Radiology
Team 438

radiological anatomy of the cardiorespiratory

Lecture 3

Objectives

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Color Index: Important | Doctor's Notes | Extra | Female slides | male slides

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Editing file

Introduction

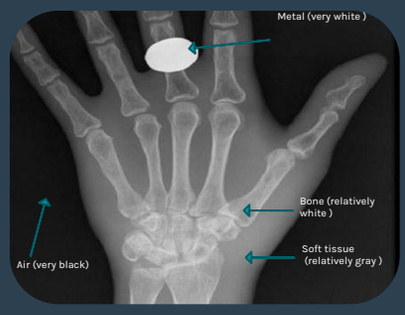
What determines black, gray, white?

Atomic # n and path length

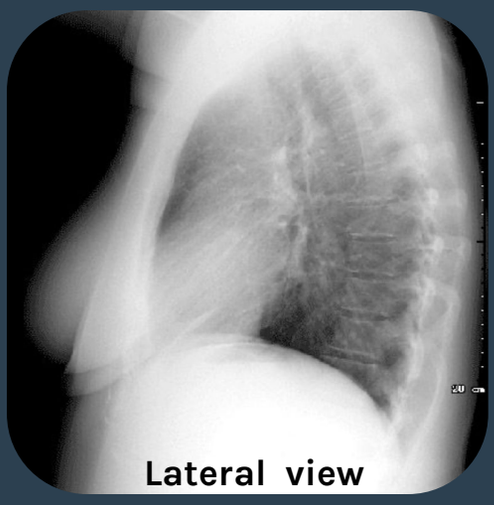
Lead | Metals | Bone | Muscle | Blood | Liver | Fat | Air

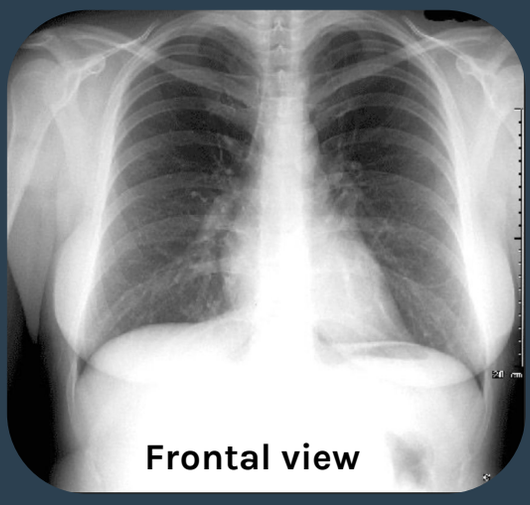
WHITE:
Radiopaque;
"More", Like Metal
High atomic #

BLACK :
Radiolucent;
"Less", Like Air
Low atomic #

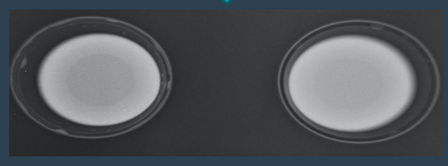


ONE View is NO View


Lateral view


Frontal view

You can't tell that it's a cup from this view



Always read together

Chest anatomy

1- Clavicle

2- Spinous process

3- Trachea

4- Scapula

5- Aortic Arch (knuckle)

6- Carina (Bifurcation)

7- Pulmonary Trunk

8- Lt. Cardiac border (atria)

9- Lt. Cardiac border (ventricle)

10- Vertebral body

11- Descending Aorta

12- Gastric fundus

13- Liver

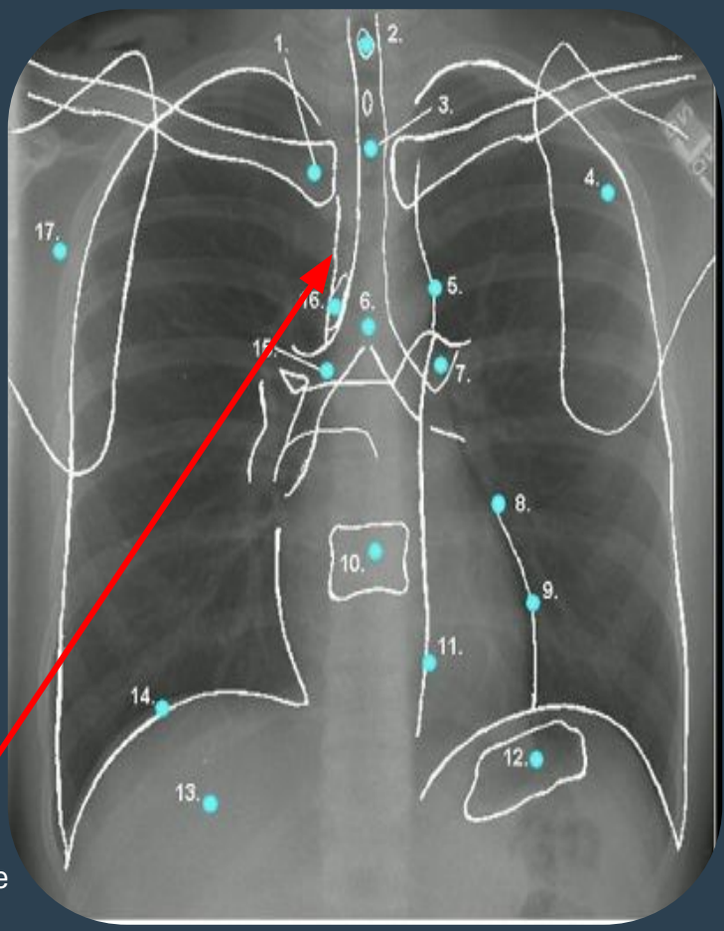
14- Rt. Hemidiaphragm

15- Rt. main bronchus

16- Azygos vein

17- Scapula

18 - Rt. paratracheal stripe

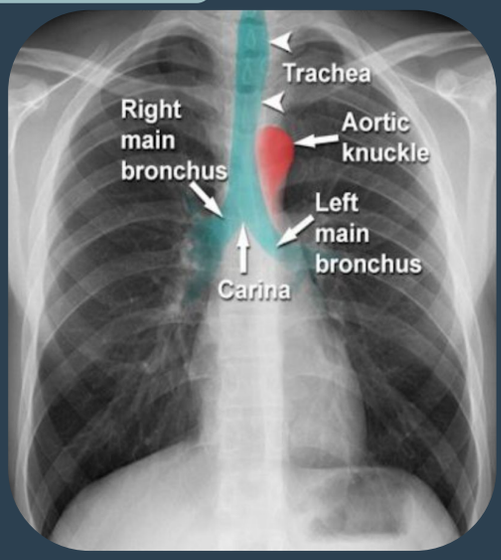


*You don't have to memorize it, but it's important to mentally visualize it and understand how normal anatomy is superimposed over each other

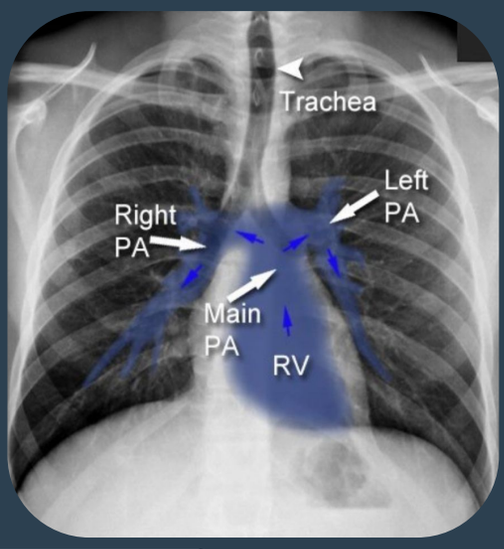
Lung anatomy

Normal Chest X Ray

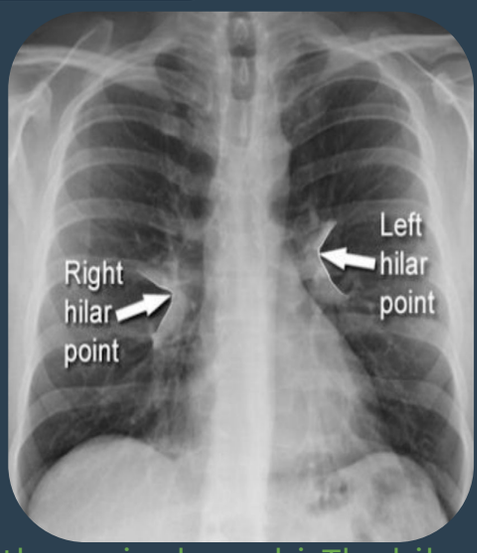
Respiratory tract



Pulmonary vessels



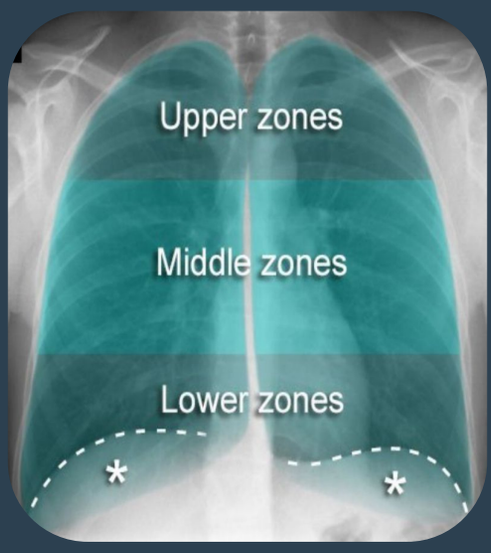
hilum of the lung



the hilum contains pulmonary vessels and the major bronchi. The hilar point is at the meeting of superior and inferior vessels, as seen below the left Hilar point is higher than the Right hilar point.

Lung anatomy

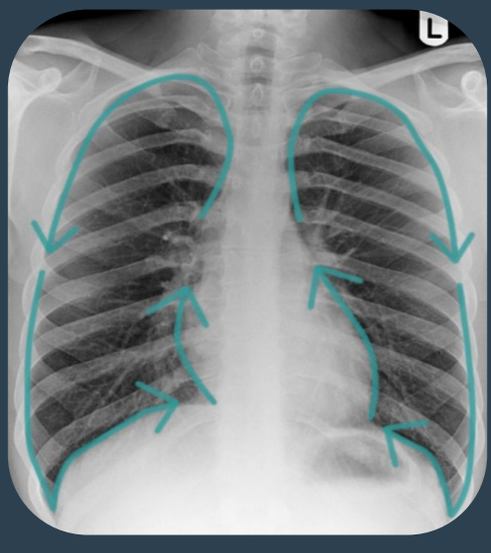
radiological segments of the lung



We prefer to use zonal anatomy in x ray rather than lobar anatomy, because it's difficult to differentiate lobes on plain X ray and to differentiate we use either:

- **Lateral view X ray**
- **CT**

Plural covering



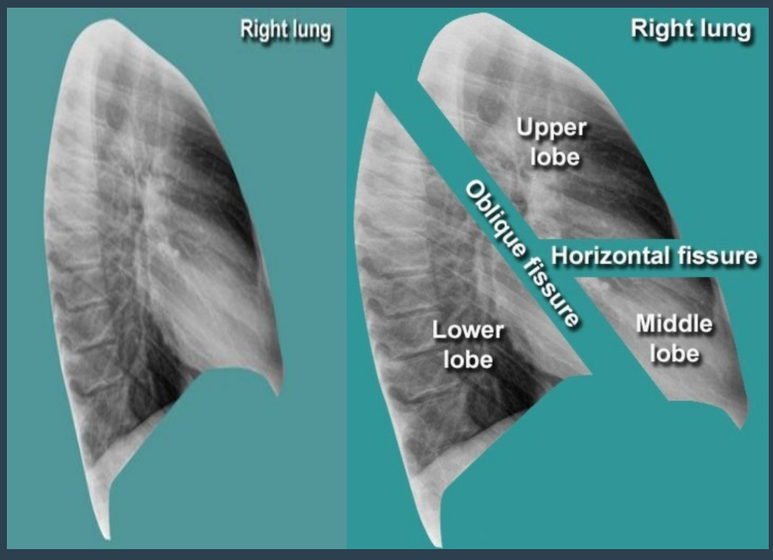
- The pleural covering runs along the peripheral aspect the thoracic and diaphragm and mediastinum.
- pleura made of 2 layers (visceral and parietal), separated via pleural space containing pleura fluid for lubrication.
- Usually we don't see the pleura in normal chest X ray except the Transverse fissure or if there is a disease causing thickening of the pleura Ex: pleural effusion, malignant (mesothelioma)

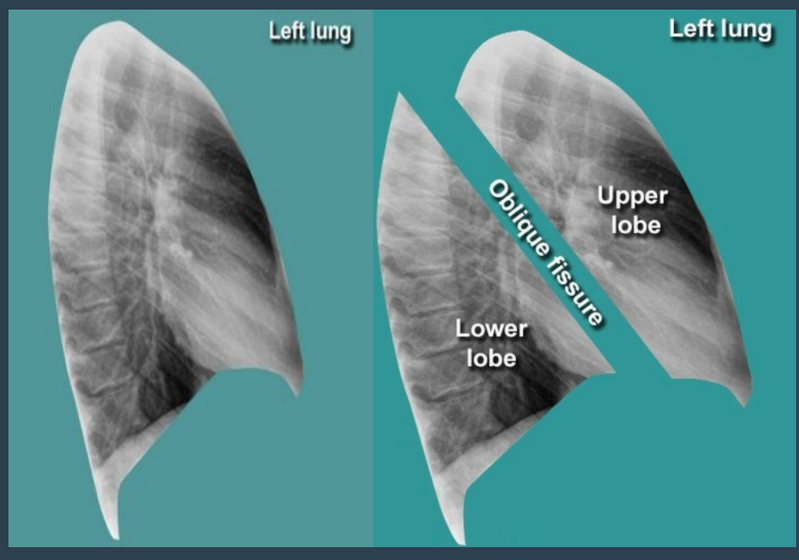
Lung anatomy

Right lung

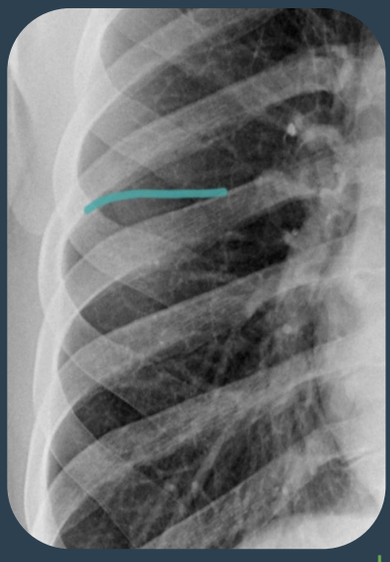
Lateral View X ray

Left lung



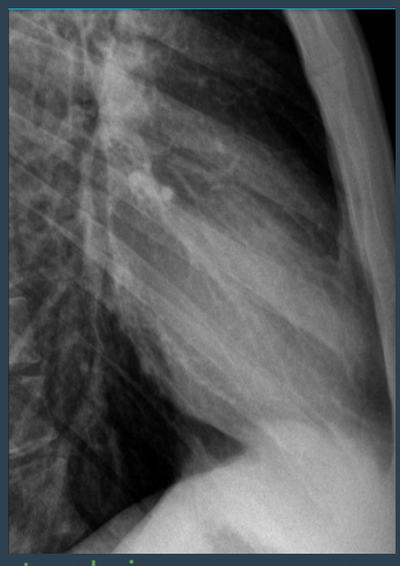


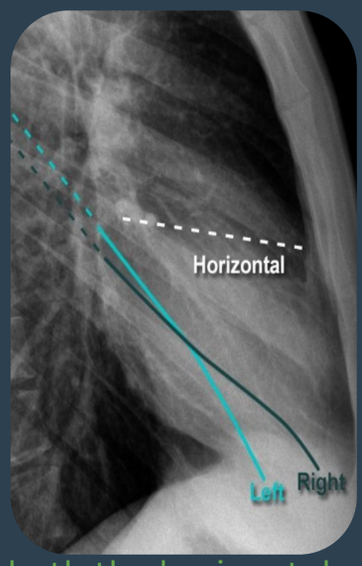
transverse fissure



Common view of the Right middle zone

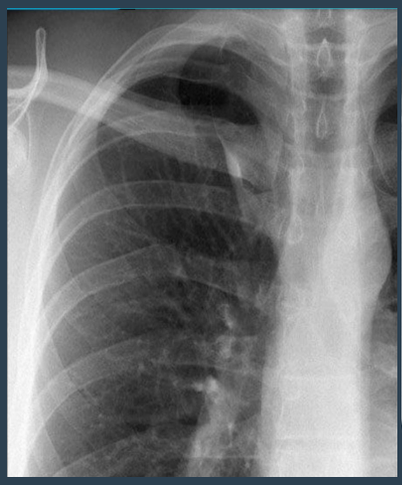
oblique fissure

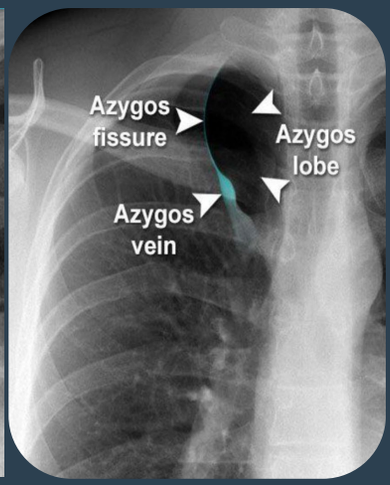




Lateral view, you can see both the horizontal fissure and right and left oblique fissures as both lungs are superimposed over each other.

Azygos fissure

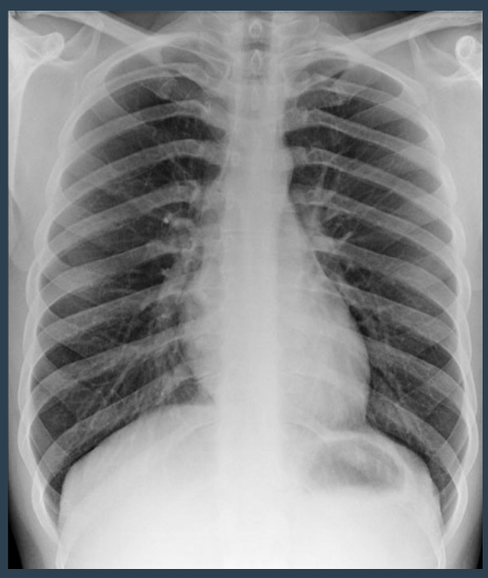


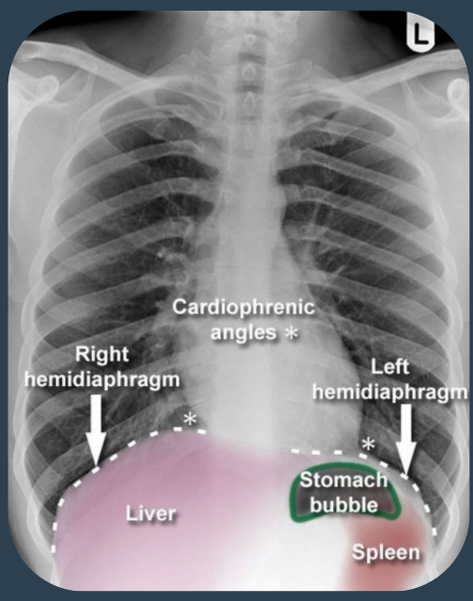


The azygos fissure is the most common accessory fissure visible on a chest X-ray (1-2% of individuals)

Chest anatomy & Diaphragm

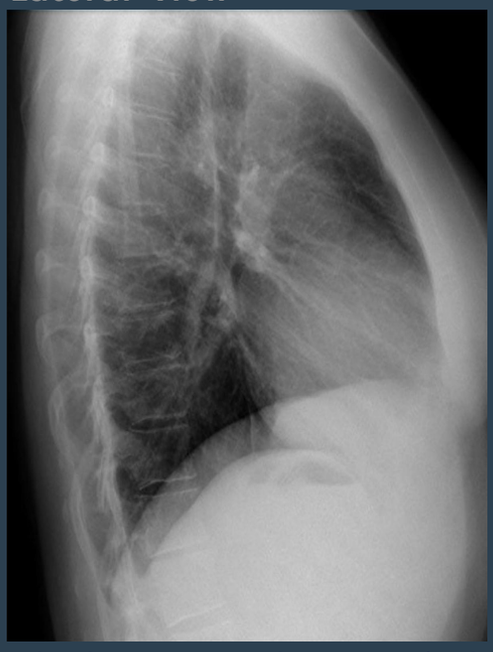
Diaphragm



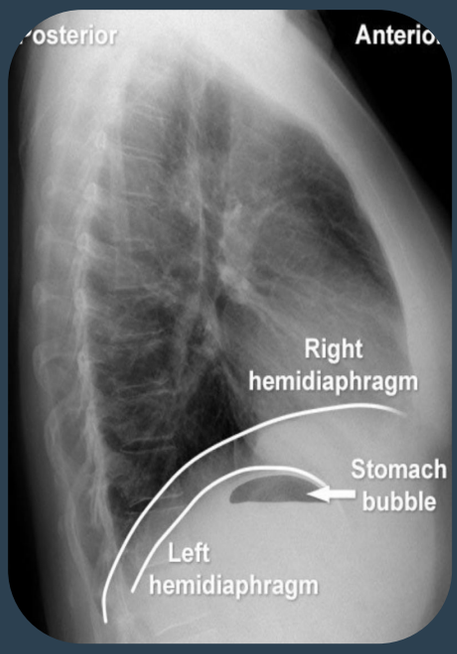


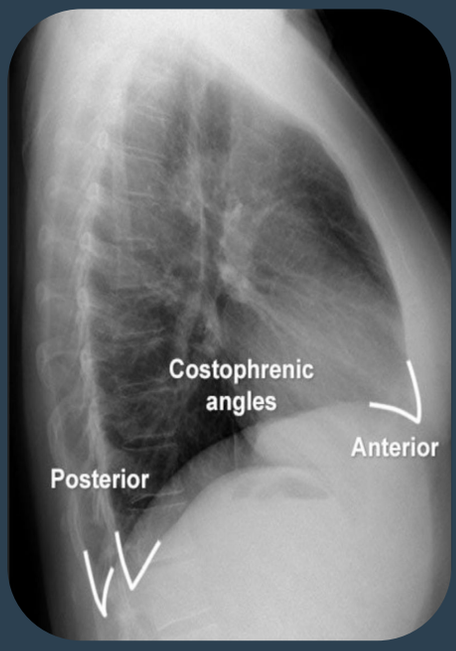
The right hemidiaphragm is usually higher than the left

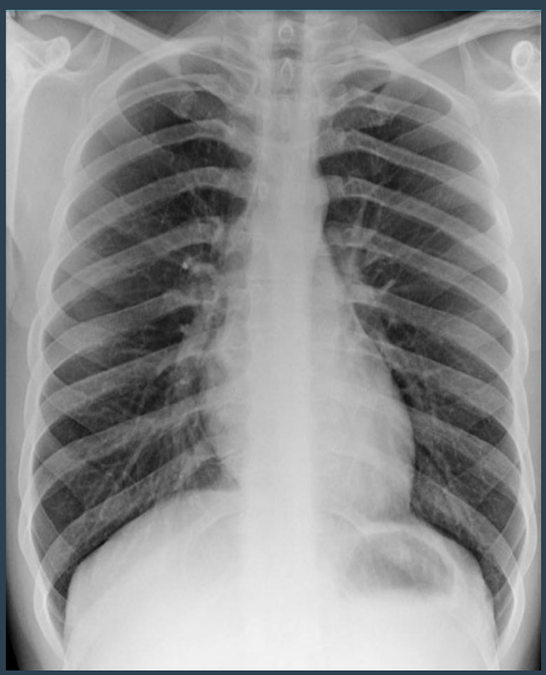
Lateral view



The lung extends posteriorly behind the diaphragm



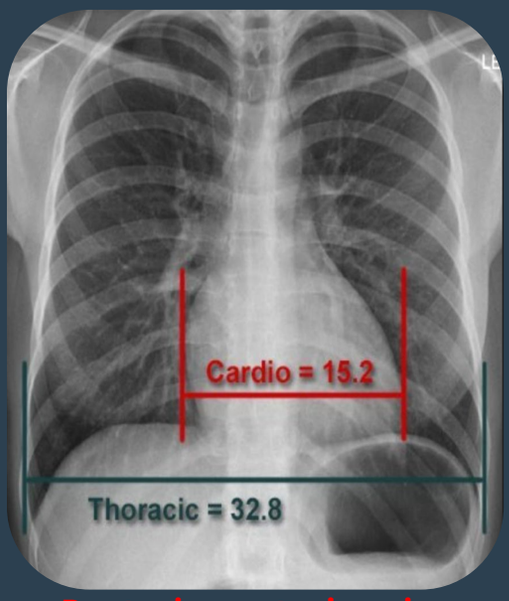


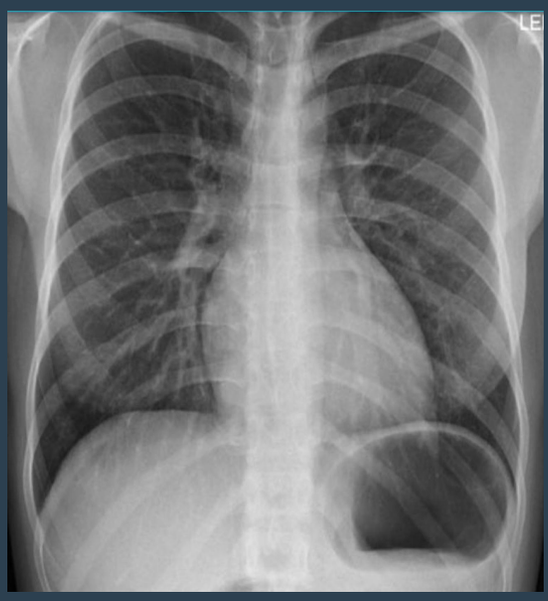


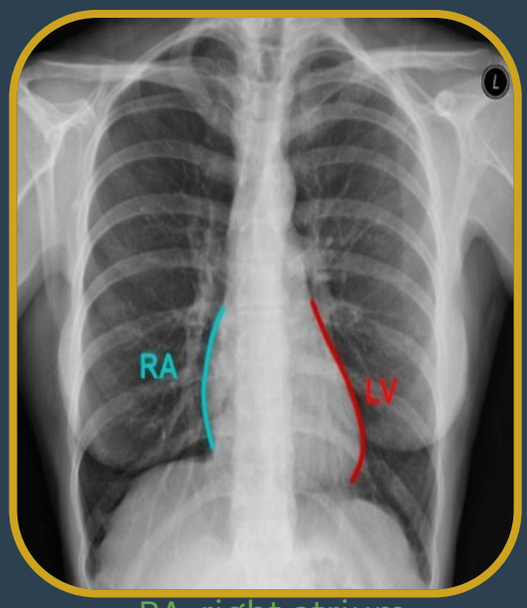
If there is **blunting** of costophrenic angle, it may indicate pleural effusion or hematoma

Cardiac anatomy

Cardiac anatomy



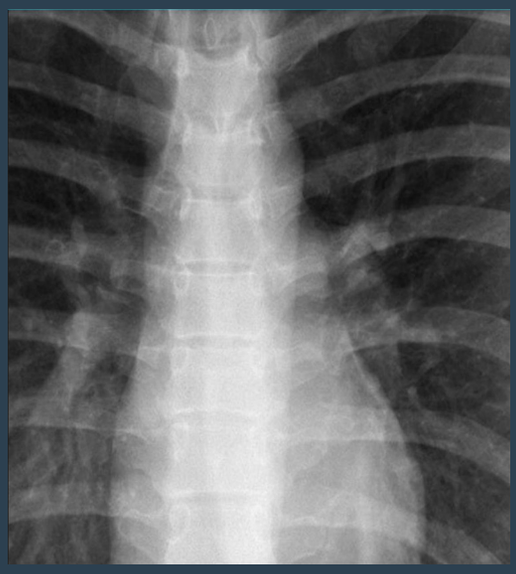


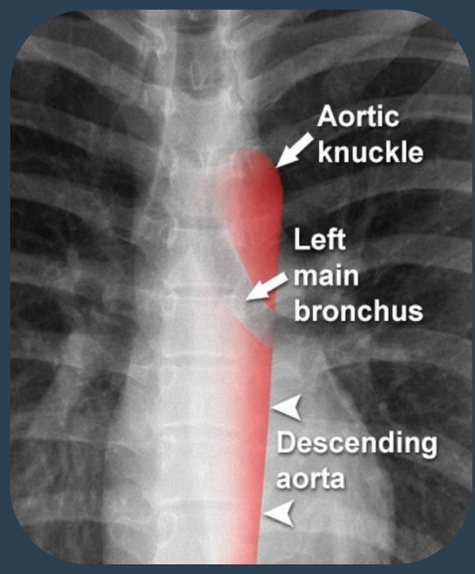


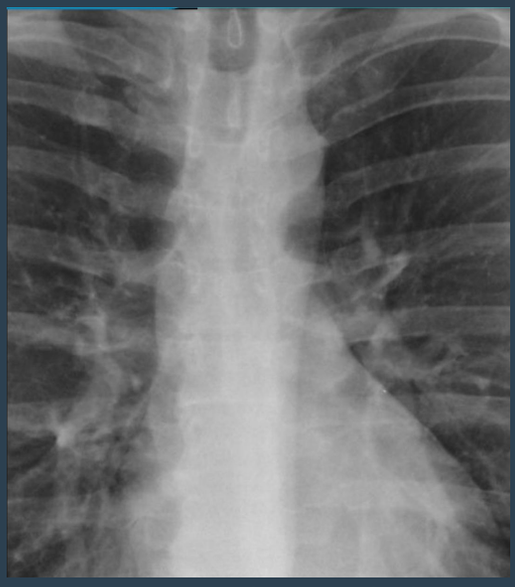
Posterior anterior view

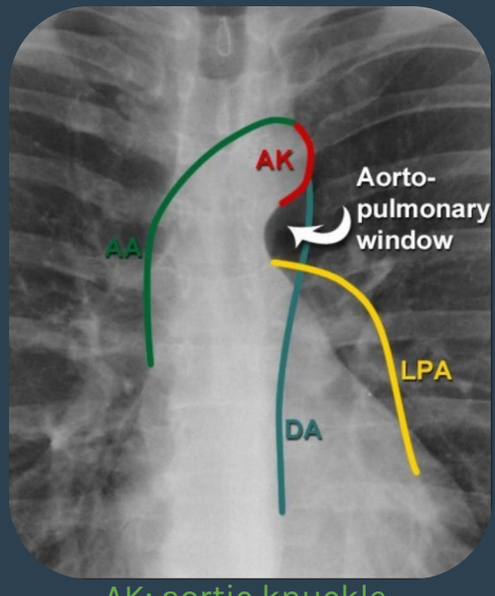
Cardiothoracic ratio: if less than 50% then is normal, greater is considered cardiomegaly

RA: right atrium
LV: left ventricle







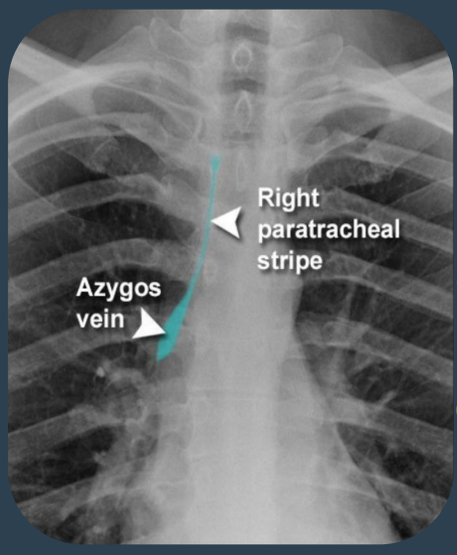


Aortopulmonary window is important anatomical landmark for lymph node enlargement and masses (Lung cancer)

AK: aortic knuckle
AA: aortic arch
DA: descending aorta
LPA: left pulmonary artery

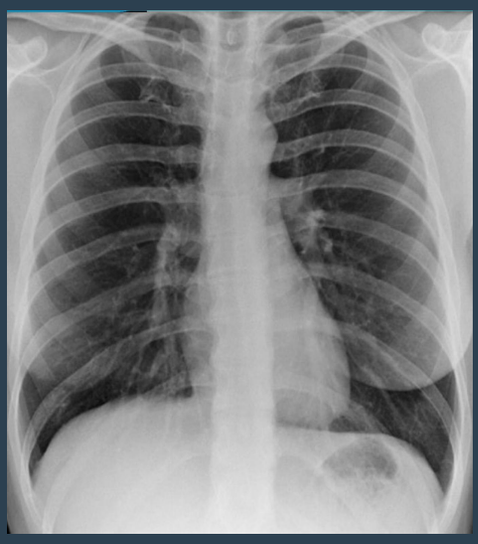
Chest anatomy

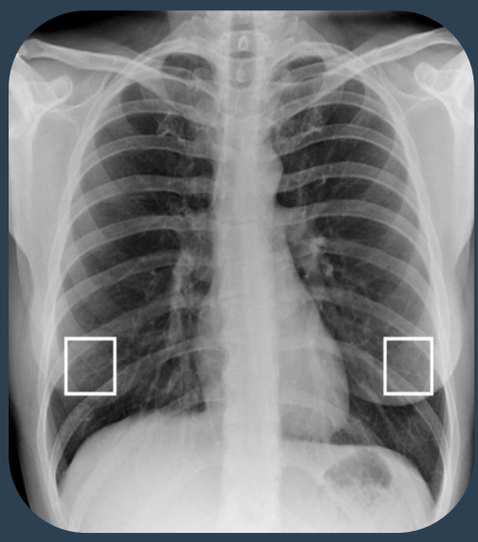
Right paratracheal stripe



Right paratracheal stripe is important anatomical landmark if thickening seen it may indicate lymph node enlargement or masses

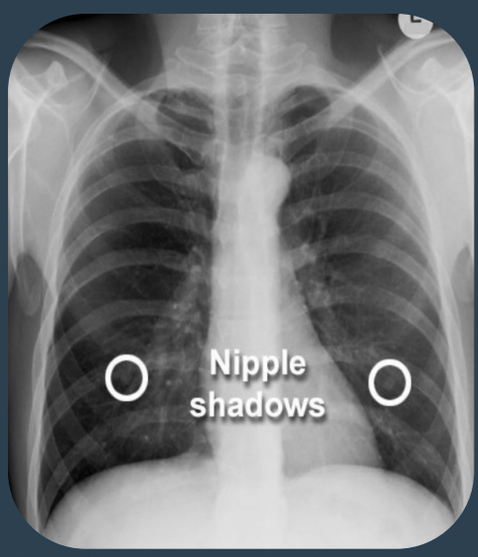
Breast shadows





Asymmetrical breast showing larger left breast shadowing which might indicate a pathology

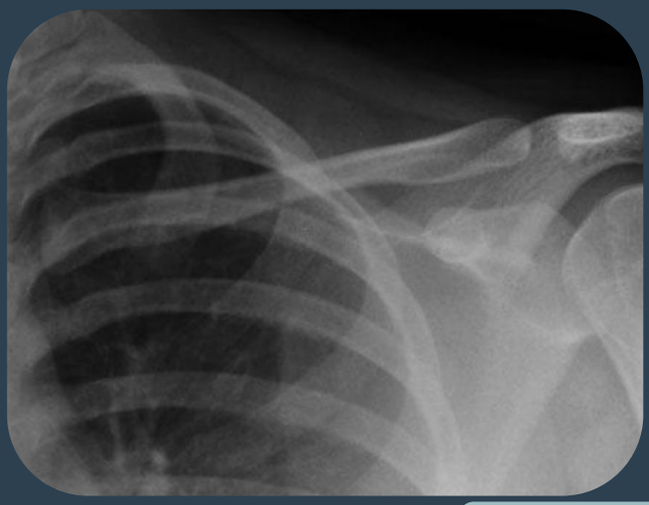
Nipple shadows

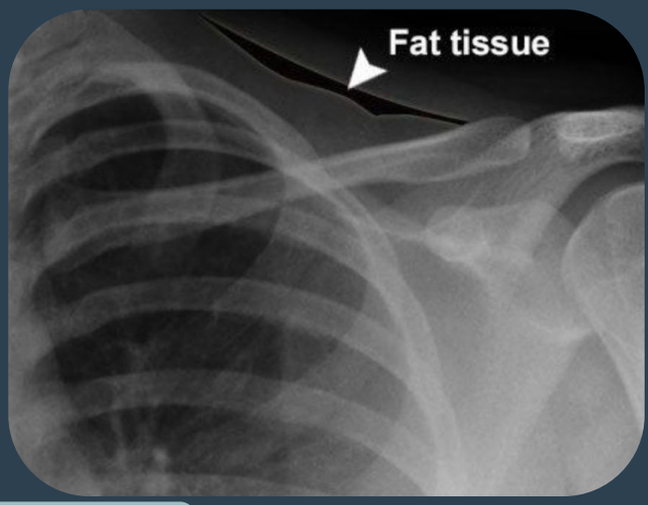


Nipple shadowing might be mistaken for breast lesion or nodule , therefore a nipple marker could be done or a lateral view can be used.

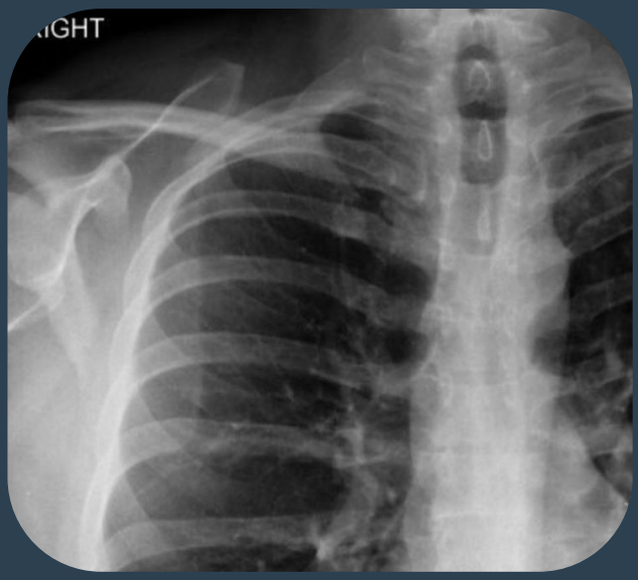
chest fat tissue & Chest bones

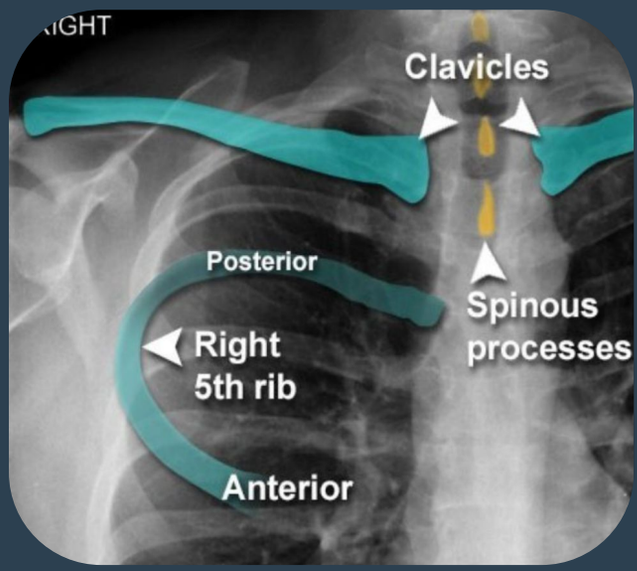
Fat tissue

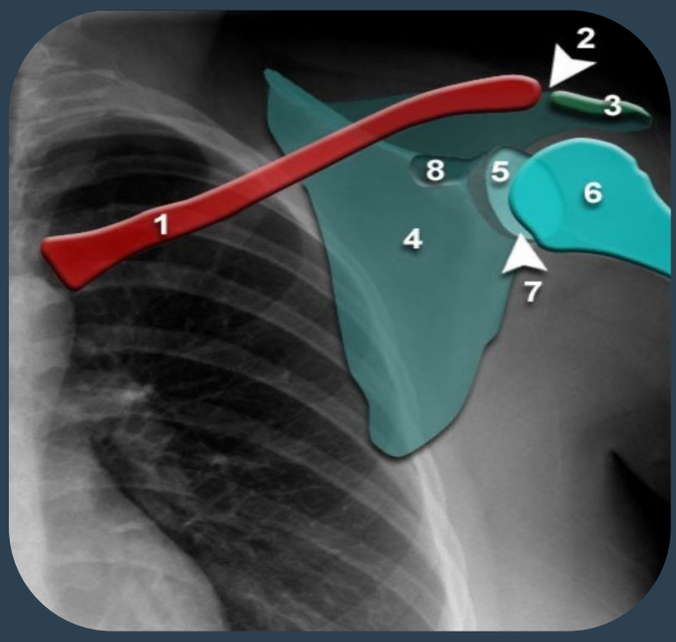




Bone structures



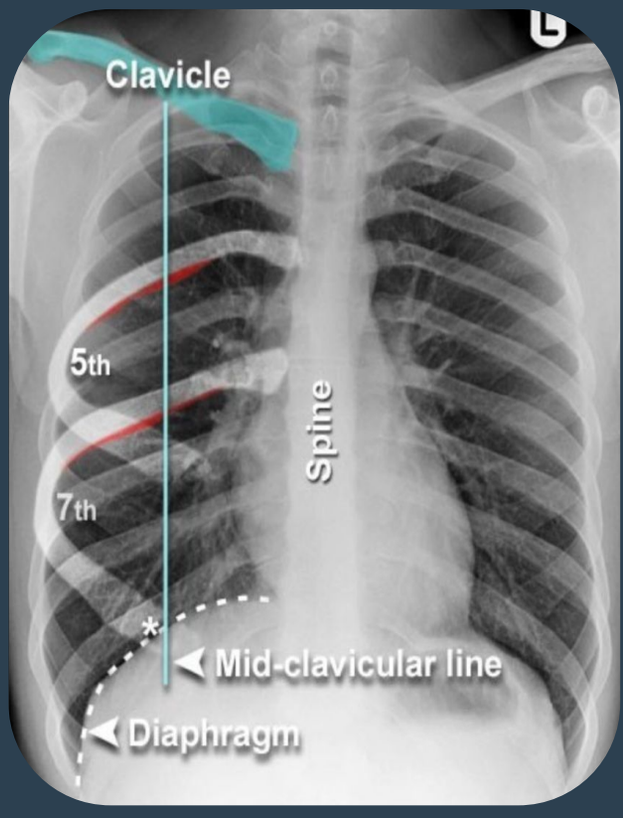




1) clavicle
2) acromioclavicular joint
3) acromion
4) scapula
5) glenoid cavity
6) humerus
7) glenohumeral joint
8) coracoid process

Chest bones

MidClavicular line



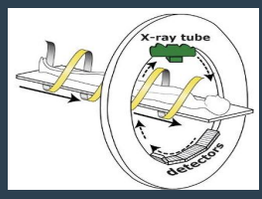
- To assess the degree of inspiration it is conventional to count ribs down to the diaphragm.
- The diaphragm should be intersected by the 5th to 7th anterior ribs in the midclavicular line. Less is a sign of incomplete inspiration
- hyperexpanded (>7th anterior rib intersecting the diaphragm at the midclavicular line). This is a sign of obstructive airways disease Ex: emphysema

wow, such empty

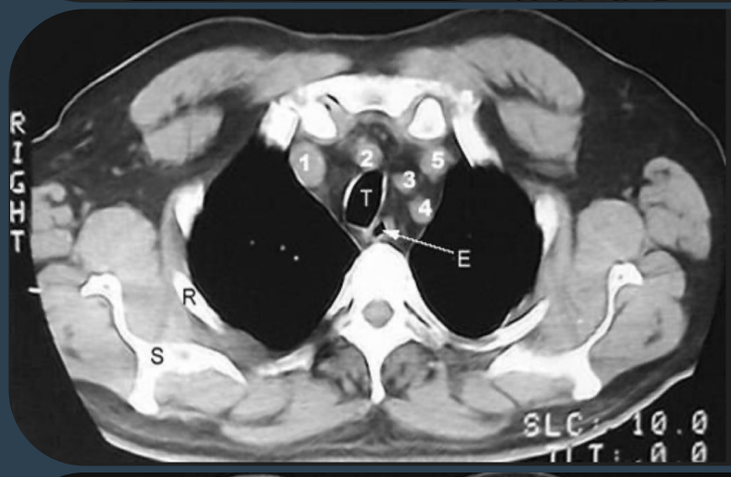
Chest CT Images

- Main pulmonary artery trunk
- CT with IV contrast is the most appropriate to characterize Aortic knob
- Cardiac CT is best to assess the coronary arteries

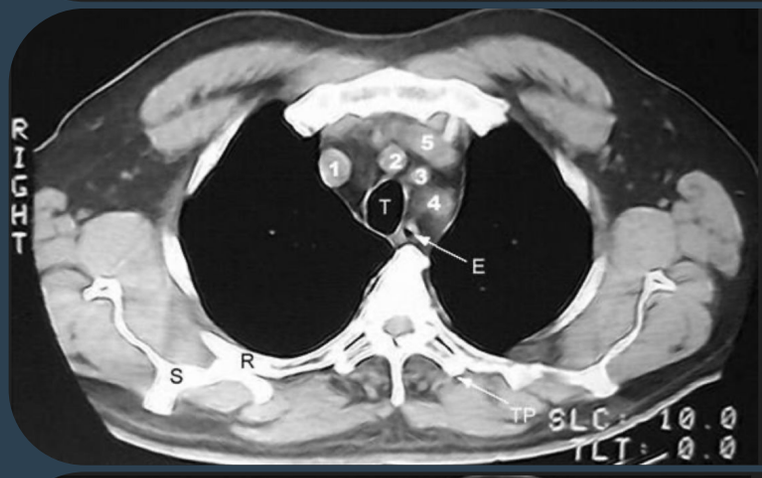
Helpful video for how to read the CT scan of the chest



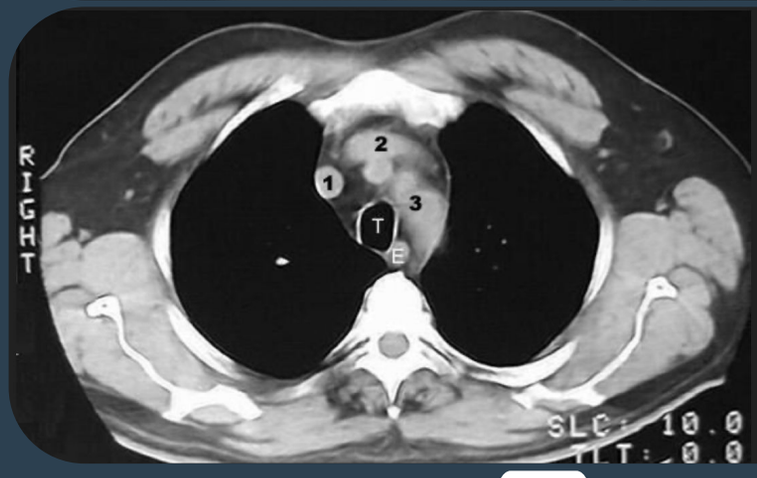
B BODY OF THORACIC VERTEBRA
C SPINAL CORD
CL CLAVICLES
LL APEX OF LEFT LUNG
RL APEX OF RIGHT LUNG
S SPINOUS PROCESS OF THE VERTEBRA
T TRACHEA



E ESOPHAGUS
R RIB
S SCAPULA
T TRACHEA
Right Brachiocephalic vein
Brachiocephalic artery
Left common carotid artery
Left subclavian artery
Left Brachiocephalic vein

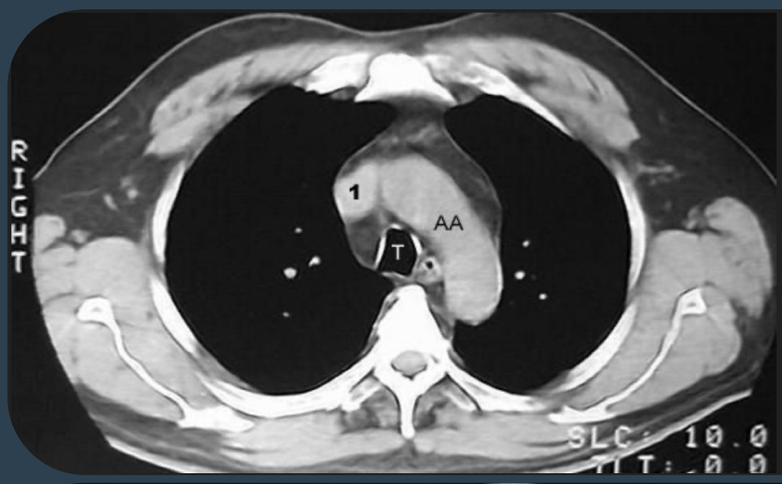


E ESOPHAGUS
R RIB
S SCAPULA
T TRACHEA
1 Right Brachiocephalic vein
2 Brachiocephalic artery
3 Left common carotid artery
4 Left subclavian artery
5 Left Brachiocephalic vein

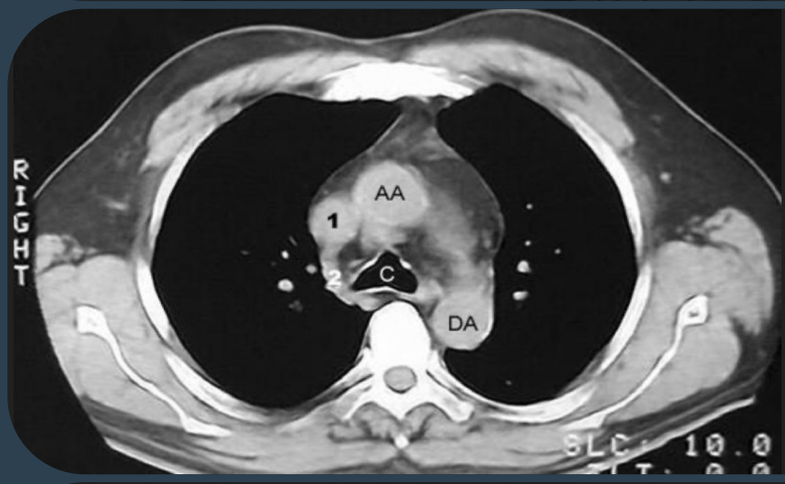


E ESOPHAGUS
T TRACHEA
1 Right Brachiocephalic vein
2 Left Brachiocephalic vein
3 Aortic arch

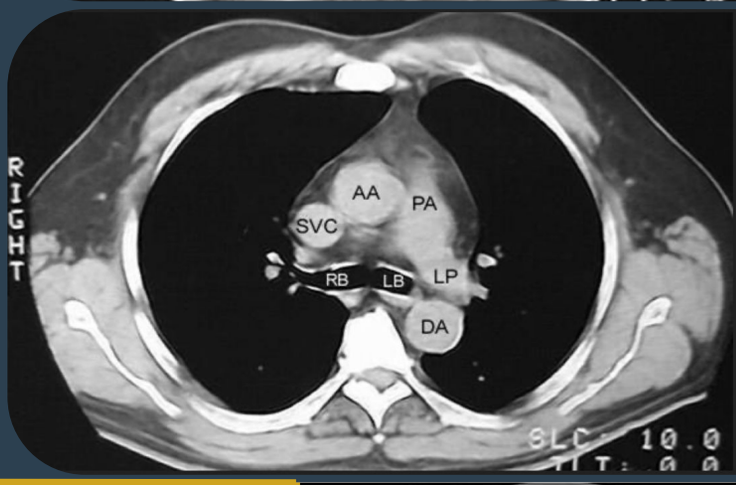
Chest CT



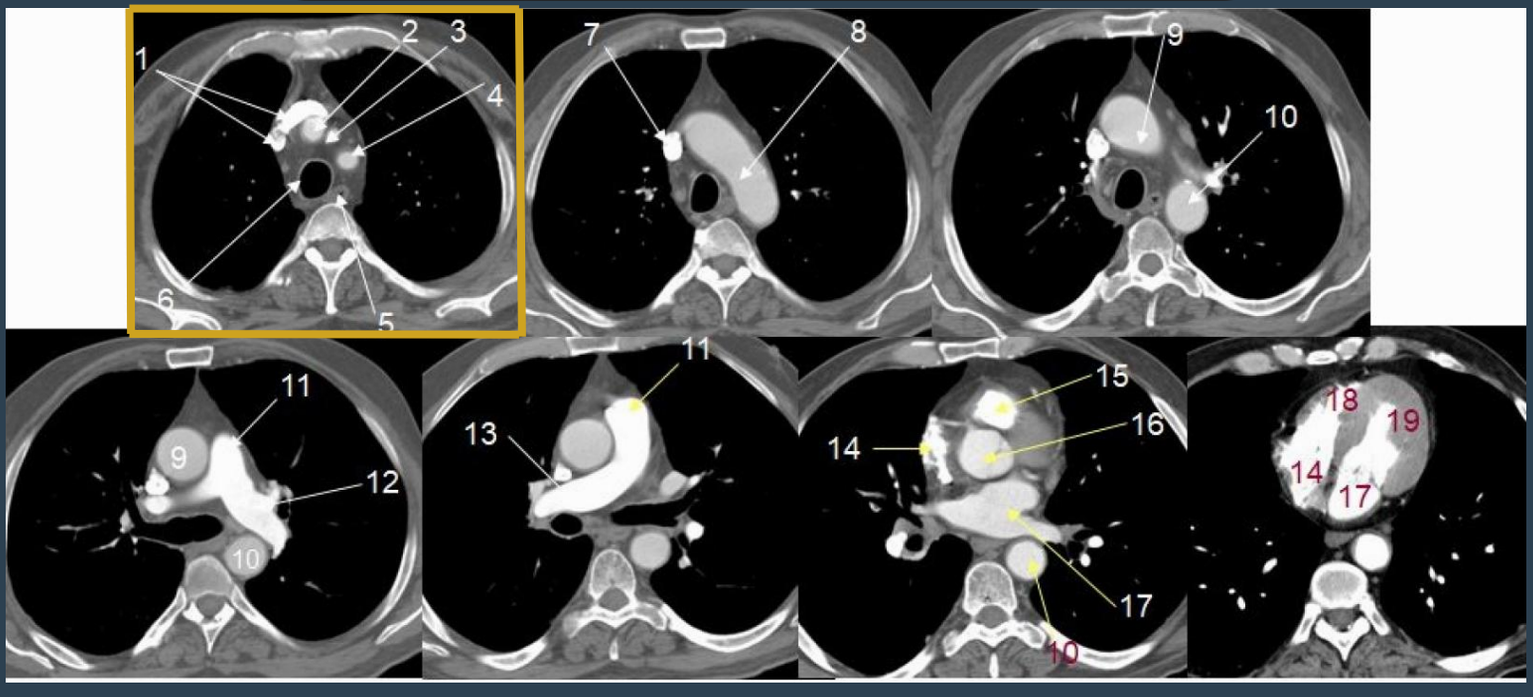
AA Aortic Arch
T TRACHEA
1 Superior vena cava



AA Ascending Aorta
DA Descending Aorta
1 Superior vena cava
2 Azygous Arch



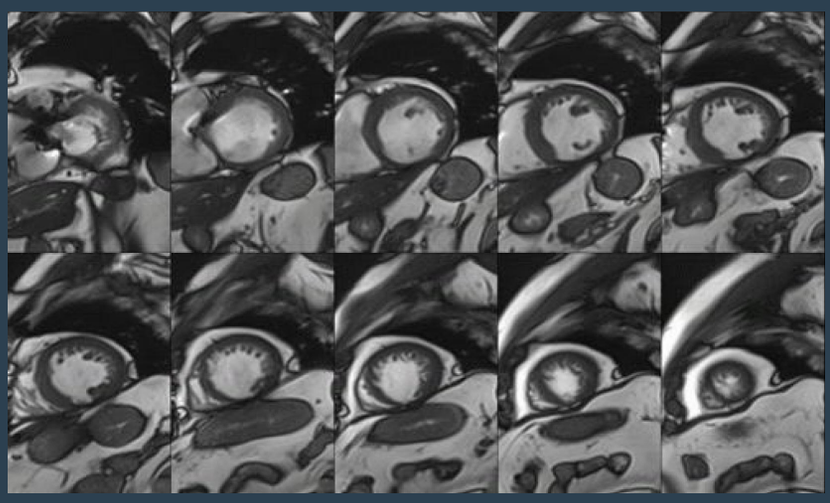
AA Ascending Aorta
DA Descending Aorta
LB Left main bronchus
LP Left pulmonary artery
PA Pulmonary trunk
RB Right main bronchus
SVC Superior vena cava



Heart radiology

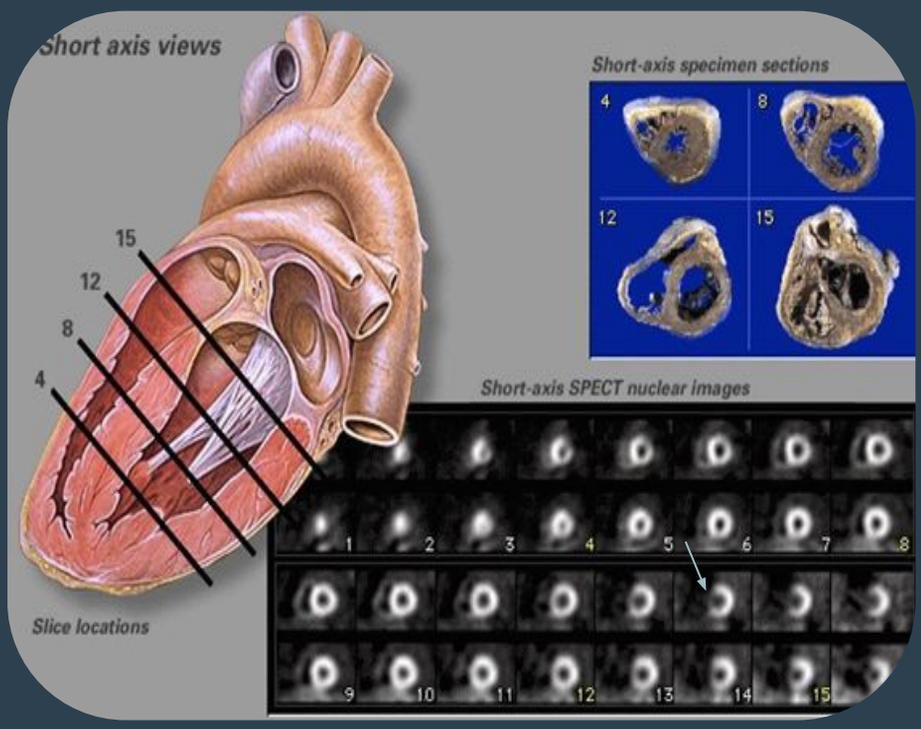
Heart MRI

Video

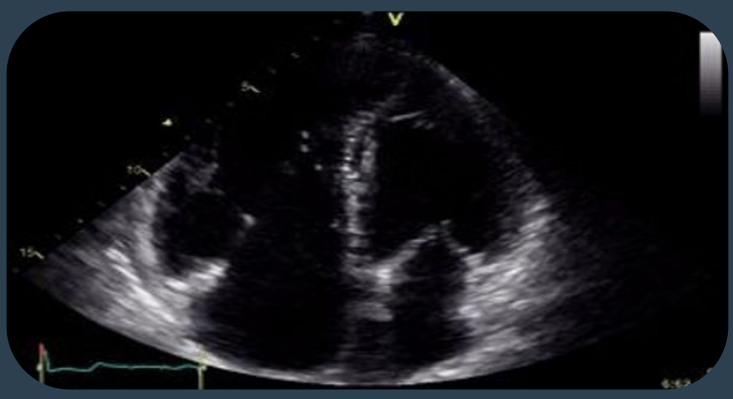


Nuclear medicine

Normal myocardial perfusion rest images have uniform uptake, which should show as **doughnut appearance**.
As shown here the patient does not show abnormal uptake at rest but after stress the uptake starts to decrease in the area suffering from **ischemia** (arrow)

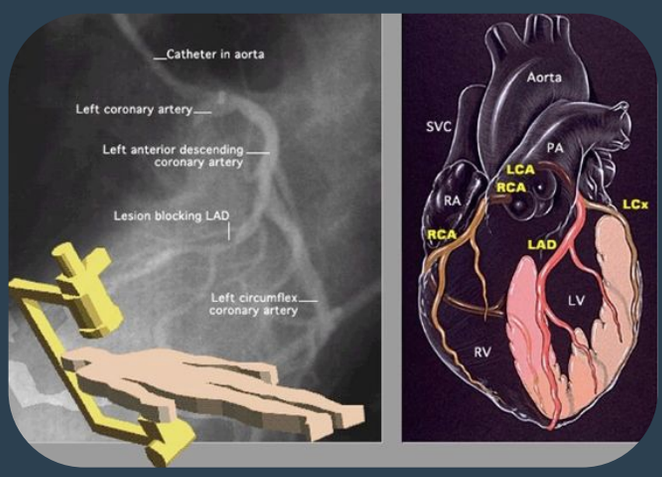


Echocardiogram



Video

catheter angiography



detects any obstruction in the heart vessels

Summary

1- Clavicle

2- Spinous process

3- Trachea

4- Scapula

5- Aortic Arch

6- Carina (Bifurcation)

7- Pulmonary Trunk

8- Lt. Cardiac border (atria)

9- Lt. Cardiac border (ventricle)

10- Vertebral body

11- Descending Aorta

12- Gastric fundus

13- Liver

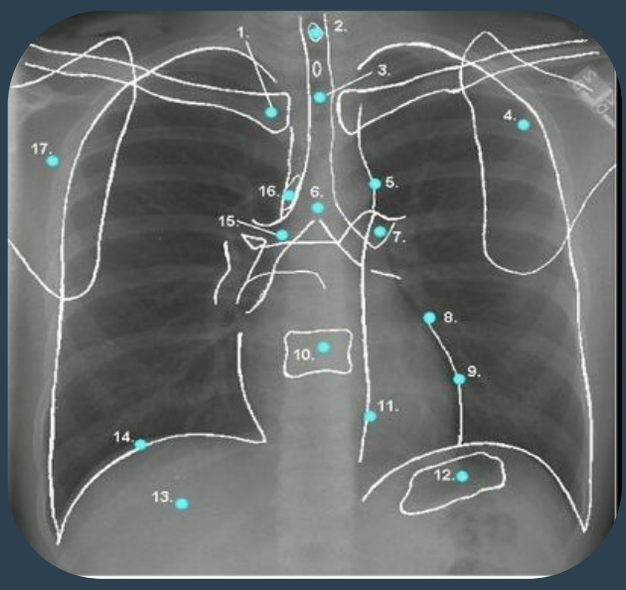
14- Rt. Hemidiaphragm

15- Rt. main bronchus

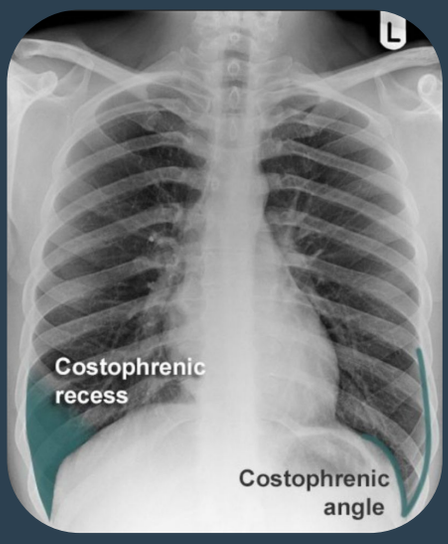
16- Azygos vein

17- Scapula

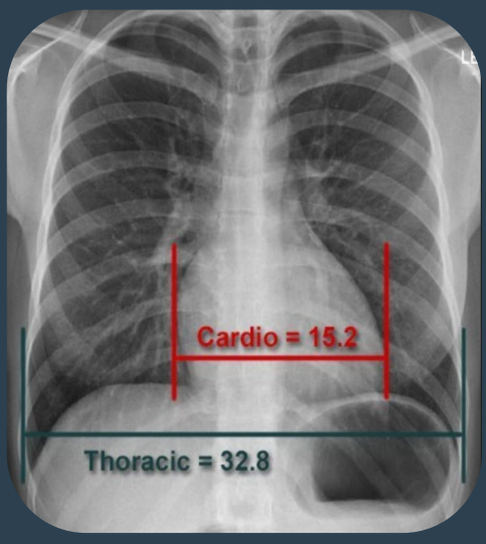
Chest X ray anatomy



Points to consider when looking at common CVS and Chest pathologies

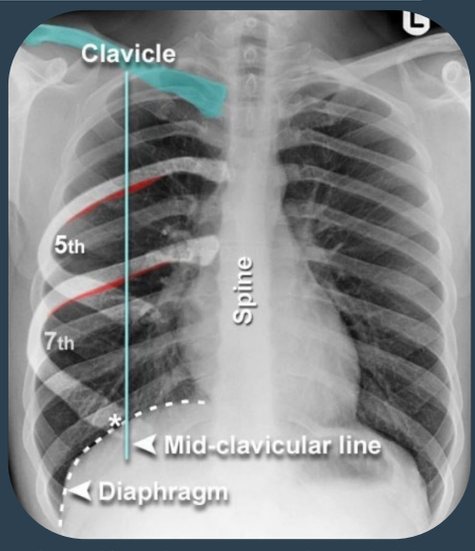


If there is **blunting** of costophrenic angle, it may indicate pleural effusion or hematoma



Posterior anterior (PA) view

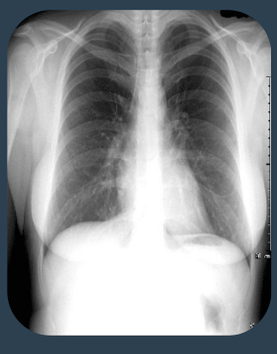
Cardiothoracic ratio: if less than 50% then is normal, greater is considered cardiomegaly

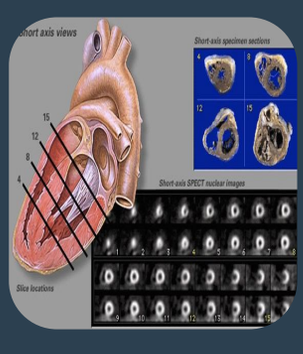


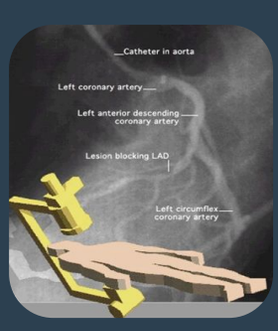
The diaphragm should be intersected by the 5th to 7th anterior ribs in the midclavicular line. Less is a sign of incomplete inspiration

radiological examinations applied in chest and CVS diseases

X Ray	CT	Nuclear medicine	Echocardiogram	catheter angiography

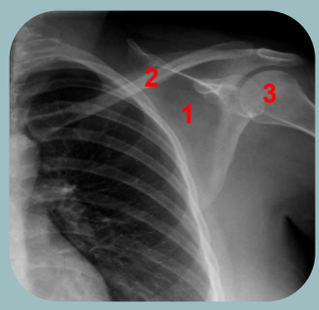






quiz

1- Indicate the names of the structures in order
a. Clavicle, Rib, Humerus
b. Scapula, Clavicle, Humerus
c. Scapula, Rib, Humerus
d. Fat, Clavicle, Joint



2- Which of the following conditions can result in a doughnut appearance in cardiac heart Nuclear medicine?
a. Cardiomyopathy
b. Hypertrophic Heart Disease
c. Previous MI
d. Normal Heart

3-Which of the following seen in this selected cut of CT scan of the chest is correct ?
A) No.5 refers to the right brachiocephalic artery
B) No.1 refers to Azygos vein
C) No.4 refers to left superior vena cava
D) No.3 refers to left common carotid artery

4- Blunting of the costodiaphragmatic recess indicates
a. Open pneumothorax
b. Pleural Effusion
c. Pleuritis
d. Pulmonary edema

5-Thickening of the paratracheal stripes indicates
a. Bronchitis
b. Injury
c. Lymphadenopathy
d. Normal variation

6-Which of the following cardiothoracic ratios is the cut off point that marks cardiomegaly
a. Greater than 50%
b. Greater than 40%
c. Greater than 60%
d. Greater than 30%

7- Which of the following is correct regarding the right and left hilar points?
a. Left hilar point is higher
b. Right hilar point is higher
c. They’re at the same level
d. Variations can occur

Answer
1)B
2)D
3)D
4)B
5)C
6)A
7)A