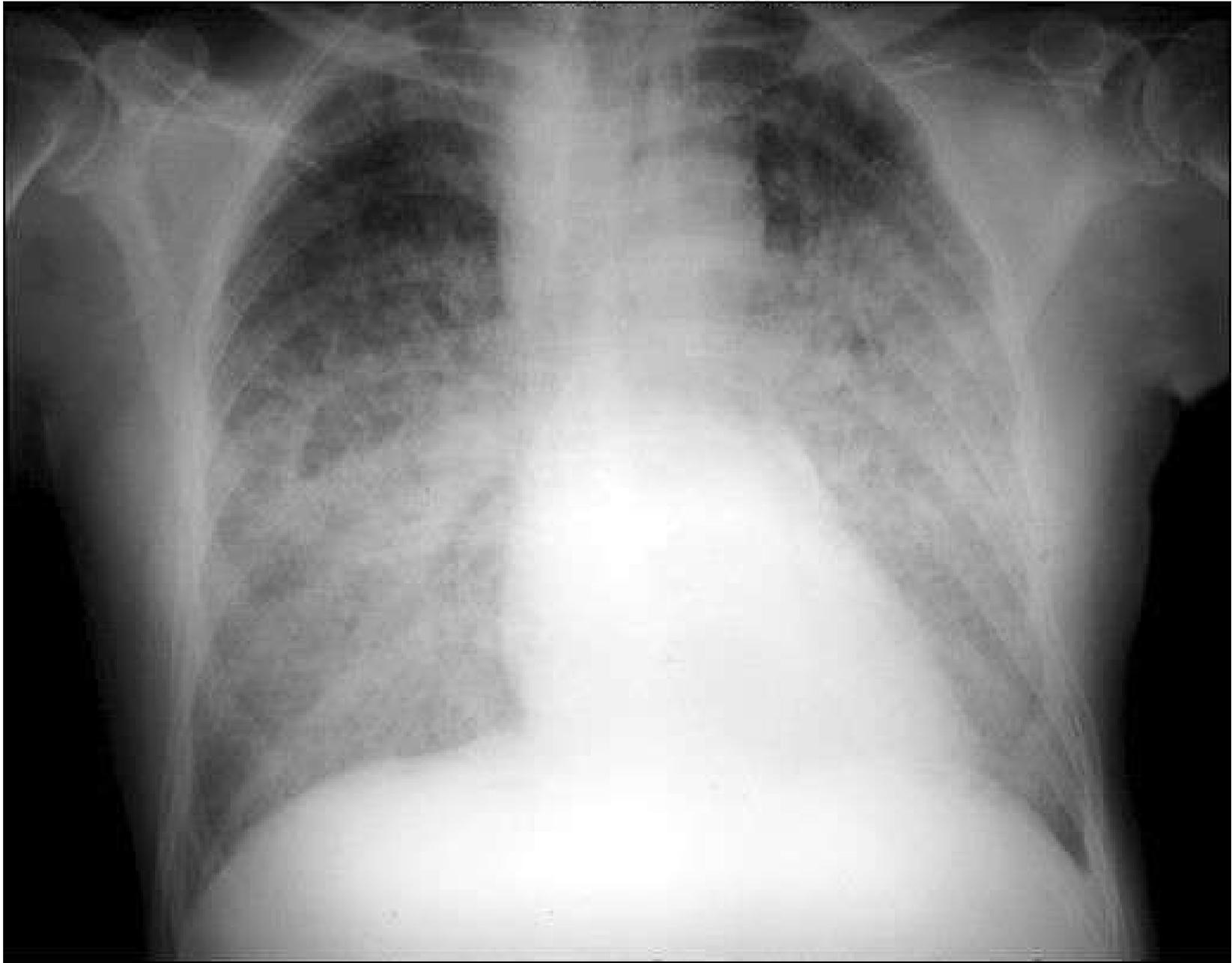


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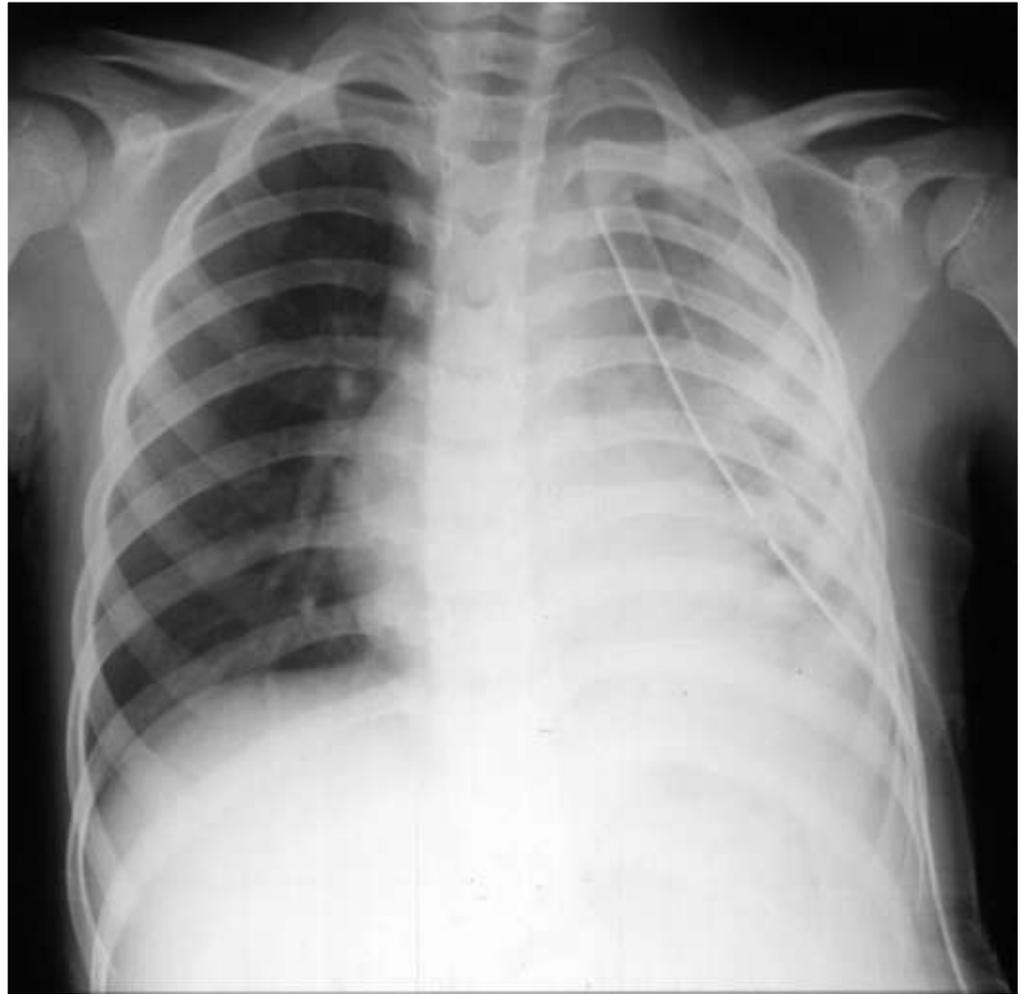
Bilateral Interstitial Infiltrate



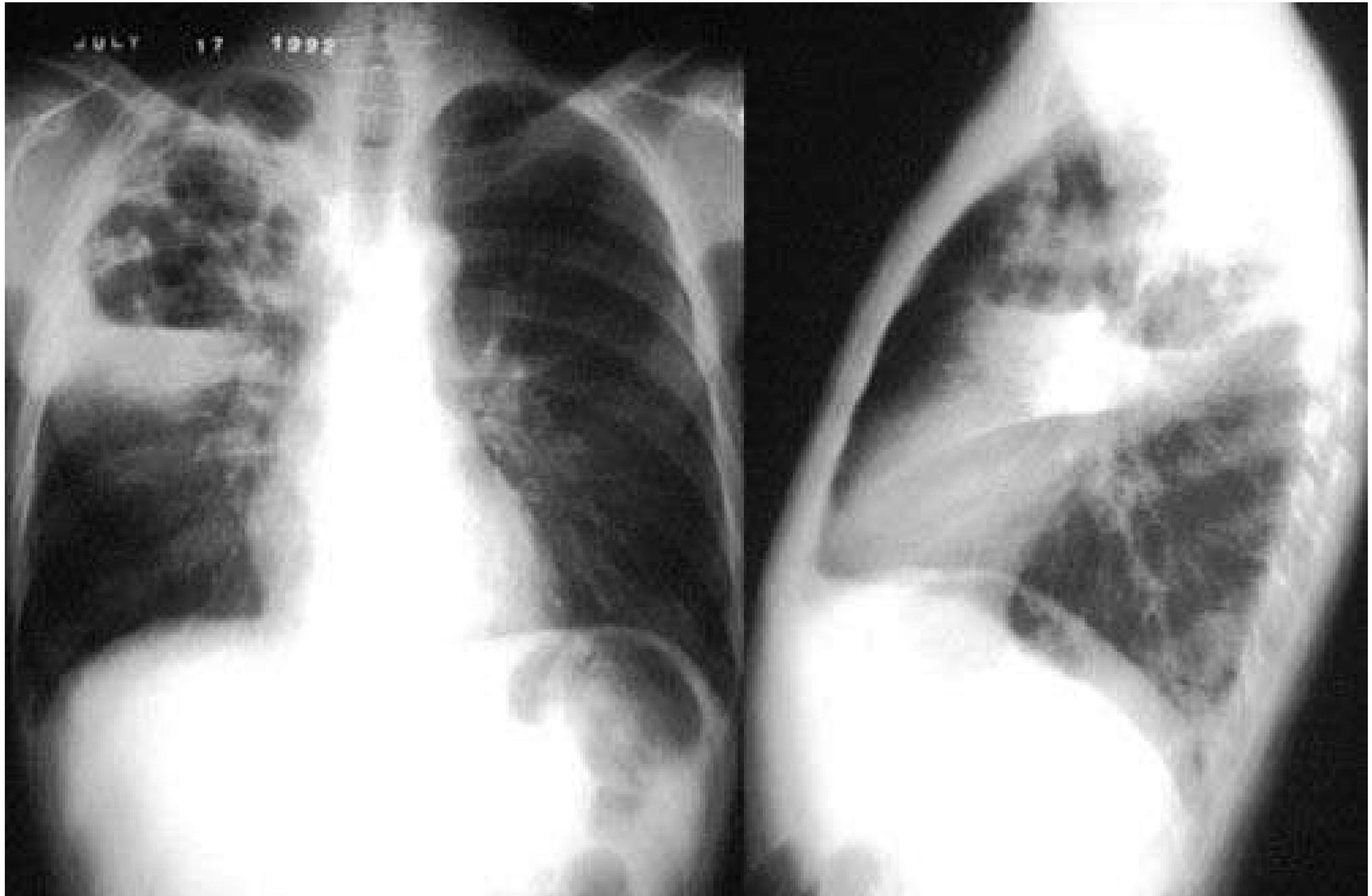
There is an interstitial infiltrate throughout both lung fields. Hilar lymphadenopathy is also present. The impression of the radiologist included pneumonia, tuberculosis, or other granulomatous disease.











Thank You

