UNIVERSITY OF ANBAR

الكلية : كلية الطب

القسم او الفرع : التشريح البشري

المرحلة: الاولى

أستاذ المادة : مهند سهيل نجم

اسم المادة باللغة العربية : التشريح

اسم المادة باللغة الإنكليزية : anatomy

اسم المحاضرة الأولى باللغة العربية: تشريح منطقة الصدر

اسم المحاضرة الأولى باللغة الإنكليزية : Thorax Anatomy

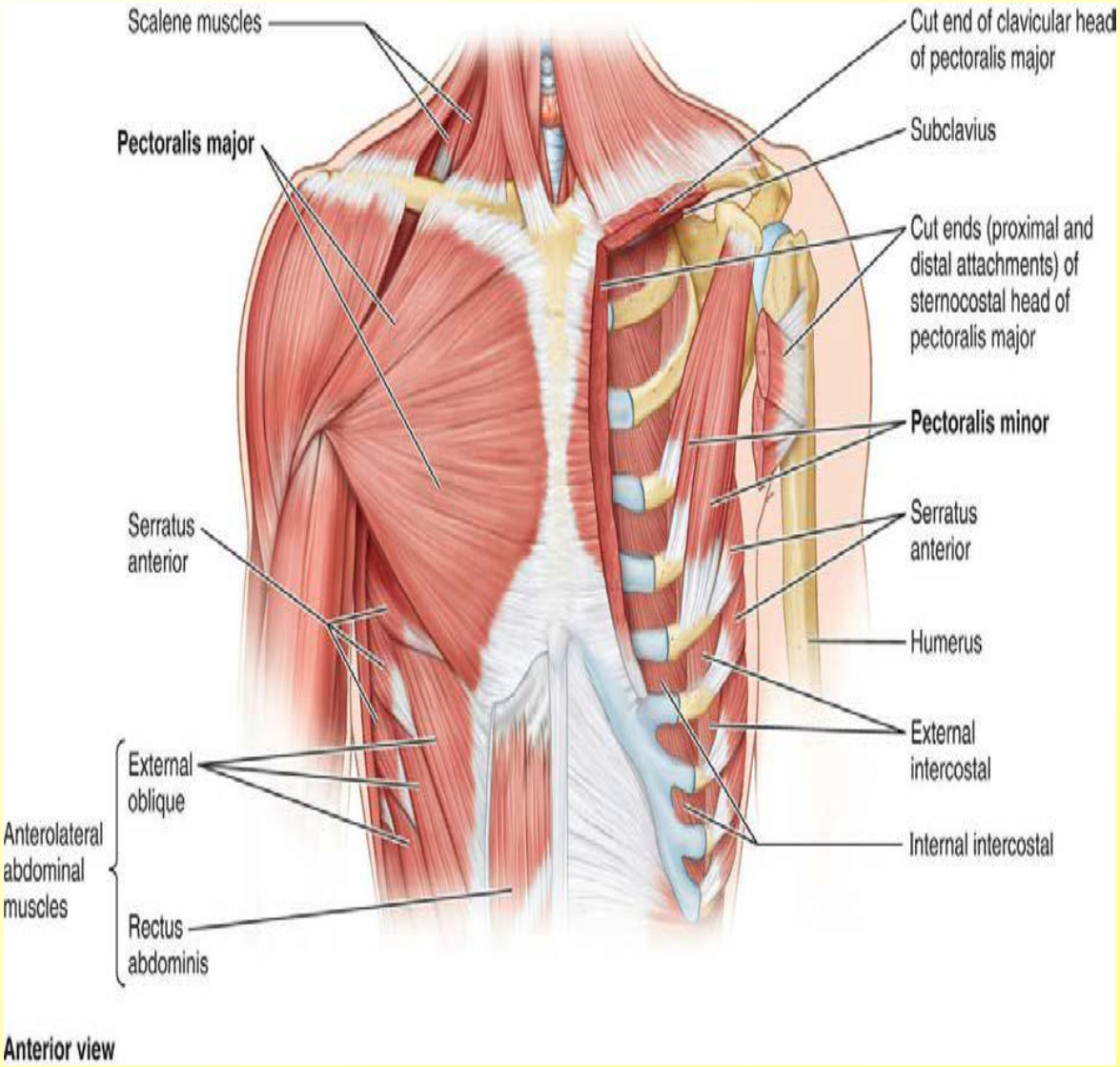
The Intercostal Space

Dr. mohanad suhail najm

Thoracic Wall Muscles

I. External layer

- A. Pectoralis major & minor
- B. Rhomboids
- C. Serratus ant.
- D. Serratus post.



Ref.1

Thoracic Wall Muscles

II. Intermediate layer

1. External intercostal

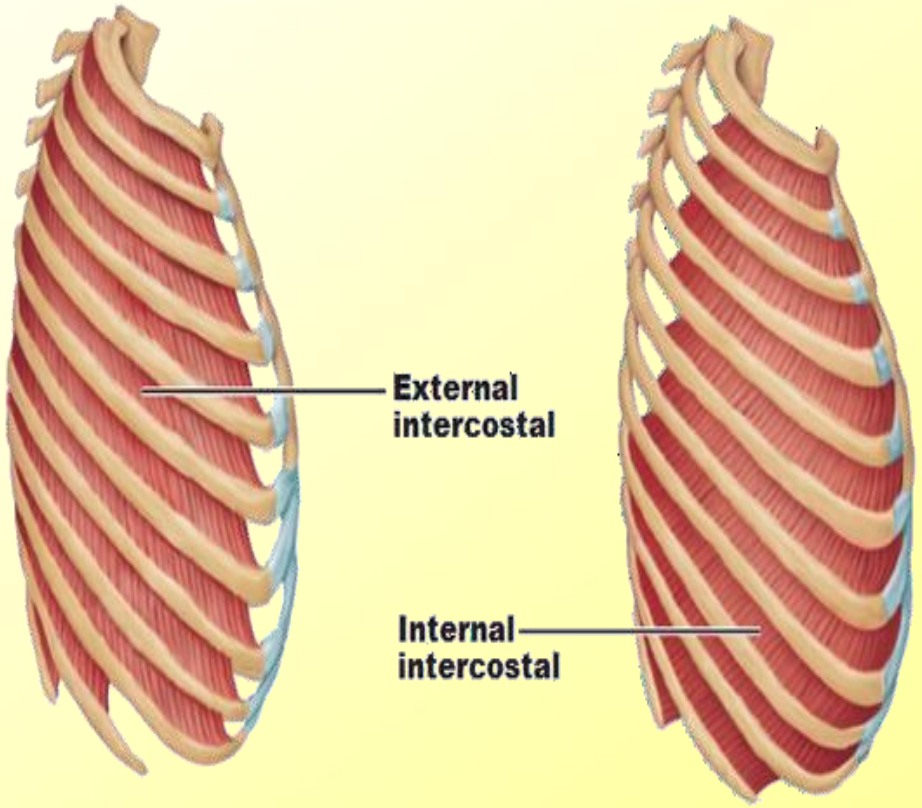
The muscle extends forward to the costal cartilage where it is replaced by an aponeurosis,

the anterior (external) intercostal membrane

2. Internal intercostal

The muscle extends backward from the sternum in front to the angles of the ribs behind, where the muscle is replaced by an aponeurosis,

the posterior (internal)intercostal membrane

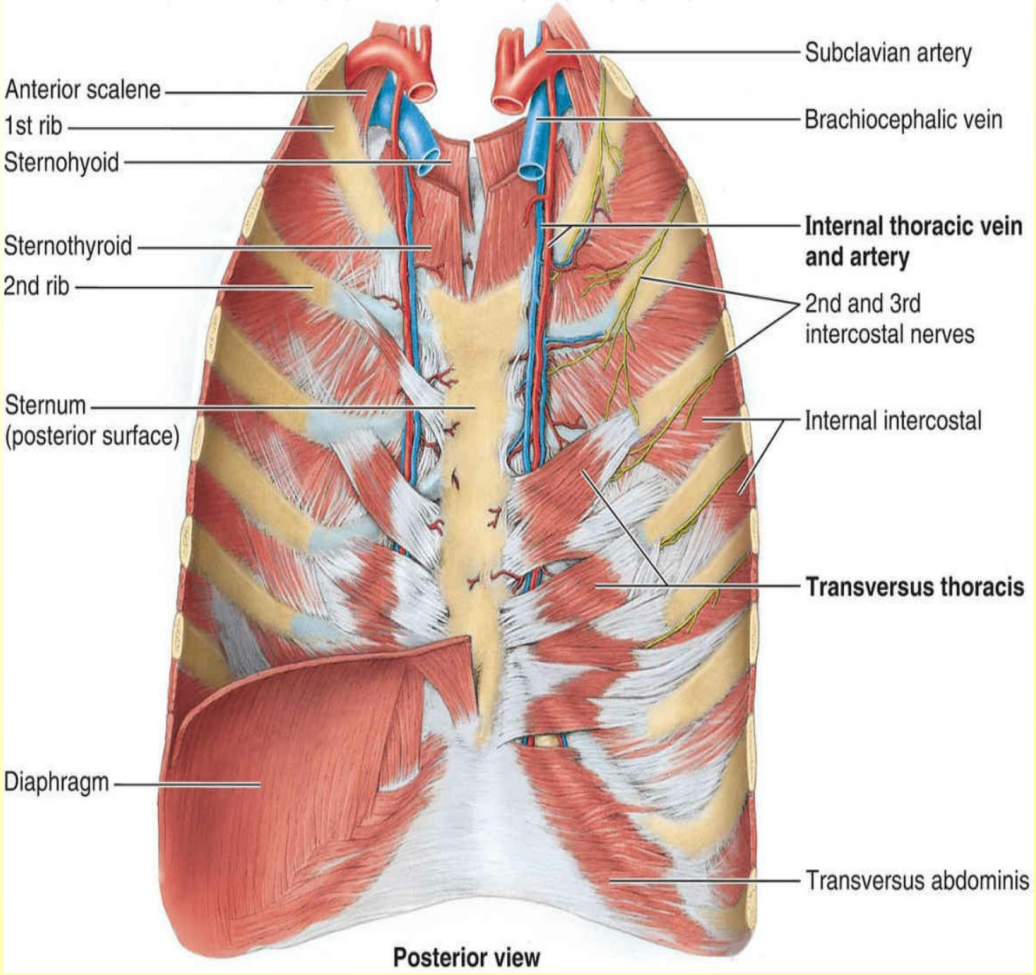


Ref.2

Thoracic Wall Muscles

III. Innermost layer

1. innermost intercostal muscles
2. transversus thoracis muscles
3. subcostalis muscle



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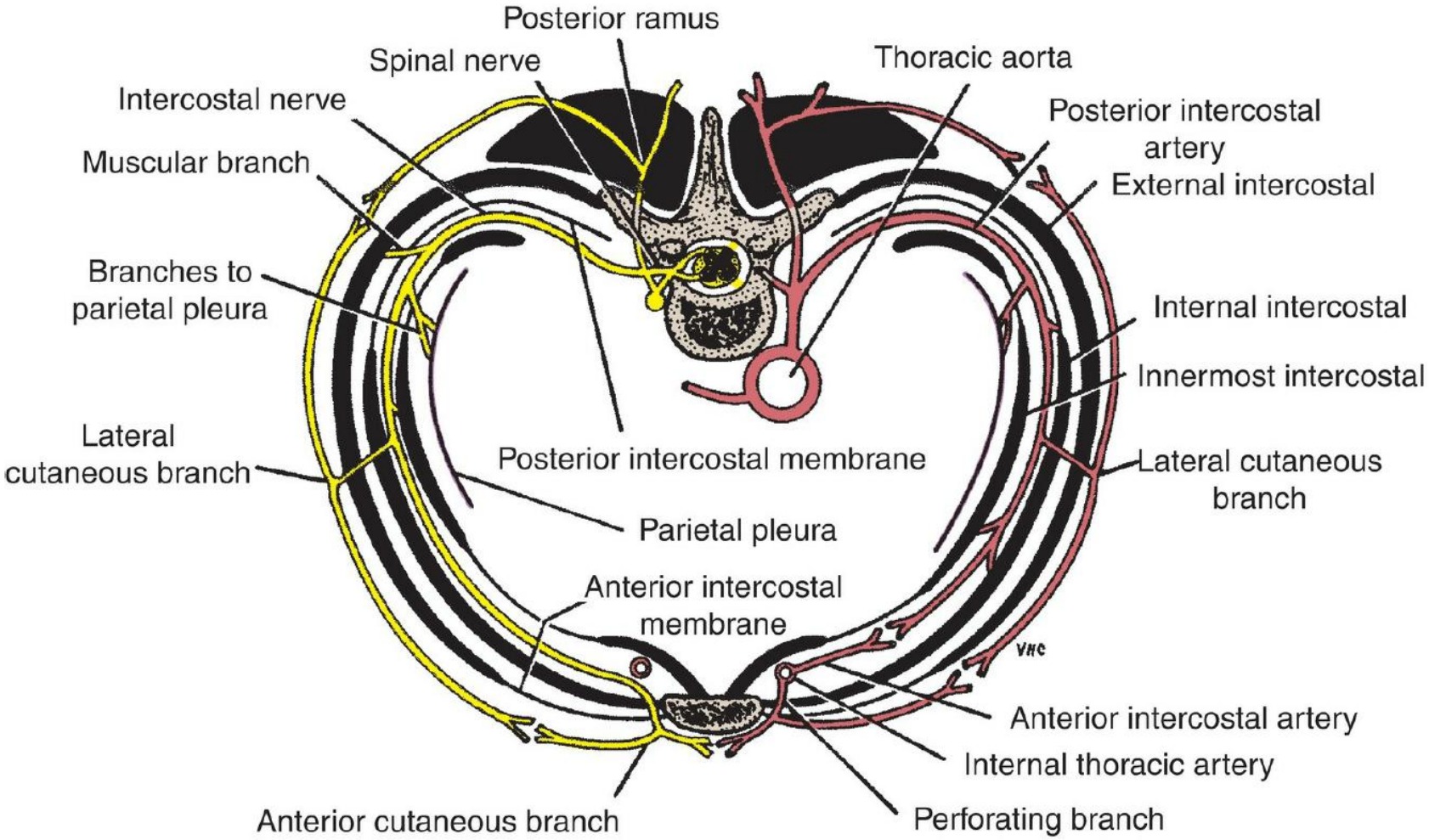
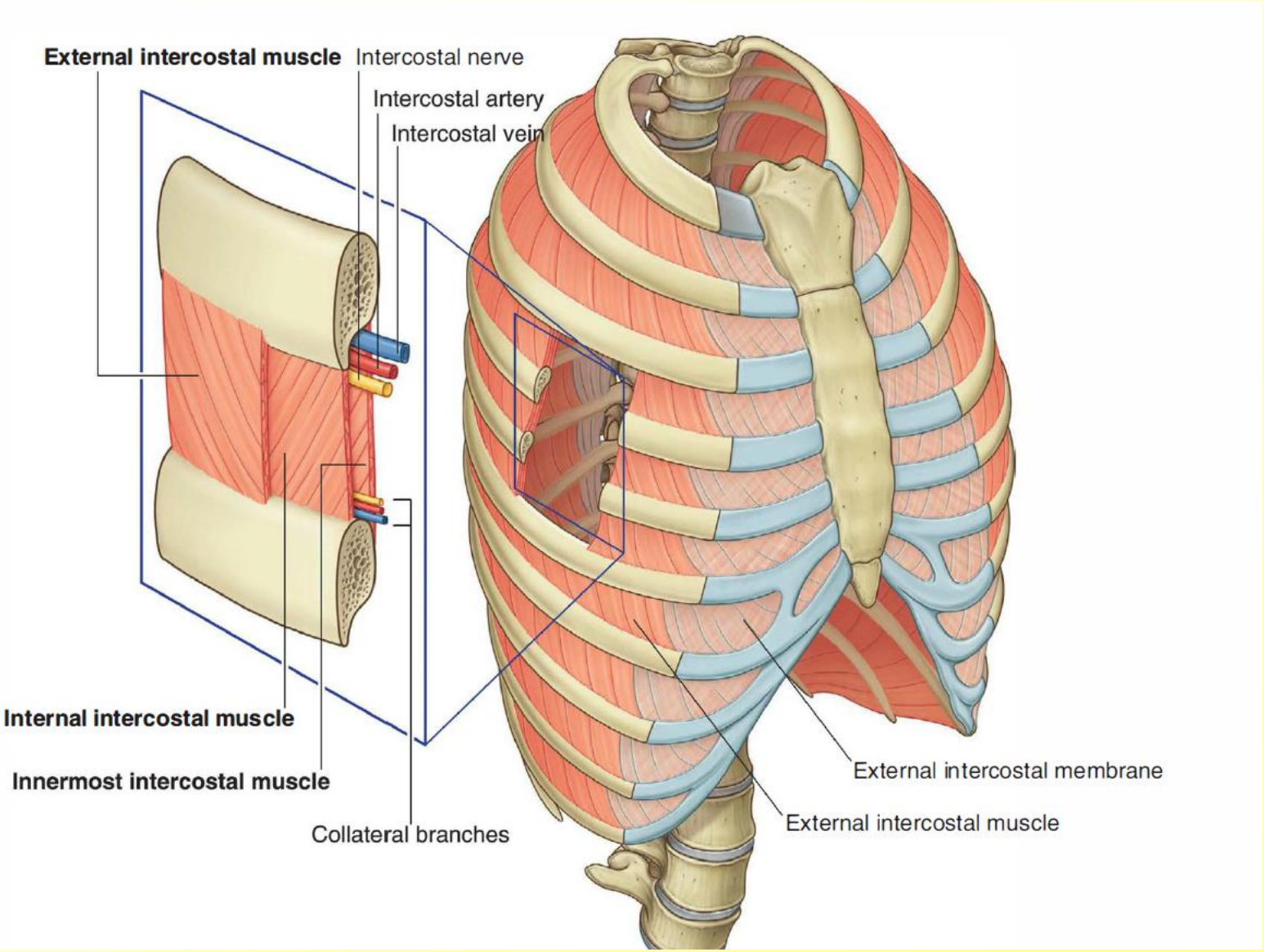
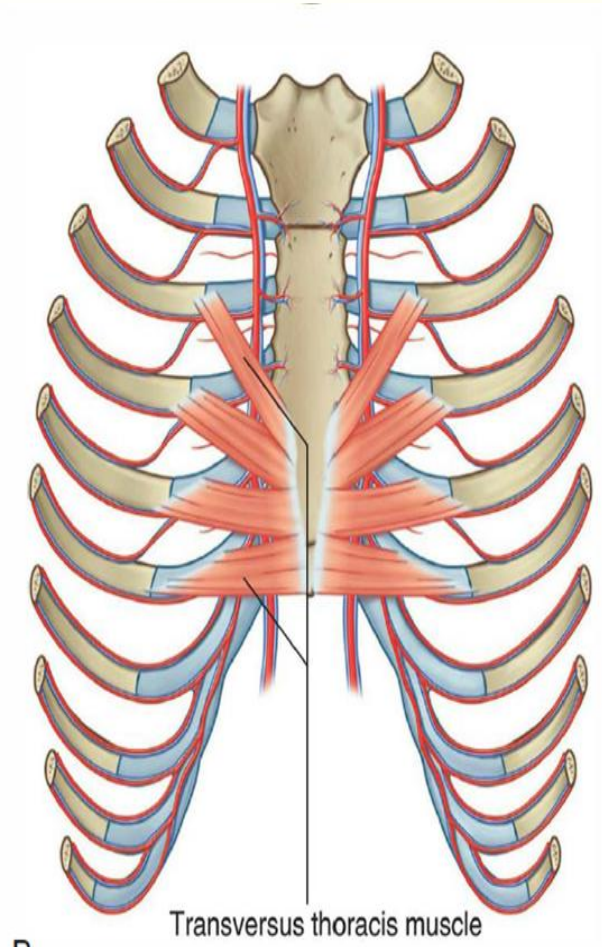
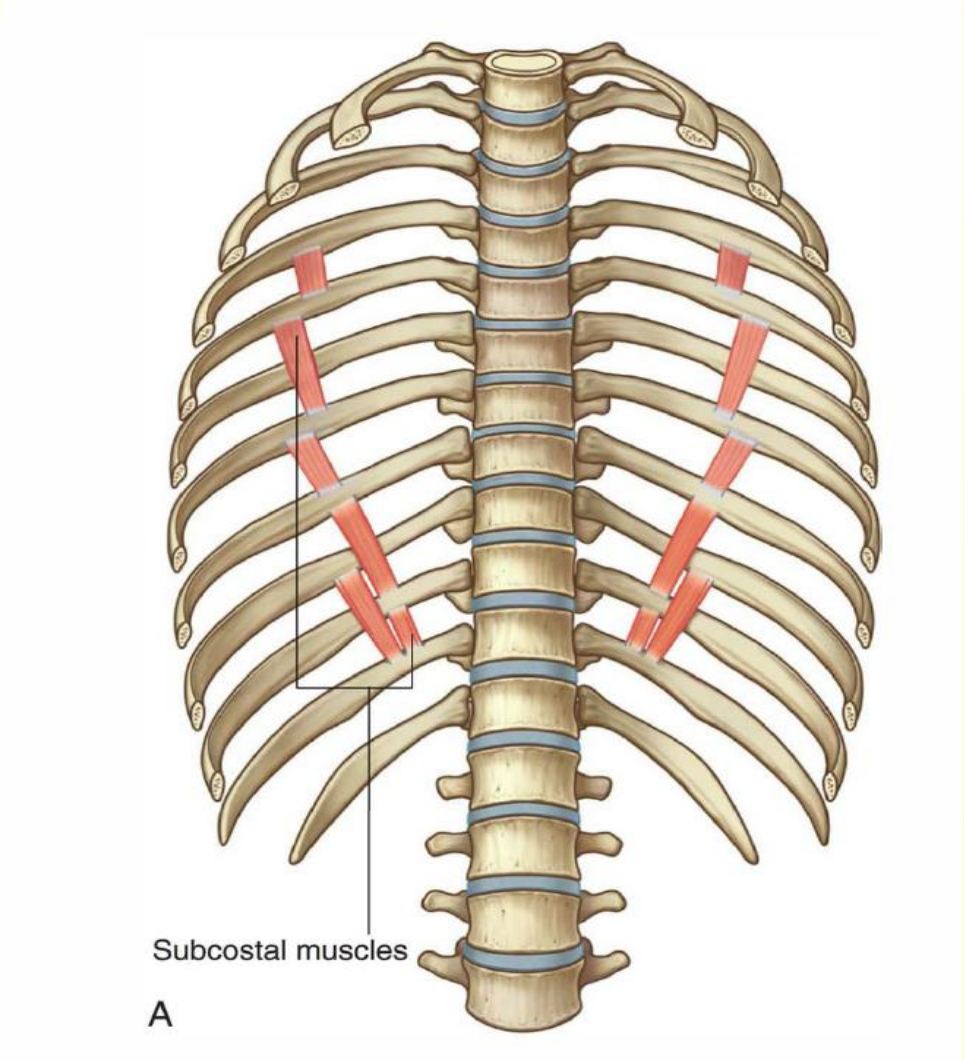
Thoracic Wall Muscles




External intercostal muscle
Intercostal nerve
Intercostal artery
Intercostal vein
Internal intercostal muscle
Innermost intercostal muscle
Collateral branches
External intercostal membrane
External intercostal muscle


Transversus thoracis muscle
B


Subcostal muscles
A

Nerves of Thoracic Wall

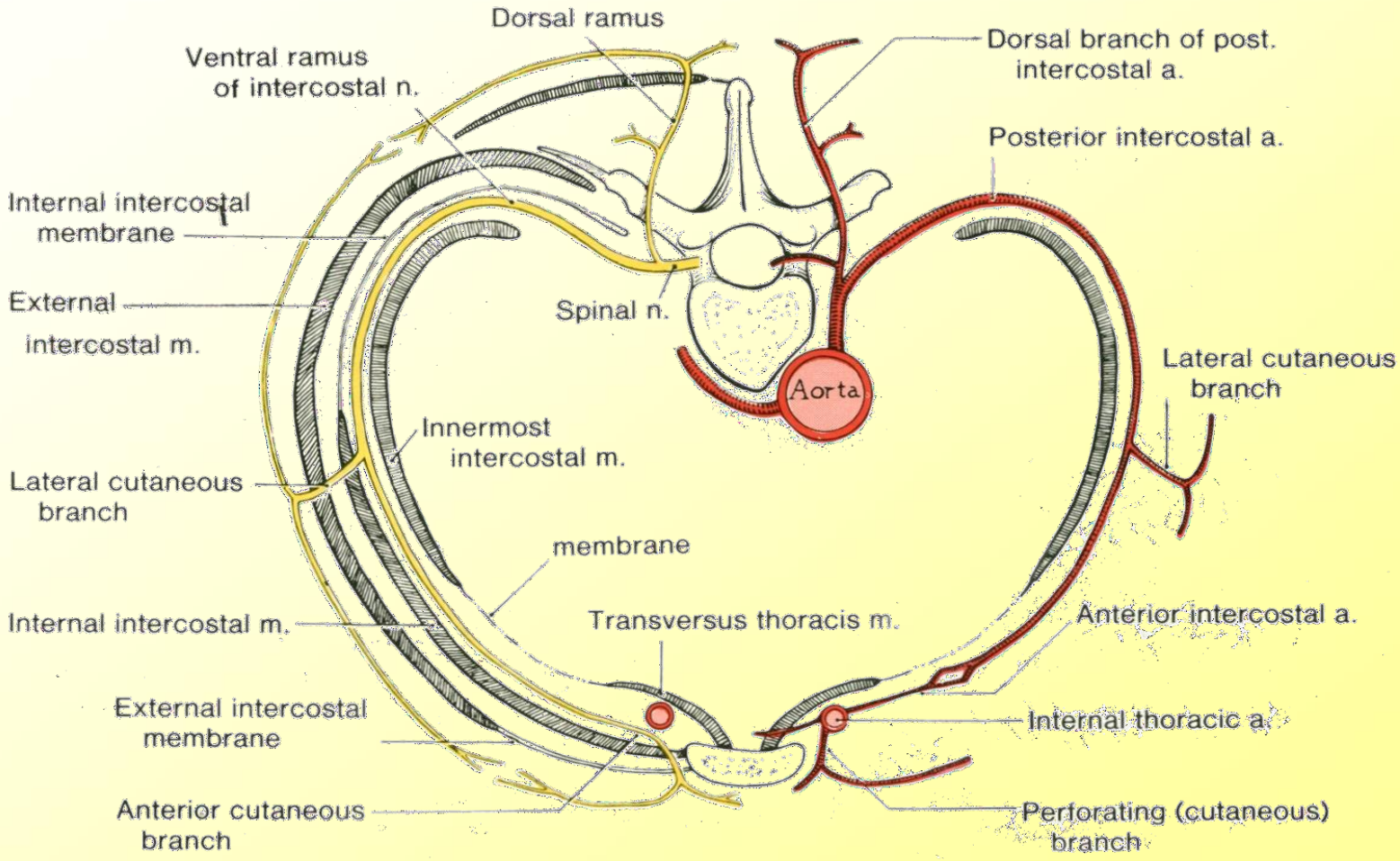
- The 12 pairs of thoracic spinal nerves supply the thoracic wall.

divide into anterior and posterior rami

- The anterior rami of nerves T1–T11 form the intercostal nerves that run along the extent of the intercostal spaces.
- The anterior ramus of nerve T12, coursing inferior to the 12th rib, is the subcostal nerve.
- The posterior rami of thoracic spinal nerves pass posteriorly, to supply the joints, deep back muscles, and skin of the back in the thoracic region.

Typical Intercostal Nerves • 3rd – 6th nerves

It then runs forward inferiorly to the intercostal vessels in the subcostal groove of the corresponding rib, the nerves pass between the internal intercostal and innermost intercostal muscles



Ref.3

Branches

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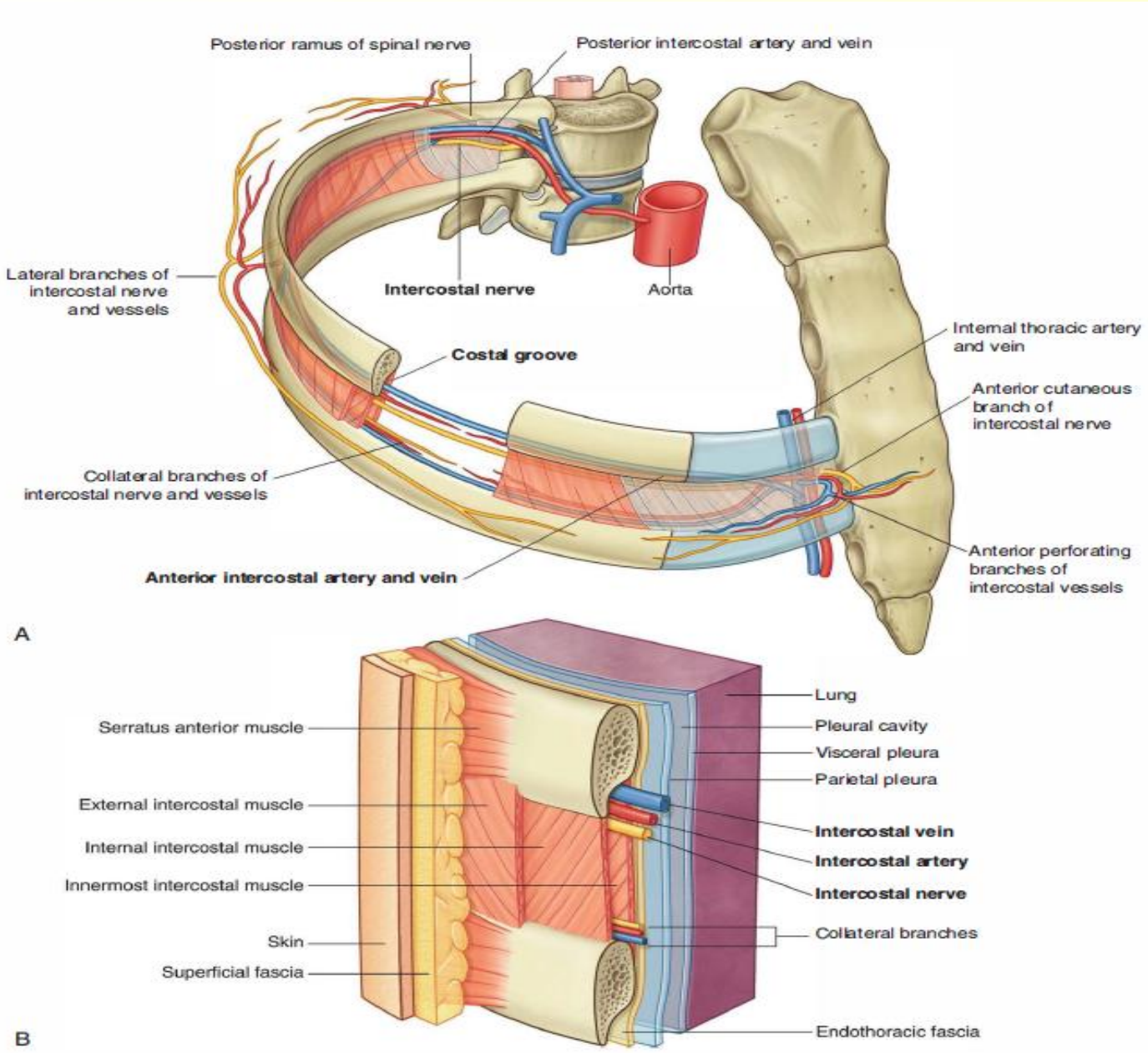
1. **Rami communicantes**
2. **The collateral branch:** runs forward inferiorly to the main nerve on the upper border of the rib below
3. **The lateral cutaneous** branch reaches the skin on the side of the chest.It divides into an anterior and a posterior branch.
4. **The anterior cutaneous branch,** which is the terminal portion of the main trunk, reaches the skin near the midline. It divides into a medial and a lateral branch.
5. **Muscular branches** run to the intercostal muscles.

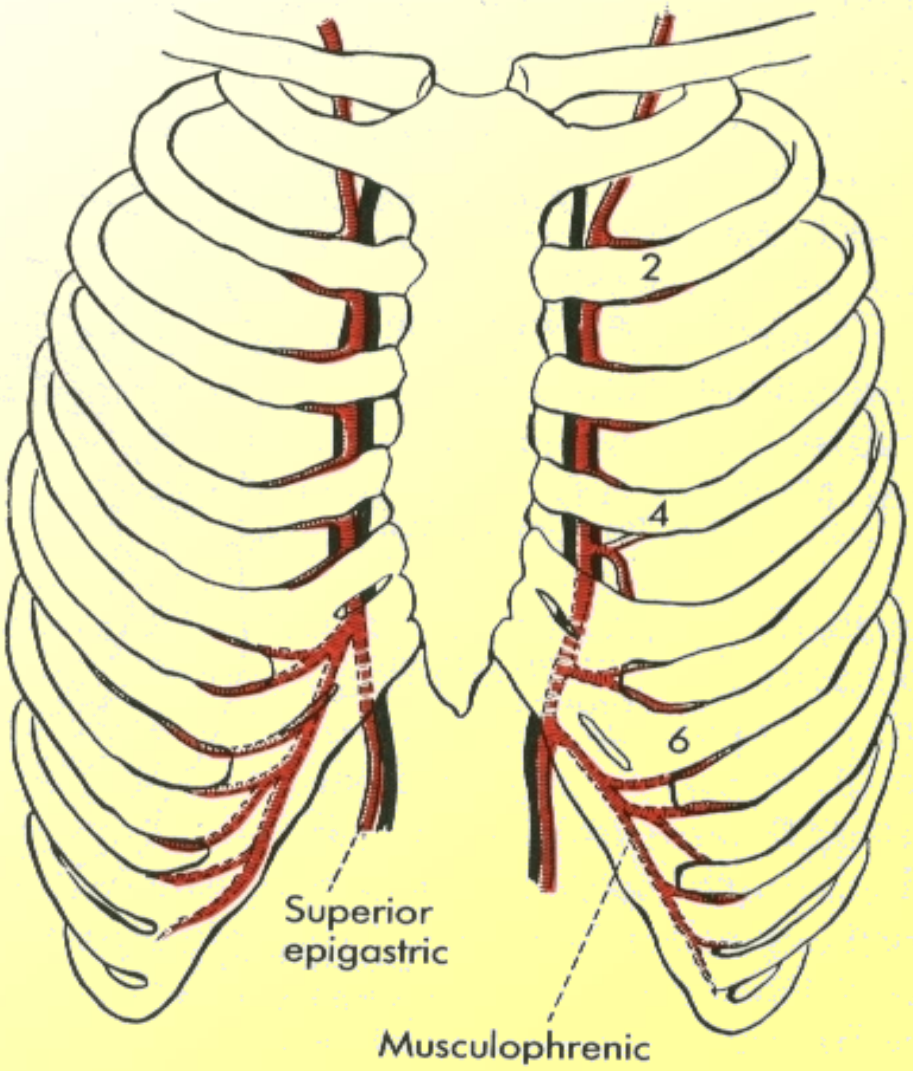

Posterior ramus of spinal nerve
Posterior intercostal artery and vein
Lateral branches of intercostal nerve and vessels
Intercostal nerve
Aorta
Internal thoracic artery and vein
Costal groove
Anterior cutaneous branch of intercostal nerve
Collateral branches of intercostal nerve and vessels
Anterior perforating branches of intercostal vessels
Anterior intercostal artery and vein
A
Lung
Serratus anterior muscle
Pleural cavity
Visceral pleura
Parietal pleura
External intercostal muscle
Intercostal vein
Internal intercostal muscle
Intercostal artery
Innermost intercostal muscle
Intercostal nerve
Collateral branches
Skin
Superficial fascia
Endothoracic fascia
B

ATypical Intercostal Nerves

- The anterior ramus of first intercostal nerve contributes to the brachial plexus .
- The lateral cutaneous branch o f the second intercostal nerve (the intercostobrachial nerve) contributes to cutaneous innervation of the medial surface of the Upper arm.
- the 7th to 11th intercostal nerves supply the muscles, skin, and peritoneum of the abdominal wall.

Internal Thoracic Artery

- The internal thoracic artery supplies the anterior wall of the body from the clavicle to the umbilicus.
- It is a branch of the first part of the subclavian artery in the neck.
- It descends vertically on the pleura behind the costal cartilages, a fingerbreadth lateral to the sternum, and ends in the sixth intercostal space by dividing into the
  - ❑ superior epigastric
  - ❑ Musculophrenic arteries

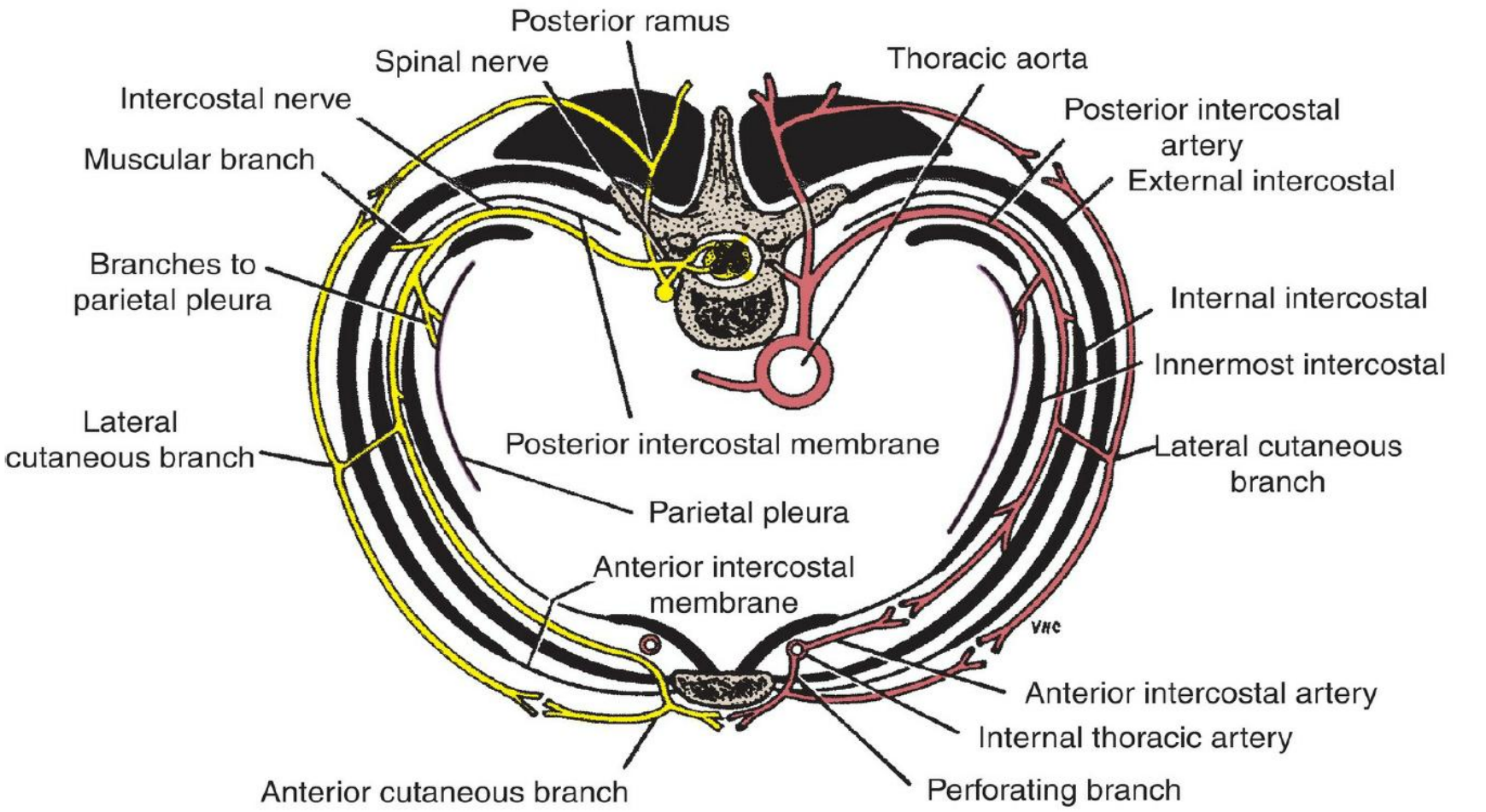


Ref.3

internal thoracic artery

Branches

1. Two anterior intercostal arteries supply the upper six intercostal spaces.
2. Perforating arteries accompany the terminal branches of the corresponding intercostal nerves.
3. The pericardiacophrenic artery accompanies the phrenic nerve and supplies the pericardium.
4. Mediastinal arteries supply the contents of the anterior mediastinum.
5. The superior epigastric artery
6. The musculophrenic artery runs around the costal margin of the diaphragm and supplies the lower intercostal spaces and the diaphragm.

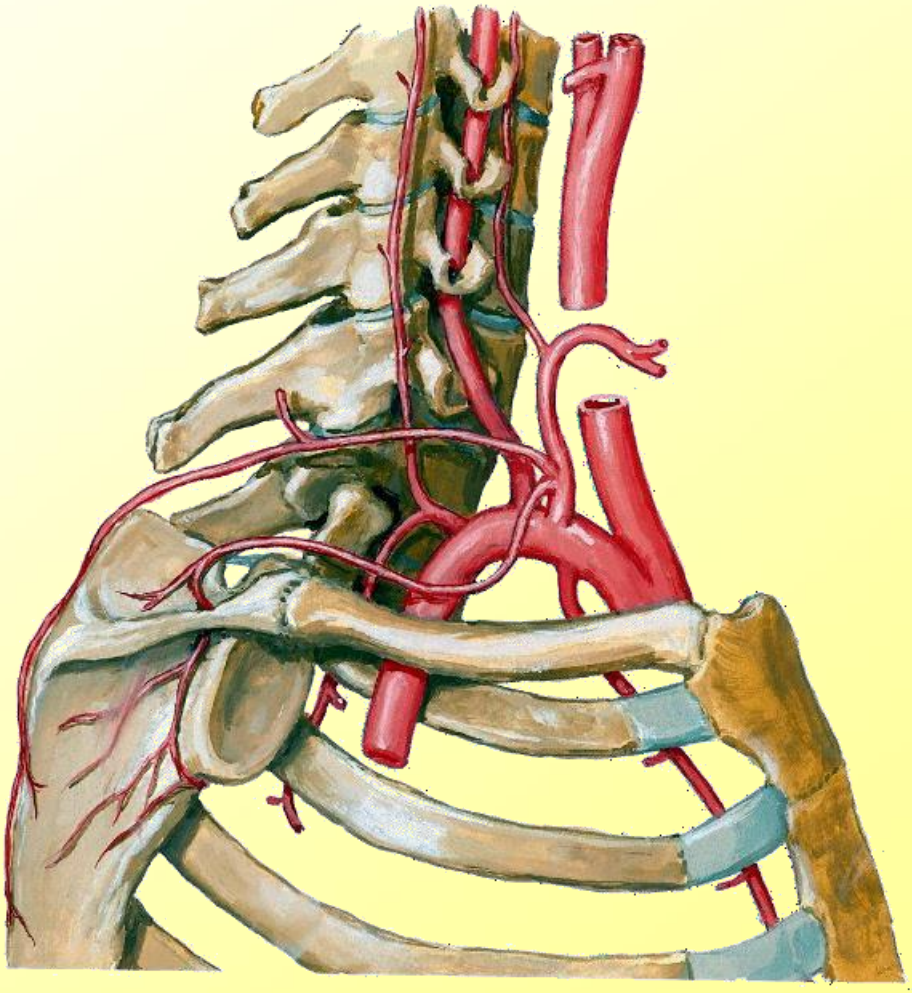


The anterior intercostal arteries of the first six spaces are branches of the internal thoracic artery, which arises from the first part of the subclavian artery.

The anterior intercostal arteries of the lower spaces are branches of the musculophrenic artery, one of the terminal branches of the internal thoracic artery

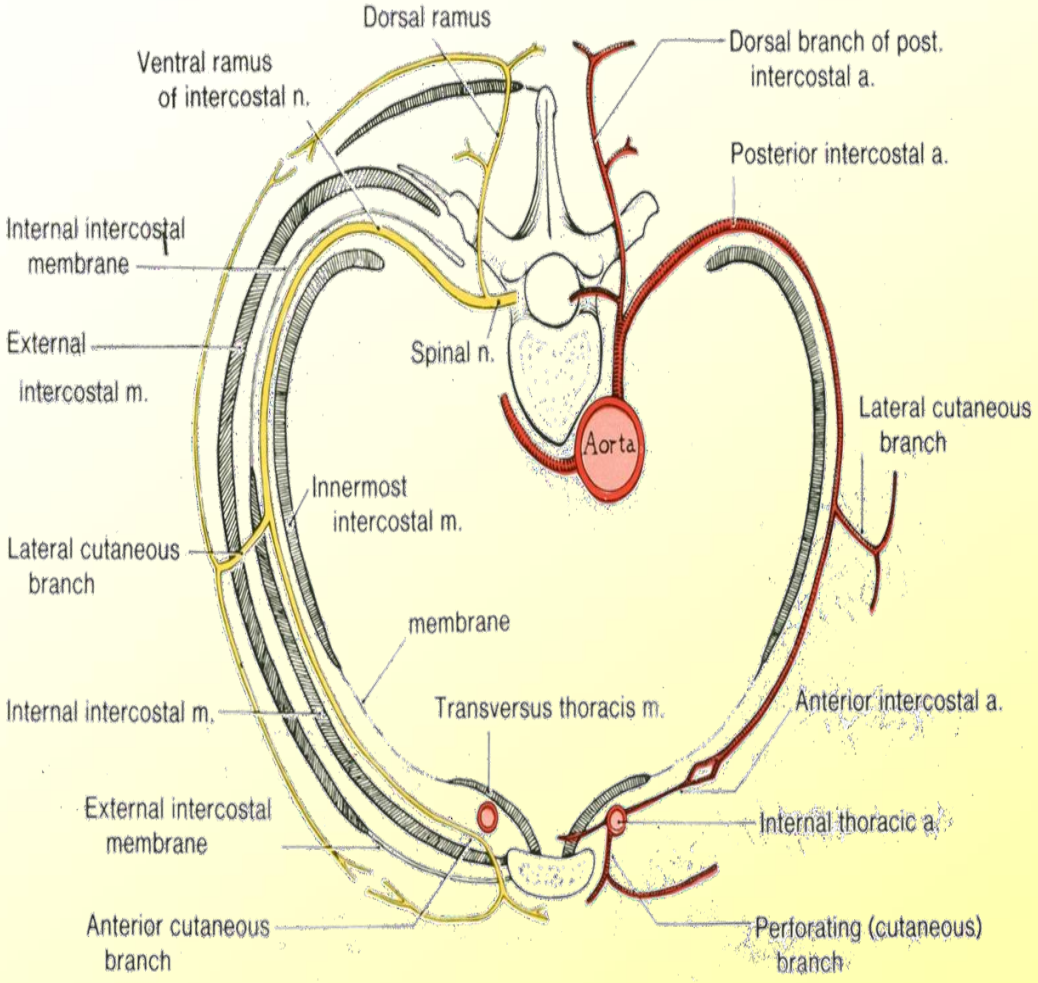
Posterior Intercostal Arteries

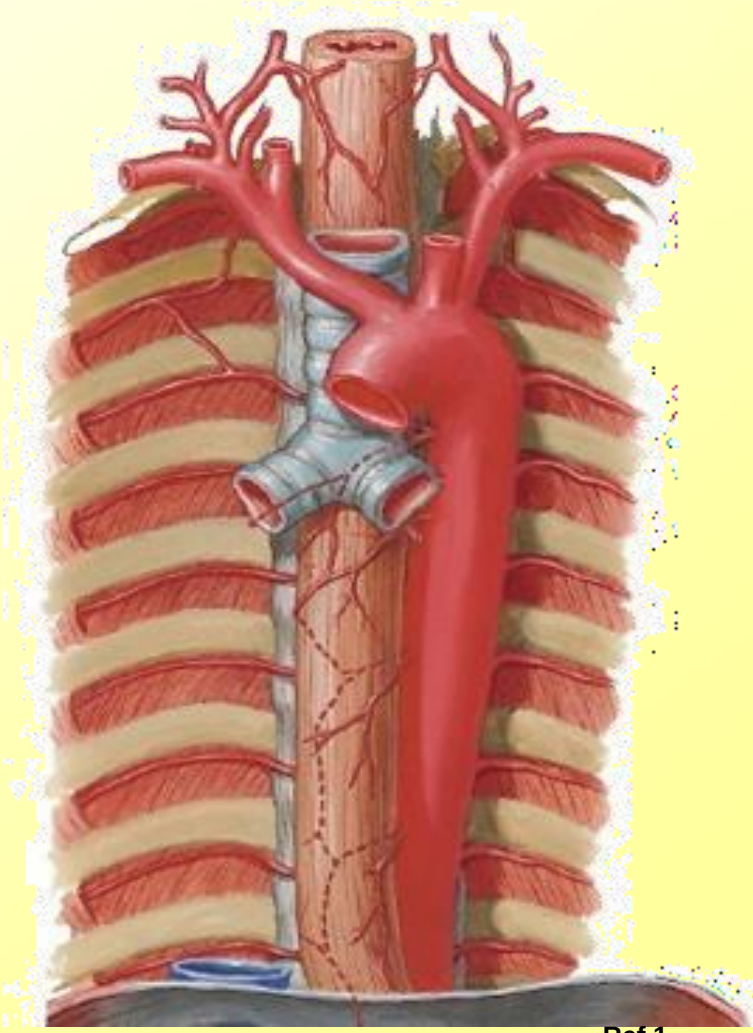
- The posterior intercostal arteries of the first two spaces are branches from the superior intercostal artery, a branch of the costocervical trunk of the subclavian artery.
- The posterior intercostal arteries of the lower nine spaces are branches of the descending thoracic aorta



Ref.1

Posterior Intercostal Arteries

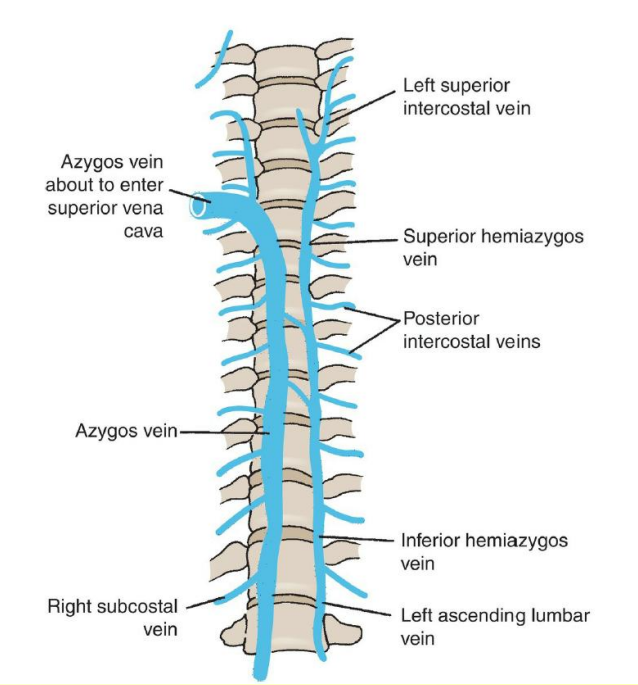


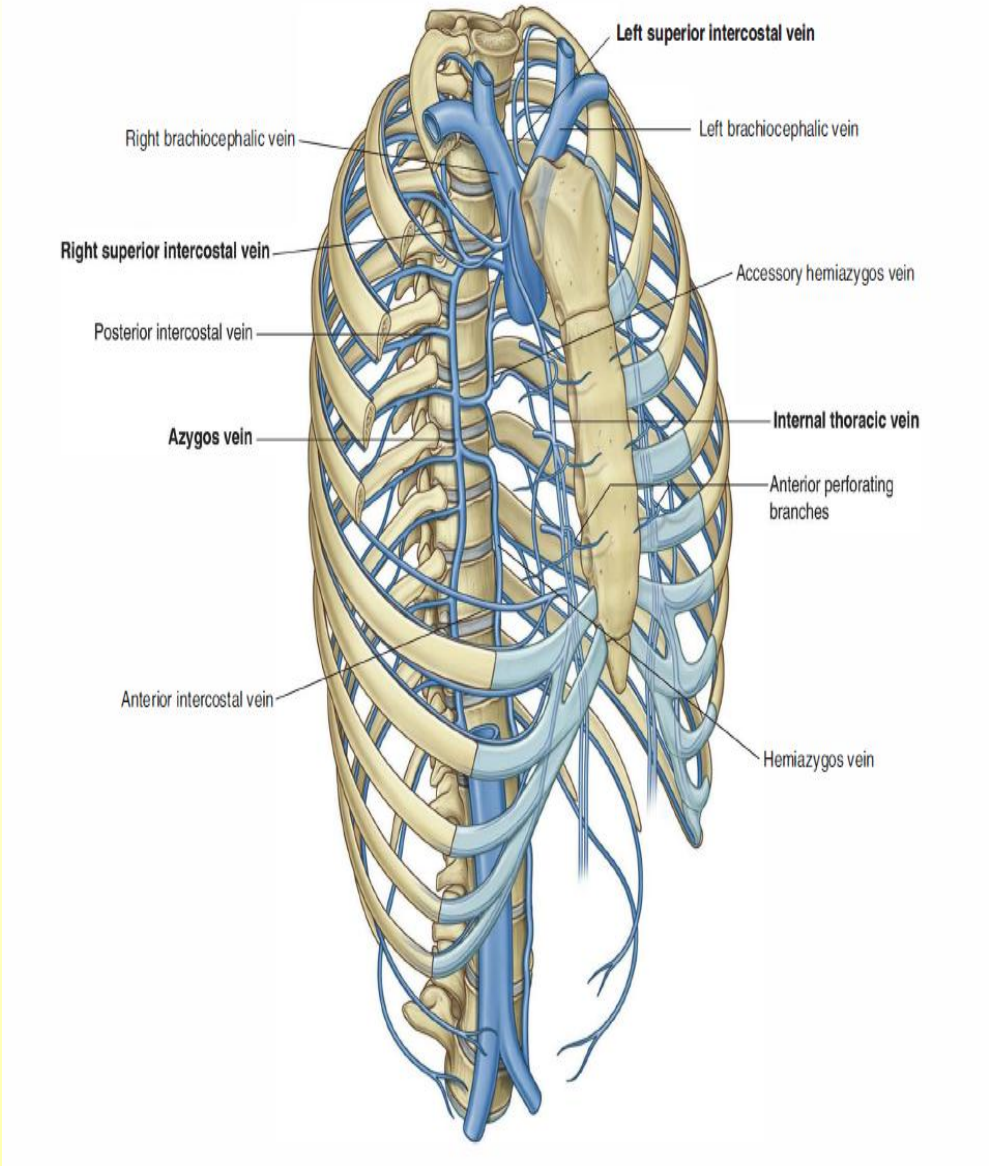


Ref.1

Intercostal Veins

- The posterior intercostal veins: drain posteriorly into the azygos or hemiazygos veins .
- The anterior intercostal veins : drain anteriorly into the internal thoracic and musculophrenic veins.





Intercostal Spaces

Intercostal spaces are the gaps between adjacent ribs. A needle passing
through the entire depth of an intercostal space must penetrate seven
structural layers

1. Skin
2. Superficial fascia
3. Deep fascia
4. Intercostal muscles
5. Endothoracic fascia
6. Extrapleural fatty layer
7. Parietal pleura

Diaphragm

- The diaphragm is a thin musculotendinous structure septum that separates the chest cavity above from the abdominal cavity below.

- The diaphragm is the most important muscle of respiration.

- It is dome shaped and consists of a peripheral muscular part, which arises from the margins of the thorax, and a centrally placed tendon.

- The diaphragm is not flat; rather, it "balloons" superiorly, on both the right and left sides, to form domes.

- The right dome is higher than the left, reaching as far as rib V.

- As the diaphragm contracts , the height of the domes decreases and the volume of the thorax increases.

Diaphragm Openings

Caval opening (T8)	Oesophageal opening (T10)	Aortic opening (T12)
1. Inferior vena cava 2. Terminal branches of right phrenic nerve	1. Oesophagus 2. Right and left vagus nerves 3. Oesophageal branches of left gastric artery/vein	1. Aorta 2. Thoracic duct 3. Azygous vein

❖ The esophagus and inferior vena cava penetrate the diaphragm; the aorta passes posterior to the diaphragm.

The origin of the diaphragm can be divided into three parts:

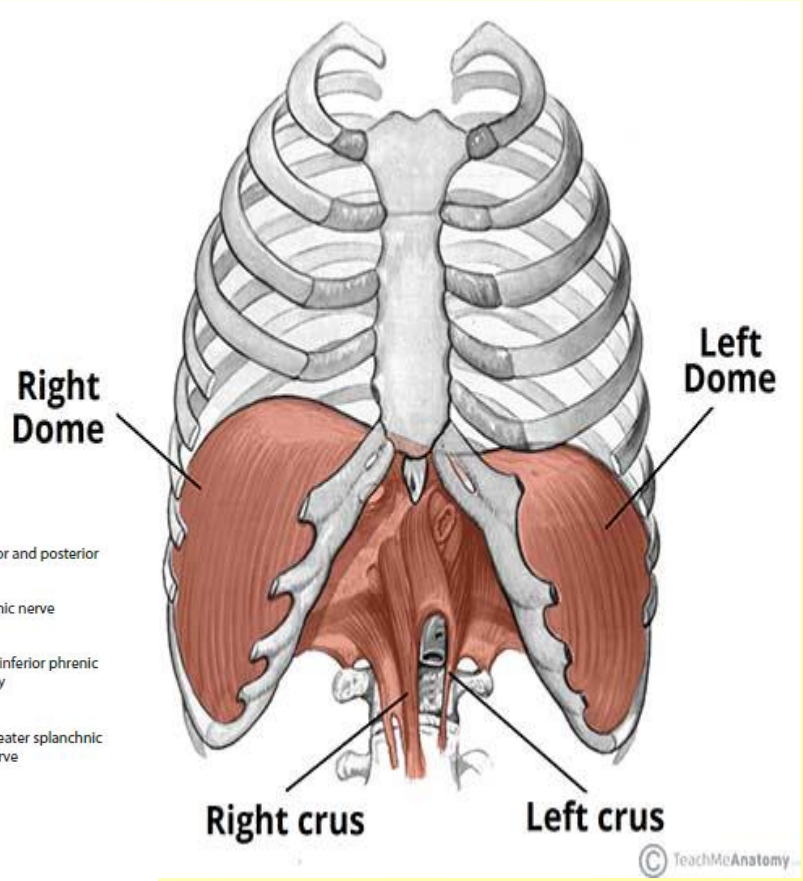
1)sternal part :arising from the posterior surface of the xiphoid process.

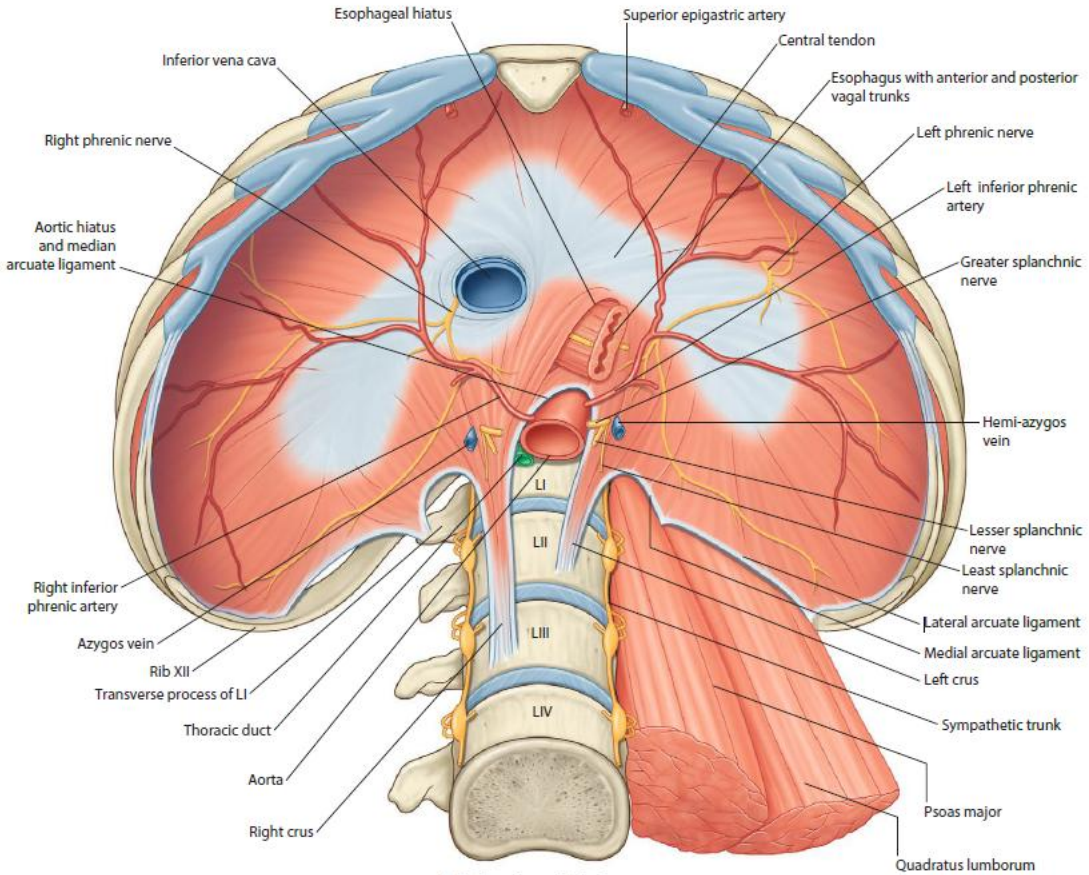
2)a costal part: arising from the deep surfaces of the lower six ribs and their costal cartilages.

3) vertebral part arising by vertical columns (crura) and from the arcuate ligaments (medial and lateral arcuate ligaments).

A) Right crus – Arises from L1-L3 and their intervertebral discs. Some fibres from the right crus surround the oesophageal opening.

B) Left crus – Arises from L1-L2 and their intervertebral discs.





Inferior view of diaphragm