Radiological Anatomy of the Thorax (CXR)

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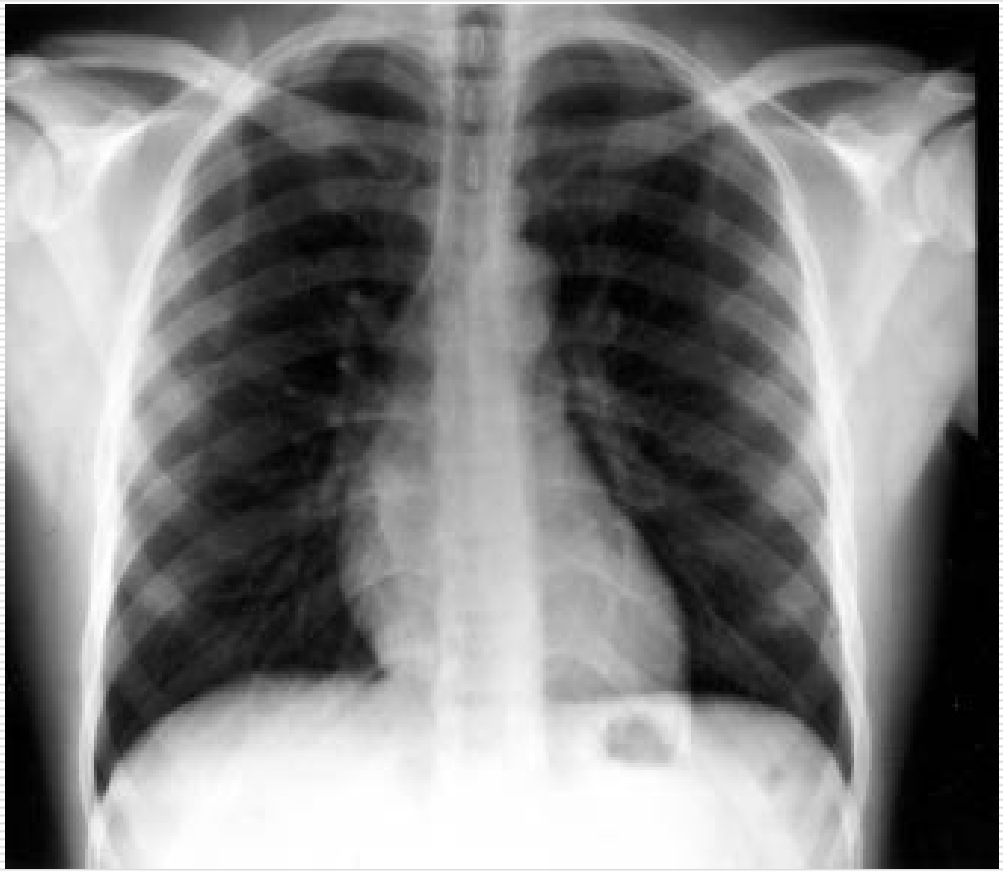
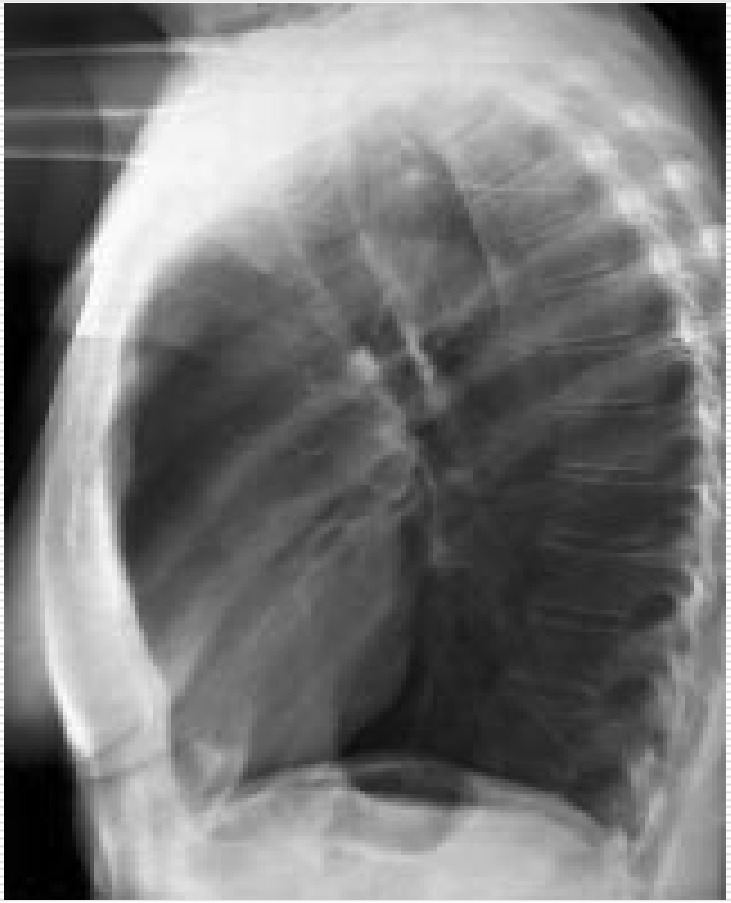
Session Objectives

- At the end of this session the student should be able to:
  - Describe the radiological anatomy features of chest x-rays.
  - Systematically interpret a chest x-ray.
  - Relate selected clinical conditions to x-ray findings of the chest.

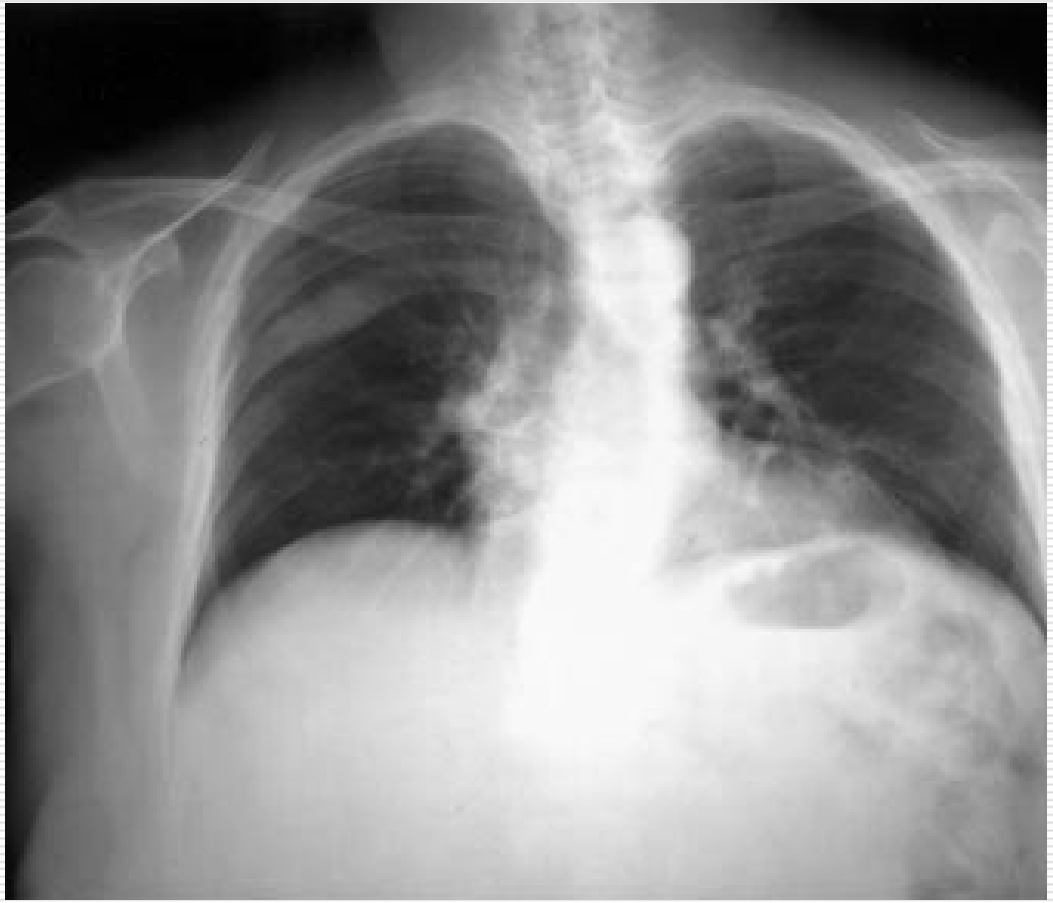
Quiz 1



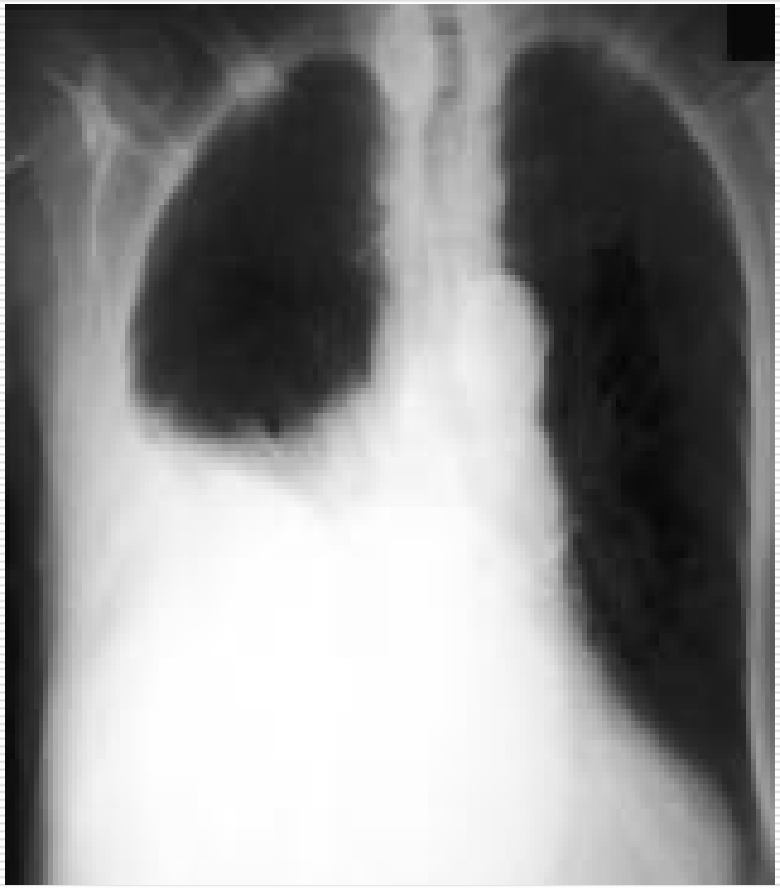
Quiz 2



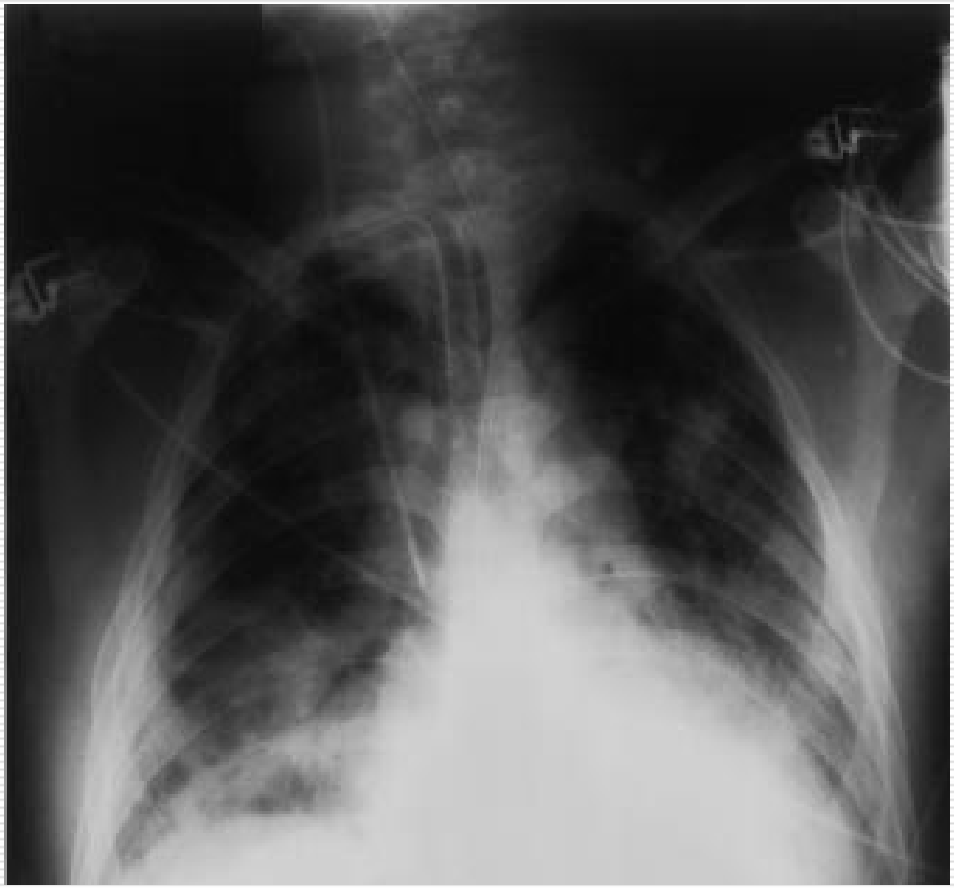
Quiz 3



Quiz 4

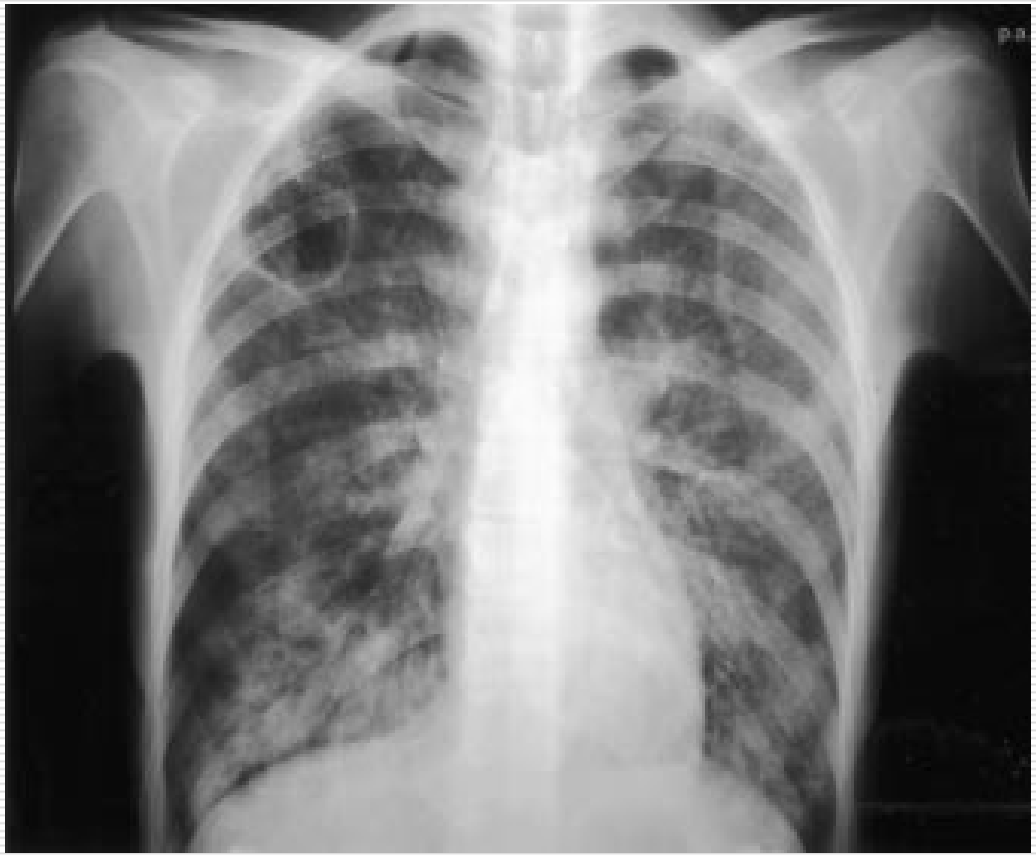


Quiz 5



Quiz 6

Quiz 7



General Assessment (1)

- Orient film (L or R)
- Plain or special x-ray? Look for the presence of contrast media.
- Name of patient.
- Male or female? Look for the presence of breast shadows.

Radiography Technique (1)

- Good inspiration? The diaphragms should lie at the level of the 6th ribs anteriorly. The spaces betweeen ribs are open and not crowded.
- Good penetration? You should just be able to see the lower thoracic vertebral bodies through the heart.

Radiography Technique (2)

- Is the patient rotated? The spinous processes of the thoracic vertebrae should be midway between the medial ends of the clavicles.
- Is it a PA? or (AP taken when patient is too sick to stand up for PA).
- An AP film will always be labelled as AP, so if nothing is written on the film it is safe to assume it is PA.

Anatomical Assessment (Mediastinal Contours 1)

- The trachea should be central.
- The aortic arch is the 1st structure on the left, followed by the left pulmonary artery.
- 2/3 of the heart lies on the left side of the chest, with 1/3 on the right.
- The heart should take about 1/2 or less of the thoracic cavity.
- The left border of the heart is made up by the left atrium and left ventricle.

Anatomical Assessment (Mediastinal Contours 2)

- The R border is made up by the right atrium alone.
- Above the right heart border lies the edge of the superior vena cava.
- The pulmonary arteries and main bronchi arise at the left and right hila.
- Enlarged lymph nodes can also occur here, as can primary tumours. These make the hilum seem bulky.
- Note the size of the hila on the film.

Anatomical Assessment (Lungs 1)

- Apart from the pulmonary vessels, they should be black (because they are full of air).
- Scan both lungs, starting at the apices and working down, comparing left with right at the same level.
- Look at the periphery of the lungs—you should not see many lung markings here;
- Don’t forget to look for a pneumothorax—in which case you would see the sharp line of the edge of the lung.

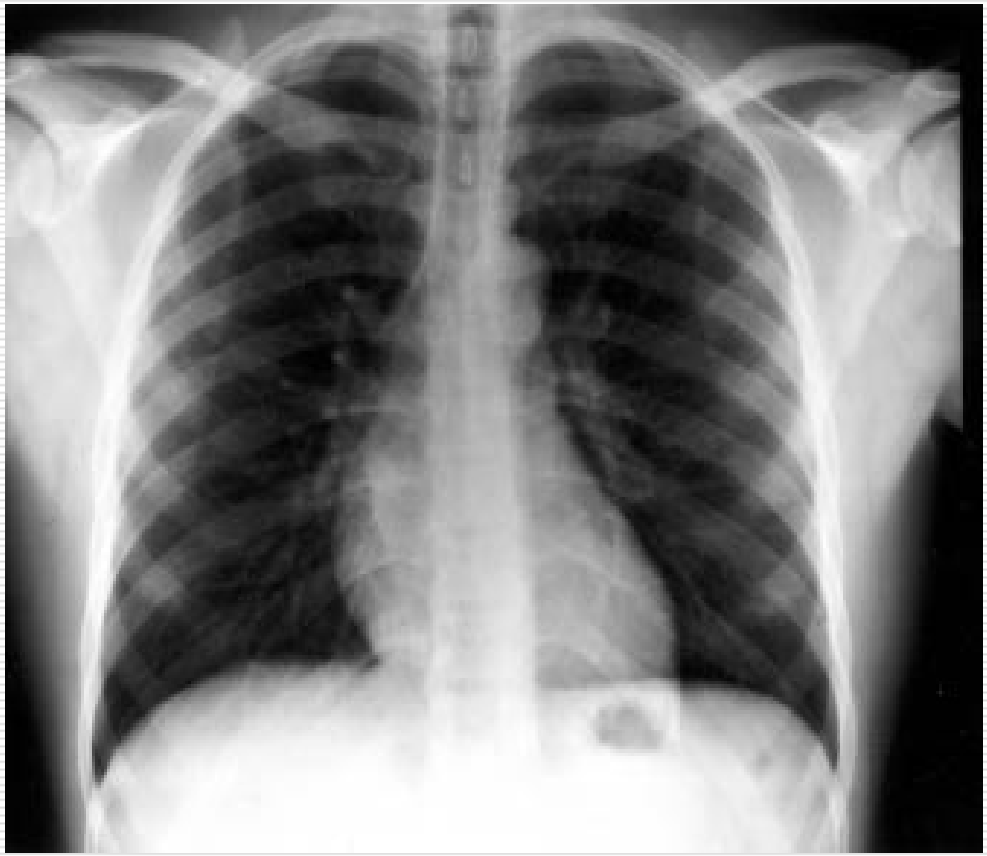
Anatomical Assessment (Lungs 2)

- Make sure you can see the surface of the hemidiaphragms curving downwards, and that the costophrenic and cardiophrenic angles are not blunted—suggesting an effusion.
- Check there is no free air under the hemidiaphragm.

Anatomical Assessment (Soft Tissue)

- Finally look at the soft tissues and bones.
- Are both breast shadows present?
- Is there a rib fracture? This would make you look even harder for a pneumothorax.
- Are the bones destroyed or sclerotic?

Normal Chest X-ray



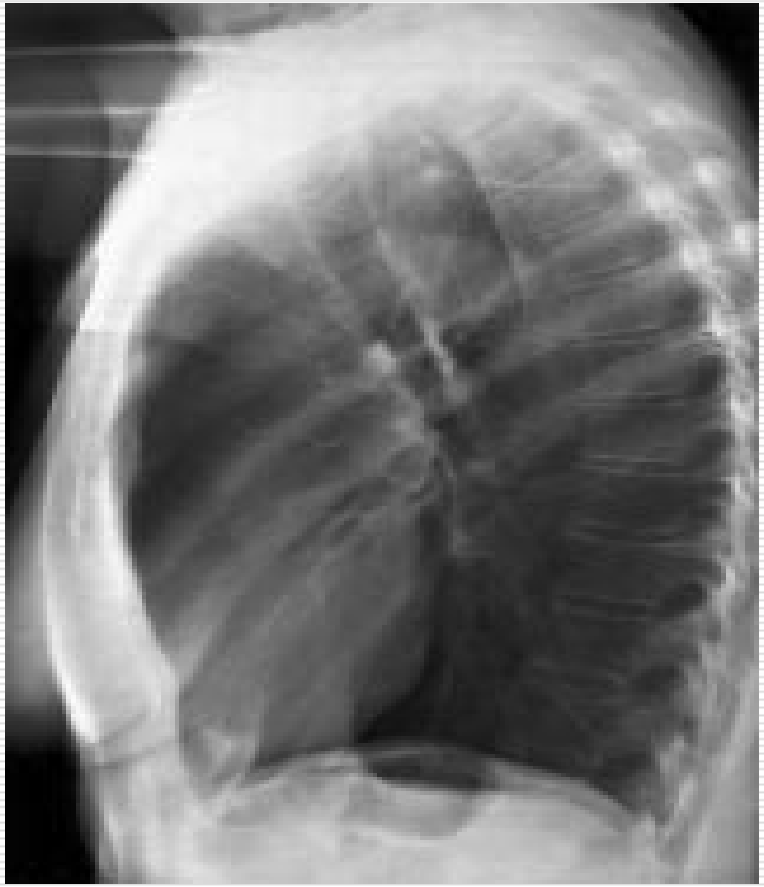
Lateral X-rays

Only 2 spaces to look at on the lateral film:

1. The area anterior and superior to the heart.
2. The area posterior to the heart right down to the hemidiaphragms.

- If 1 is opacified, suspect disease in upper lobes.
- If 2 opacified suspect collapse or consolidation in the lower lobes.

Lateral X-ray Normal

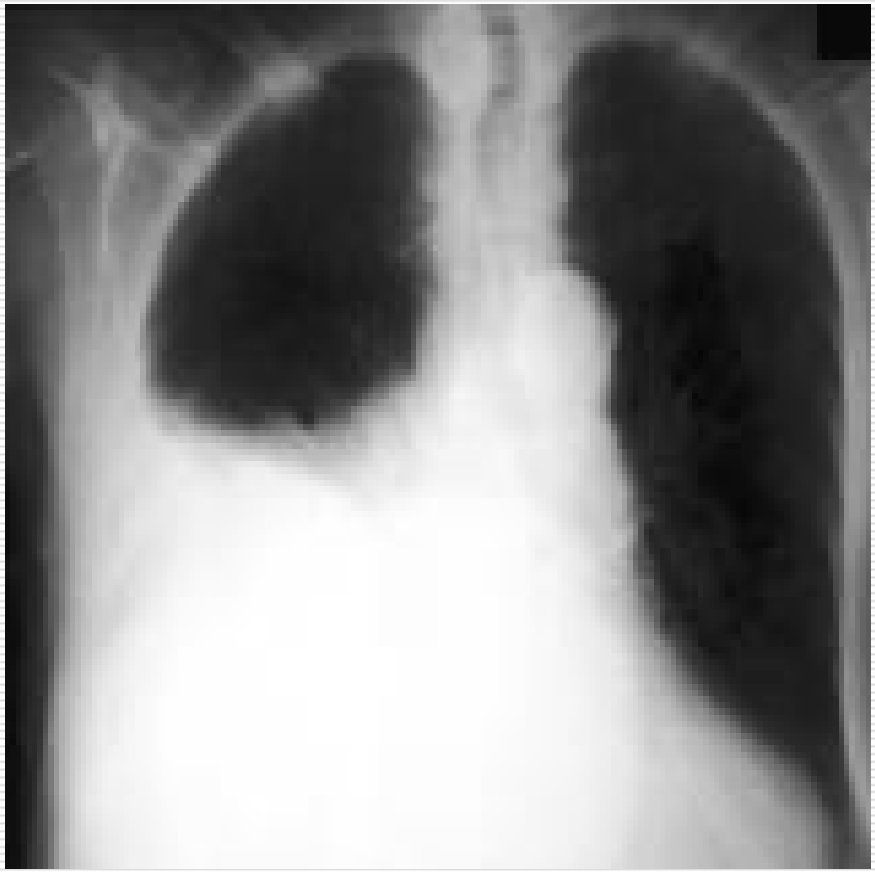


Mediastinal Abnormalities

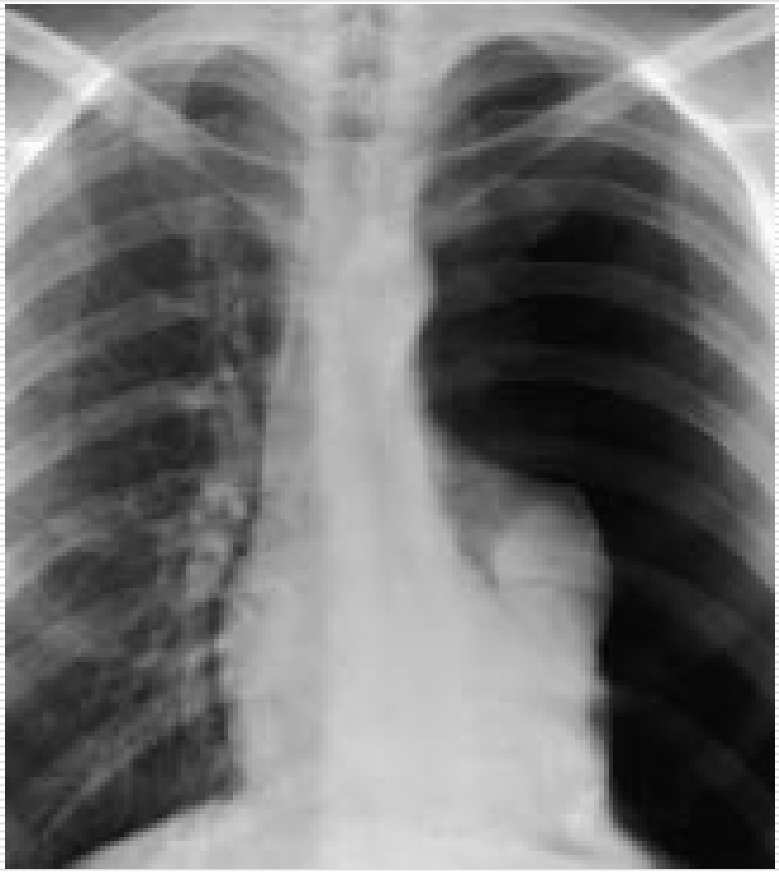
Trachea & Mediastinum Shifted

- The trachea can be pulled or pushed by one of three processes (two that push, one that pulls):
  1. Pleural effusion will push the trachea and mediastinum.
  2. Tension pneumothorax will push the mediastinum as air builds up in the pleural space and cannot be released.
  3. Collapse will pull the trachea and mediastinum to the affected.

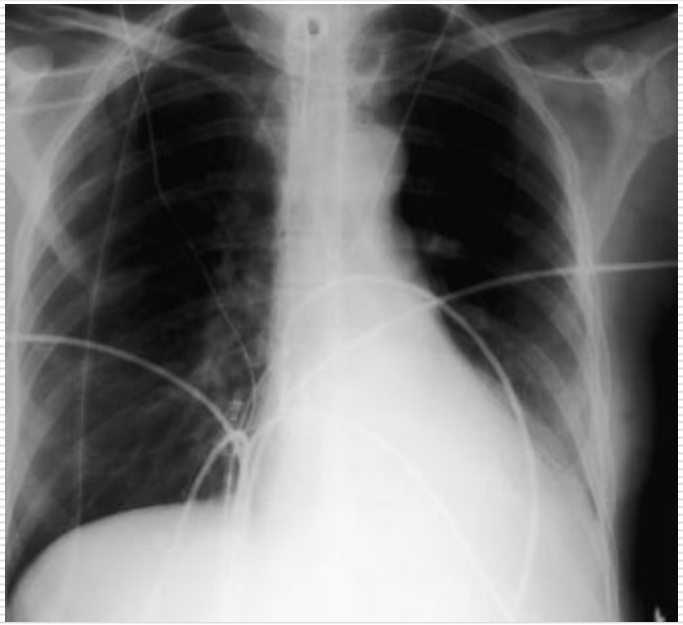
Rt Sided Pleural Effusion



Lt Sided Tension Pneumothorax



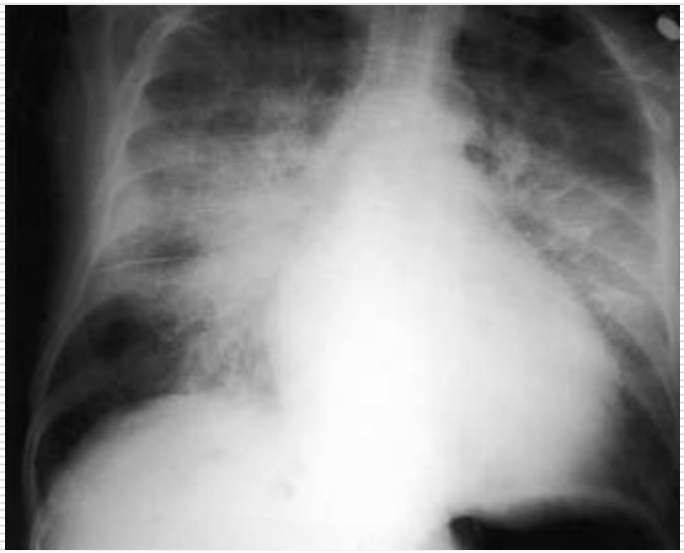
Lt Lower Lobe Collapse



Enlarged Heart

- The heart size is measured using the cardio-thoracic ratio.
- The normal cardio-thoracic is ratio is no more than 1:2.

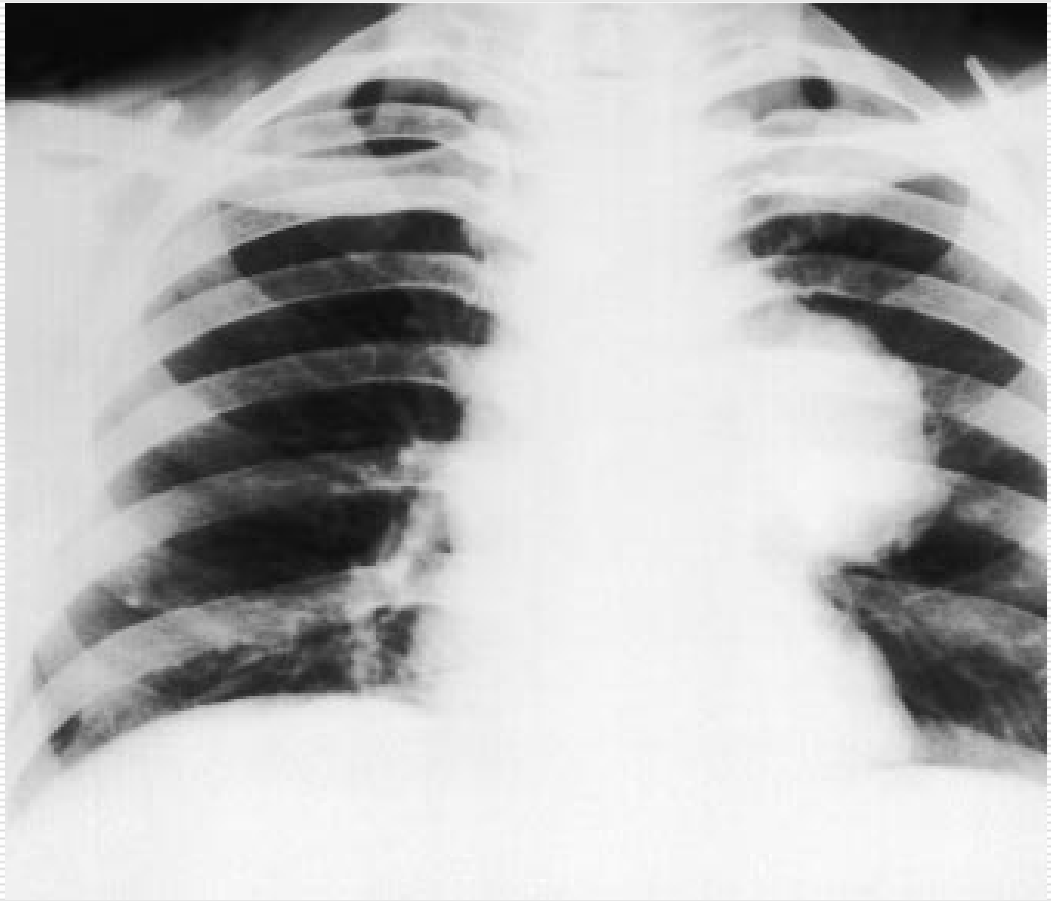
Enlarged heart



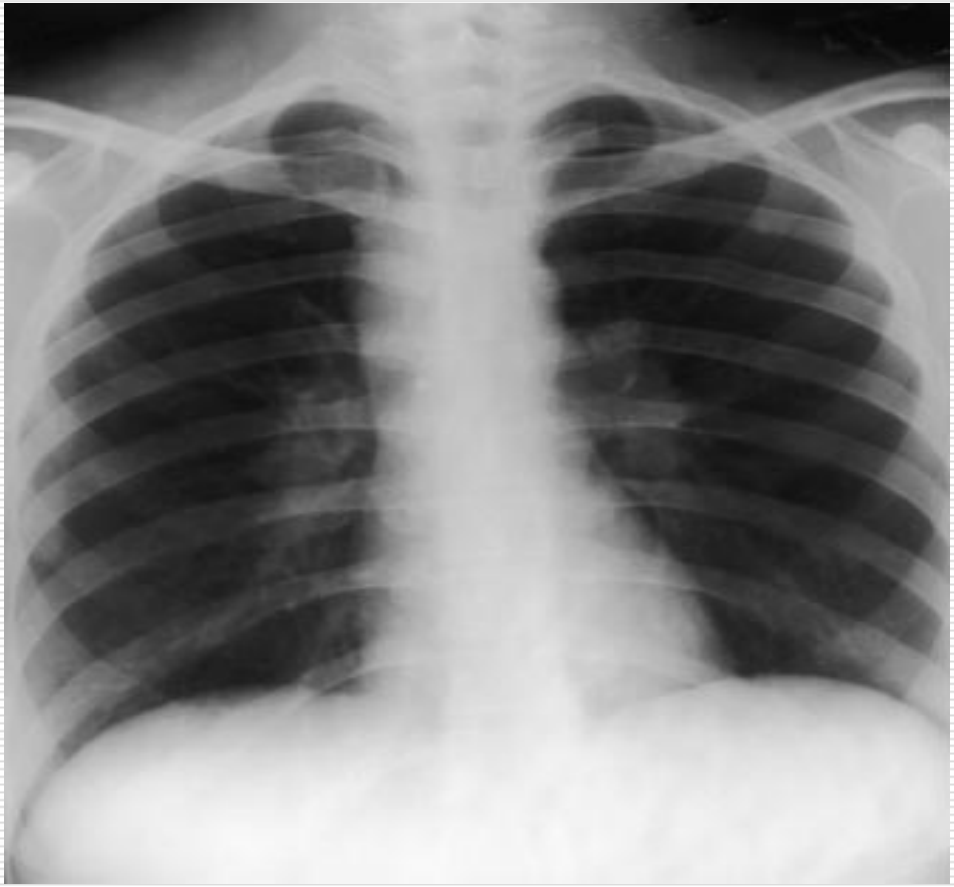
Enlarged Hila

- This could be due to an abnormality in any of the three structures which lie at the hilum.
  - The pulmonary artery.
  - The main bronchus.
  - Enlarged lymph nodes.

Left Hilar Carcinoma



Bilateral Hilar Lymphadenopathy

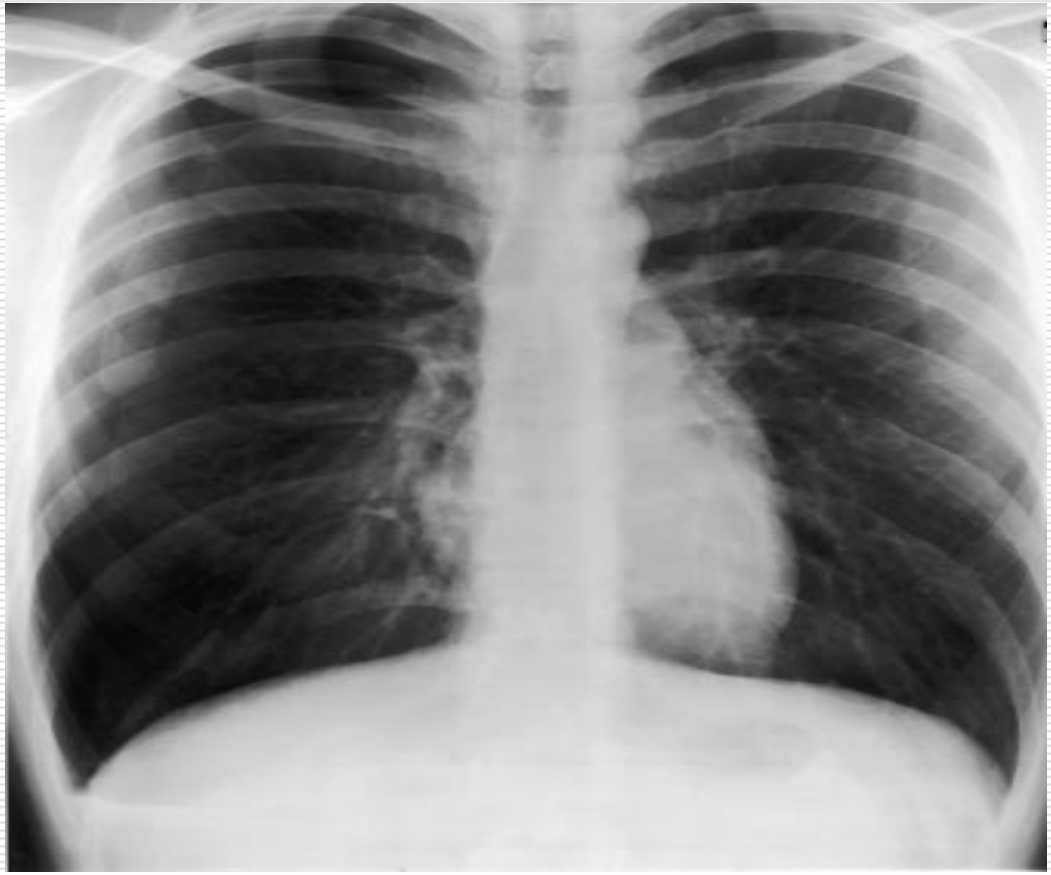


Lung Abnormalities

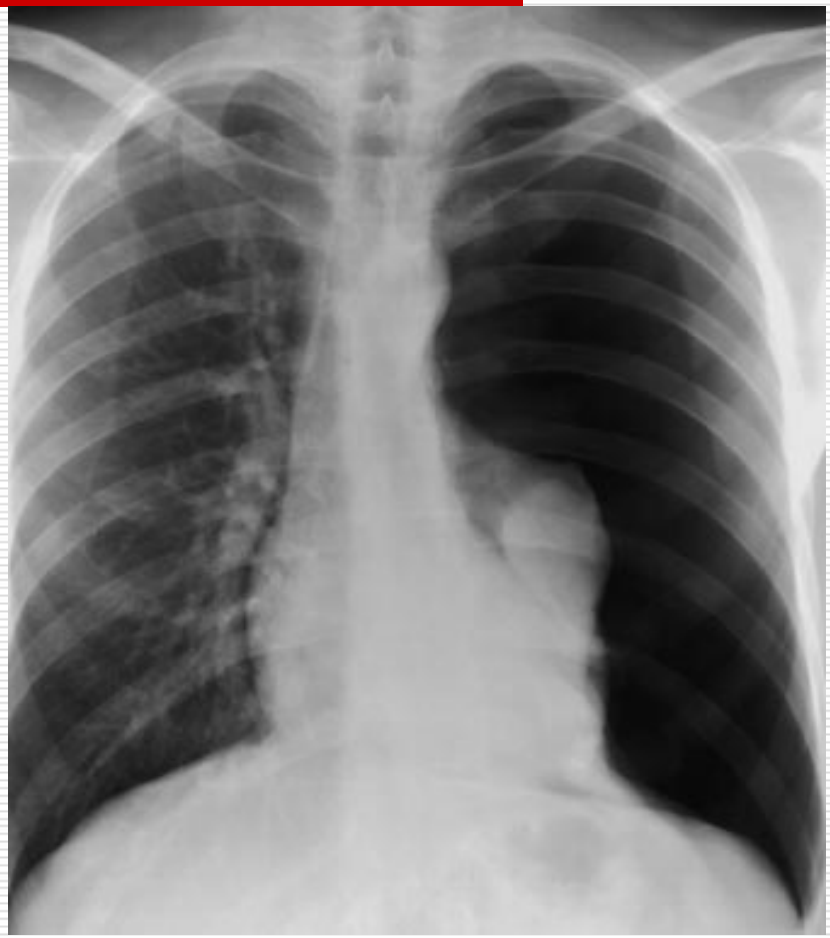
Pneumothorax

- View around the periphery of the lungs. Watch out for the following signs:
  - One half of the lung may seem blacker than the other. In particular, the area beyond the collapsed lung will be very radiolucent because there are no pulmonary vessel markings.
  - You should be able to identify the edge of the collapsed lung.
  - Having identified a pneumothorax:
  - Is there evidence of a tension pneumothorax?

Rt Pneumothorax



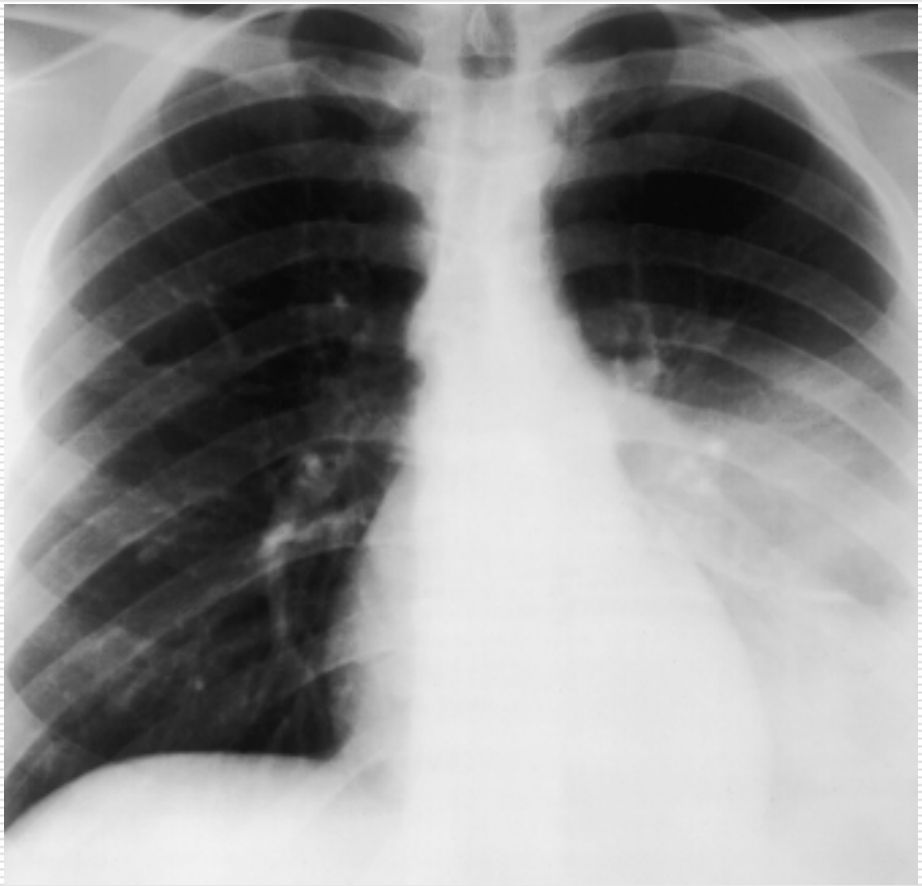
Lt Tension Pneumothorax



Other lung pathology

- Collapse
- Consolidation

Lt Lower Lobe Consolidation



Complete Collapse of the Rt Lung