

Lecture 7:

Radiology of the Cardiac Diseases



Radiology Team
Med433



● Slides

● Explanation

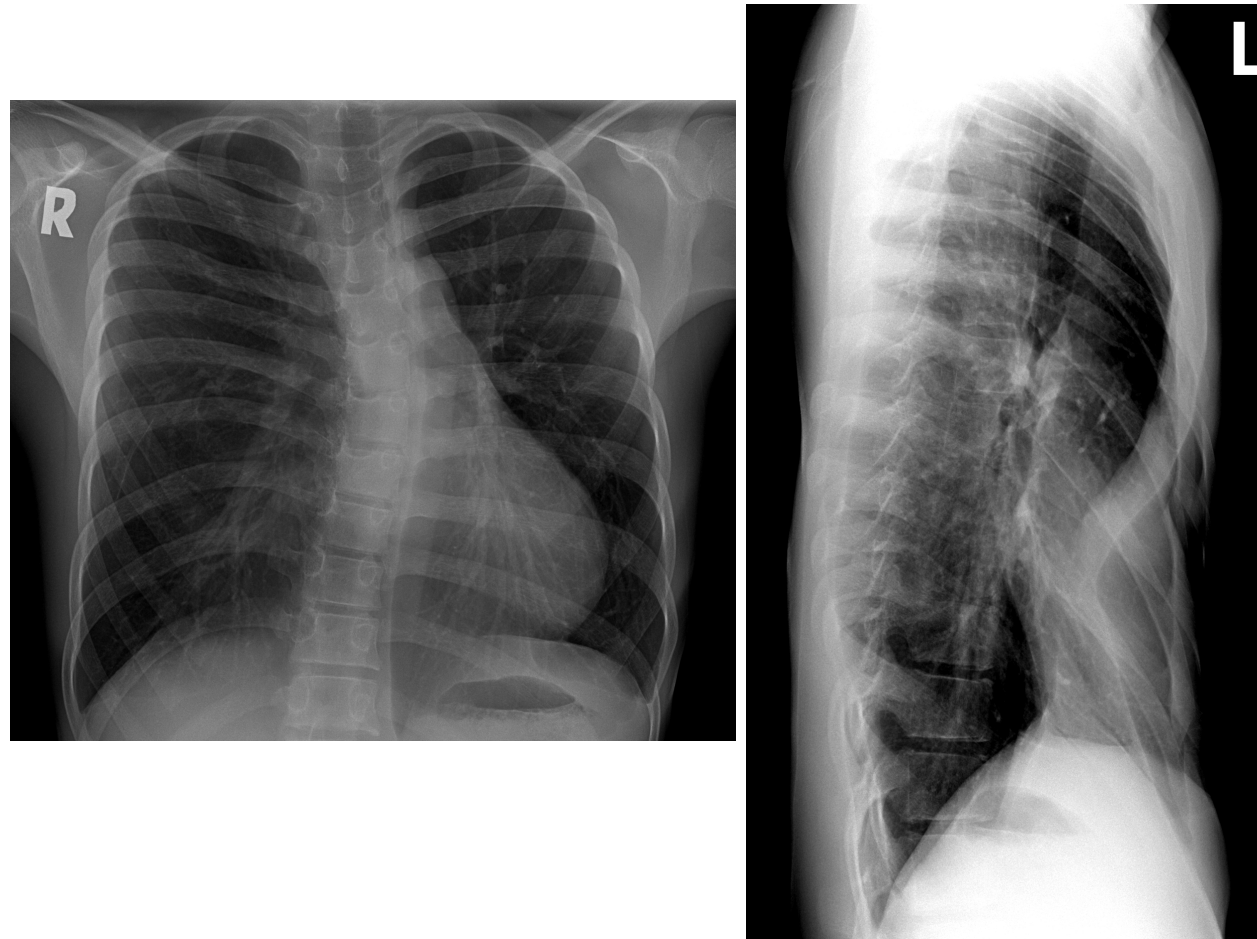
● Notes

● Additions

● Important

Cardiac Displacement

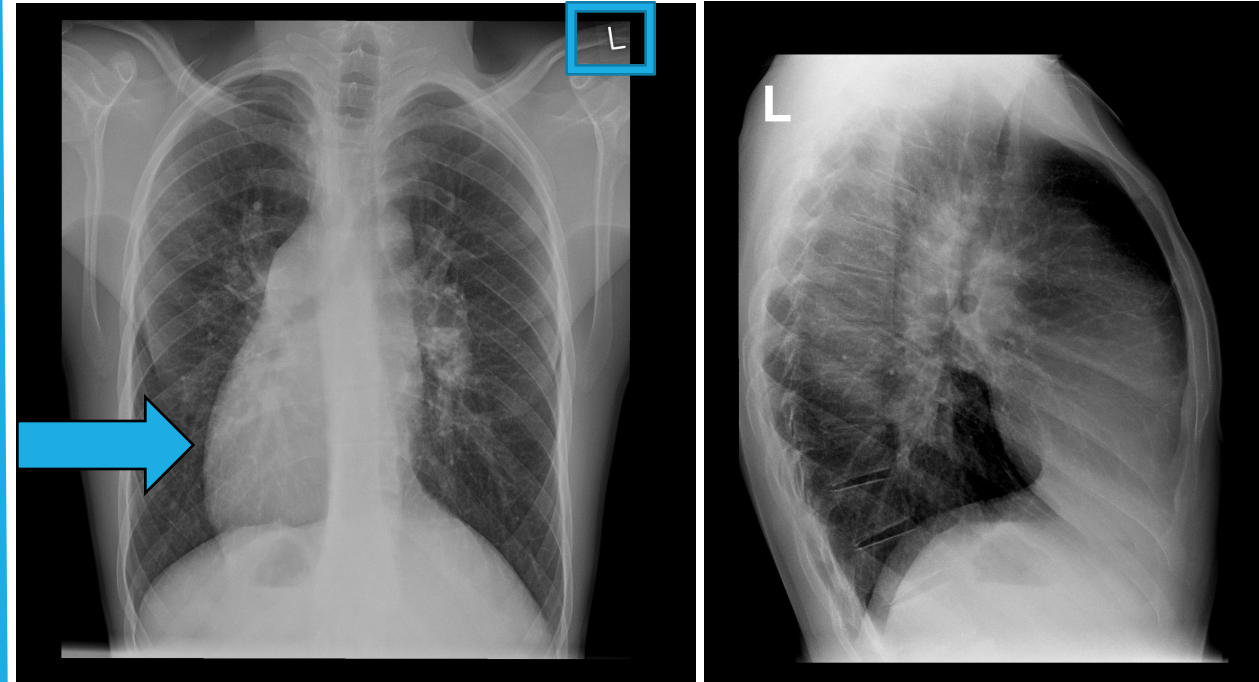
Due to scoliosis and pectus excavatum



Dextrocardia

The heart is in the right side

If the whole abdominal organs in the opposite side, it is called **Situs Inversus**



Note:

knowing contents of chest X-Ray, and places of fissures (mentioned in previous lecture) is important because they shift from their original place during variety of conditions

Cardiovascular Imaging

Aortic Arch Anatomy

- This is **MRA** = MRI of vessels, here it is without contrast but if we want to see the small vessels we should give contrast.
- **Not used for diagnosis of PE** because it takes a **long time** & also because of its **cost**.

NOTES:

- Gold standard for diagnosing acute pulmonary embolism: **spiral CT angiogram** (because we need to see the pulmonary artery).
- To see the lung parenchyma: **high resolution CT of the chest**.
- To see which chamber of the heart is enlarged and the details of the cardiac muscles: **echocardiogram** (Done by the cardiology department).
- To Assess pulmonary vasculature: **chest x-ray** (the only simple way).

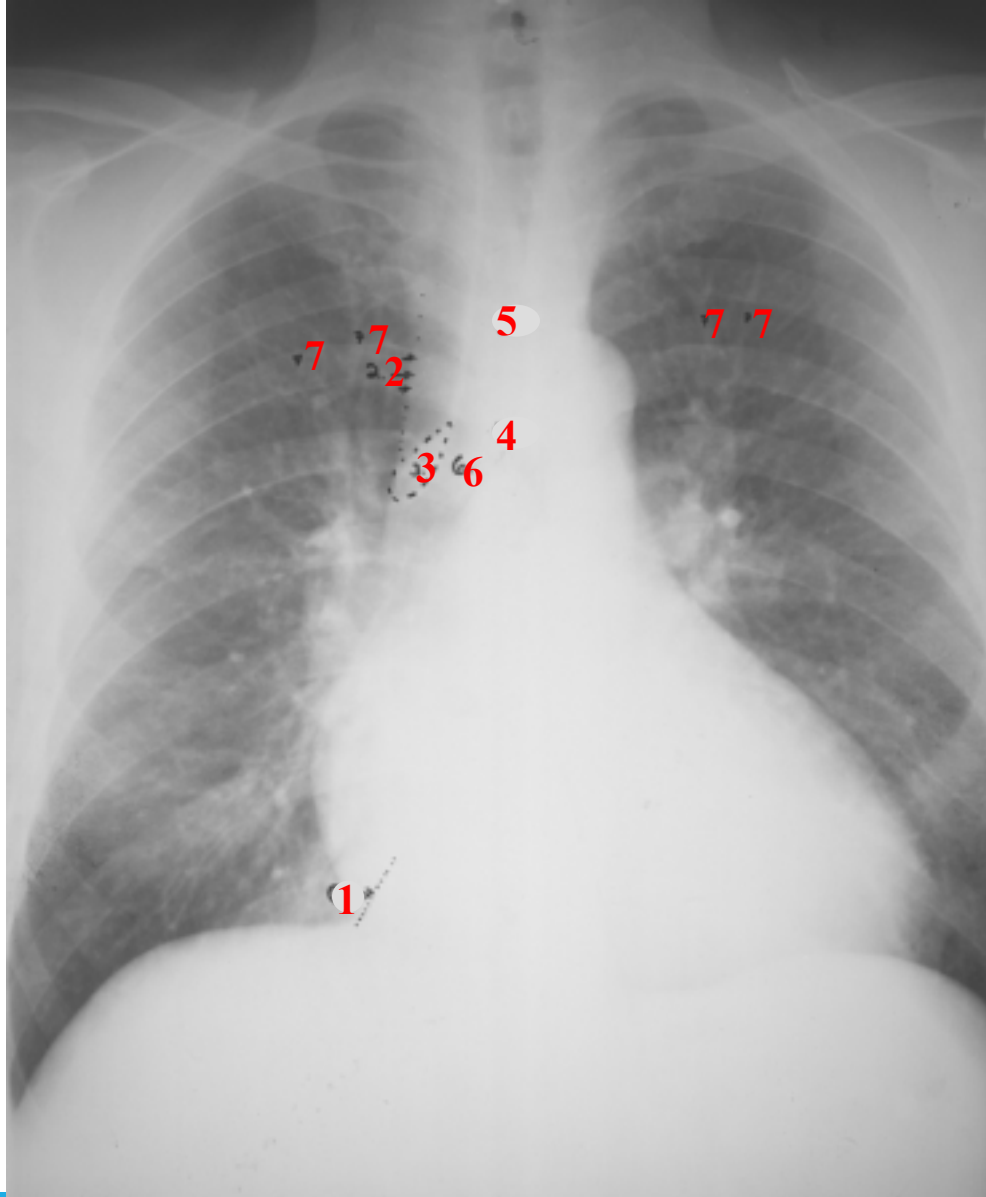


Heart and Vessels



Cardiomegaly plus early Congestive Heart Failure (CHF):

- Any and or all heart chambers may enlarge when the heart becomes diseased. Cardiomegaly = big heart.
- A patient's heart enlarges due to a number of diseases e.g. valve disease, high blood pressure, congestive heart failure.
- If the heart fails, the lung often become congested.
- Early on the pulmonary vessels appear more prominent as in this case. More advanced failure can result in a condition of pulmonary edema which is fluid flooding into the alveoli of the lungs causing the patient marked shortness of breath.



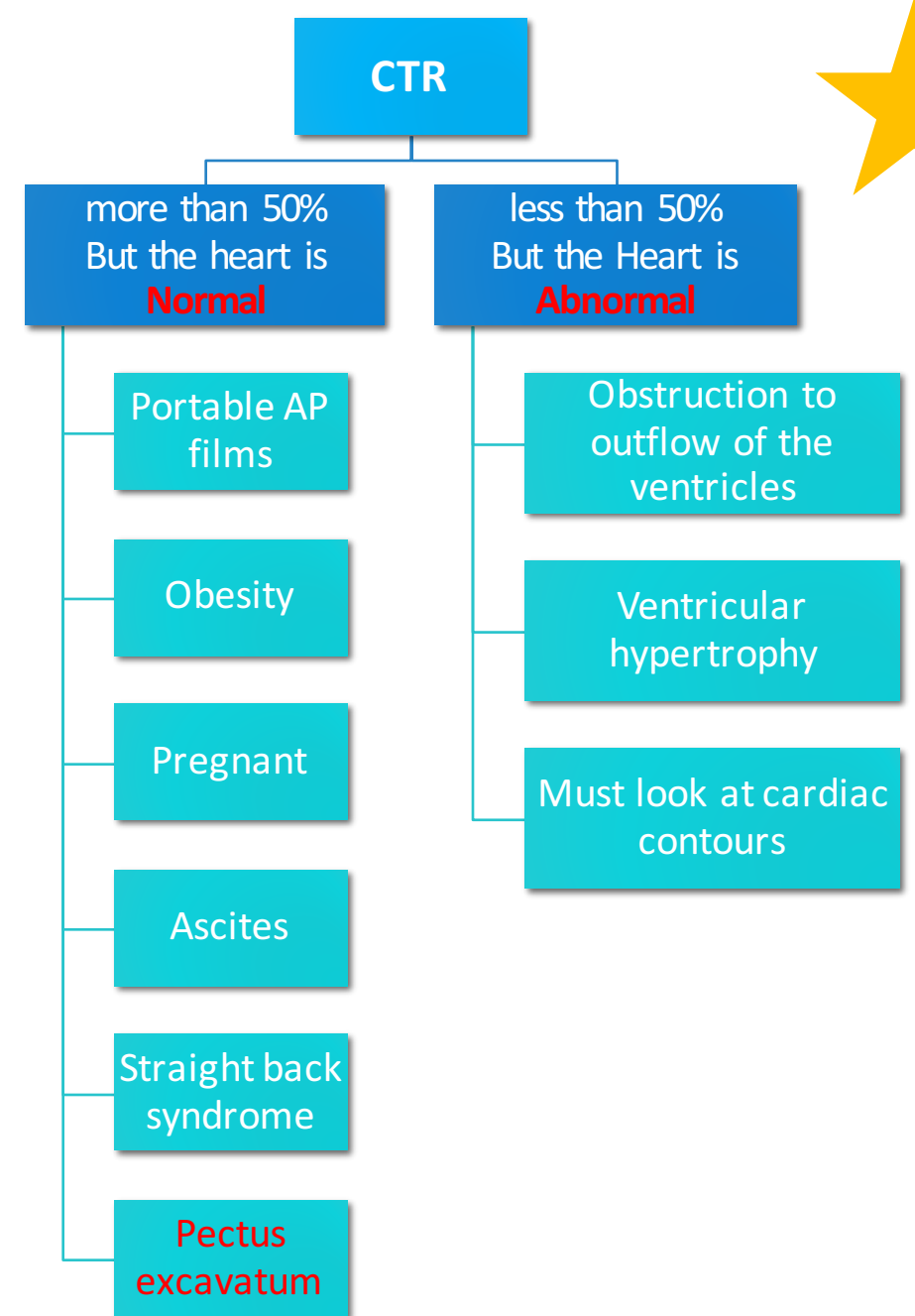
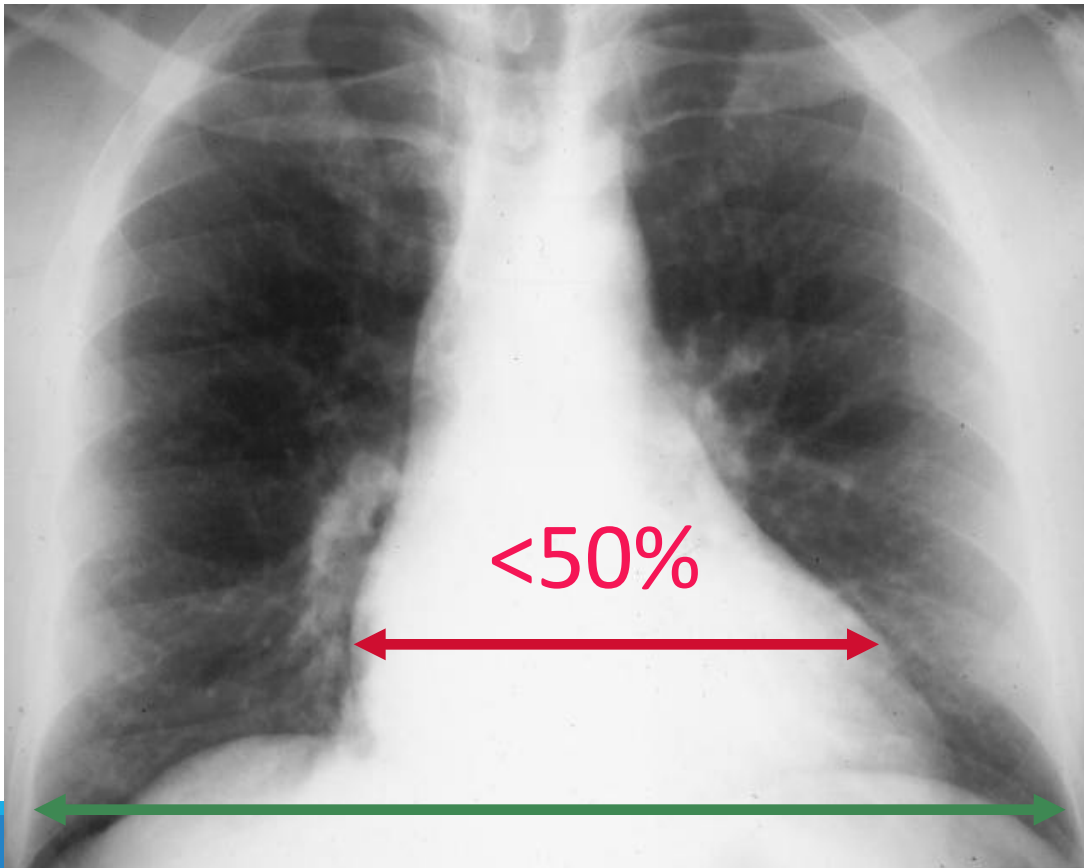
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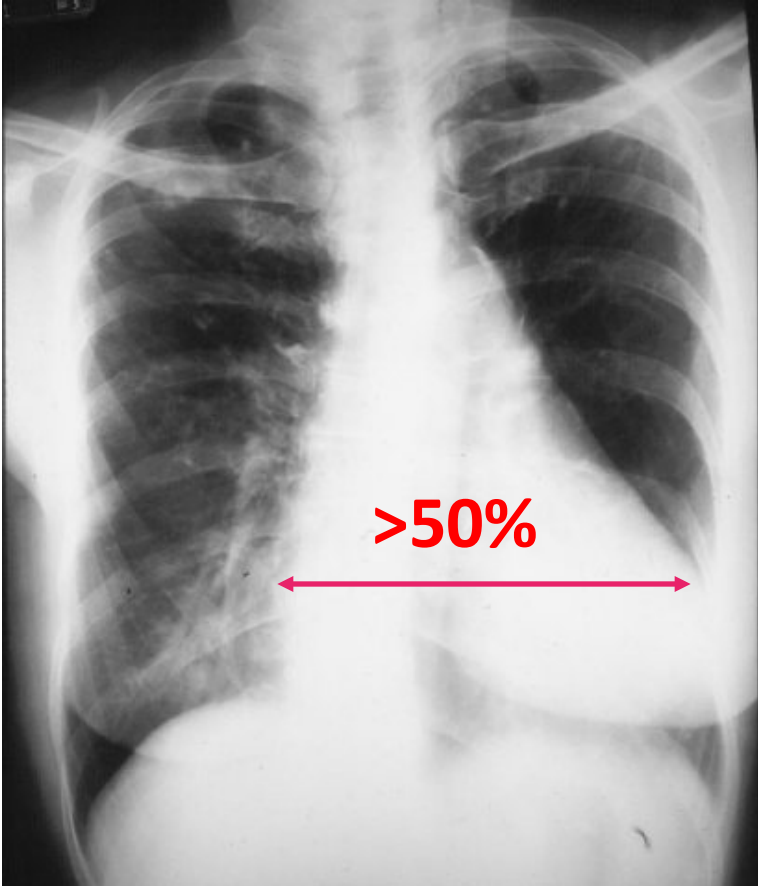
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|--------------------------------|-----------------------------|
| 1. Inferior vena cava (IVC) | 4. carina |
| 2. Superior vena cava (SVC) | 5. trachea |
| 3. Azygos vein | 6. right main stem bronchus |
| 7. Prominent pulmonary vessels | |

Cardio-Thoracic Ratio



- One of the easiest observations to make is something you already know: the cardio-thoracic ratio which is **the widest diameter of the heart** compared to the **widest internal diameter of the rib cage** and it should be less than 50%.
- It is a crude assessment of cardiac size and It has to be measured under only PA view + erect position with full inspiration.

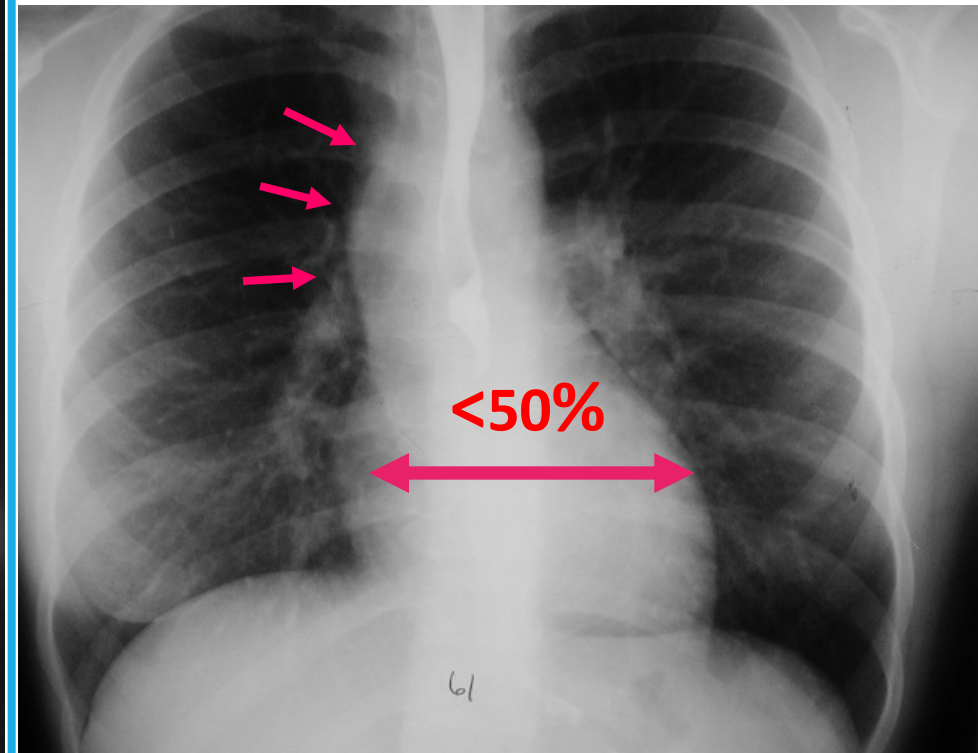




Here is a heart that is larger than 50% of the cardiothoracic ratio, but it is still a **normal** heart. This is because there is an extracardiac cause for the apparent cardiomegaly.



On the lateral film, the arrows point to the inward displacement of the lower sternum in a pectus excavatum deformity.



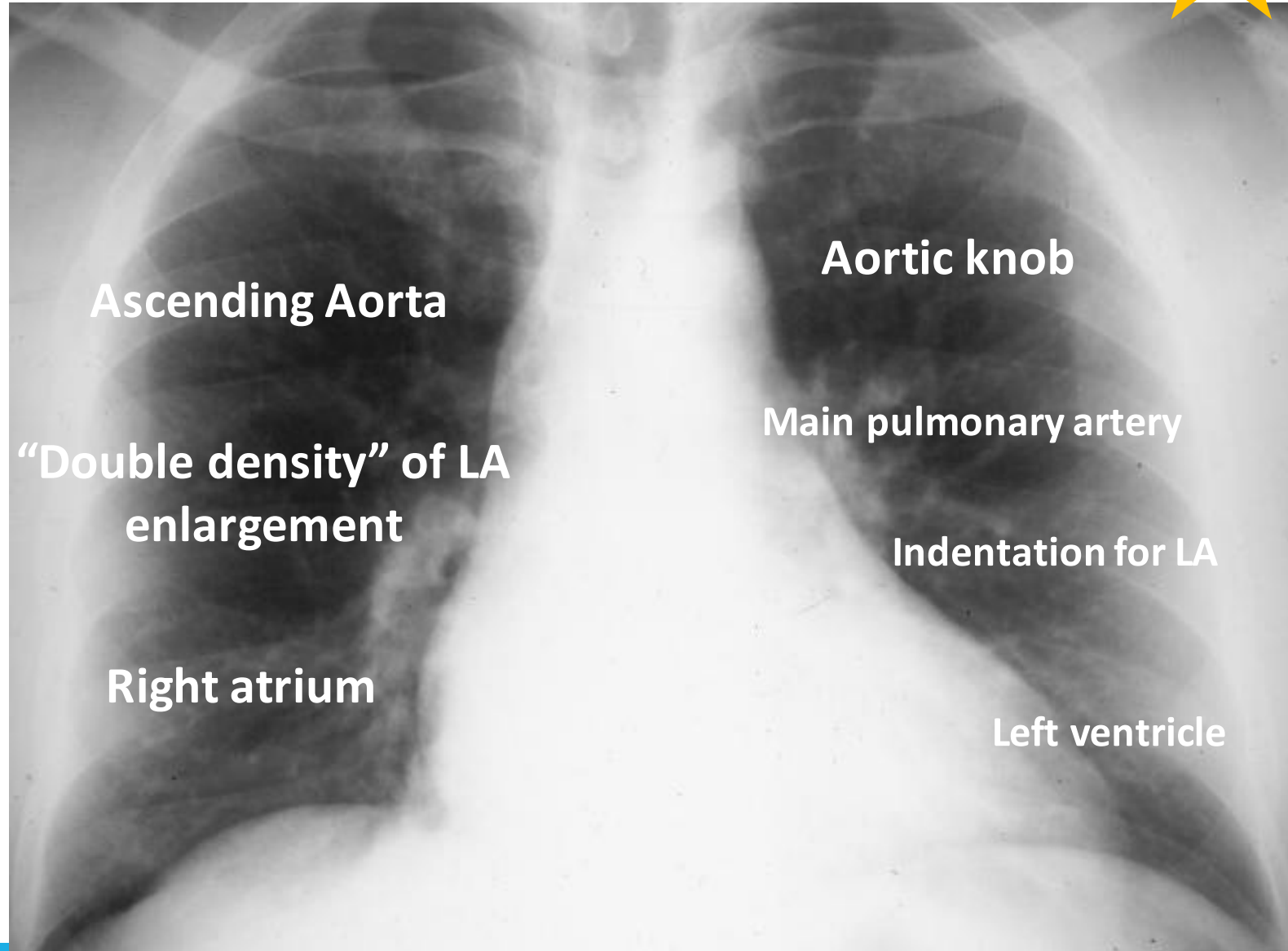
Here is an example of a heart which is less than 50% of the CTR in which the heart is still **abnormal**.

This is recognizable because there is an abnormal contour to the heart (arrows).

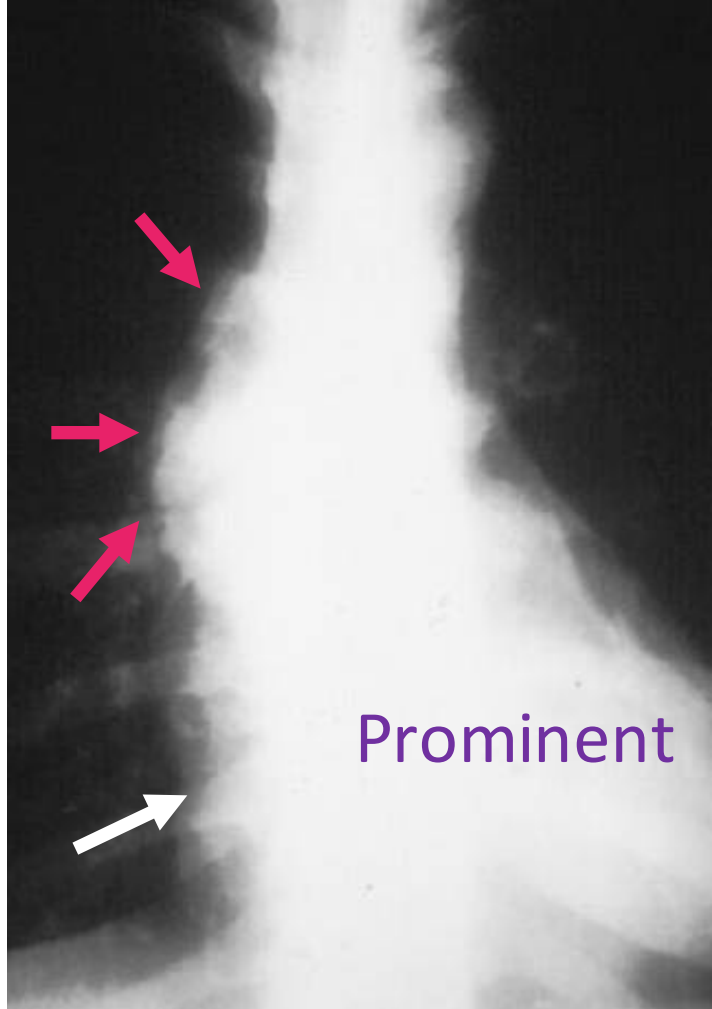
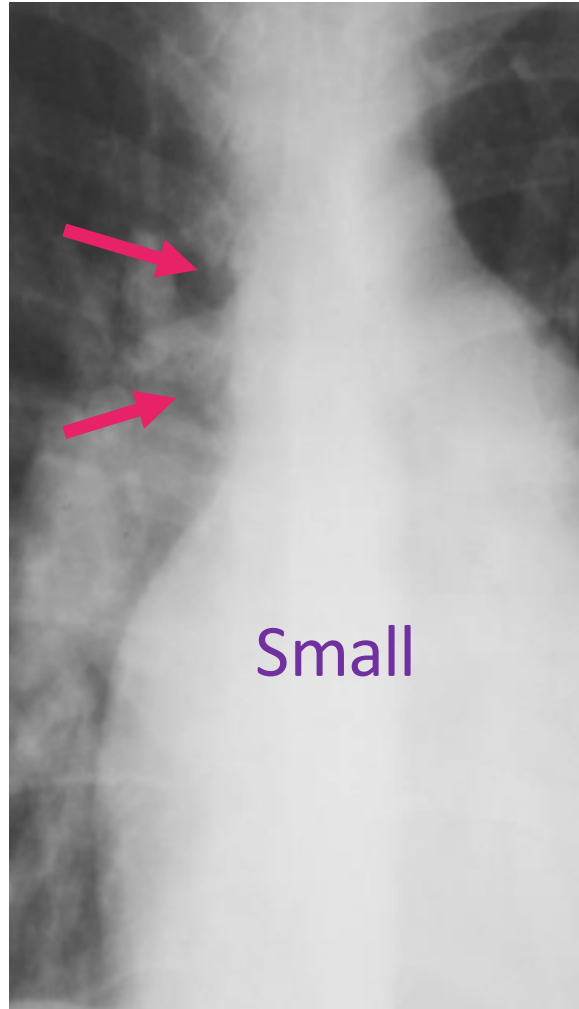
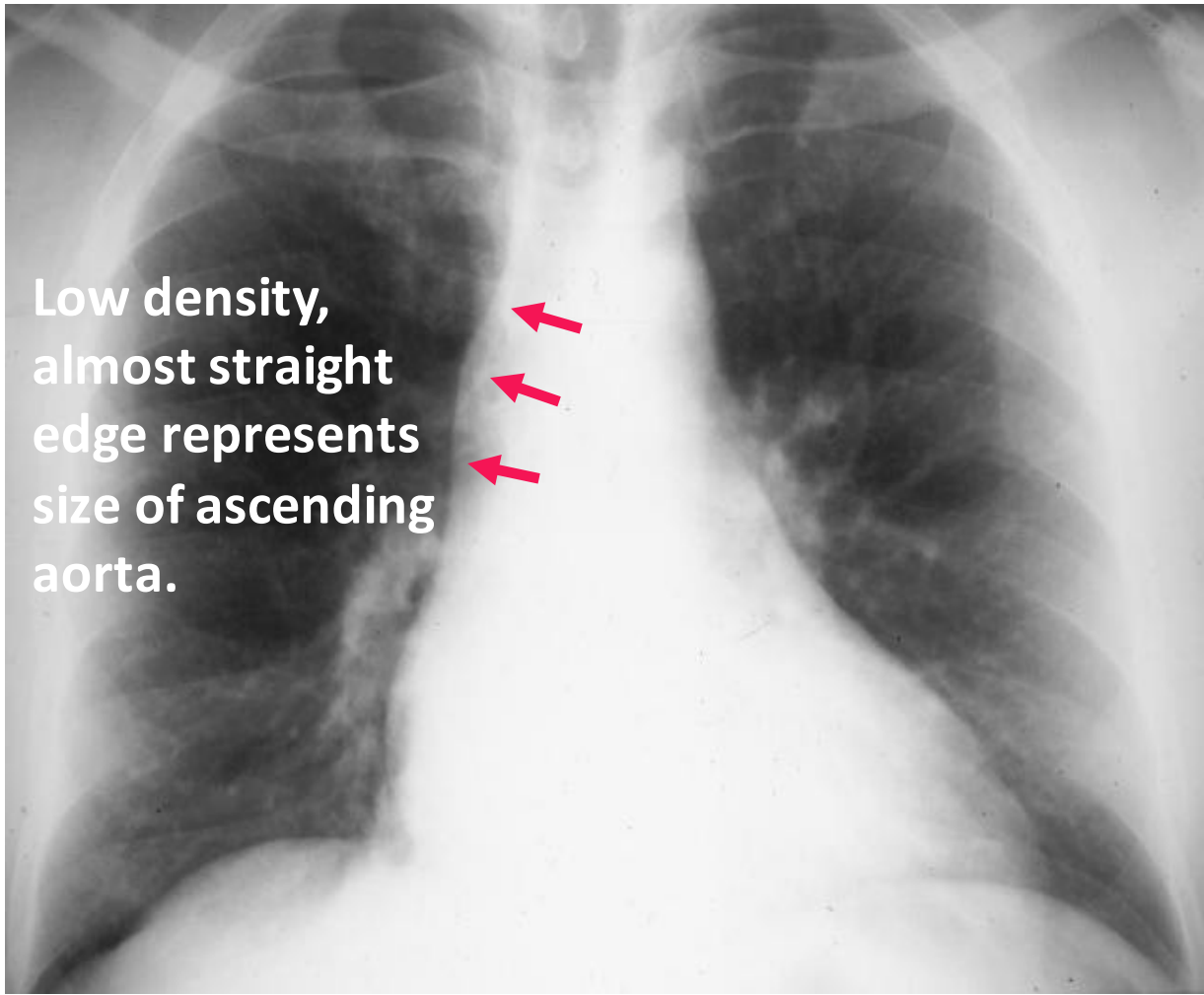
The Cardiac Contours



- There are 7 contours to the heart in the frontal projection in this system.
- But only the top five are really important in making a diagnosis.

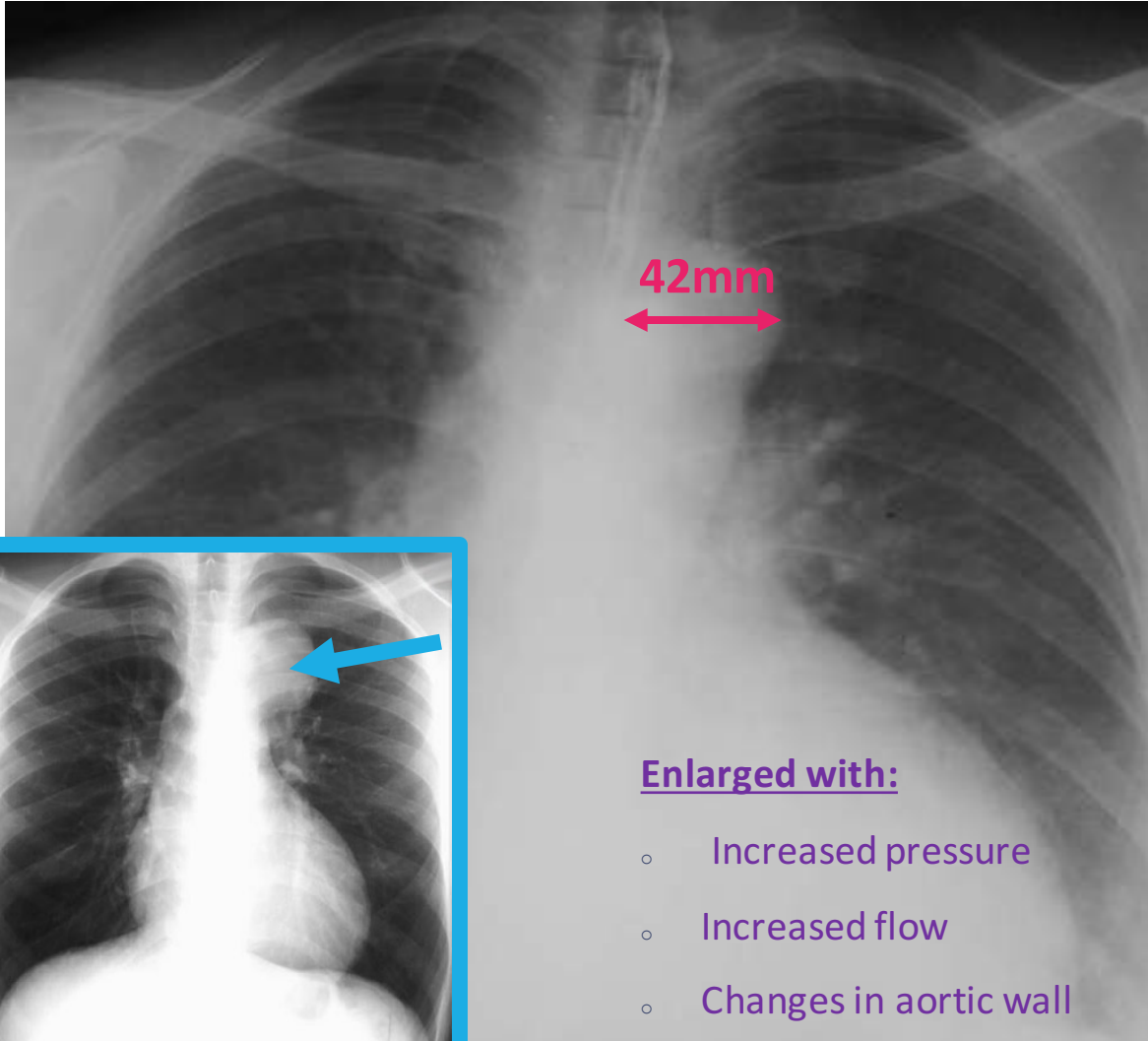


Ascending Aorta

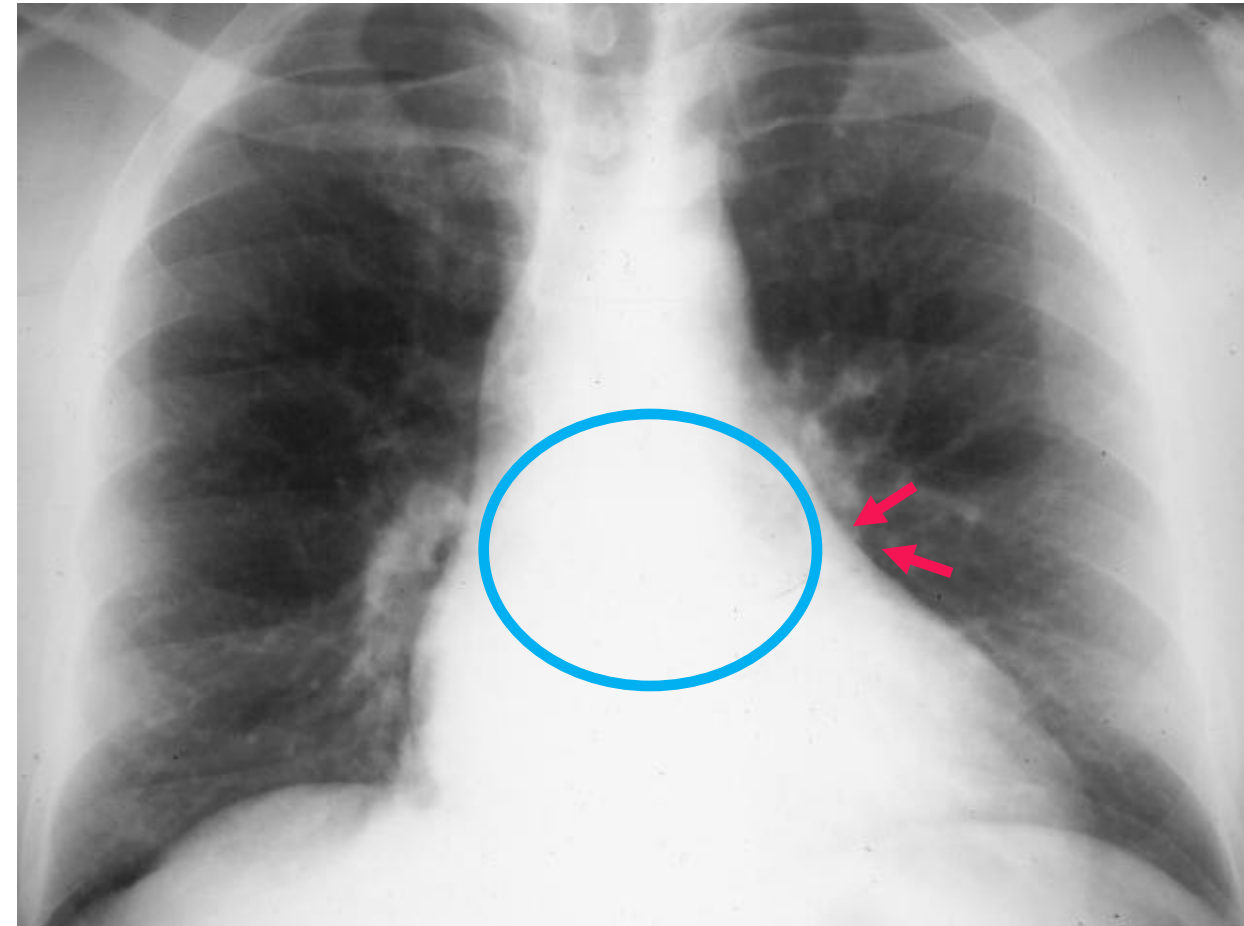


Aortic Knob/knuckle

(Aortic Aneurysm)



Left Atrial Enlargement



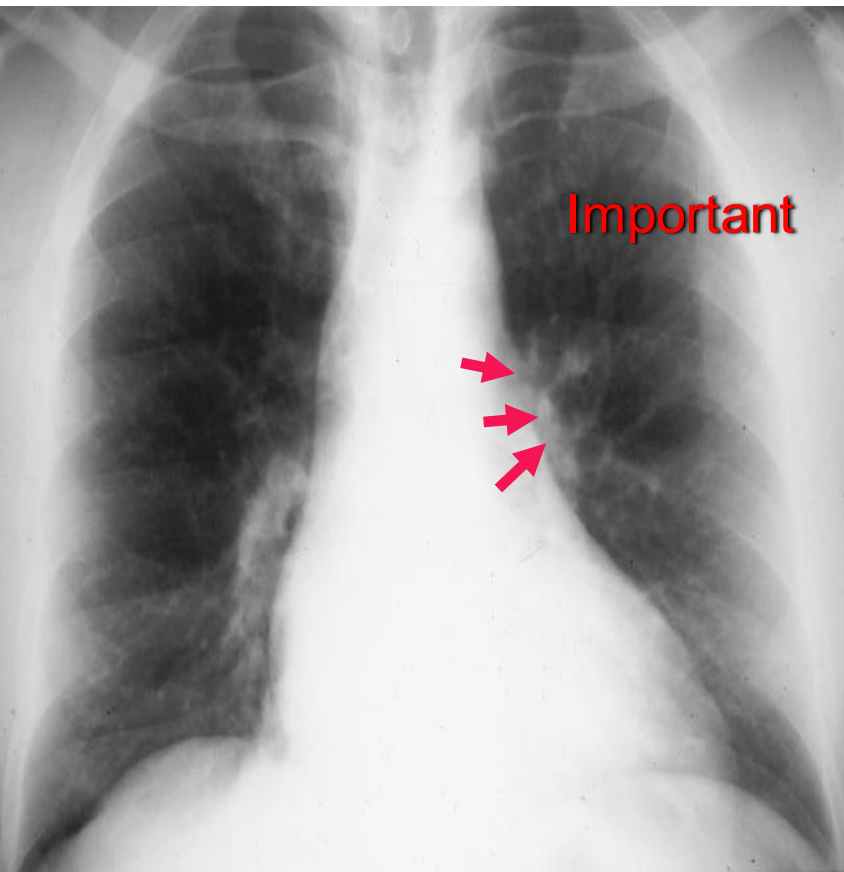
Concavity where Left atrium will appear on left side when enlarged



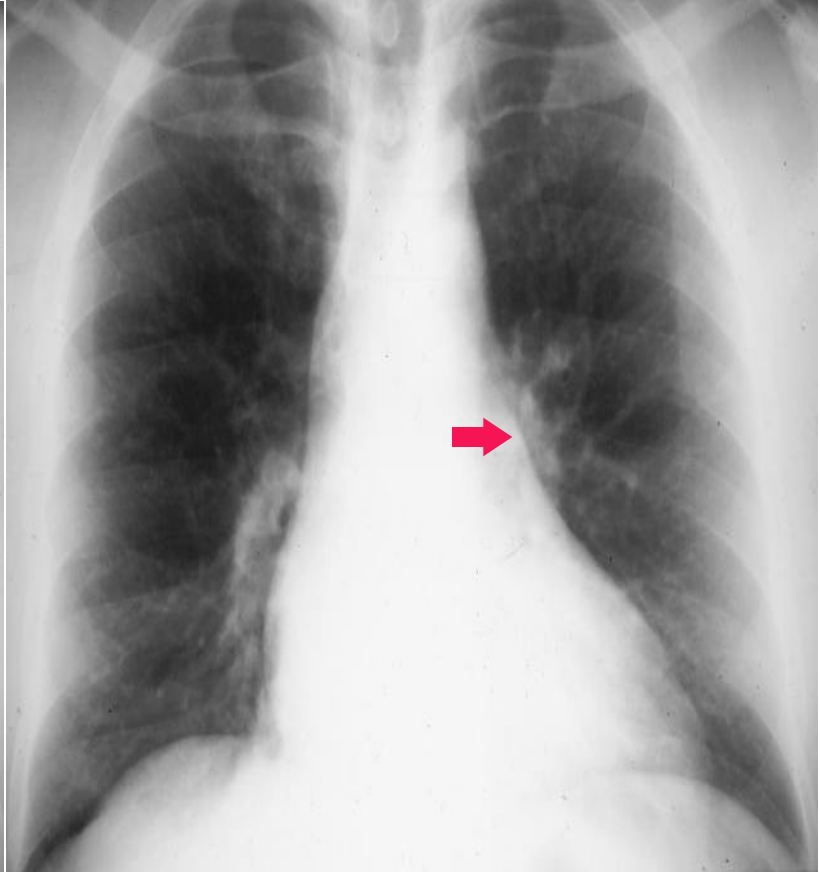
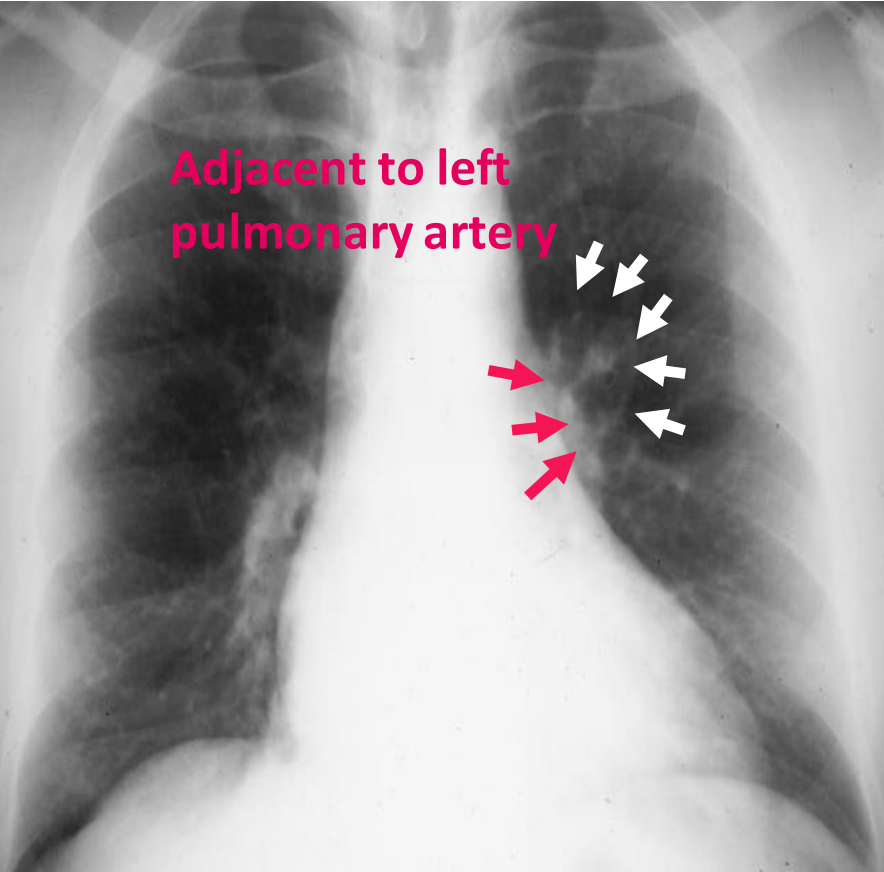
Pulmonary Artery



Main Pulmonary Artery



Finding the Main Pulmonary Artery



We can measure the main pulmonary artery

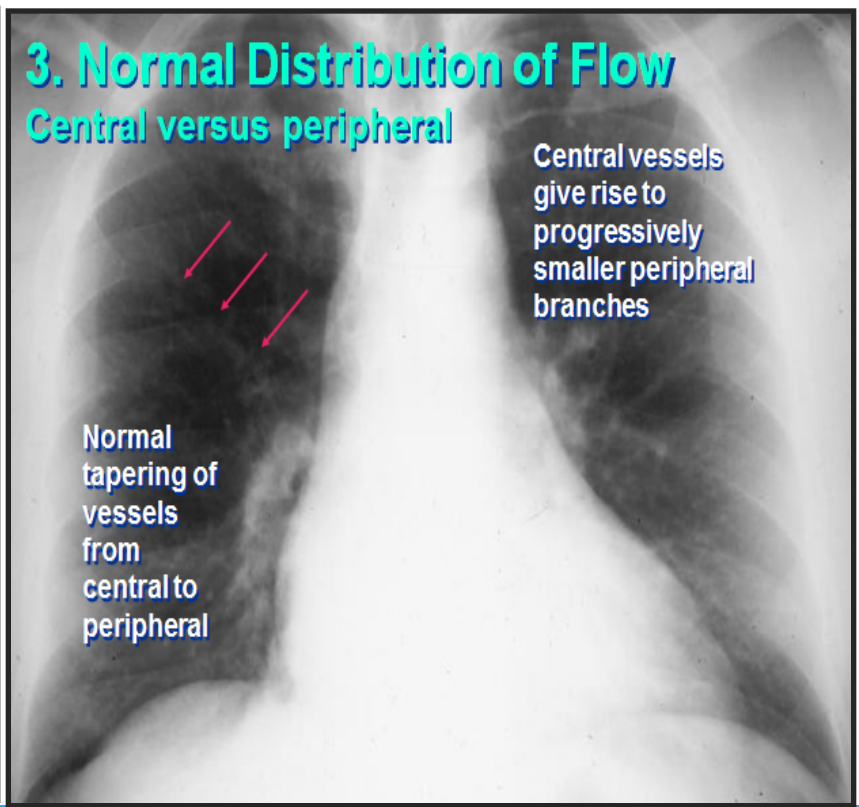
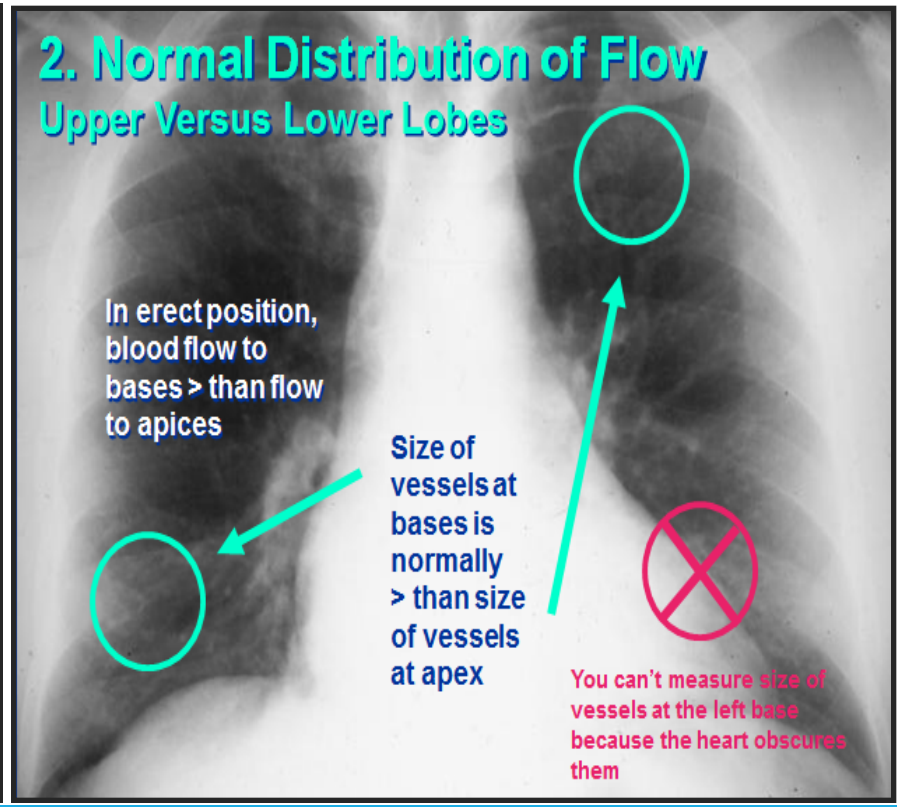
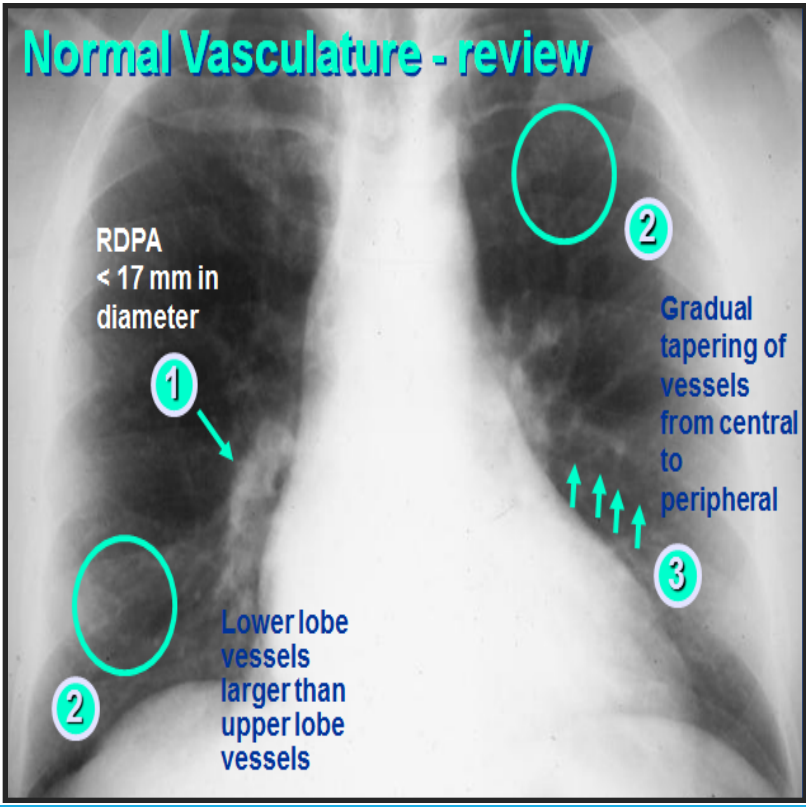
The next bump down is the main pulmonary artery and is the keystone of this system.



The Pulmonary Vasculature

5 States of the Pulmonary Vasculature:

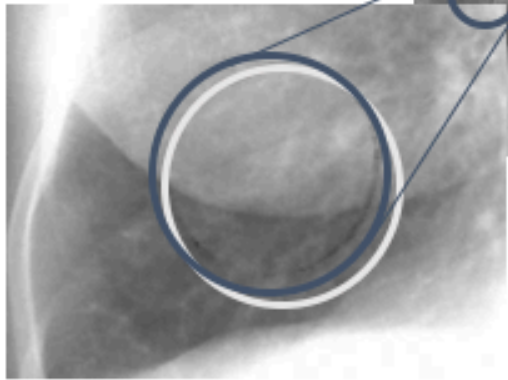
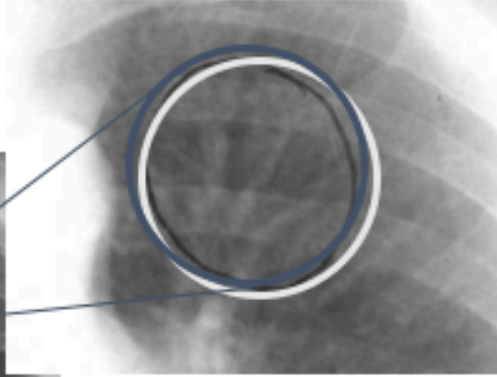
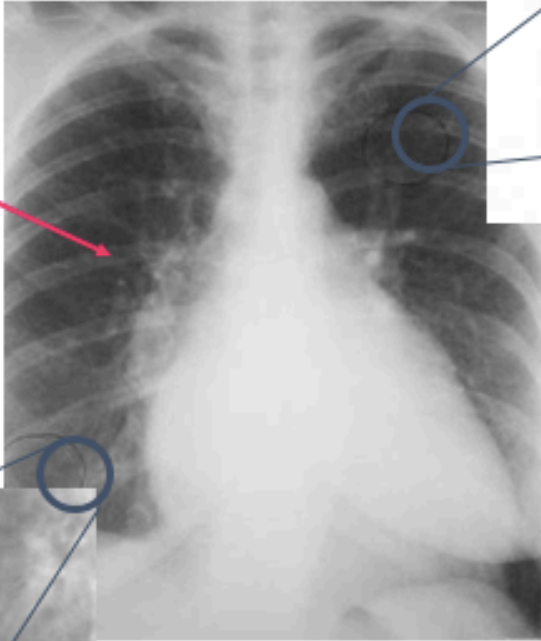
- Normal
- Pulmonary venous hypertension
- Pulmonary arterial hypertension
- Increased flow
- Decreased flow - *mostly unrecognizable even when it is present*





The Pulmonary Vasculature

RDPA usually
> 17 mm

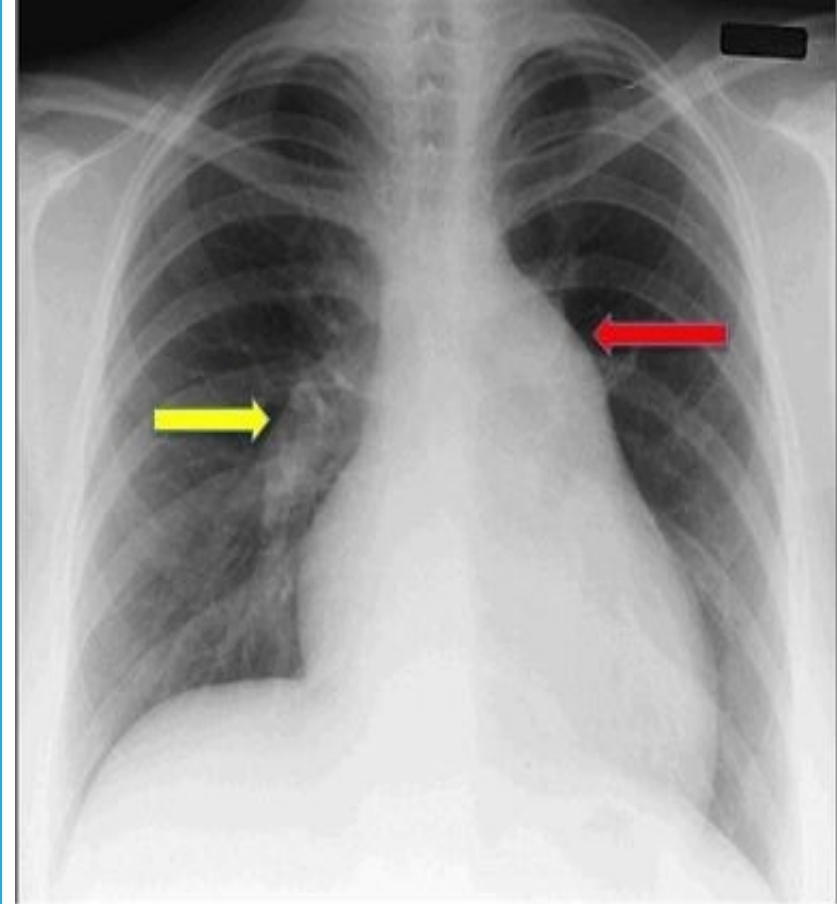


Venous Hypertension:

Cephalization:

Upper lobe vessels equal to or larger than size of lower lobe vessels

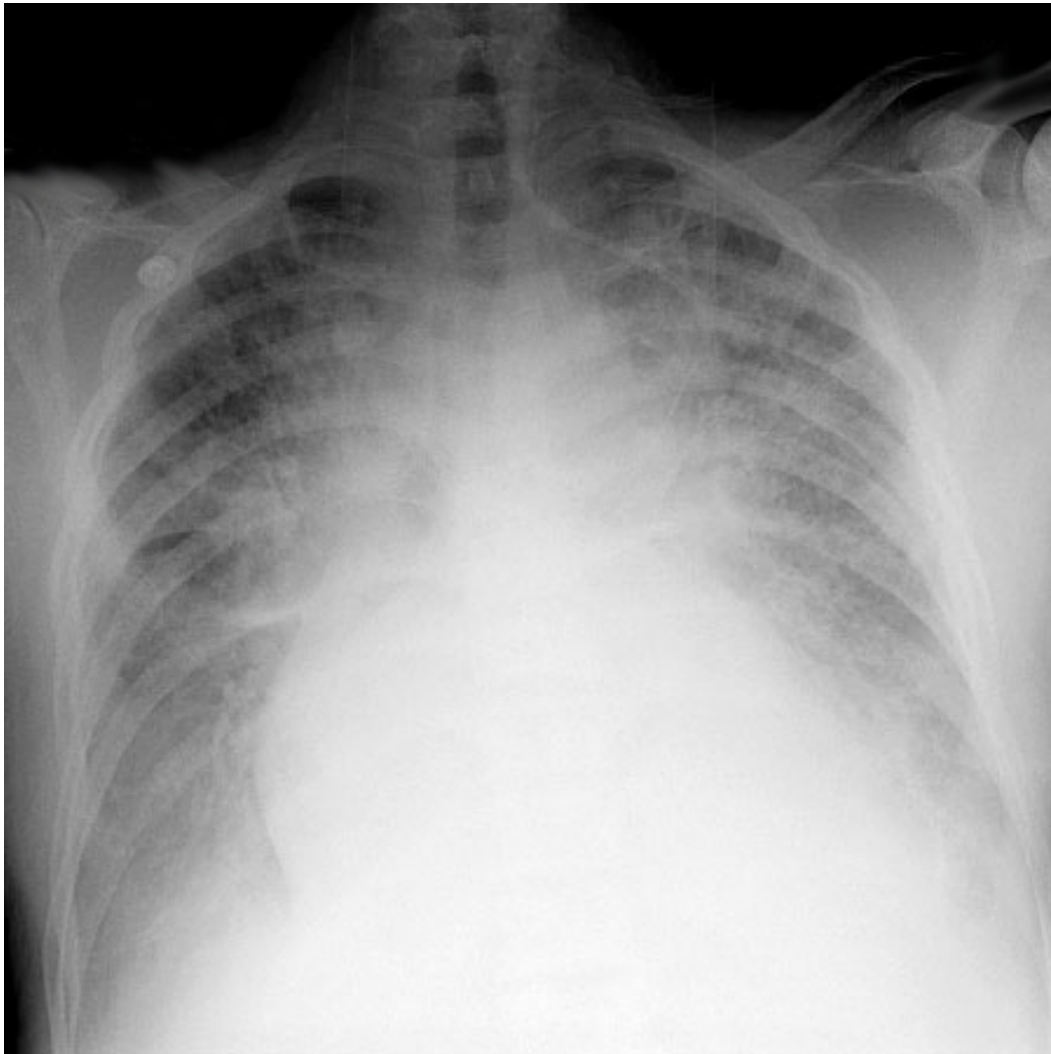
RDPA = "Right Descending Pulmonary Artery"



Atrial Hypertension

Congestive Heart Failure (CHF)

CHF → consolidation + Pulmonary Edema



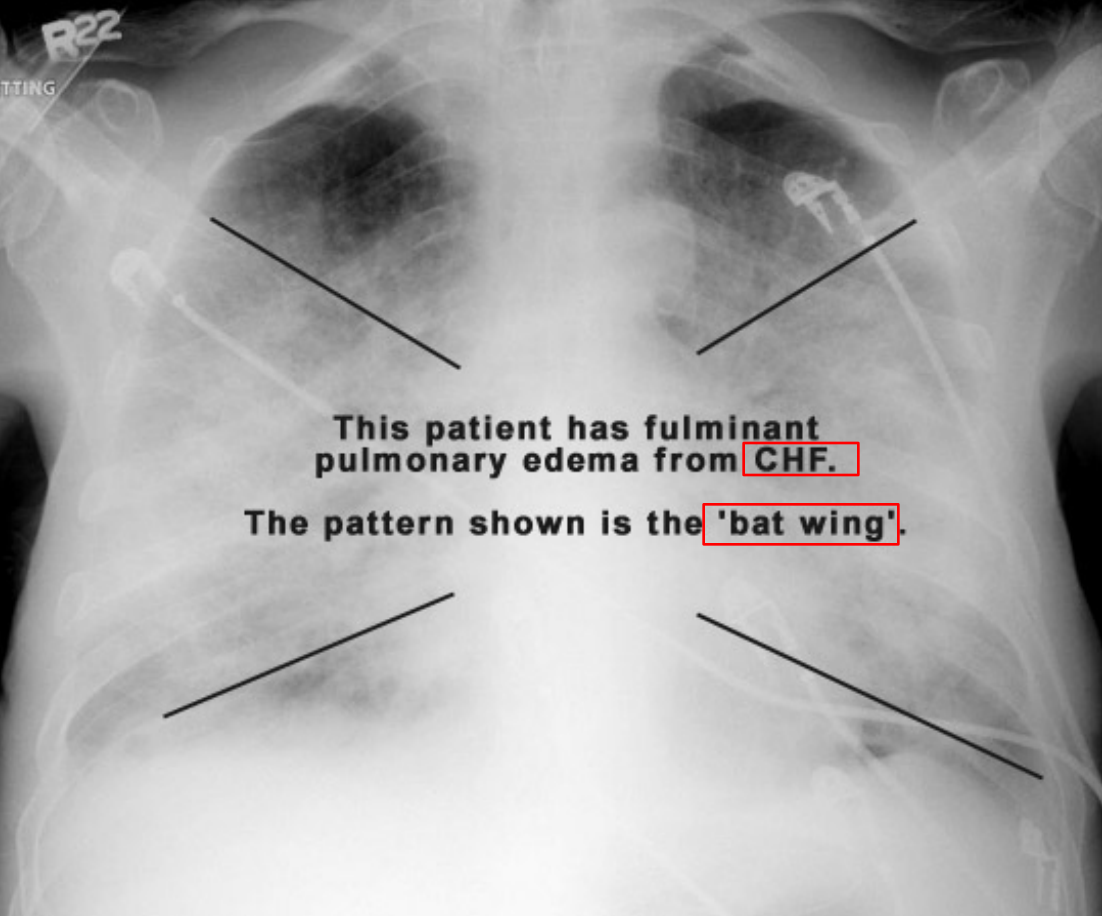
How to differentiate between Pneumonia and CHF?

CHF	Pneumonia
No fever, orthopnae and PND	Fever
Diffuse consolidation (butterfly area) spread to upper and lower lobe	Consolidation is seen in segments of the lung
Patient's chest X-ray will improve when given Diuretic treatment (Therapeutic Test)+ taking digitalis	No improvement

Acute Pulmonary Edema

we can differentiate between Pneumonia and CHF by giving the patient HF treatment, IF they improved after 2 to 3 h > this is differently CHF

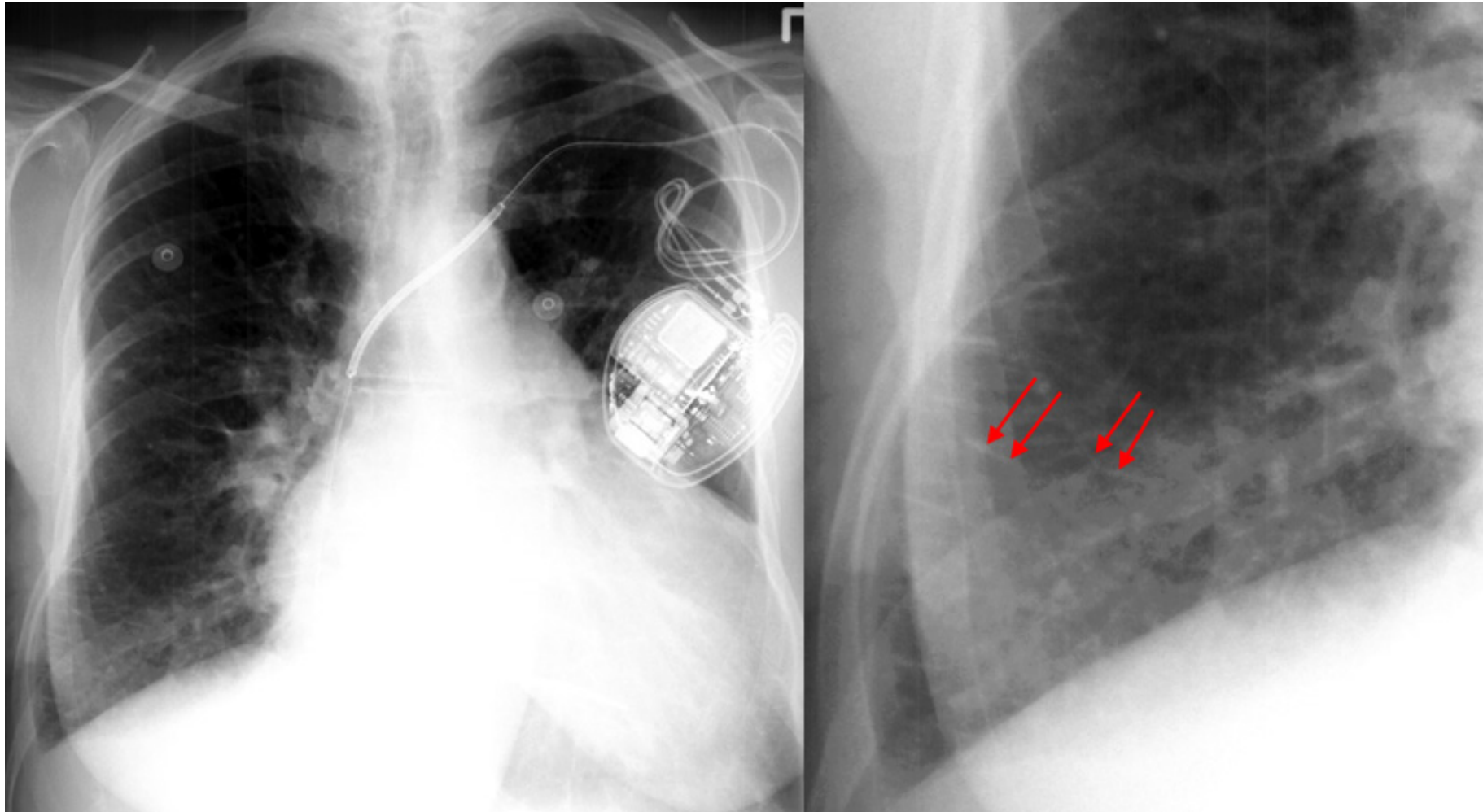
Before treatment



After treatment



Kerely's B-lines



- These lines are the thickened, edematous interlobular septa.
- Causes of Kerley B lines include; pulmonary edema, lymphangitis carcinomatosa and malignant lymphoma, viral and mycoplasmal pneumonia, interstitial pulmonary fibrosis, pneumoconiosis, sarcoidosis.

Thank You!

We hope you found this helpful and informative.

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