MARRAKECH
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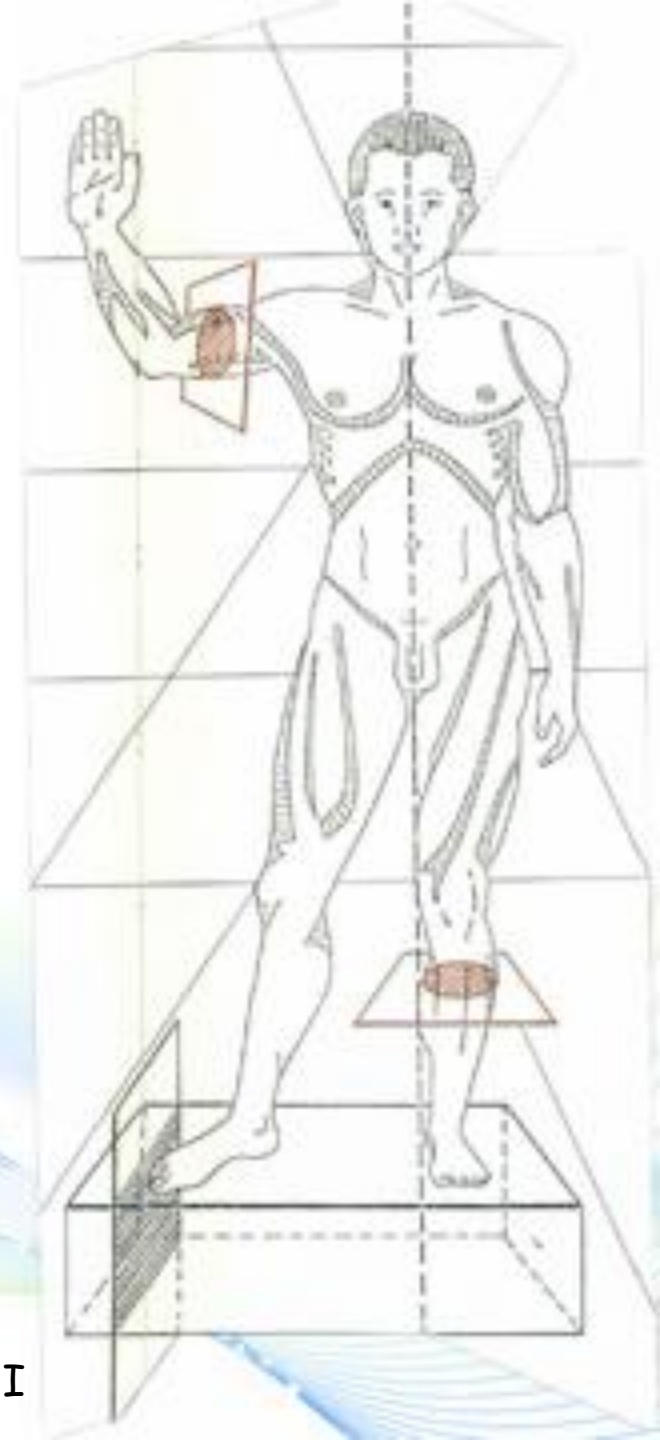
UNIVERSITÉ CADI AYYAD
كلية الطب والصيدلة - مراكش
FACULTÉ DE MÉDECINE ET DE PHARMACIE - MARRAKECH
ANATOMIE FMPM

THE DIAPHRAGM



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Plan :

I. INTRODUCTION

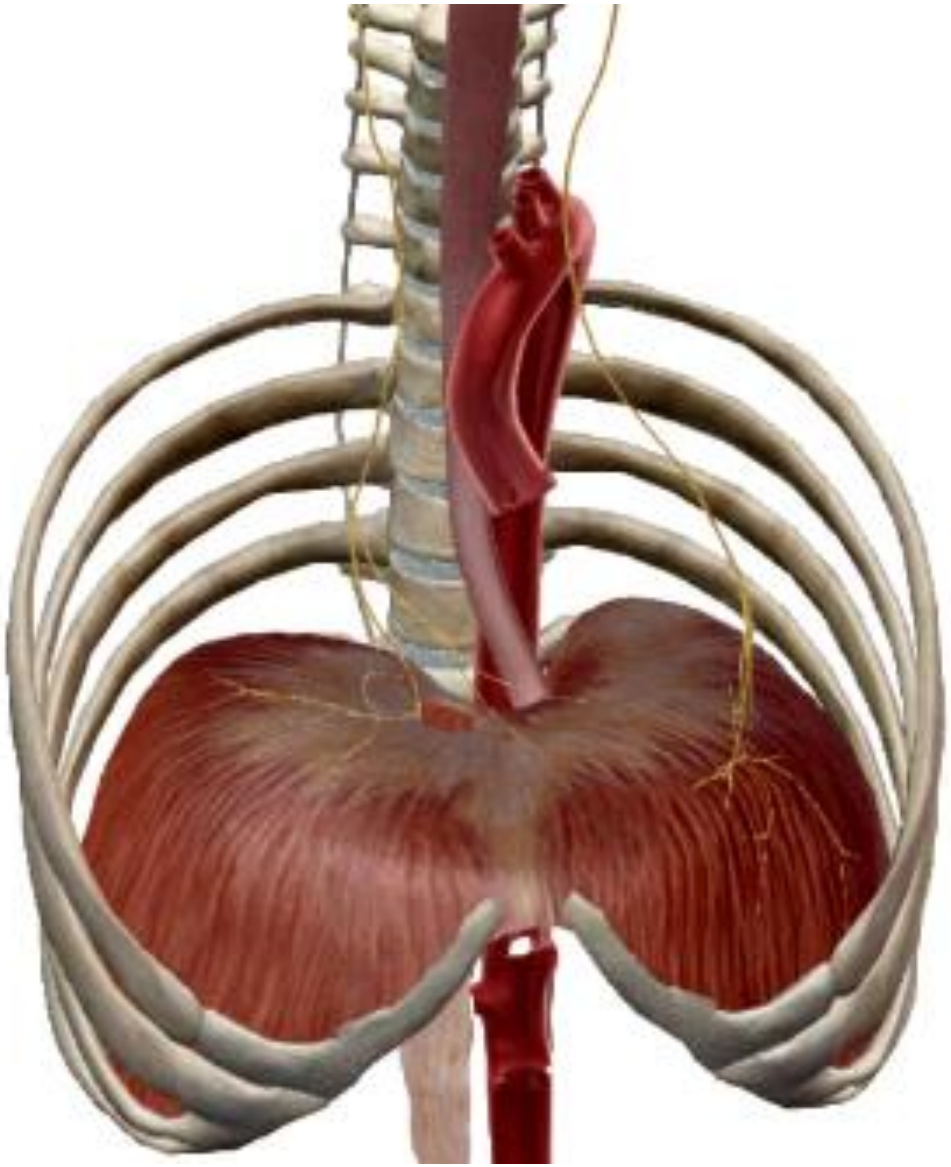
II. DESCRIPTIVE ANATOMY

III. ANATOMICAL RELATIONS

IV. BLOOD AND NERVE SUPPLY

V. CLINICAL APPLICATIONS

VI. CONCLUSION

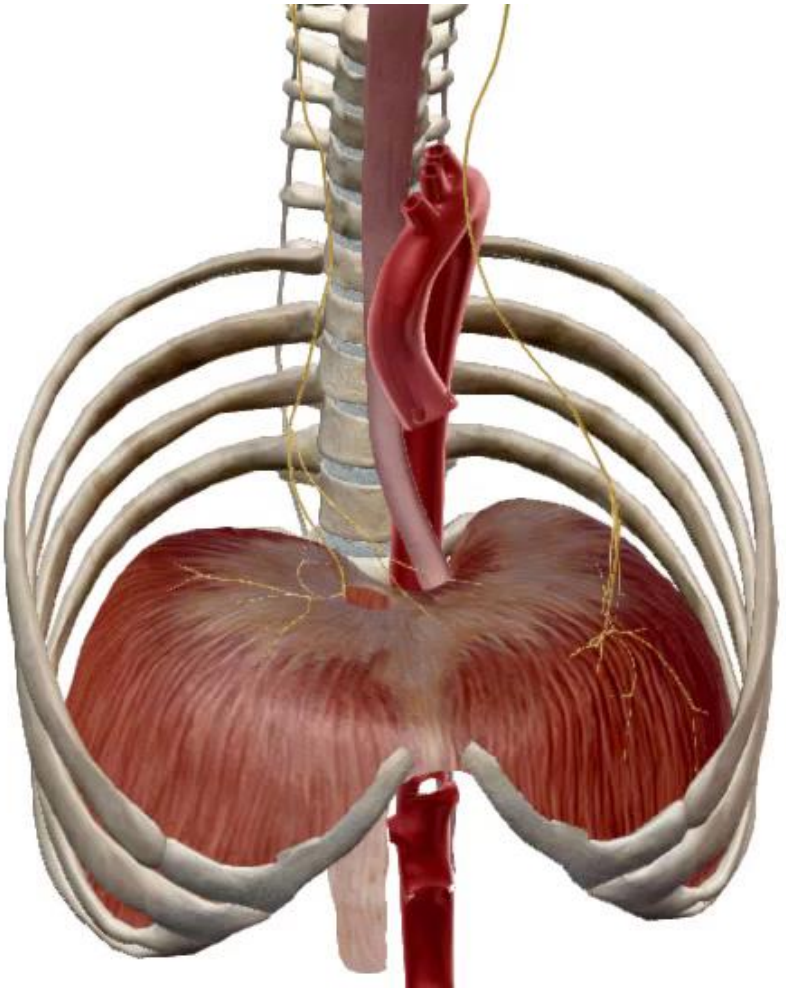


I. INTRODUCTION :

- The diaphragm is a musculo-aponeurotic partition separating the thoracic cavity from the abdominal cavity.

- It is traversed by
  - The esophagus.
  - Blood vessels.
  - Nerves.

- It is the primary muscle for respiratory dynamics.



II. DESCRIPTIVE ANATOMY:

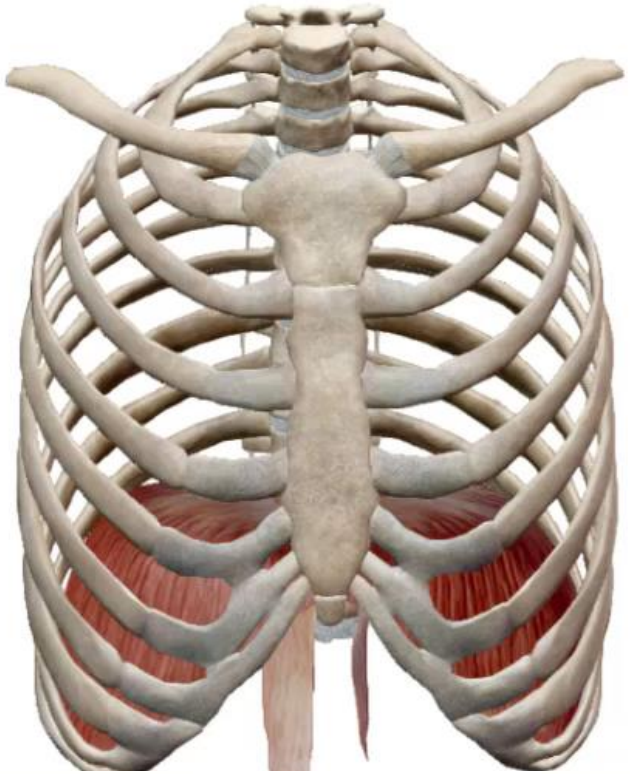
1. Shape :

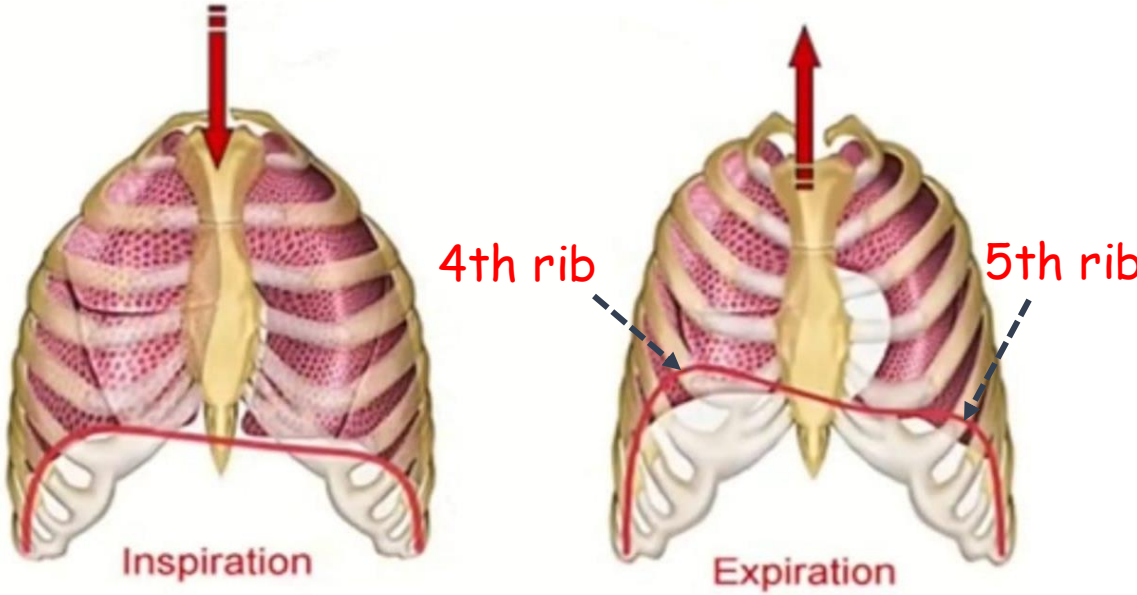
The diaphragm forms a double dome, with an inferior concavity, of unequal height, with the right dome being higher than the left.

2. Position :

During forced expiration: it reaches the 4th rib on the right and the 5th rib on the left.

During inspiration: the domes descend by two intercostal spaces.





3. Constitution :

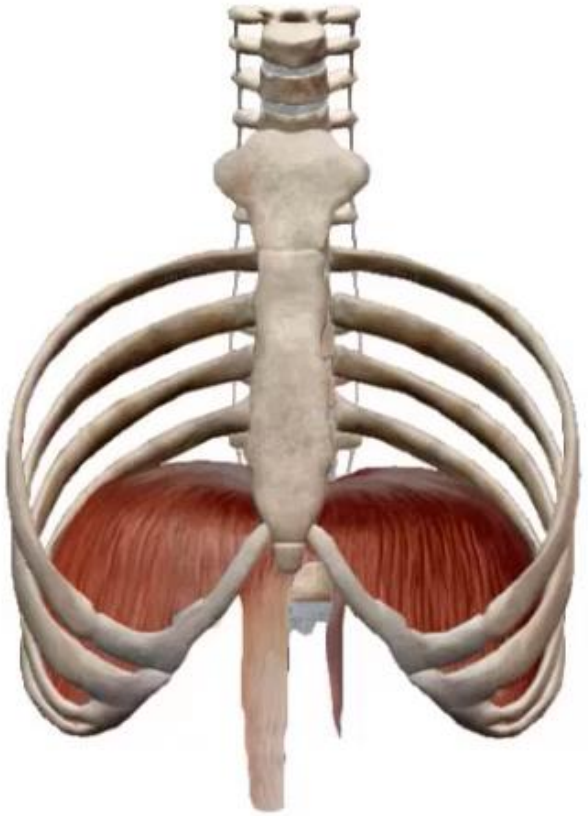
- The diaphragm is composed of :
  - A peripheral muscular zone.
  - A central tendinous zone the phrenic center.

Muscular bundles

A- Sternal portion

B- Chondro-costal portion

C- Lumbar portion

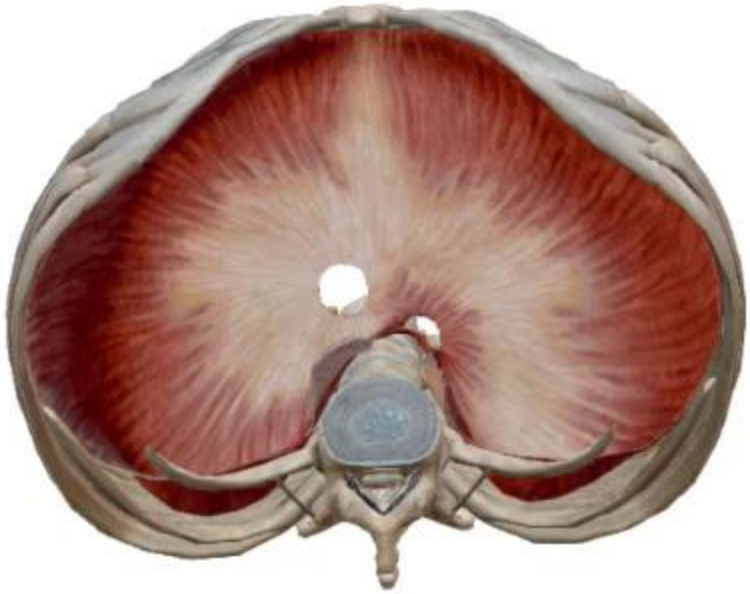


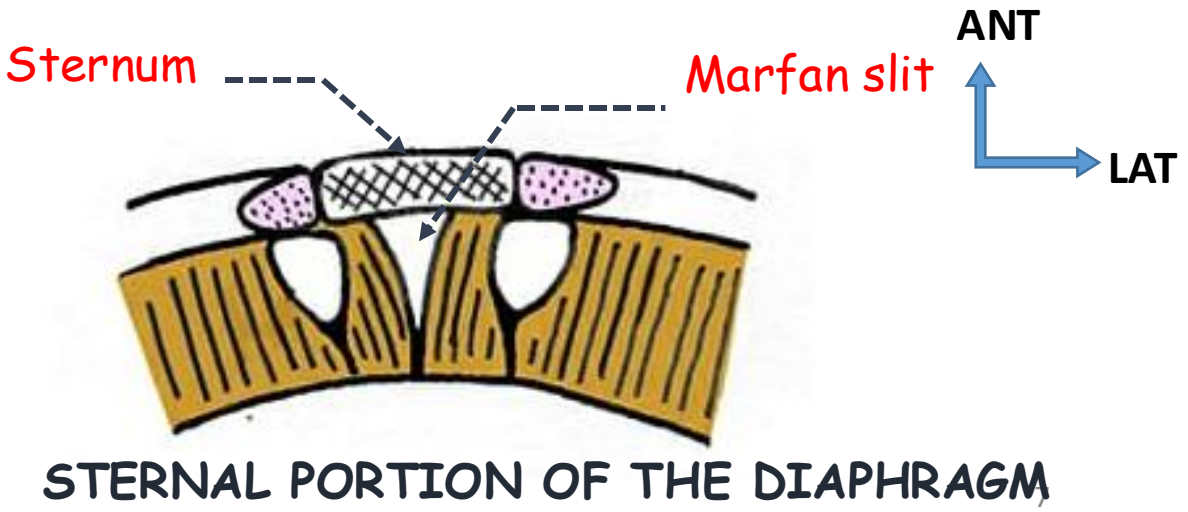
Muscular bundles

A- Sternal portion :

- Two bundles that stretch from the base of the xyphoid process to the anterior border of the phrenic center.

- Two bundles define an avascular opening, known as **the Marfan slit**.



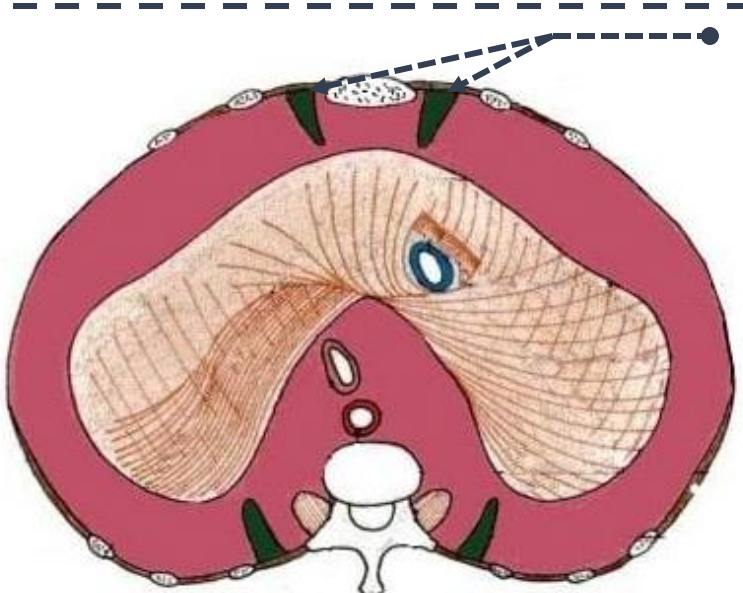


STERNAL PORTION OF THE DIAPHRAGM

Muscular bundles

B- Chondrocostal portion :

- Osseous segment
- Aponeurotic segment
- The chondrocostal portion is separated from the sternal portion by an opening : **the Larrey slit or costoxiphoid hiatus.**

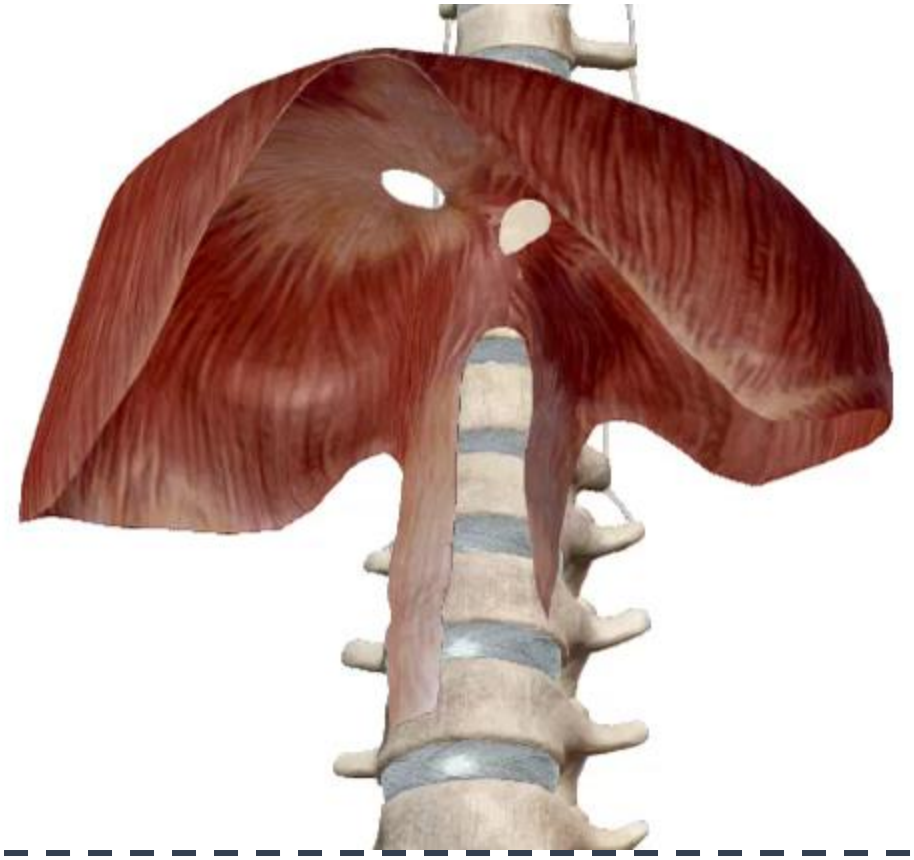


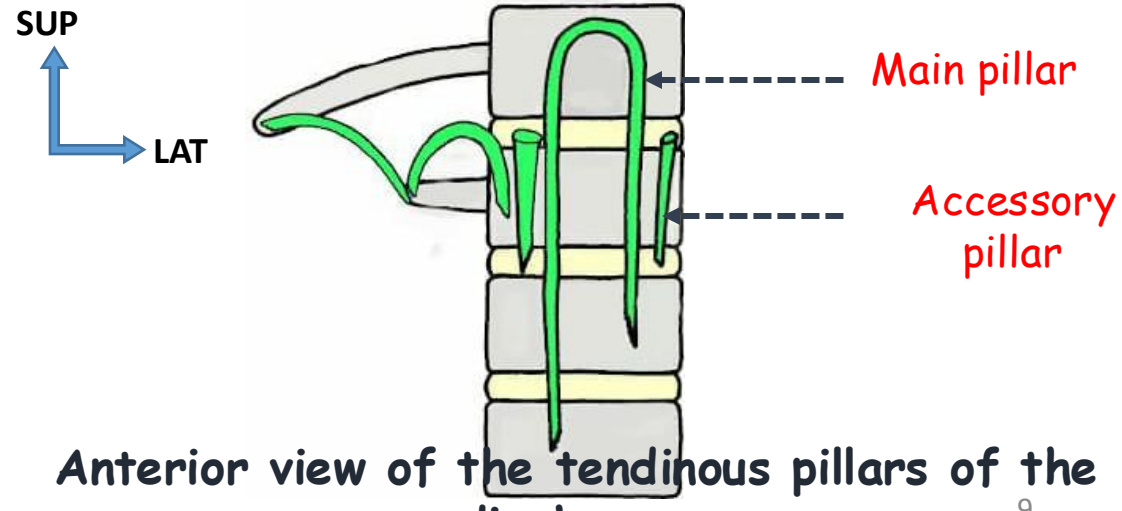
SUPERIOR VIEW OF THE DIAPHRAGM

Muscular bundles

C- Lumbar portion:

- Medial segment (pillars of the diaphragm)
  - Main pillars
  - Accessory pillars



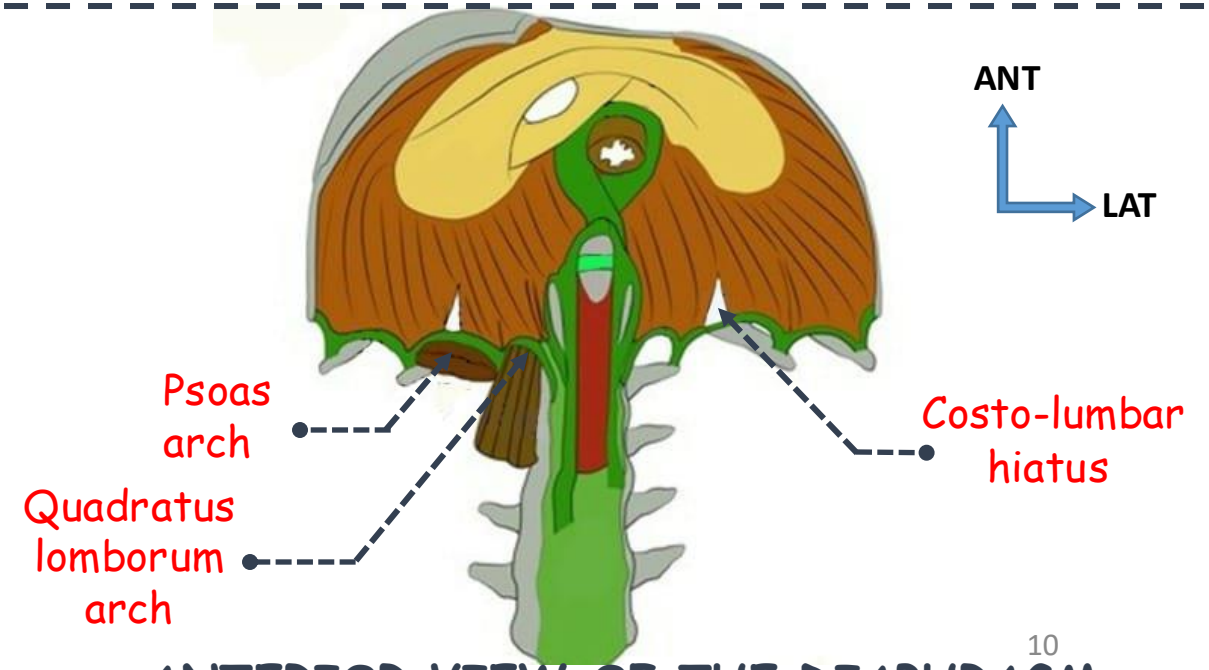


Anterior view of the tendinous pillars of the diaphragm

Muscular bundles

C- Lumbar portion:

- Lateral segment
  - The psoas arch or internal arcuate ligament
  - The quadratus lomborum muscle arch
- This bundle is sparsly distributed in its middle part, creating a true hiatus or **the costo-lumbar hiatus of Henlé.**



ANTERIOR VIEW OF THE DIAPHRAGM

Phrenic center:

A- Form:

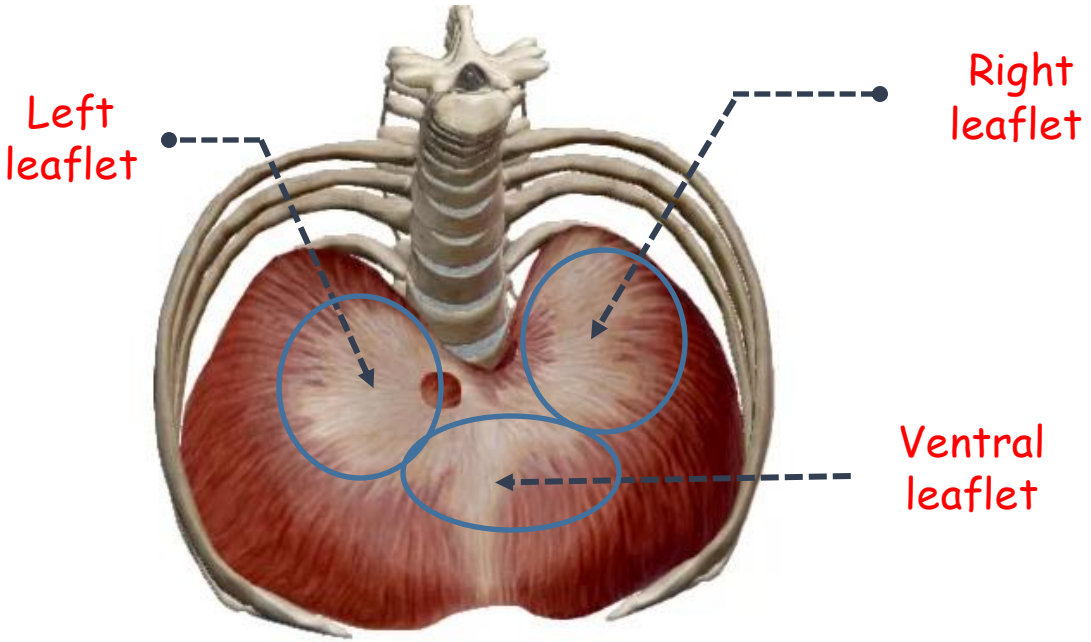
It is a thin aponeurosis, pearly white and shiny in appearance.

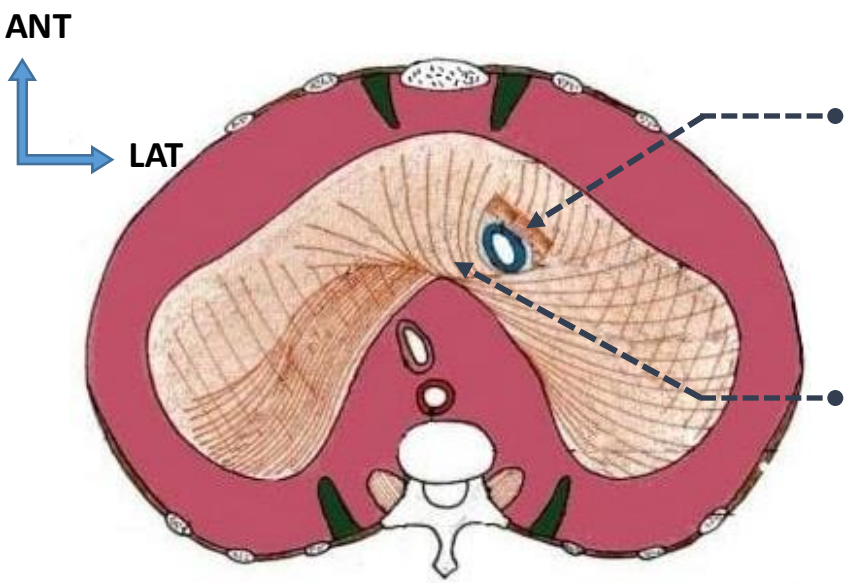
It is tre-foil shaped, with three leaflets:

- **Ventral**
- **Right**
- **Left.**

B- Constitution :

- Fundamental fibers
- Association fibers



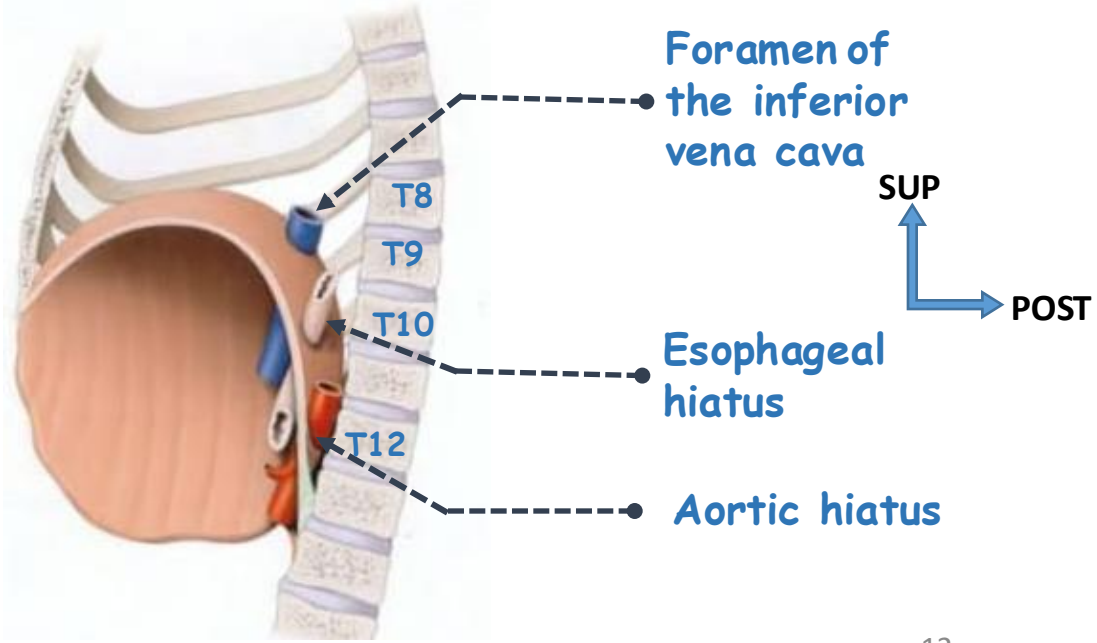


SUPERIOR VIEW OF THE DIAPHRAGM

4. Orifices :

Main orifices:

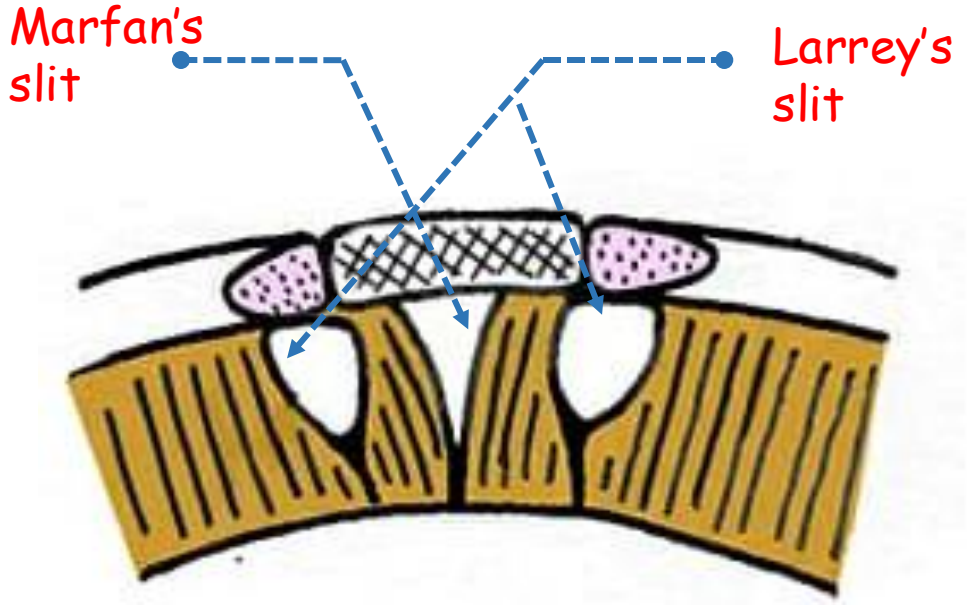
- Foramen of the inferior vena cava
- Esophageal hiatus
- Aortic hiatus



LATERAL VIEW OF THE DIAPHRAGM

Accessory orifices :

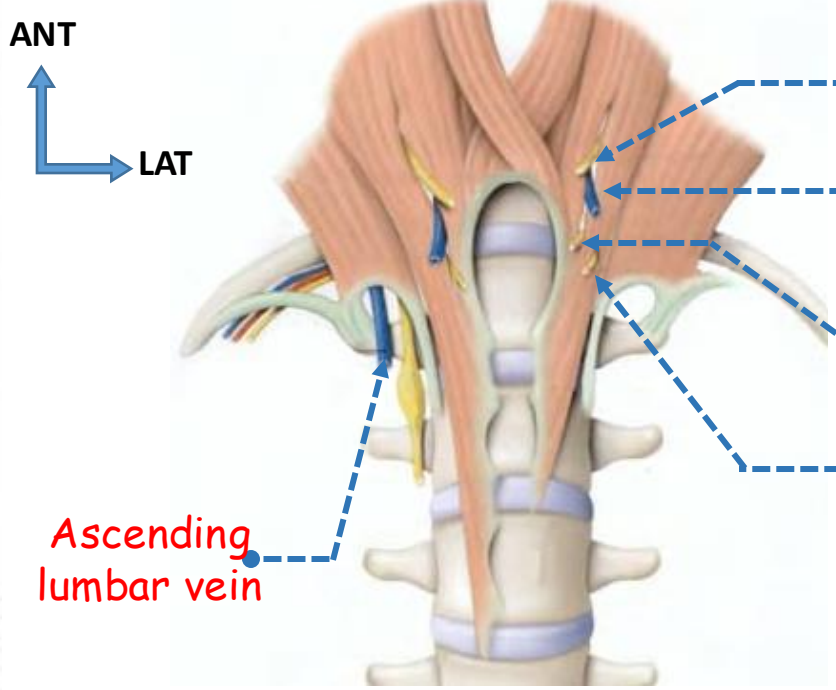
- **Anterior orifices**
  - Marfan's slit
  - Larrey's slit



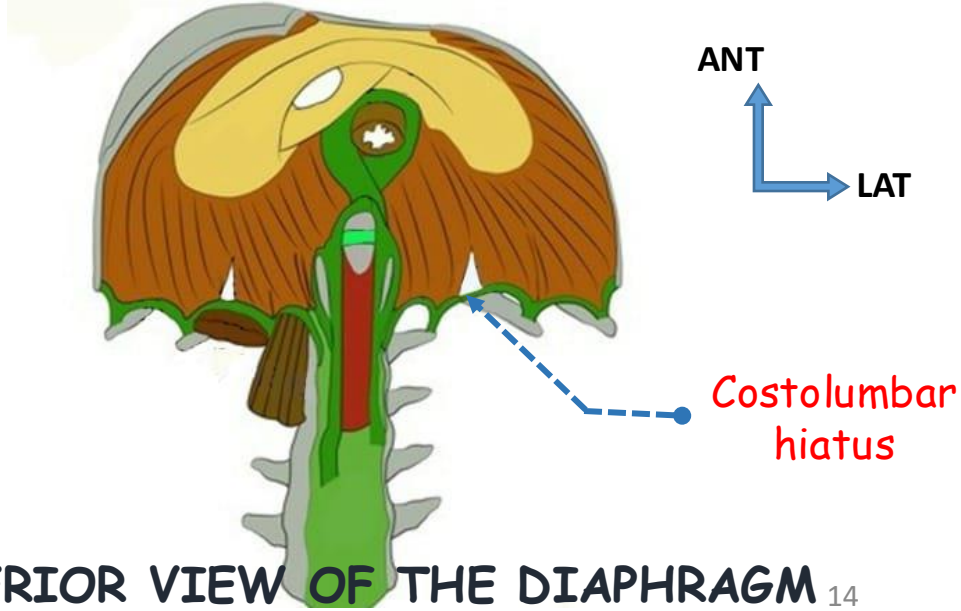
STERNAL PORTION OF THE DIAPHRAGM

Accessory orifices:

- **Posterior orifices**
  - Medial hiatus
  - Lateral hiatus
  - Under the psoas arch
  - Costo-lumbar hiatus
- **Lateral orifices**



ANTERIOR VIEW OF THE DIAPHRAGM



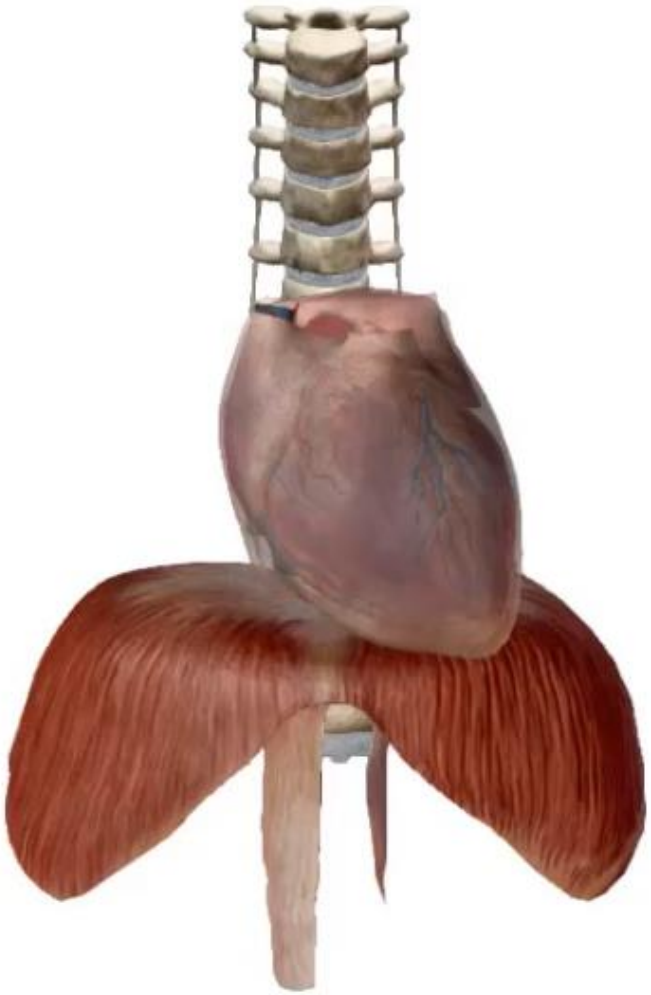
ANTERIOR VIEW OF THE DIAPHRAGM

III. ANATOMICAL RELATIONS:

- Superior or thoracic surface :
  - The pericardium
  - The diaphragmatic pleurae

- Inferior or abdominal surface:

- On the right :
  - ✓ The liver
- On the left :
  - ✓ Abdominal esophagus,
  - ✓ Greater curvature of the stomach
  - ✓ Left lobe of the liver,
  - ✓ The spleen,
  - ✓ Left colic flexure.



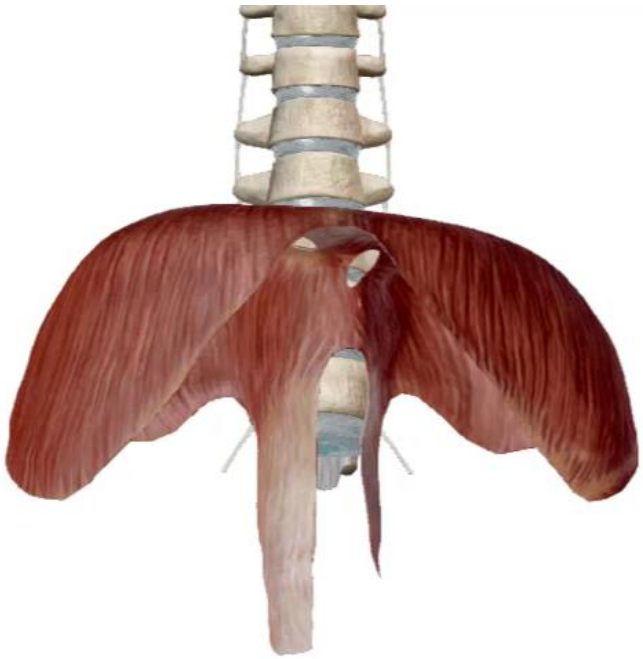
IV. VASCULARIZATION – INNERVATION – LYMPHATIC DRAINAGE SYSTEM:

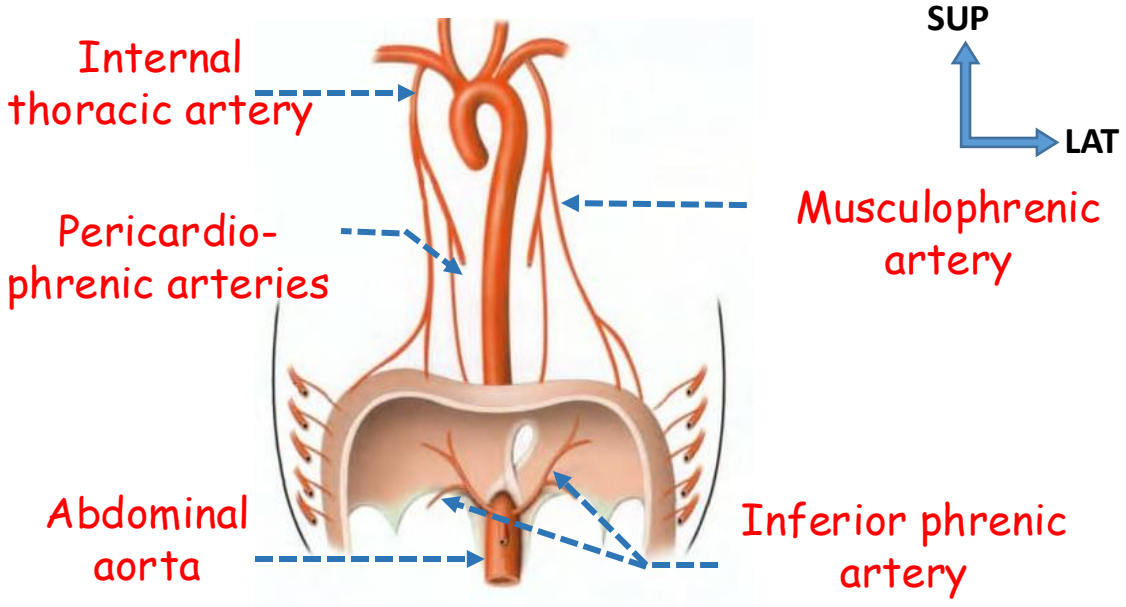
➢ Arterial vascularization:

- The superior phrenic arteries
- The inferior phrenic arteries
- The internal thoracic arteries
- The last five intercostal arteries.

➢ Venous vascularization:

- They are satellites of the arteries





ARTERIAL SUPPLY OF THE DIAPHRAGM

➢ Lymphatic drainage:

✓ **On the superior surface:**

- Anteriorly :

○ Prepericardial lateral lymph nodes

○ Mediastinal lymph nodes

- Posteriorly :

○ Peri-esophageal lymph nodes.

○ Juxta-aortic lumbar lymph nodes.

✓ **On the inferior surface :**

- Subdiaphragmatic :

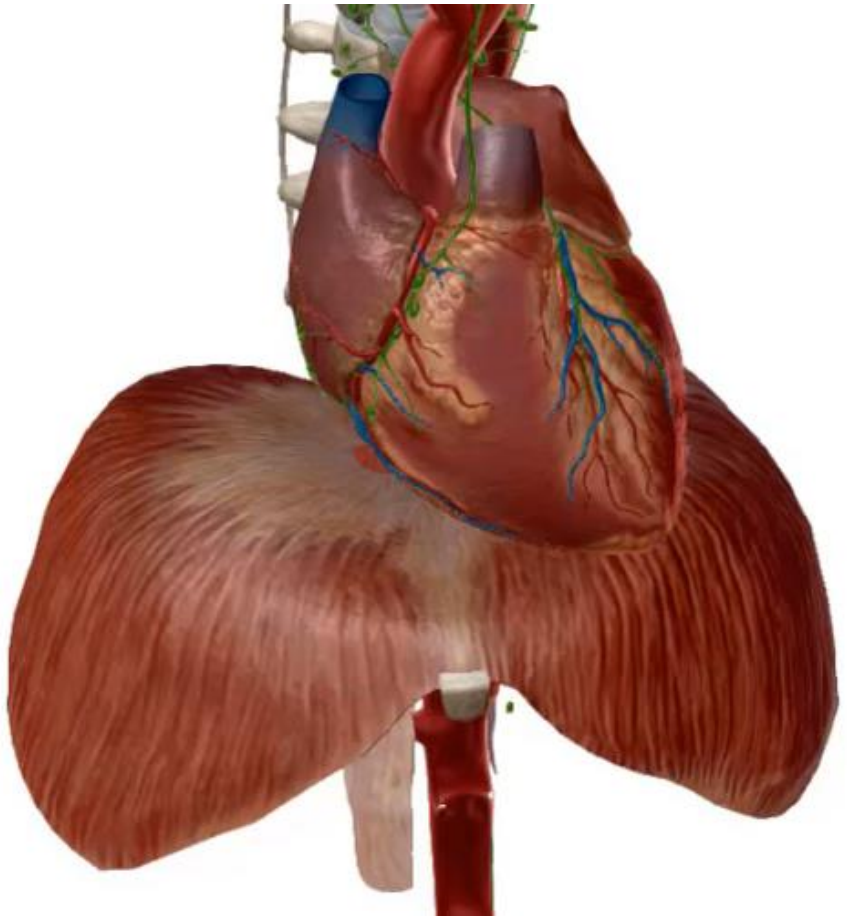
○ Inferior diaphragmatic lymph nodes.

○ Juxta-aortic lymph nodes.

- Transdiaphragmatic :

○ Juxta-phrenic lymph nodes.

○ Retro-xyphoid lymph nodes.



➢ Innervation:

- **Motor innervation:**

It is provided by the right and left phrenic nerves.

- **Sensory innervation:**

It is provided by the last six intercostal nerves.

VI. CLINICAL APPLICATIONS:

- Diaphragmatic paralysis :

- Paralysis of one half of the diaphragm (hemidiaphragm) occurs due to phrenic nerve damage.

- It can be detected radiographically by observing its paradoxal movement.

Congenital diaphragmatic hernia :

- In congenital diaphragmatic hernia, a portion of the stomach and intestine herniates into the thoracic cavity through a defective posterolateral area of the diaphragm.
- It most commonly occurs on the left side.

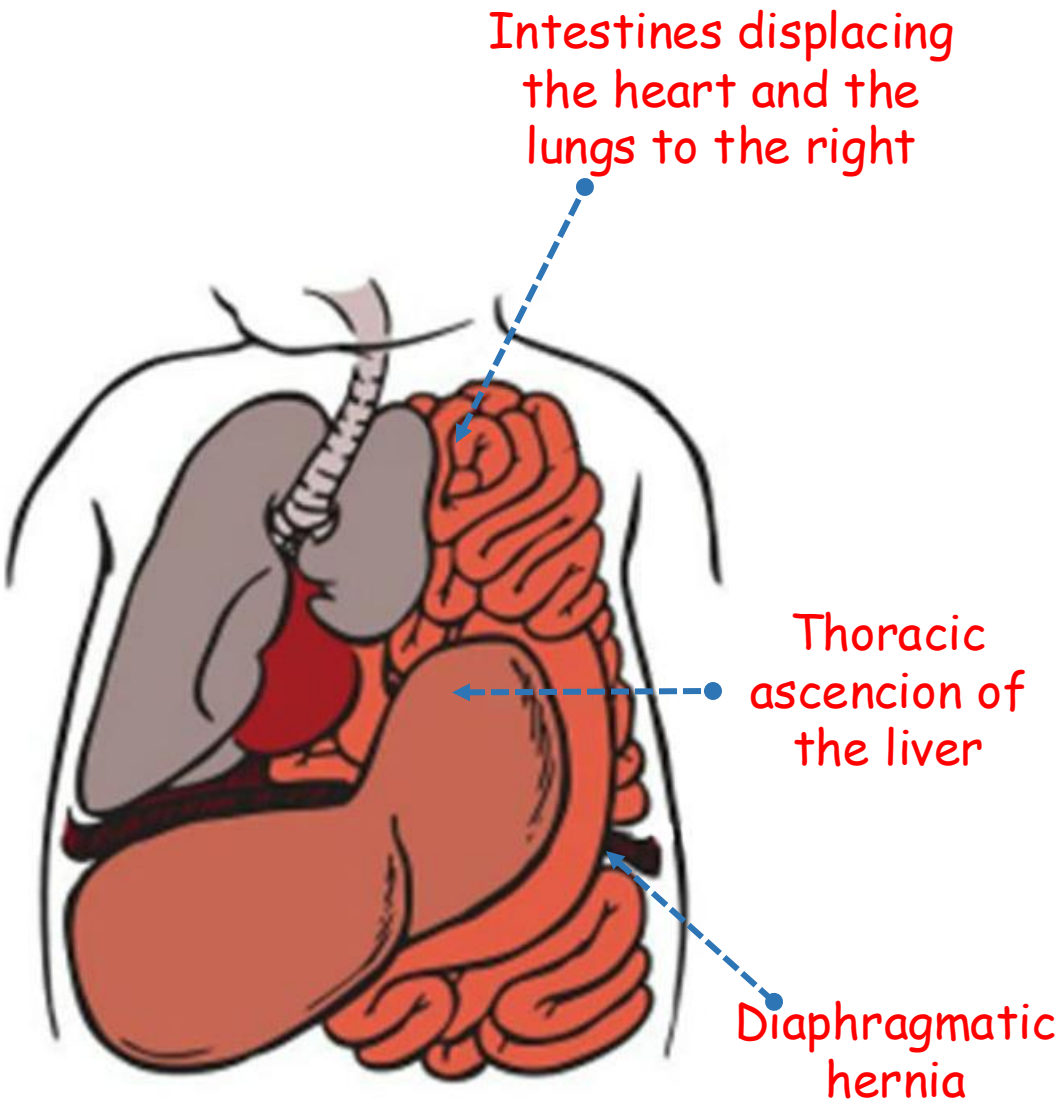


ILLUSTRATION OF DIAPHRAGMATIC HERNIA ON THE LEFT SIDE

VII.CONCLUSION :

- The diaphragm is a vital muscle in humans.
- It plays a primary role in inspiration and a secondary role in the resistance of the abdominal wall.
- Its pathologies are varied, as are its diagnostic methods, which highlights the importance of understanding its anatomy.