RADIOLOGY OF HEART SHADOW & CARDIOMEGALY

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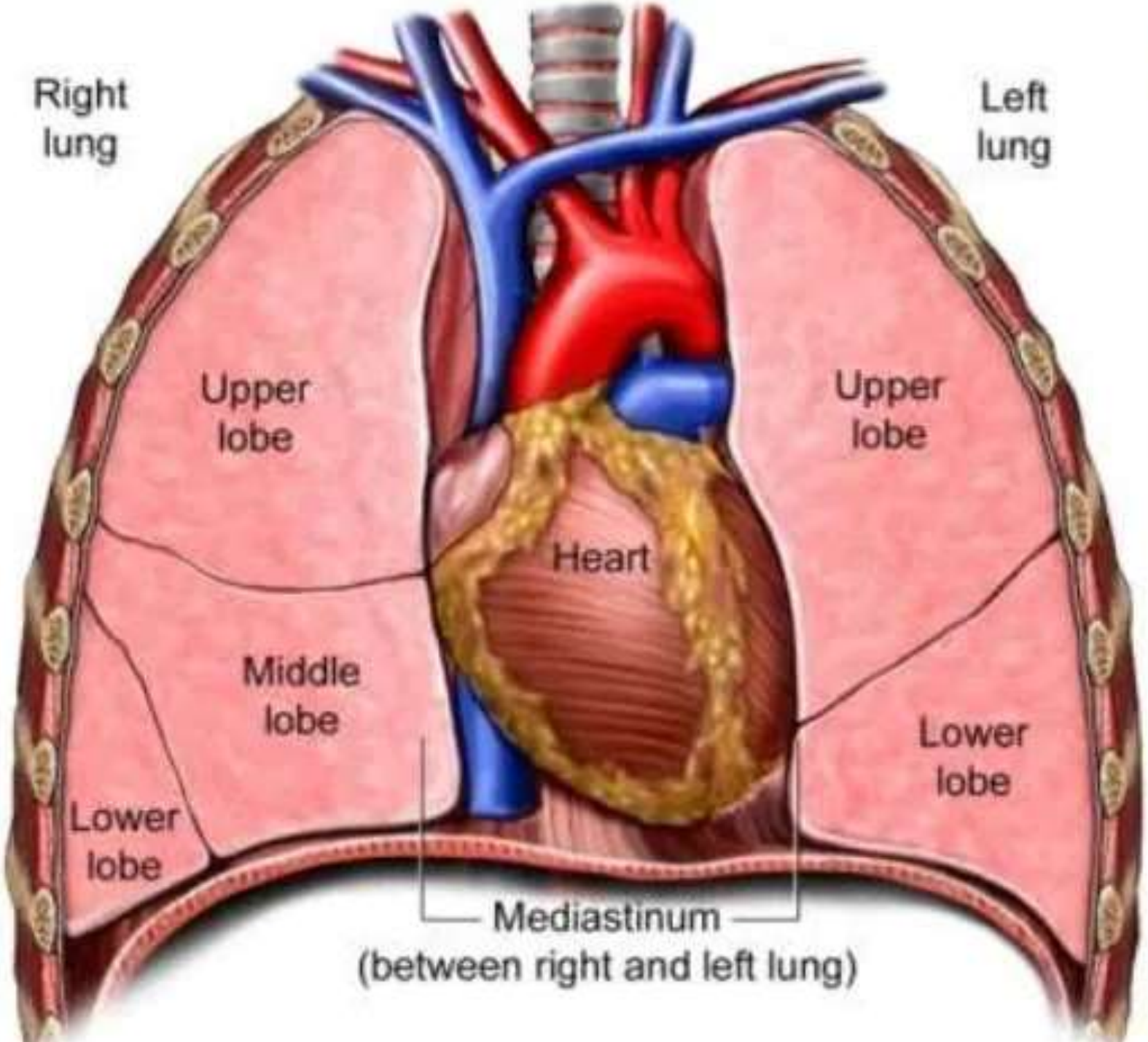
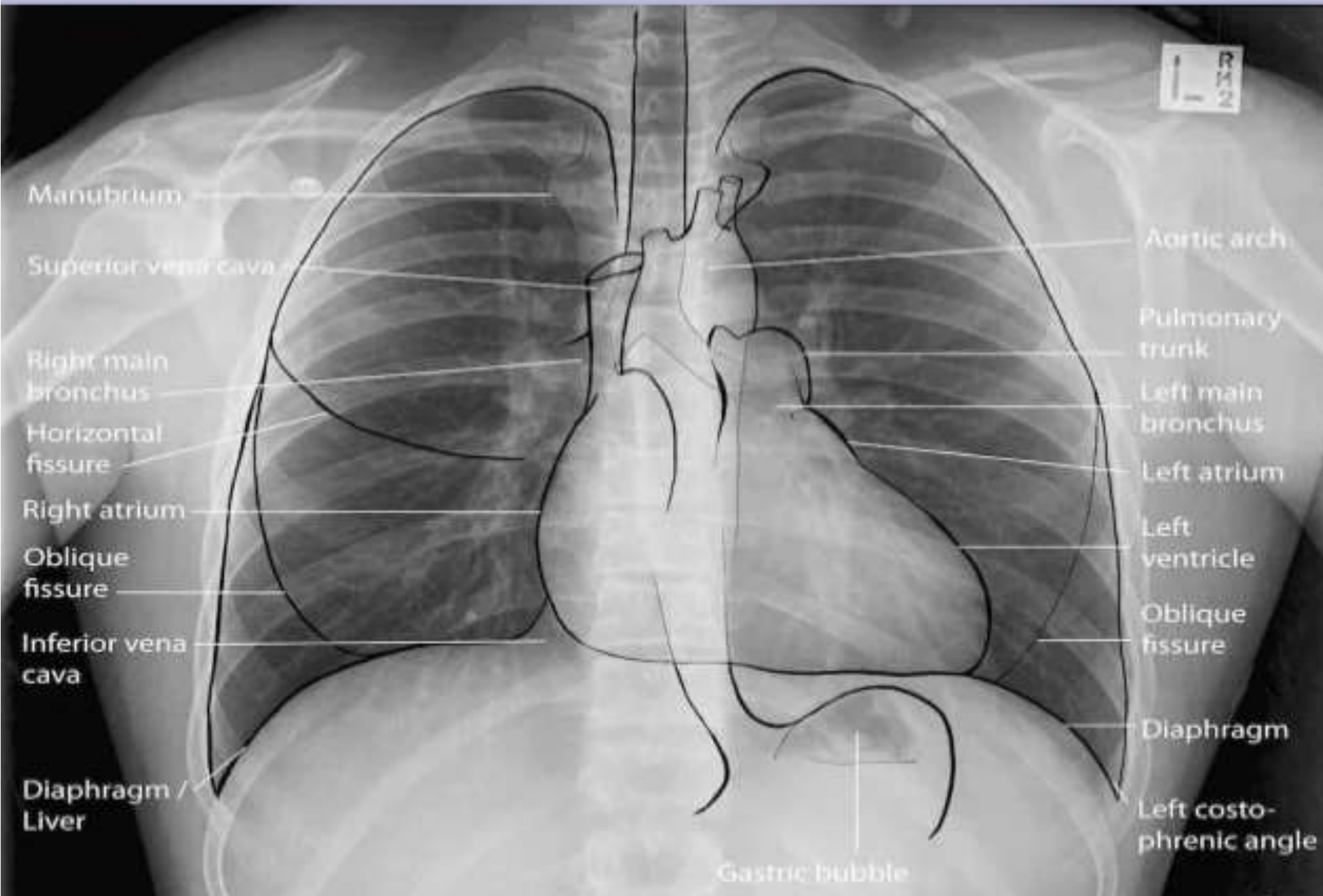
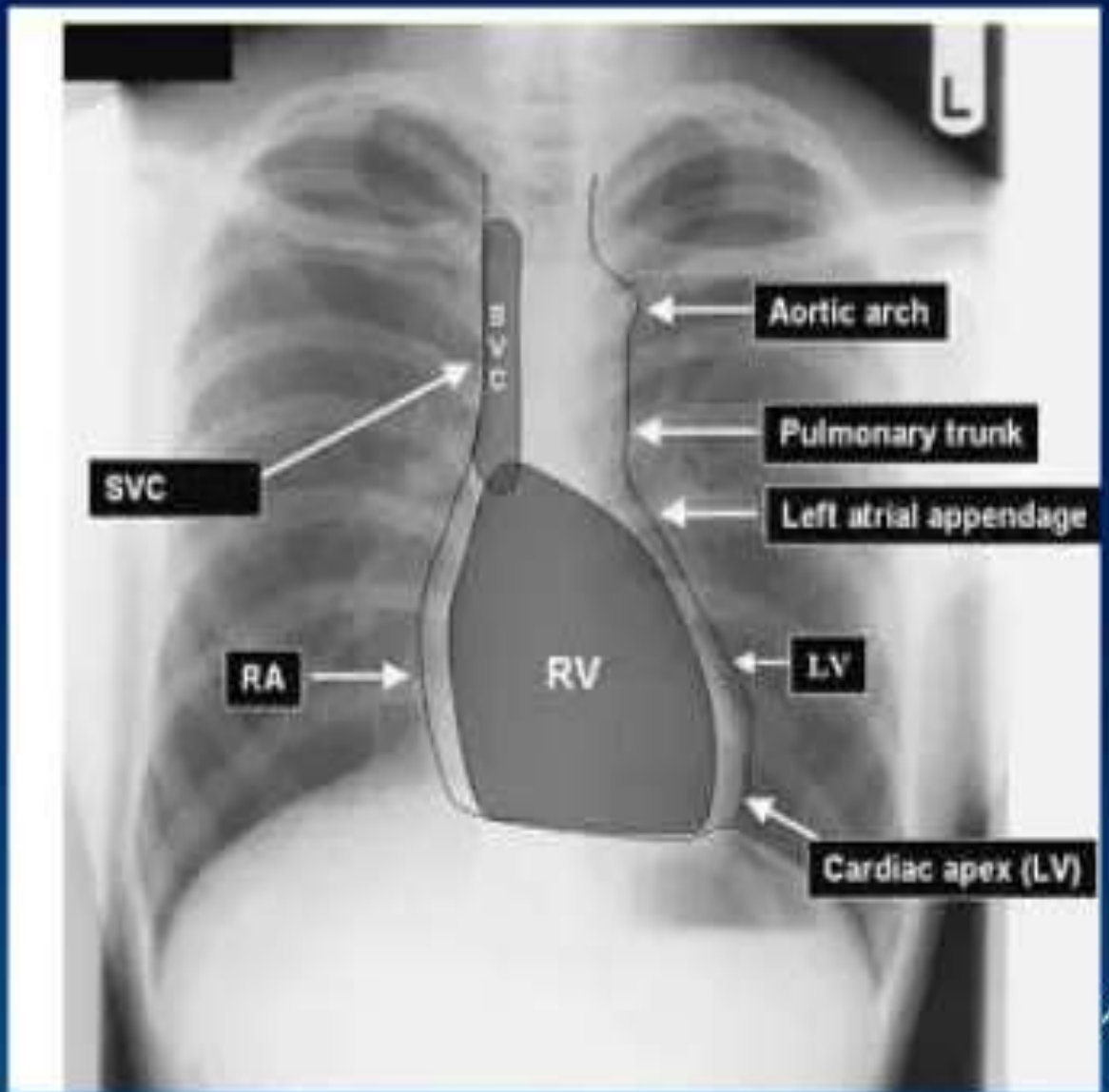
LECTURER ANATOMY KGMC


Right lung
Left lung
Upper lobe
Upper lobe
Heart
Middle lobe
Lower lobe
Lower lobe
Mediastinum
(between right and left lung)

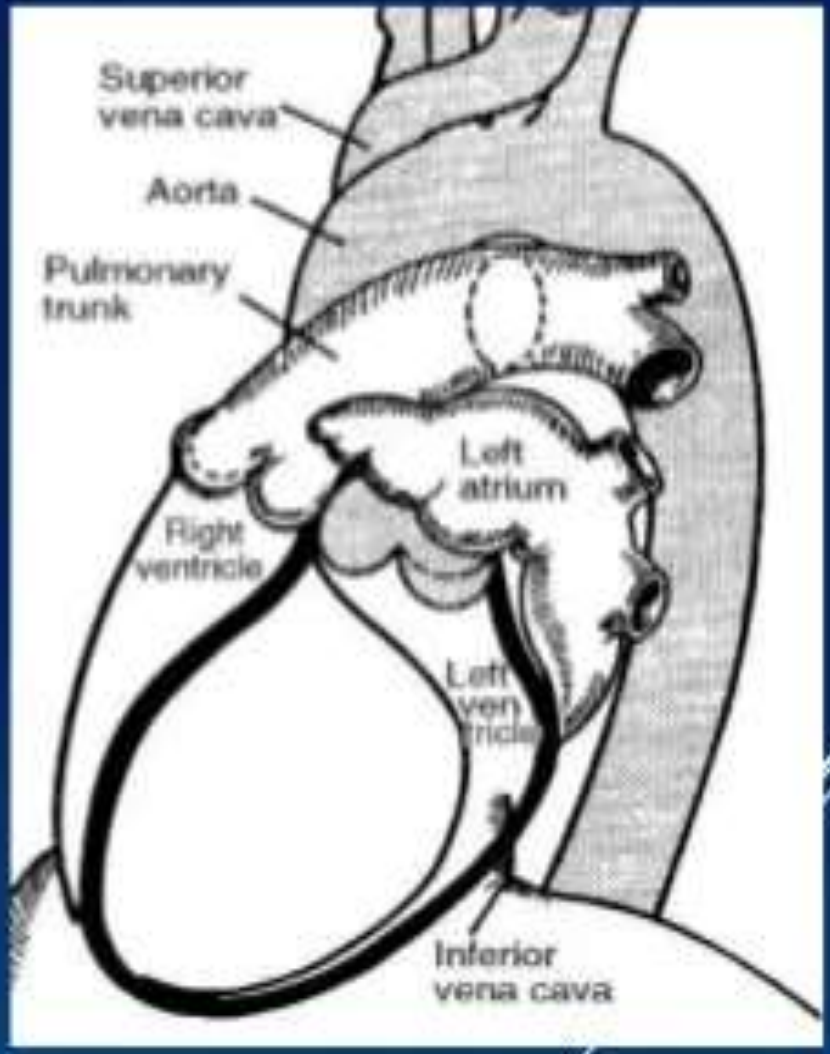
RADIOLOGICAL ANATOMY



STRUCTURES SEEN IN ANTERIOR VIEW



STRUCTURES IN LATERAL VIEW



X RAY CHEST

- Good quality Posterior-Anterior chest X-ray with no rotation (the spinous processes are at the mid point between the medial ends of the clavicles) - this allows the heart size to be assessed accurately

PROJECTION OF X-RAY

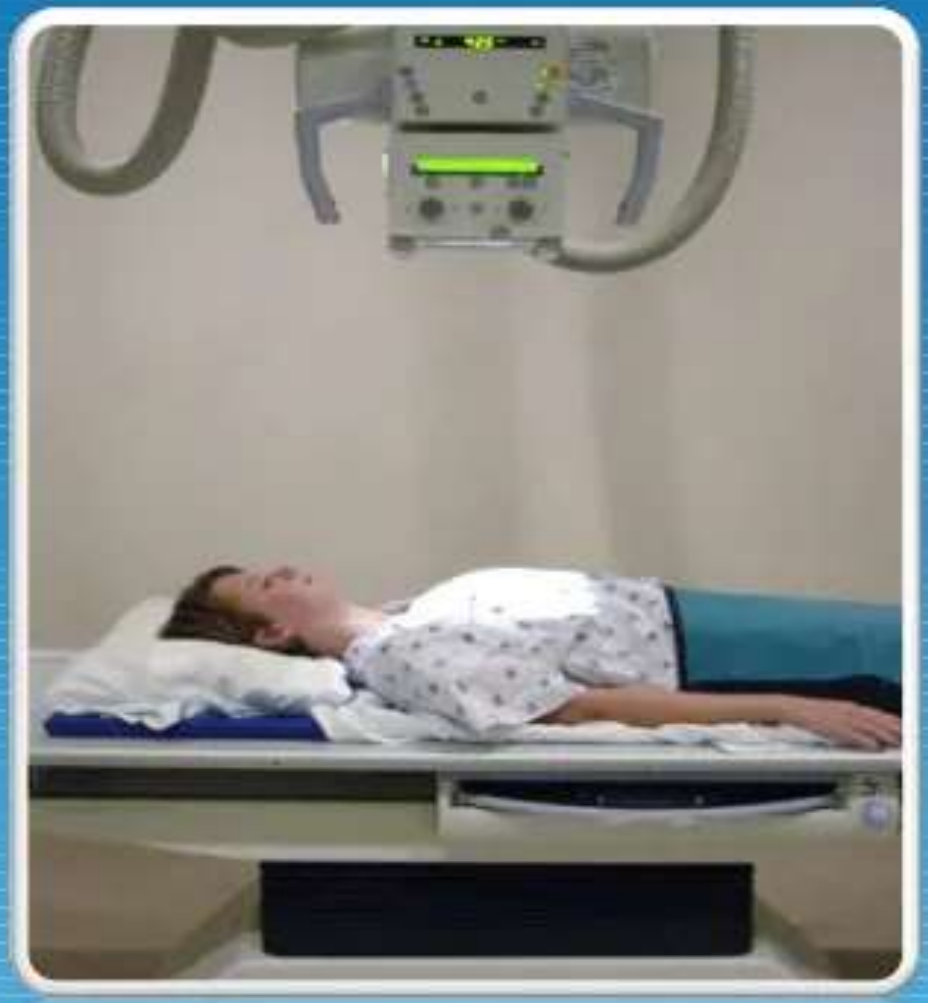
- Projection is defined as the direction of x-ray with relation to the patient
- If the direction of x-ray projection is from front – AP projection
- If the direction of x-ray projection is from behind –PA projection

PA VIEW

- In erect patients
- Vertebral spines more prominent
- Scapulae clear of lungs
- Clavicles are horizontal

AP VIEW

- In supine patients
- Vertebral bodies clear
- Apparent cardiomegaly
- Scapulae overlap
- Clavicles are oblique



Postro-anterior

Antero-posterior

NORMAL HEART SIZE

- Heart size is not assessed by an absolute measurement, but rather is measured in relation to the total thoracic width - the Cardio-Thoracic Ratio (CTR).

- CTR = Cardiac Width : Thoracic Width

CARDIO THORACIC RATIO

- The CTR is frequently expressed as a percentage.
- A CTR of greater than 1:2 (50%) is considered abnormal.
- Accurate assessment of heart size assumes the projection is Posterior-Anterior (PA).

CARDIO THORACIC RATIO

- Cardiac size is measured by drawing vertical parallel lines down the most lateral points of the heart and measuring between them.
- Thoracic width is measured by drawing vertical parallel lines down the inner aspect of the widest points of the rib cage, and measuring between them.
- The cardio-thoracic ratio can then be calculated.

methods

normal

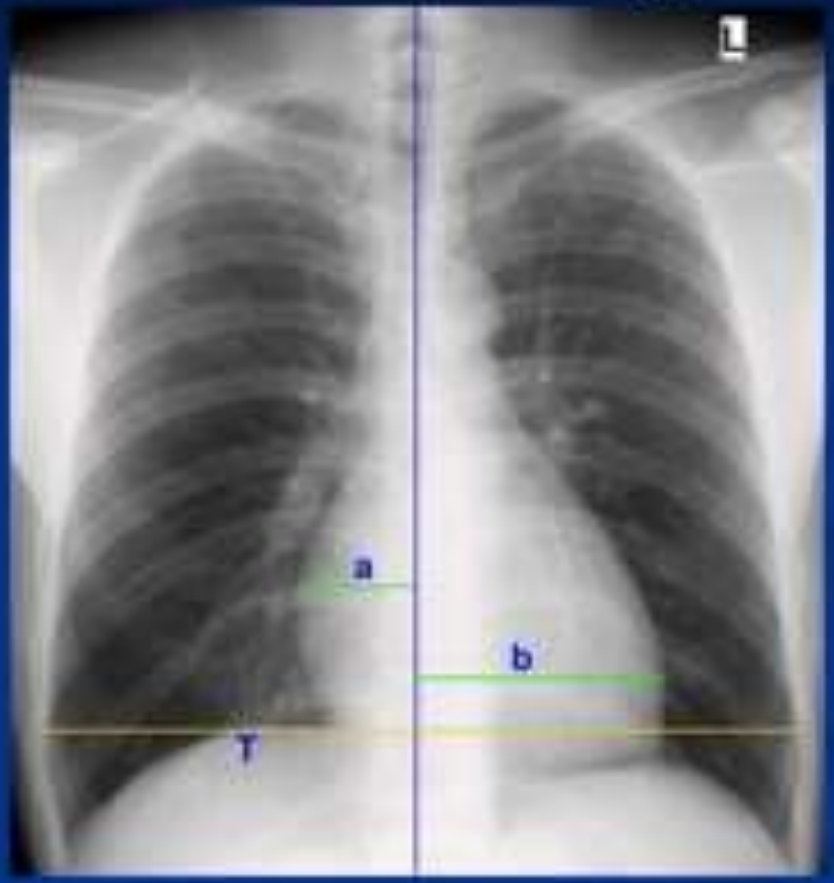
abnormities

diseases

Size of the heart and great vessels

C/T ratio = a+b / T

= ≤ 0.5



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CARDIAC SILHOUTTE

- Cardiac silhouette refers to the outline of the heart as seen on frontal and lateral chest radiographs and forms part of the cardiomediastinal contour.
- The size and shape of the cardiac silhouette provide useful clues for underlying diseases…

CARDIAC SILHOUETTE

- Radiographic features
- From the frontal projection, the cardiac silhouette can be divided into right and left borders:

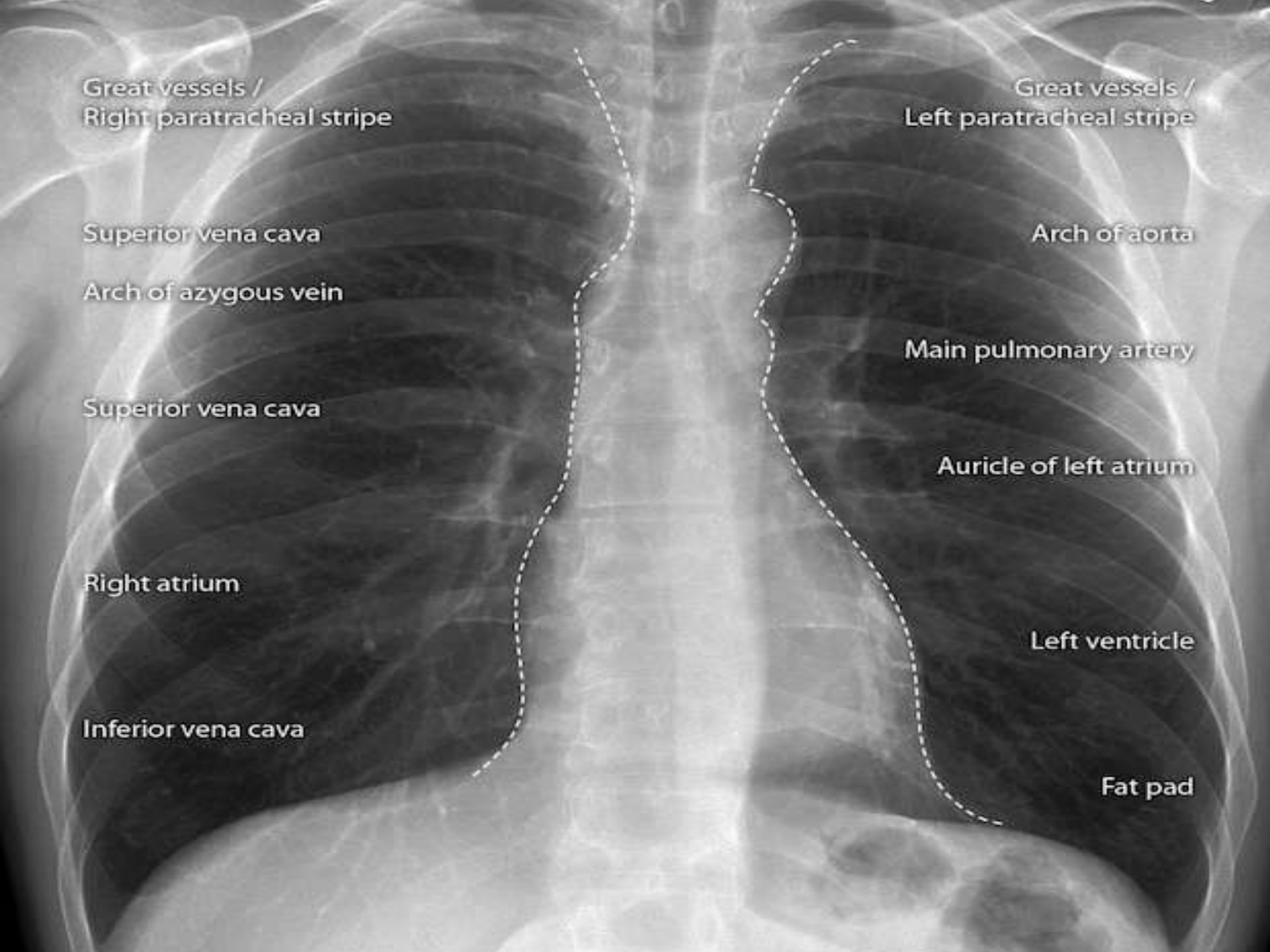
- the right border is formed by the right atrium
- the superior vena cava entering superiorly and the inferior vena cava often seen at its lower margin..

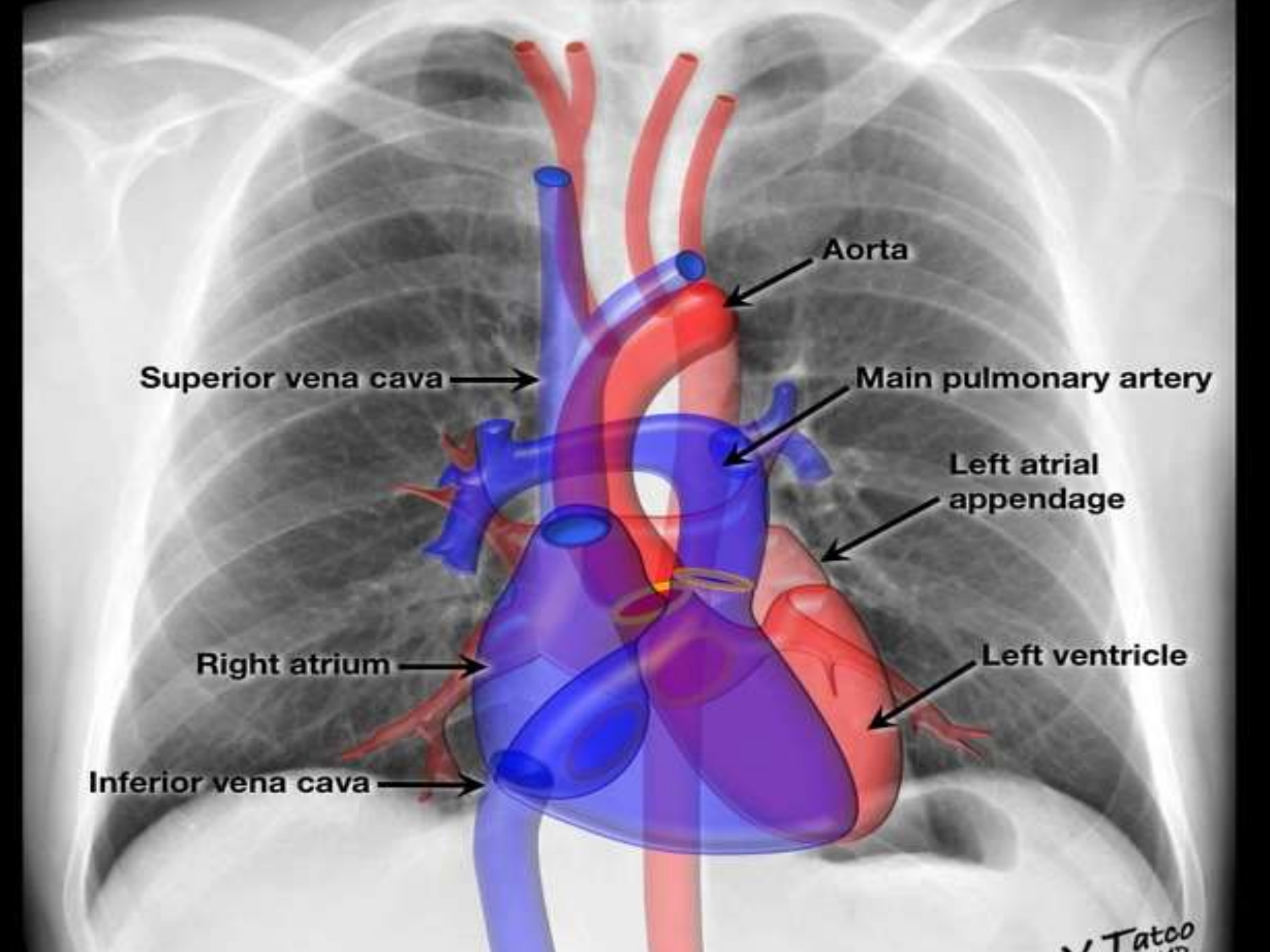
- the left border is formed by the left ventricle and left atrial appendage

SIZE

- The cardiac silhouette is considered enlarged if the cardiothoracic ratio is greater than 50% on a PA view of the chest x ray.

- Enlargement of the cardiac silhouette for more information.


Great vessels /
Right paratracheal stripe
Superior vena cava
Arch of azygous vein
Superior vena cava
Right atrium
Inferior vena cava
Great vessels /
Left paratracheal stripe
Arch of aorta
Main pulmonary artery
Auricle of left atrium
Left ventricle
Fat pad


Aorta
Superior vena cava
Main pulmonary artery
Left atrial appendage
Right atrium
Left ventricle
Inferior vena cava

Heart enlargement

- Enlargement of the heart chambers
  - Left ventricular enlargement
  - Right ventricular enlargement
  - Left atrium enlargement
  - Right atrium enlargement
  - General cardiac enlargement

CARDIOMEGALY

- Cardiomegaly is a catch-all term to refer to enlargement of the heart, and should not be confused with causes of enlargement of the cardiomediastinal outline, or enlargement of the cardiac silhouette.

AETIOLOGY

- congestive heart failure
- ischaemic heart disease
- hypertension (with left ventricular hypertrophy)
- valvular disease
- mitral regurgitation
- tricuspid regurgitation
- aortic stenosis
- aortic regurgitation
- subacute bacterial endocarditis

- congenital heart disorders
- ASD
- VSD
- PDA
- coarctation of the aorta
- Ebstein anomaly
- tetralogy of Fallot
- pulmonary disease (leading to right-sided enlargement)
- pulmonary embolism
- COPD
- cor pulmonale
- primary pulmonary hypertension

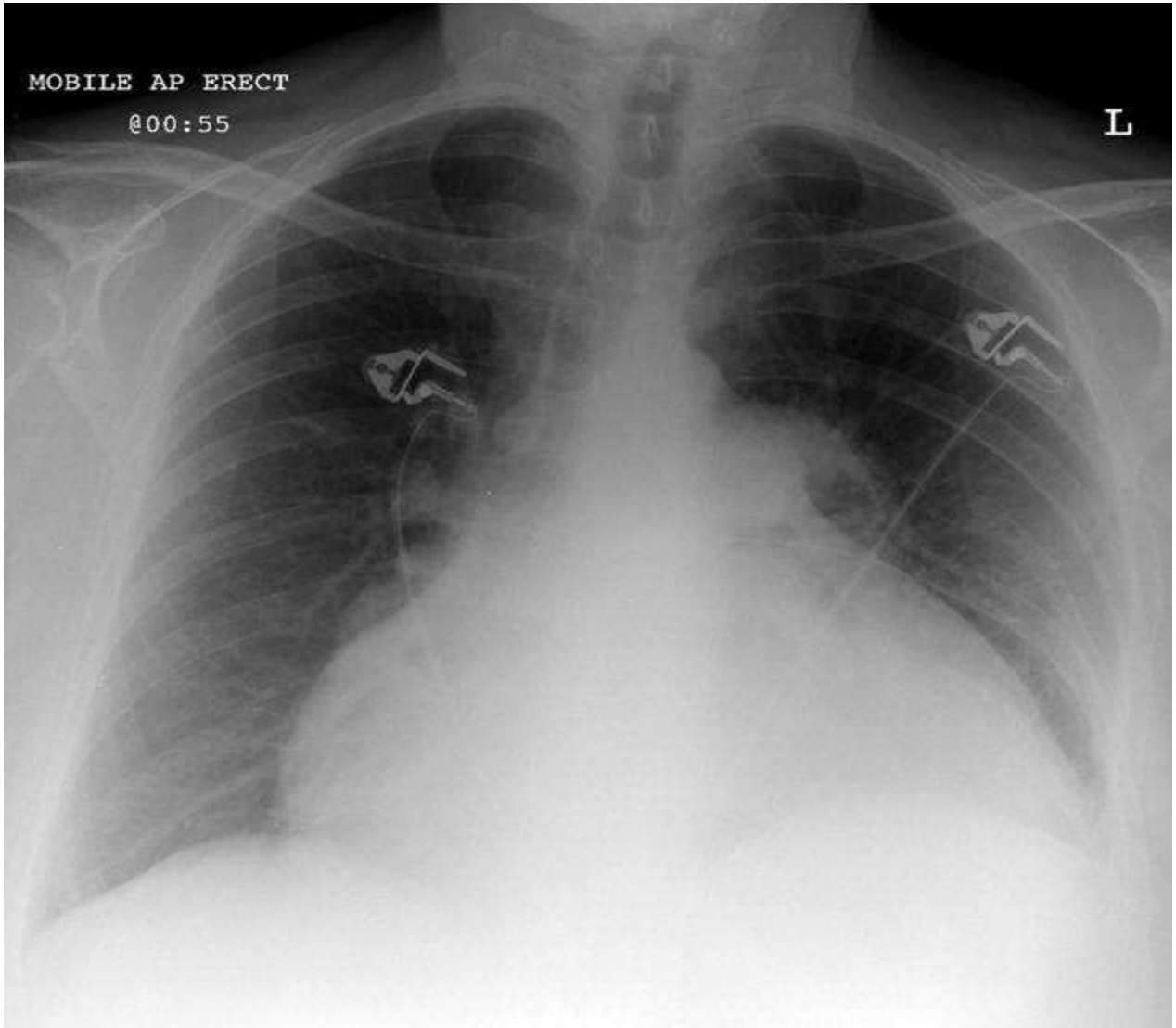
- myocarditis
- systemic disease/physiology
- normal “athletic” heart
- pregnancy
- renal failure
- anaemia
- scleroderma
- systemic lupus erythematosus
- sickle cell disease
- rheumatoid arthritis
- post-radiation

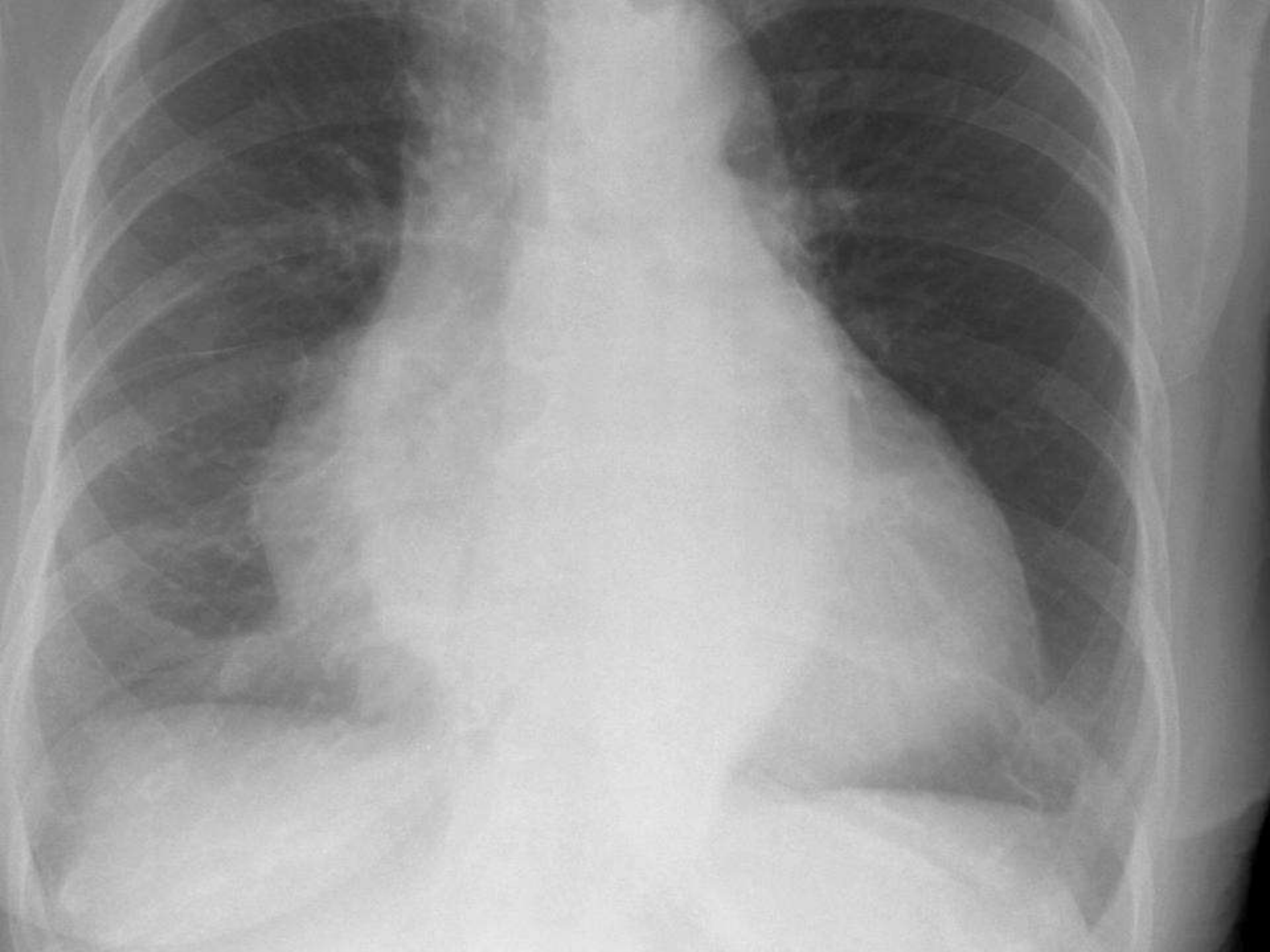
X-RAY CARDIOMEGALY

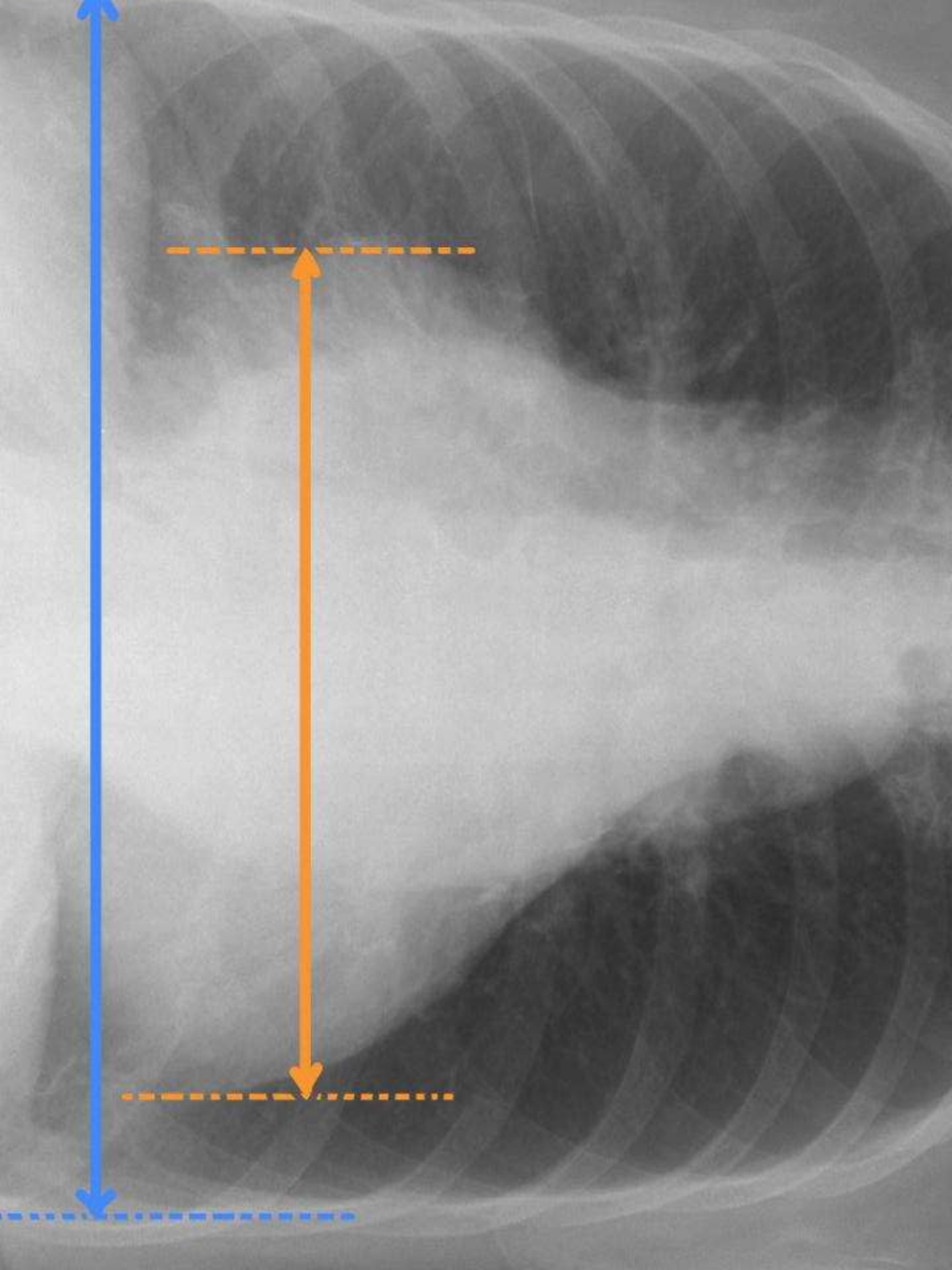
- In most cases, merely 'eye-balling' a chest x-ray will be sufficient in detecting cardiomegaly (as the heart is either clearly normal in size or clearly abnormally enlarged).
- The cardiothoracic ratio (CTR) can be easily calculated on a PA chest x-ray. The CTR measures the width of the cardiac silhouette and the thoracic cavity; a ratio greater than 0.5 is an abnormal finding.

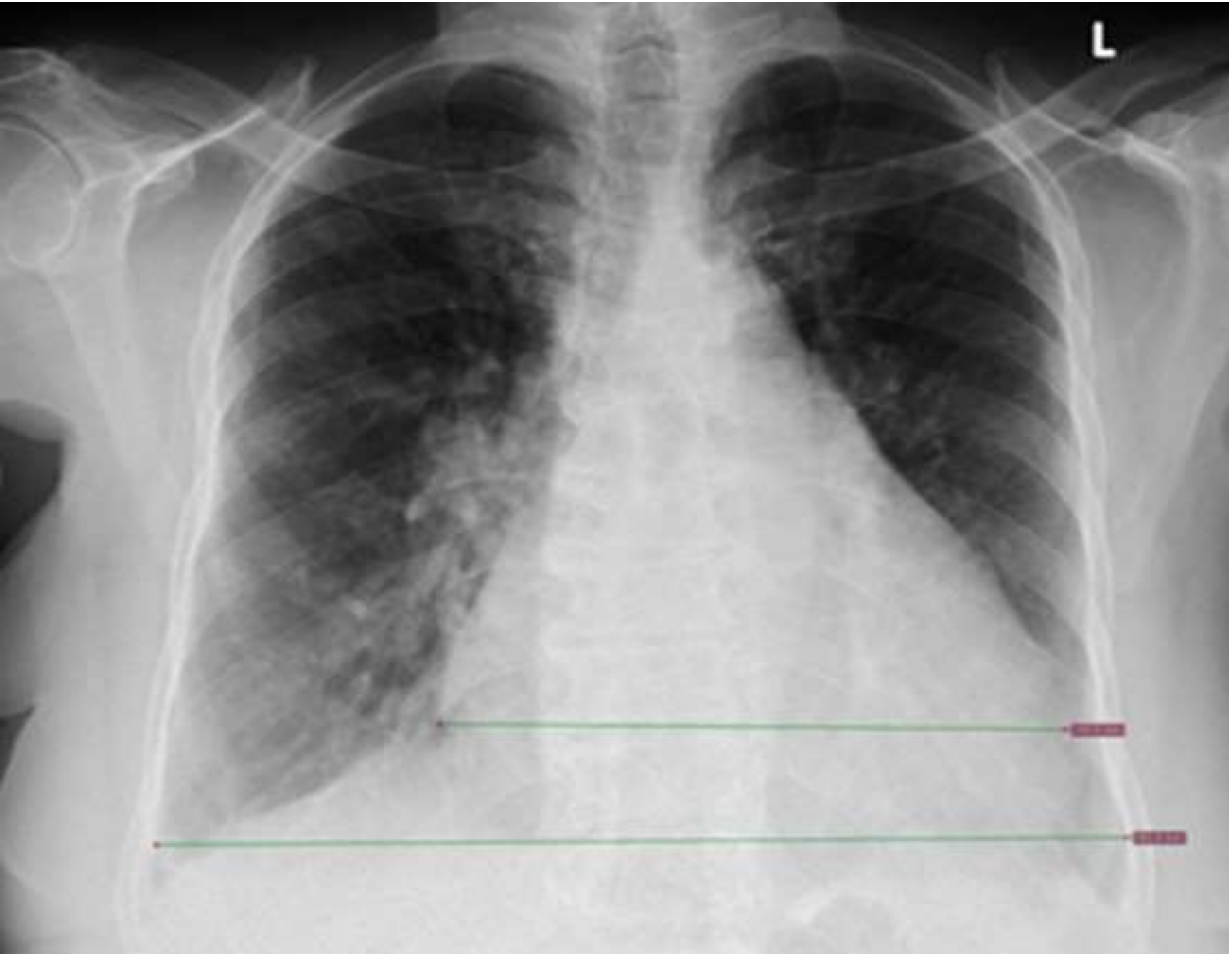
MILD CARDIOMEGALY

SEVERE CARDIOMEGALY





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DIFFERENTIAL DIAGNOSIS

- Enlargement of the cardiac silhouette on a frontal (or PA) chest x-ray can be due to a number of causes :

- cardiomegaly (most common cause by far)
- pericardial effusion
- anterior mediastinal mass
- prominent epicardial fat pad
- expiratory radiograph
- AP projection (e.g supine radiographs taken with a portable machine)
- Recognising enlargement relies upon an understanding of the normal cardiomediastinal outline and normal cardiothoracic ratio.