Department of Anesthesia Techniques

كلية المستقبل الجامعة
قسم تقنيات التخدير

المرحلة الاولى ٢٠٢٢-٢٠٢٣

Anatomy

Lecture :Diaphragm and abdominal muscles

Dr.Nemah Hossouni Aljobouri

Dr.Ali Hussein Al-nasrawi •

The Abdominal wall muscles and the diaphragm

Anterior Abdominal Wall

Muscles of the Anterior Abdominal Wall

They consist of three muscles that end anteriorly by **aponeuroses;** from exterior to interior they are the **external oblique, internal oblique, and transversus** (Fig. 4). Anteriorly , on either sides of the midline there is a wide vertical muscle called **the rectus abdominis** . As the aponeuroses of the three muscles pass forward, they enclose the rectus abdominis to form the **rectus sheath..**

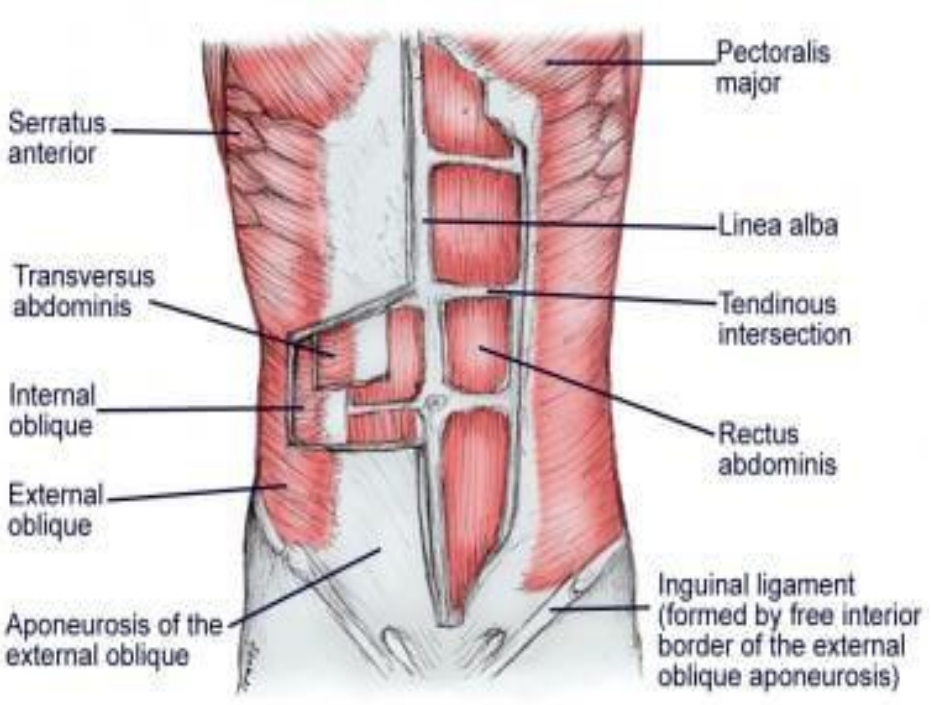


Figure 4

Anterior Abdominal Wall

The External Oblique

It **arises** from the outer surfaces of the lower eight ribs starting from the 5th and fans out to be **inserted** into:

a. the xiphoid process,

b. the linea alba,

c. the pubic crest,

d. the pubic tubercle, and

e. the anterior half of the iliac crest. (figure 5).

The most posterior fibers passing down to the iliac crest form a posterior free border.

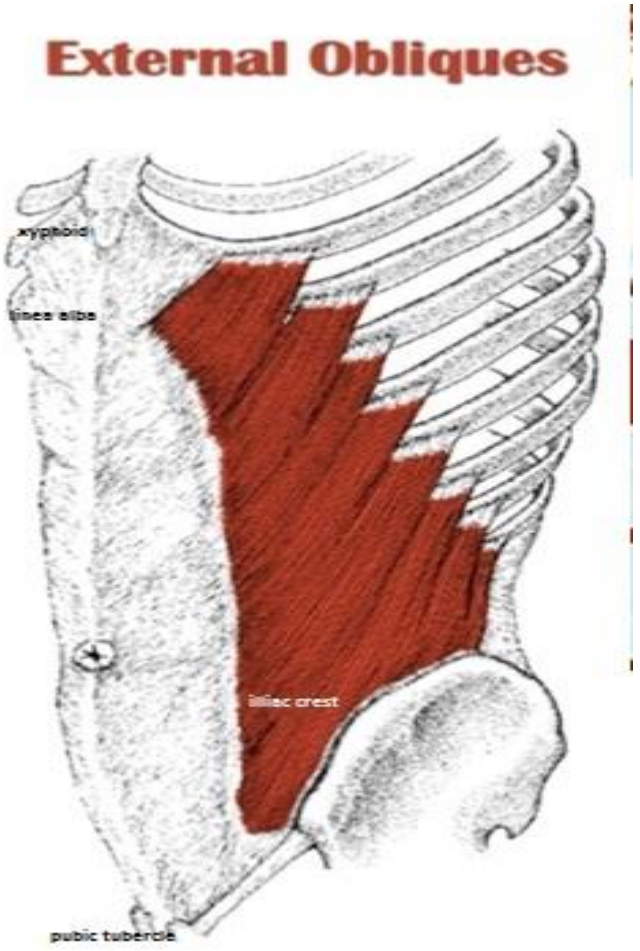


Figure 5

Anterior Abdominal Wall

Internal Oblique

The internal oblique muscle lies deep to the external oblique. It **arises** from: (figure 7)

a. the lumbar fascia,

b. the anterior two thirds of the iliac crest, and

c. the lateral two thirds of the inguinal ligament.

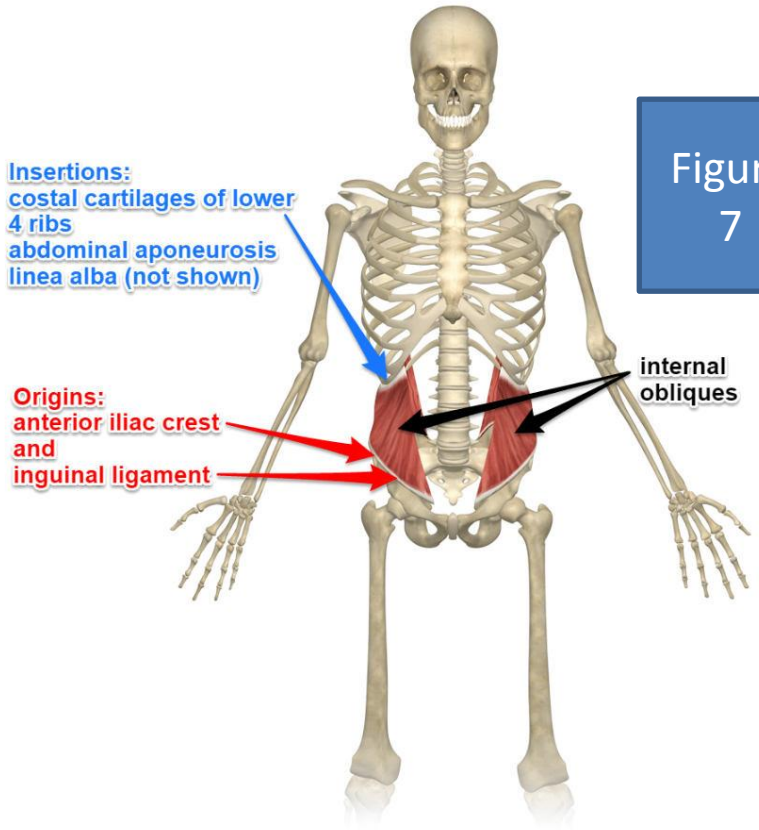


Figure 7

Anterior Abdominal Wall

The muscle is inserted into: (figure 8)

a. the lower borders of the lower four ribs and their costal cartilages,

b. the xiphoid process,

c. the linea alba,

d. The symphysis pubis.

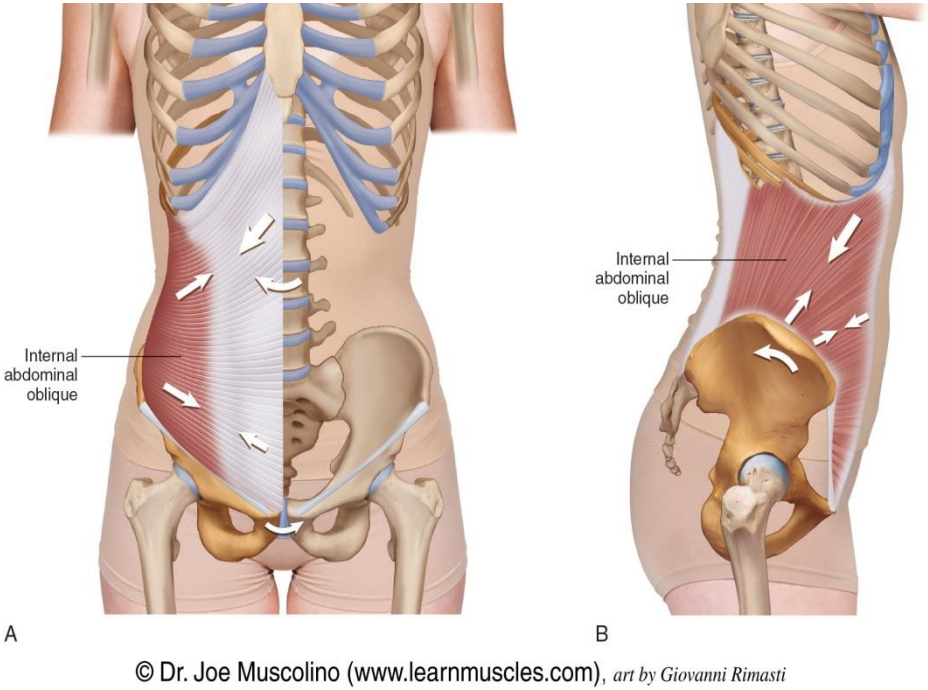


Figure 8

Anterior Abdominal Wall

Transversus Abdominis (figure 9)

The muscle lies deep to the internal oblique. It **arises** from

a. the deep surface of the lower six costal cartilages ,

b. the lumbar fascia,

c. the anterior two thirds of the iliac crest, and

d. the lateral third of the inguinal ligament.

It is **inserted** into the **xiphoid process, the linea alba, and the symphysis pub**is.

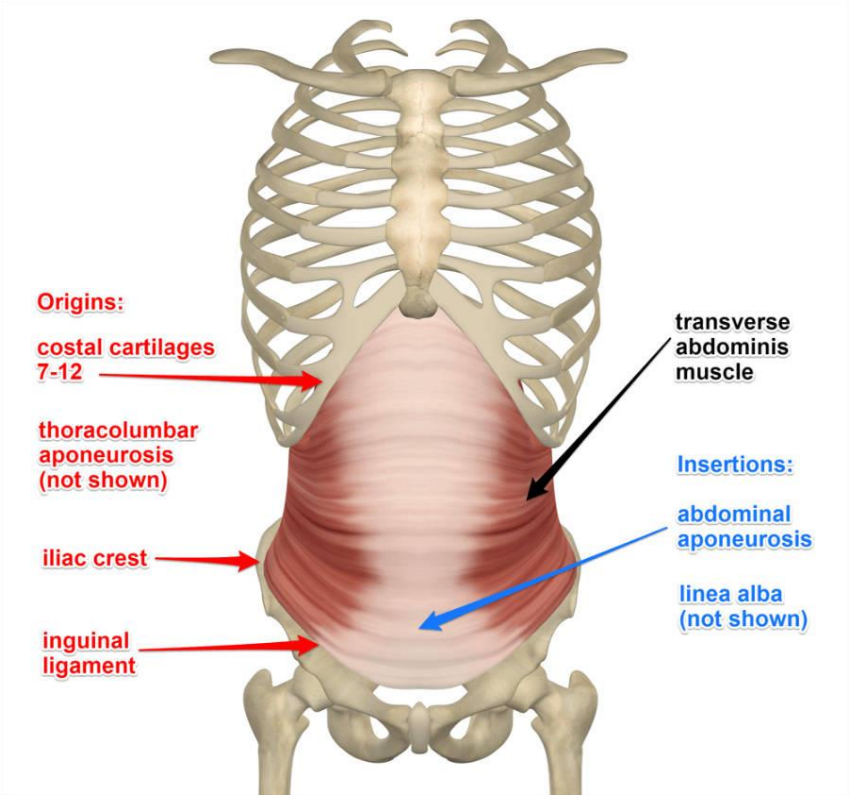


Figure 9

Anterior Abdominal Wall

The rectus abdominis muscle arises by two heads, from the front of the **symphysis pubis and from the pubic crest**.

It is inserted into the **5th, 6th, and 7th costal cartilages** and **the xiphoid process**. The rectus abdominis is enclosed between the **aponeuroses of the external oblique, internal oblique**, and **transversus**. which form the **rectus sheath.**

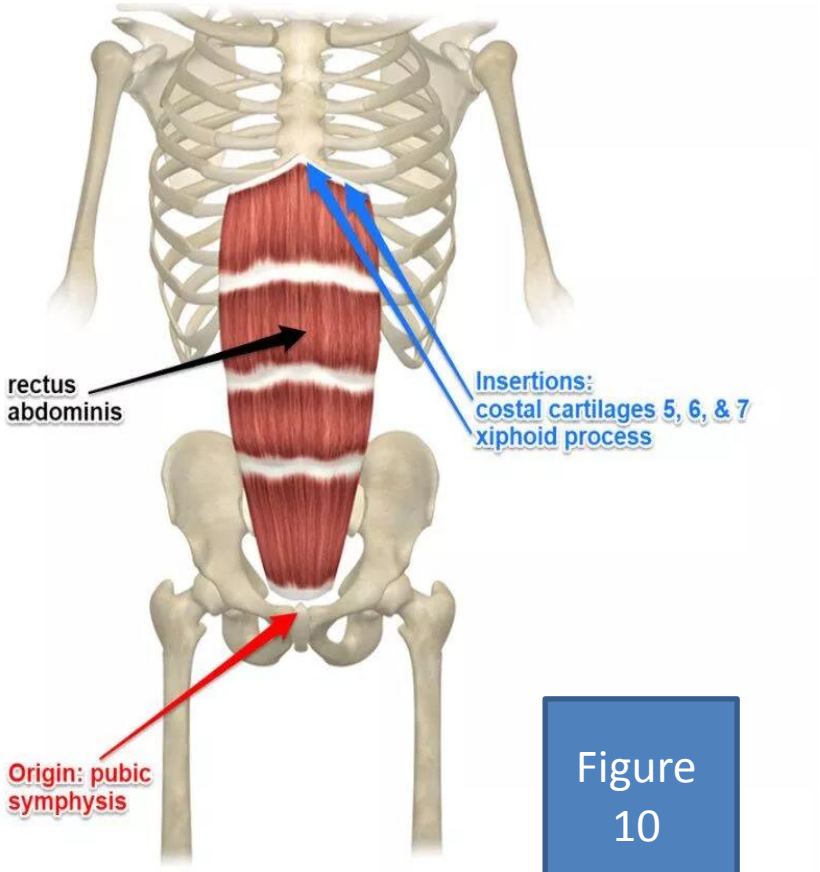


Figure 10

Anterior Abdominal Wall

Function of the Anterior Abdominal Wall Muscles.

The oblique muscles laterally flex and rotate the trunk. The rectus abdominis flexes the trunk and stabilizes the pelvis.They assist the diaphragm during inspiration by relaxing as the diaphragm descends so that the abdominal viscera can be accommodated. The transverses increases the intra-abdominal pressure and help in micturition, defecation, vomiting, and parturition

.

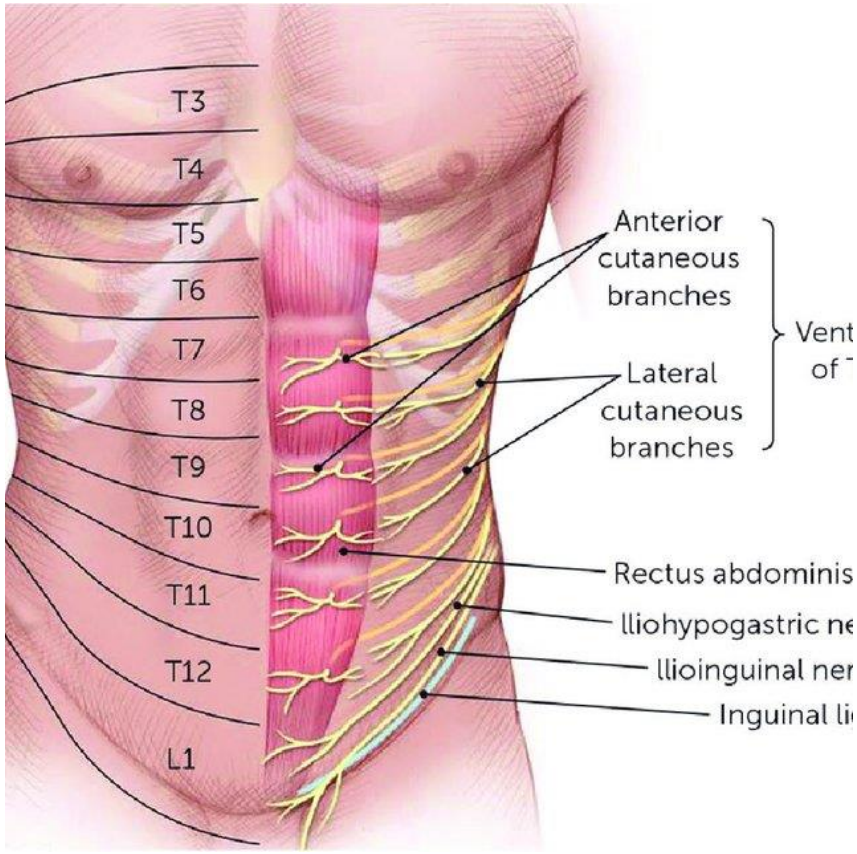
Muscle	Role in movement	Role in respiration
Rectus abdominis	Flexion of vertebral column, assisting in lateral flexion	Pulls ribcage down-wards to assist in (forced) expiration
External oblique	Flexion, rotation and lateral flexion of the vertebral column	Pulls ribcage down-wards to assist in (forced) expiration
Internal oblique	Rotation and lateral flexion of the verte-bral column	Pulls ribcage down-wards to assist in (forced) expiration
Transverse abdominis	Stabilization of the pelvis	Increases intra-abdominal pressure to assist in (forced) expiration

Anterior Abdominal Wall

Nerve Supply of Anterior Abdominal Wall Muscles

The oblique and transversus abdominis muscles are supplied by the lower six thoracic nerves and the iliohypogastric and ilioinguinal nerves (L1). The rectus muscle is supplied

by the lower six thoracic nerves.



Anterior Abdominal Wall

Arteries of the Anterior Abdominal Wall (figure10)

1. The superior epigastric artery, one of the terminal branches of the internal thoracic artery, it supplies the upper central part of the anterior abdominal wall.

2. The inferior epigastric artery is a branch of the external iliac artery just above the inguinal ligament. It supplies the lower central part of the anterior abdominal wall, and anastomoses with the superior epigastric artery.

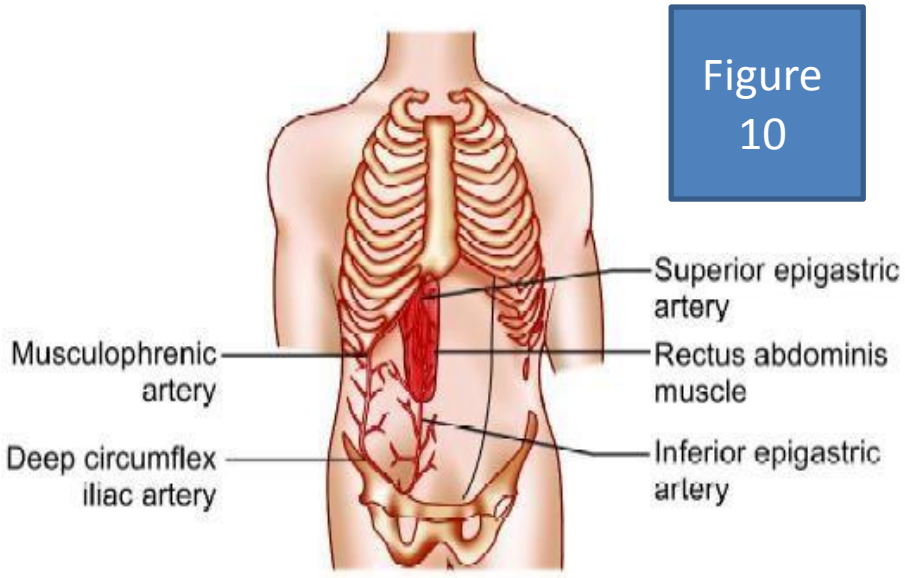


Figure 10

Anterior Abdominal Wall

3. The deep circumflex iliac artery (figure 11)

is a branch of the external

iliac artery just above the inguinal ligament. **It supplies the lower lateral part of the abdominal wall.** The lower two posterior intercostal arteries, branches of the descending thoracic aorta, and the four lumbar arteries, branches of the abdominal aorta, pass forward between the

muscle layers and supply the lateral part of the abdominal

Wall.

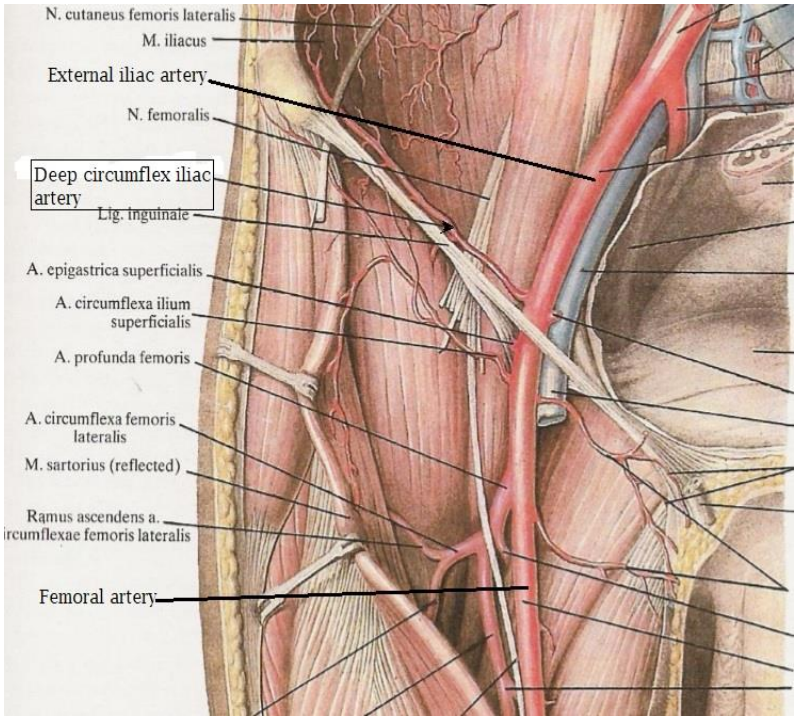


Figure 11

Posterior Abdominal Wall

The Posterior Abdominal wall

The posterior abdominal wall is formed by

1. in the midline by the **five lumbar vertebrae** and their intervertebral discs and

2. laterally by the 12th ribs

3. The upper part of the bony pelvis, the psoas muscles,

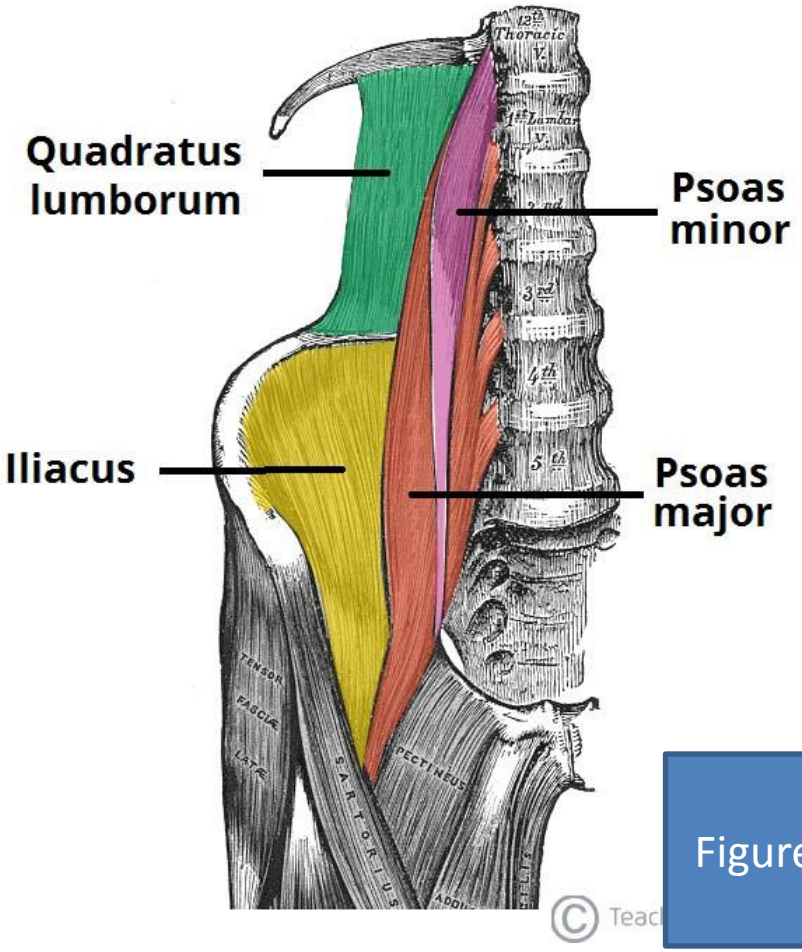


Figure 12

Posterior Abdominal Wall

the quadratus lumborum muscles **(figure 12) and,**

4. the iliacus muscles lie in the upper part of the bony pelvis.

Lumbar Vertebrae

The **body** of each vertebra is massive , and has wedge-shape, giving lumbar lordosis . The 5th lumbar vertebra articulates with the base of the sacrum at the **lumbosacral joint. (figure 13)**

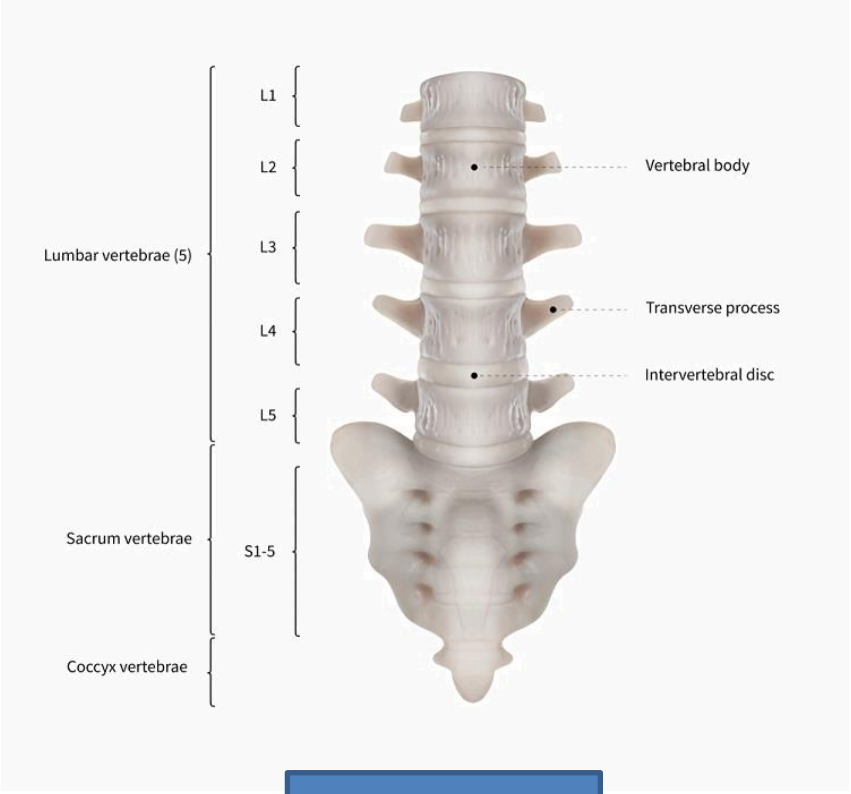


Figure.13

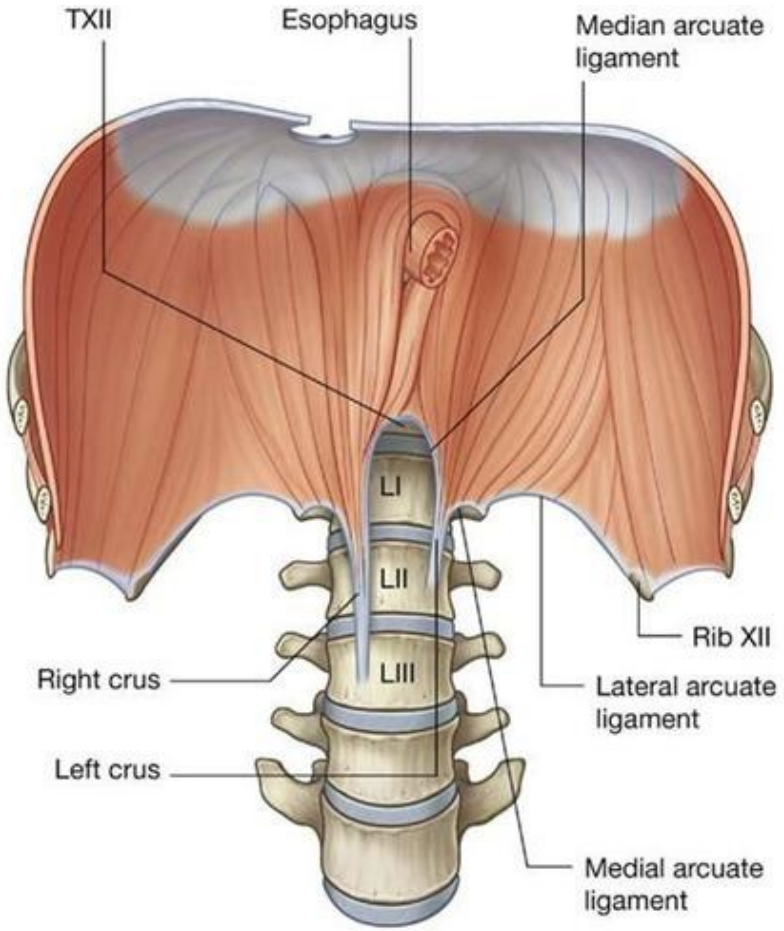
The diaphragm

The Diaphragm

The diaphragm is a thin **muscular and tendinous 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 muscular part and a centrally placed tendon.** The diaphragm is inserted into a **central tendon,** which is shaped like three leaves.



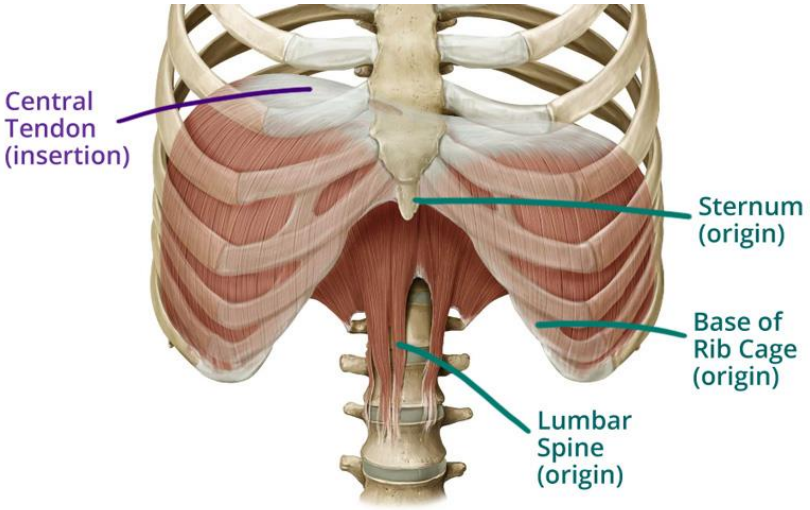
The diaphragm

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

A **sternal part** arising from the posterior surface of the xiphoid process .

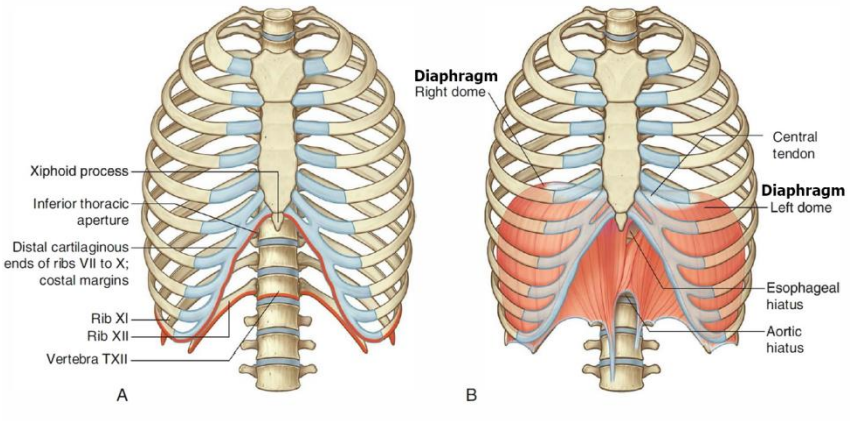
A **costal part** arising from the deep surfaces of the lower six ribs and their costal cartilages.

A **vertebral part** arising by vertical columns or crura and from the arcuate ligaments



The diaphragm

The right dome reaches higher than the left because the **right lobe of the liver** The central tendon lies at the level of the xiphisternal joint. **The domes support the right and left lungs, whereas the central tendon spports the heart**.

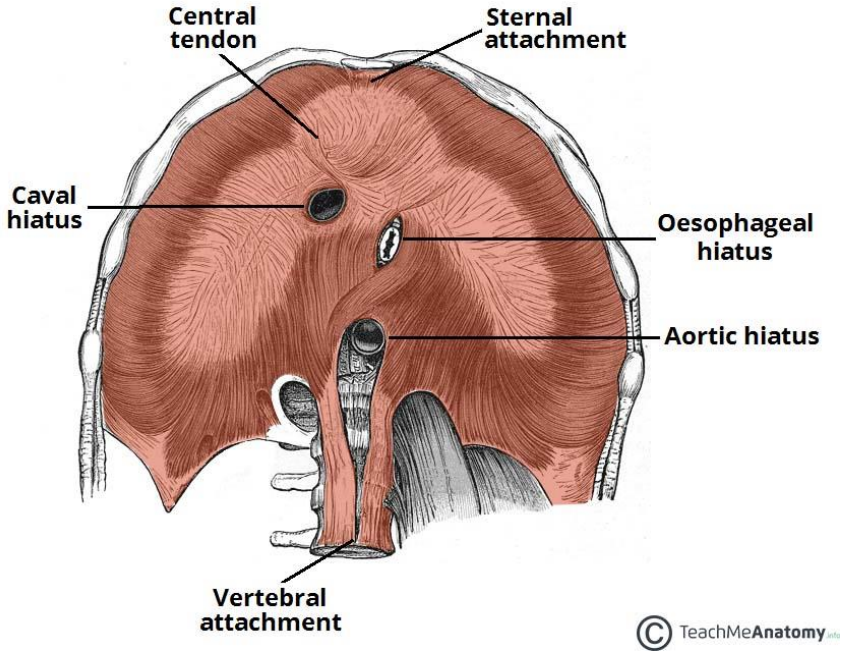


The diaphragm

Openings in the Diaphragm

The diaphragm has three main openings:

- **The aortic opening** lies anterior to the body of the 12th thoracic vertebra. It transmits the aorta, the thoracic duct, and the azygos vein.
- **The esophageal opening** lies at the level of the 10th thoracic vertebra in a sling of muscle fibers derived from the right crus.



The diaphragm

It transmits the esophagus, the right and left vagus nerves, the esophageal branches of the left gastric vessels.

■■ The **caval opening** lies at the level of the 8th thoracic vertebra in the central tendon. It transmits the inferior vena cava and terminal branches of the right phrenic nerve.