



# RADIOLOGY

TEAM 435



## LECTURE 6

# X-ray Chest

# Objectives:

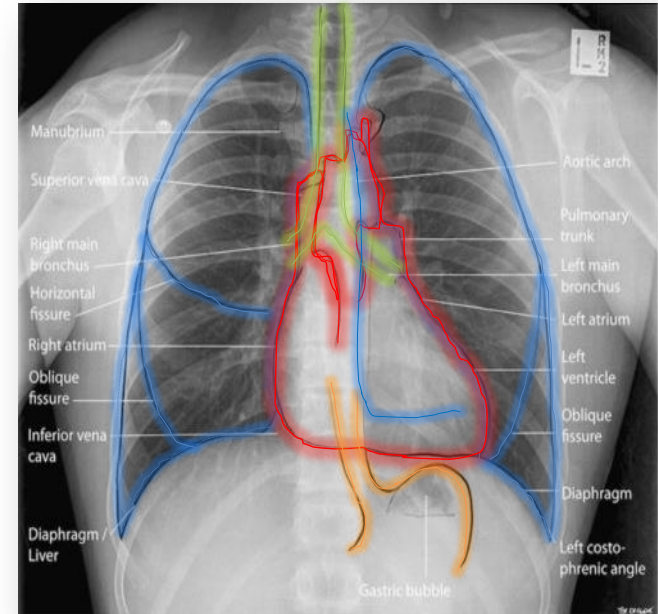
## By the end of the lecture you should be able to:

- 1- Identify the bones of the thoracic cage.
- 2- Identify superficial soft tissues.
- 3- Identify the trachea and lung fields.
- 4- Describe the mediastinum and the cardiac shadows.
- 5- Describe brief knowledge about **Bronchography**.
- 6- Describe brief knowledge about **Coronary Angiography**



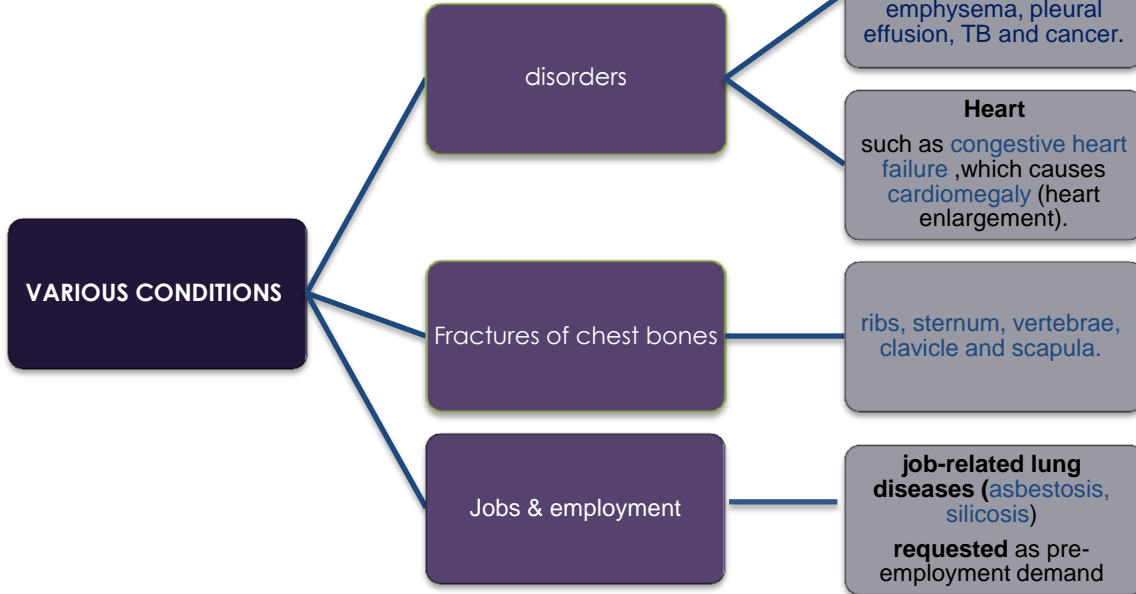
## These are some important points that will help you understand this lecture :

- First thing you must know the anatomy of the chest before the radiograph.
- X-rays are a type of electromagnetic radiation, just like visible light.
- Structures that are **dense (such as bone)** will block most of the x-ray particles, and will appear **white**.
- **Metal and contrast media** (special dye used to highlight areas of the body) will also appear **white**.
- Structures containing **air** will be **black**, and **muscle, fat, and fluid** will appear as shades of **gray**.



A chest x-ray may be used to diagnose and to plan the treatment and follow up for **various conditions, including:**

## Radiography



**Lung**  
such as pneumonia, emphysema, pleural effusion, TB and cancer.

**Heart**  
such as congestive heart failure, which causes cardiomegaly (heart enlargement).

ribs, sternum, vertebrae, clavicle and scapula.

**job-related lung diseases (asbestosis, silicosis)**  
**requested** as pre-employment demand

Different views of the chest can be obtained by :

- Changing the orientation of the body
- The direction of the x-ray beams.

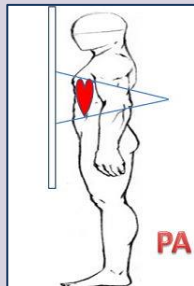
**The most common views are:**

- Posteroanterior (PA).
- Anteroposterior (AP).
- Lateral (L).
- Decubitus.



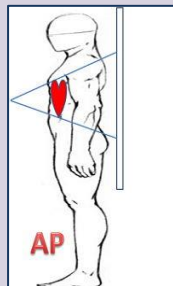
## Posteranterior (PA) view

- The x-ray enter through the **posterior** aspect of the lung and exits the **anterior** aspect.
- It gives a good visualization of the cardiac size.
- It avoids magnification of the heart as the film is close to the anterior chest wall.
- It is identified by the **presence** of the fundal gas bubble and the **absence** of the scapulae in the lung fields.



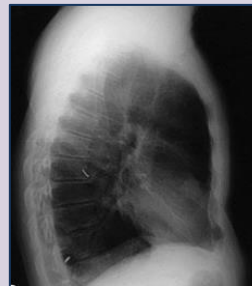
## Anteroposterior (AP) view

- The x-ray enter through the **anterior** aspect of the lung and exits the **posterior** aspect.
- Its done where it is difficult for the patient to get out of the bed (supine position).
- It shows an increase in the cardiac size.



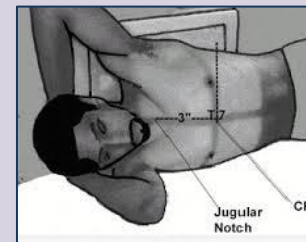
## Lateral (L) view

- Indicated only for further interpretation.
- Gives better visualization for specific ribs.



## Decubitus view

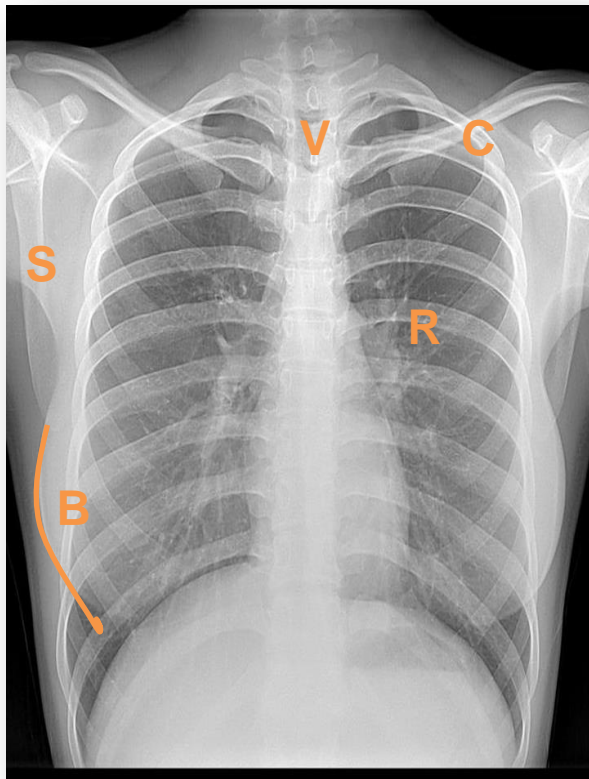
- The x-ray image is taken while the patient is lying on his side.



## Posteroanterior

For **Posteroanterior** radiograph (**PA**), the following systems must be examined in order

- **Superficial soft tissues:** **Nipples** in both sexes and the **Breast** in (females) are seen superimposed on the lung fields.
- **Bones of thoracic cage.**
- **Diaphragm .**
- **Lungs and Bronchi.**
- **Heart & Great Vessels.**



## Posteroanterior radiograph (Bones)

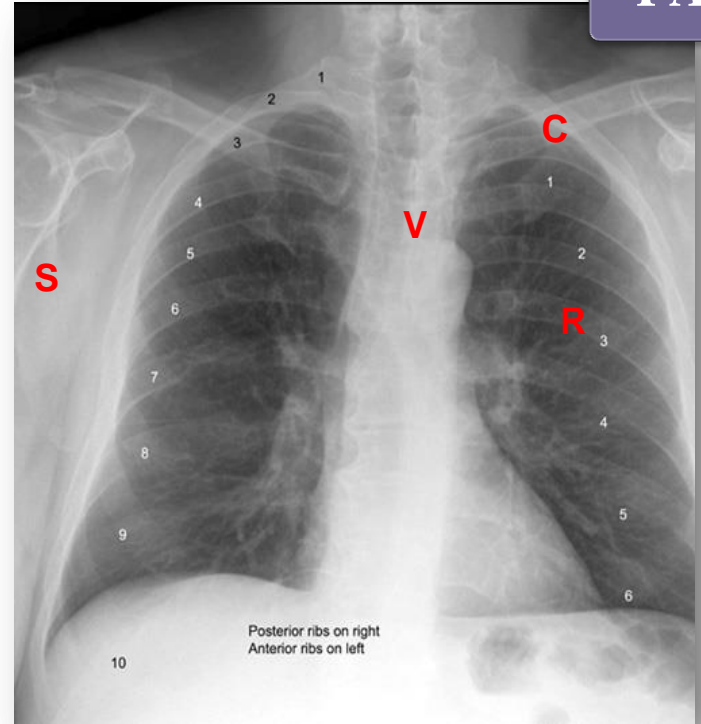
**Bones of the thoracic cage, e.g.**

- (anterior ribs, posterior ribs).
- Thoracic vertebrae.
- Cost-transverse joints.
- Clavicles.
- Medial border of the scapula.



# Bones

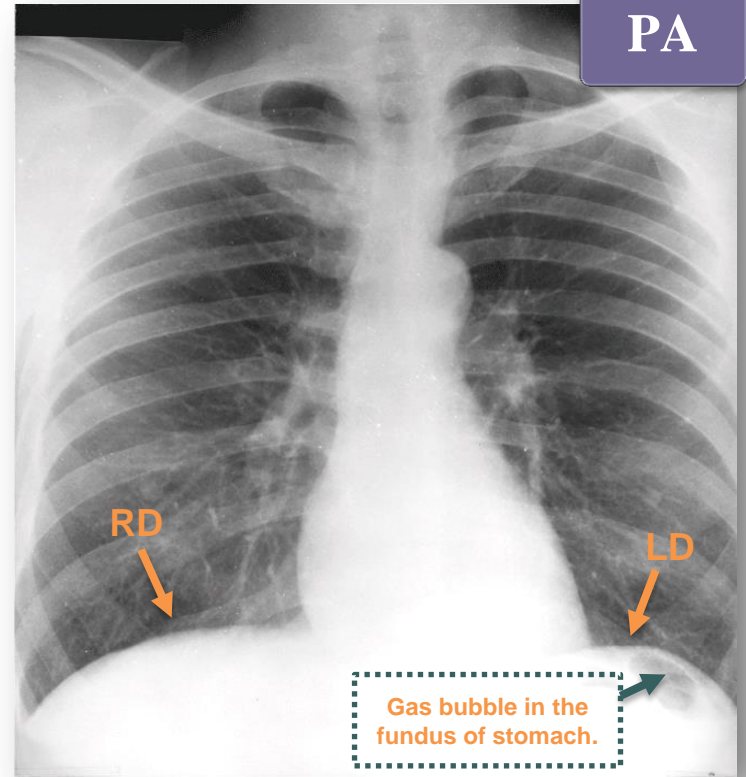
- The **Thoracic Vertebrae** are imperfectly seen.
- The Costovertebral joints and each **Rib** should be examined in order from above downward and compared to their fellows of the opposite side .
- The Costal Cartilages are not usually seen, but if calcified, they will be visible.
- The **Clavicles** are seen clearly crossing the upper part of each lung field.
- The medial borders of the **Scapulae** may overlap the periphery of each lung field.



# Diaphragm

The diaphragm show a **Dome-shaped** shadow on each side.

- Right side is slightly higher than the left side.
- Beneath the right dome homogenous dense shadow of the liver.
- Beneath the left dome a gas bubble mostly seen in the fundus of the stomach.

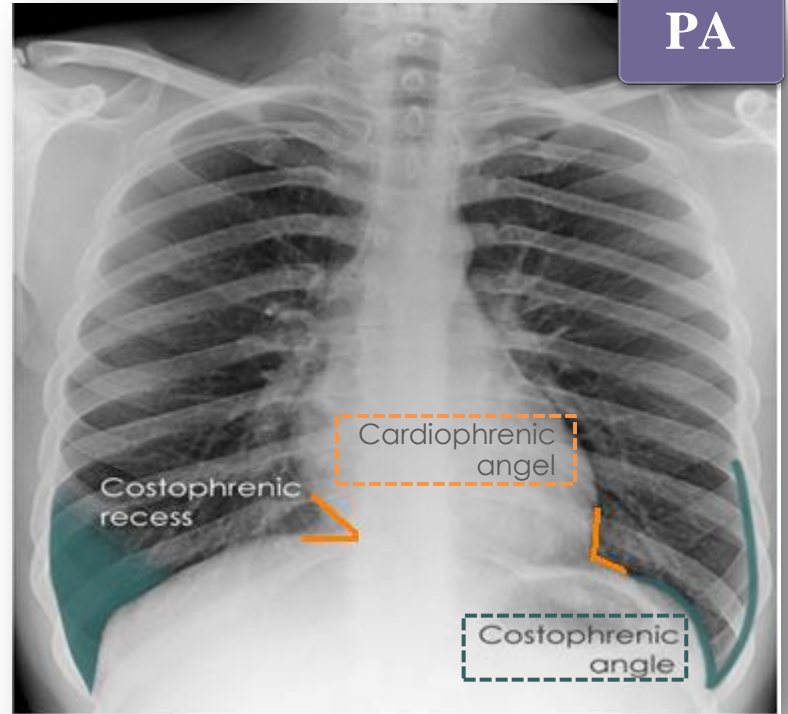




# Diaphragm

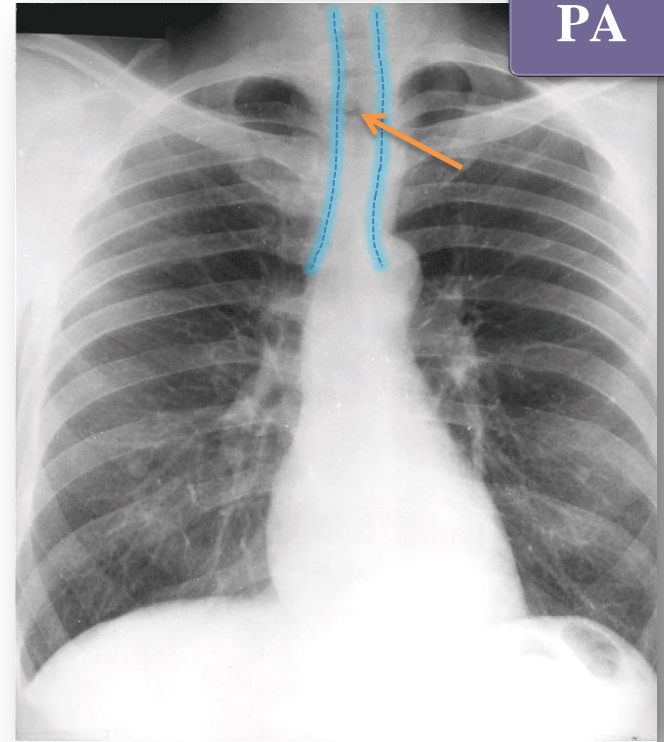
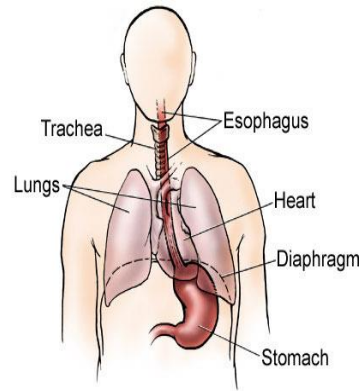
- **CardioPhrenic angel:**  
The angel where the *diaphragm* meet the *heart*.
- **CostoPhrenic angel:**  
The angel where the *diaphragm* meet the *thoracic wall*.

The angle becomes blunt or obscured due to minimal *pleural fluid (effusion)* or fibrosis.



# Trachea radiograph

- The radio-translucent, air-filled shadow of the trachea is seen in the midline of the neck as a dark area.
- It is superimposed by the lower cervical and upper thoracic vertebrae.



## Tracheal shift

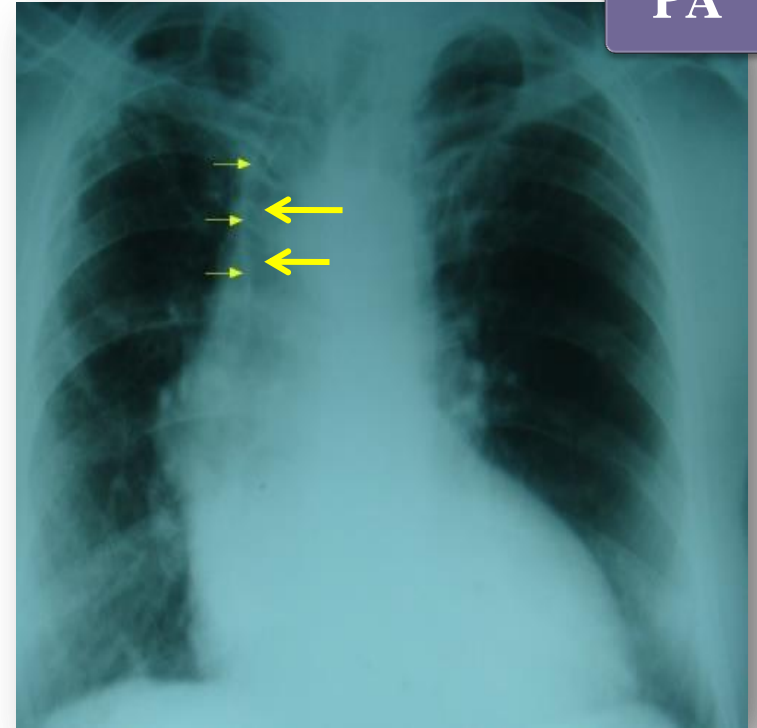
Tracheal air column is seen shifted to right on X-ray chest PA view.

**It indicates:**

- A loss of volume of the right upper lobe of the lung, either due to collapse or fibrosis.

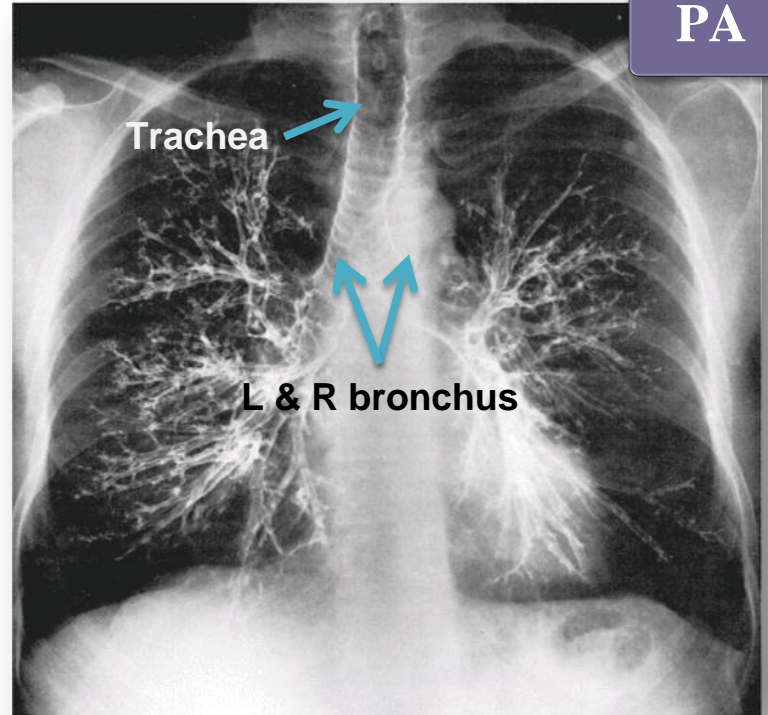
**OR**

- A massive pleural effusion on the left side. (But in this x ray, no pleural effusion is seen on the left)



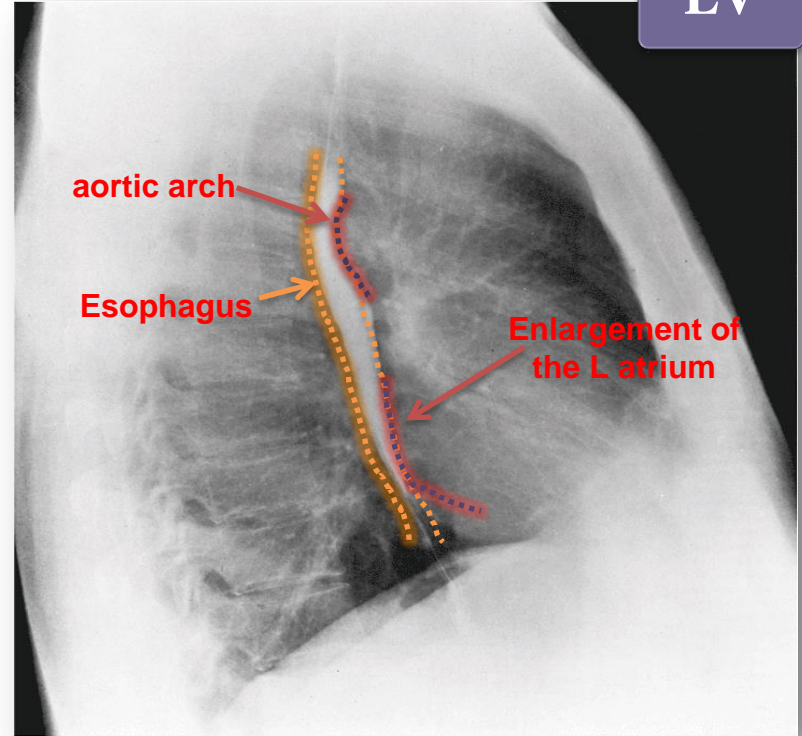
# Bronchography

Bronchography is a special study of the bronchial tree by means of the introduction of **contrast media** into a particular bronchus or bronchi, usually under fluoroscopic control. The contrast media are nonirritating and sufficiently radio opaque to allow good visualization of the bronchi. After the radiographic examination is completed, the patient is asked to cough and expectorate the contrast medium.



## Contrast visualization of the esophagus

- **Contrast visualization of the esophagus by swallow a contrast media, (barium swallow).**
- **Other barium contrast studies:**
  - Barium meal is used to visualize the stomach.
  - Barium follow through to visualize the small intestine.
  - Barium enema is used to visualize the large intestine.(its taken by the anus)



# Lung

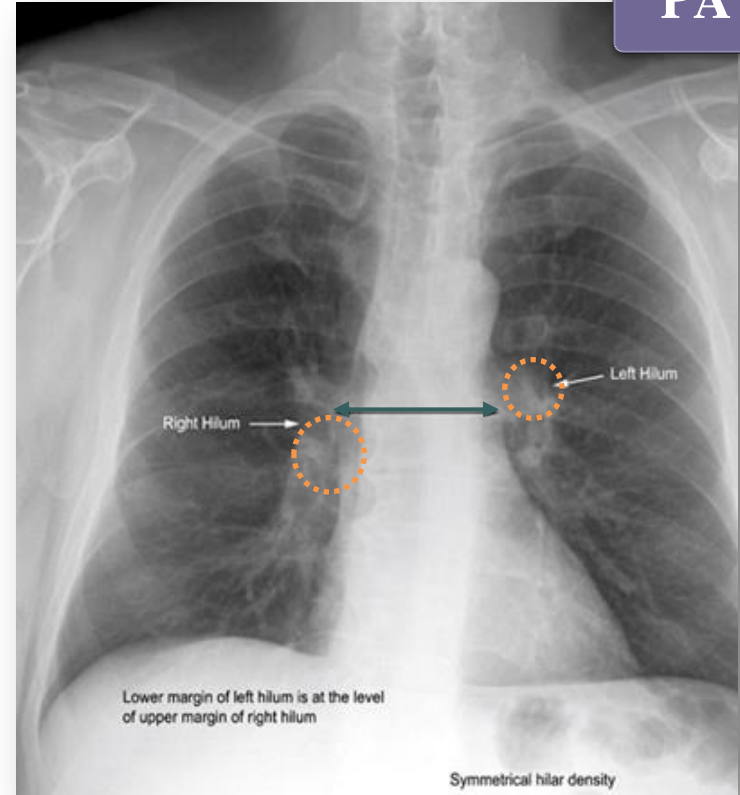
Lung roots relatively dense shadow caused by:

- Blood filled pulmonary and bronchial vessels.
- Large bronchi.
- Lymph nodes.

➤ **Notice:** that the **lower margin** of the **left hilum** is at the level of the **upper margin** of the **right hilum**.

the patient will be asked to take a deep inspiration before the image is taken, its because the lung image will be more clear

PA

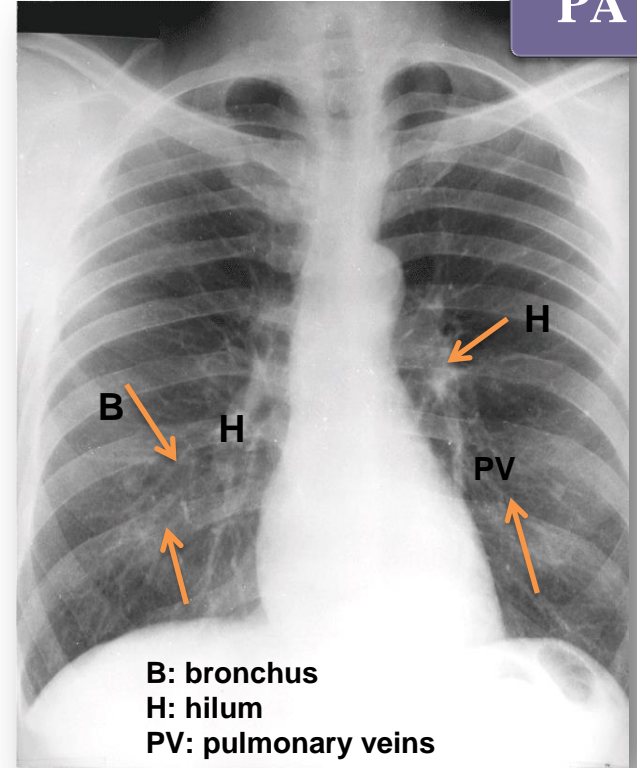


# Lung

The lung fields, by the air so they are more translucent on full inspiration than on expiration.

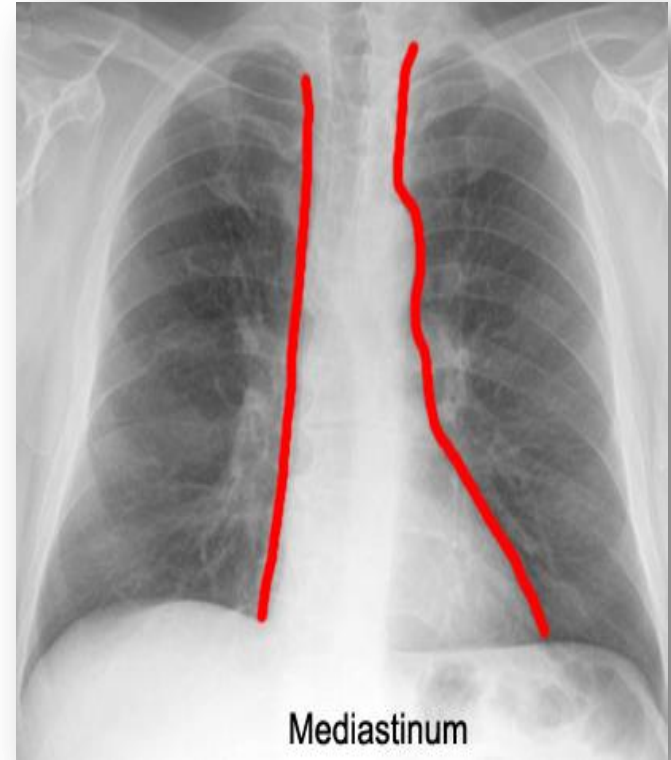
The pulmonary blood vessels are seen as a **series of small, rounded, white shadows** radiating from the lung root.

- The large bronchi, are seen as similar round shadows.
- The smaller bronchi are not seen.



# mediastinum

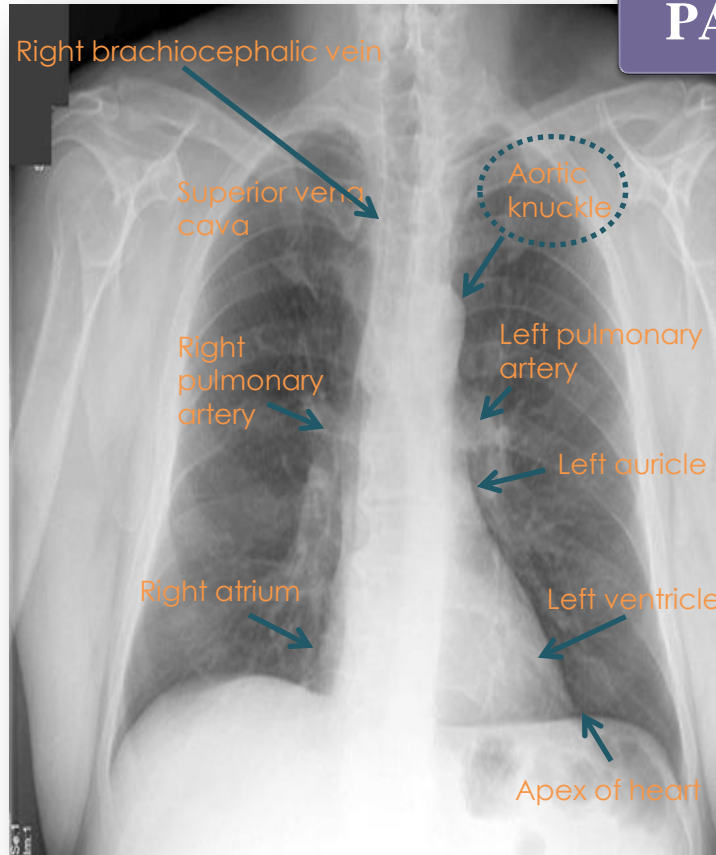
- *The shadow is produced by the various structures within the mediastinum, superimposed one on the other*
- Note the outline of the heart and great vessels.





## Posteroanterior radiograph (Mediastinum)

- ❖ The Right Border of The Mediastinum  
Consists of:
  - Right brachiocephalic vein,
  - Superior vena cava,
  - Right atrium, and
  - Inferior vena cava.



- ❖ The Left Border of Mediastinum  
Consists of:
  - Aortic knuckle, or knob (aortic arch),
  - Pulmonary trunk,
  - Left auricle,
  - Left ventricle.

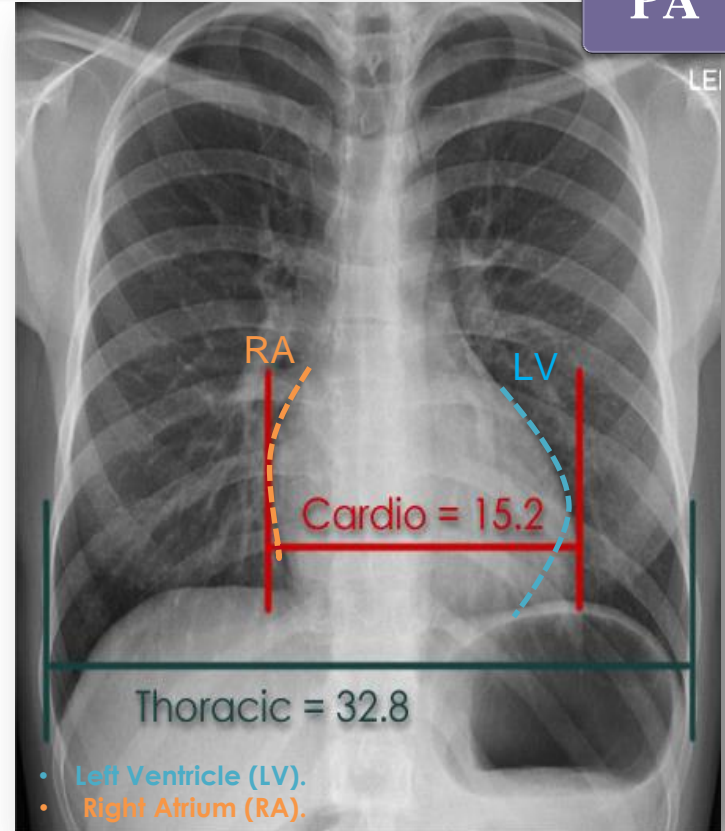
- ❖ The inferior Border of Mediastinum  
(lower border of the heart lends with the diaphragm and liver shadow).



## Posteroanterior radiograph (Mediastinum)

PA

- The transverse diameter of the heart **should not** exceed half of the width of thoracic cage.
- On **deep** inspiration, when the diaphragm **descends**, the vertical length of the heart increases and the transverse diameter is narrowed.
- In **infants**, the heart is always wider and more globular in shape than in adults.



# Heart

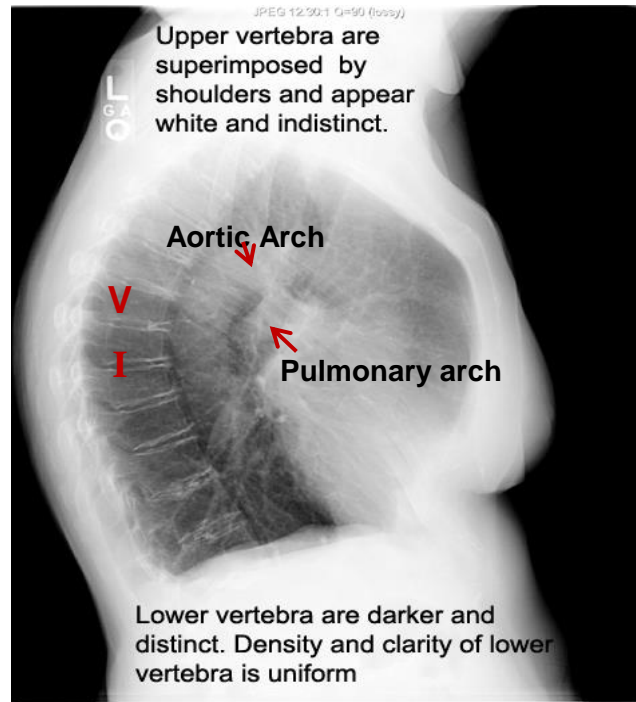


LV

In the LV view we can see the R ventricle and the L atrium



PA



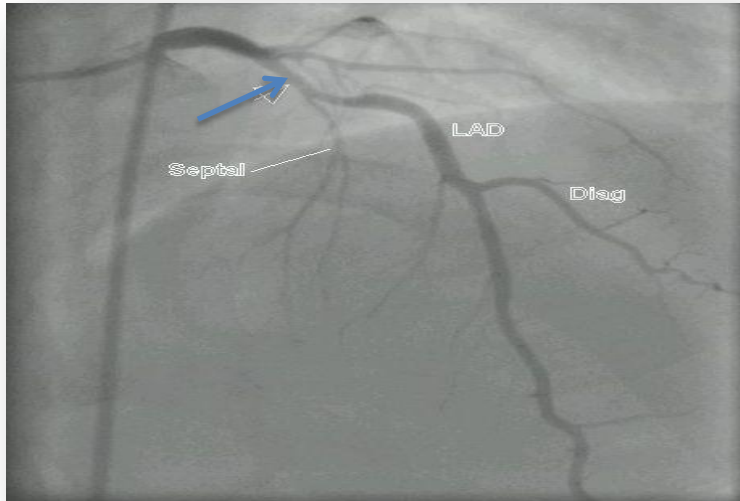
LV



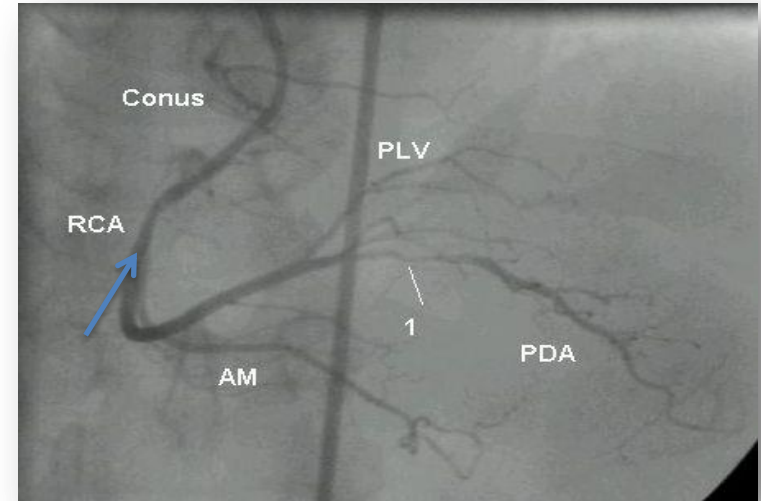
# Coronary Angiography

- Coronary Angiogram or angiography is an X-ray with radio-opaque material contrast in the coronary arteries for good visualization.
- Pathological narrowing or blockage of coronary artery can be identified.

Left coronary

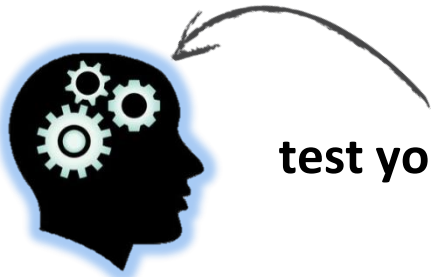


Right coronary



# You Useful videos

[Chest X-Ray \(CXR\) Analysis in a Nutshell](#)



test your self

[More information  
for x-ray chest](#)

[For more information  
about Broncho gram](#)

[For more information  
about Coronary  
angiogram](#)



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