



# Abdominal Wall

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## *Ever tried doing a plank exercise for longer than 10 seconds?*

Then you surely must've felt your abdominal muscles.

The abdominal muscles are divided into the anterolateral and posterior groups, thus comprising:

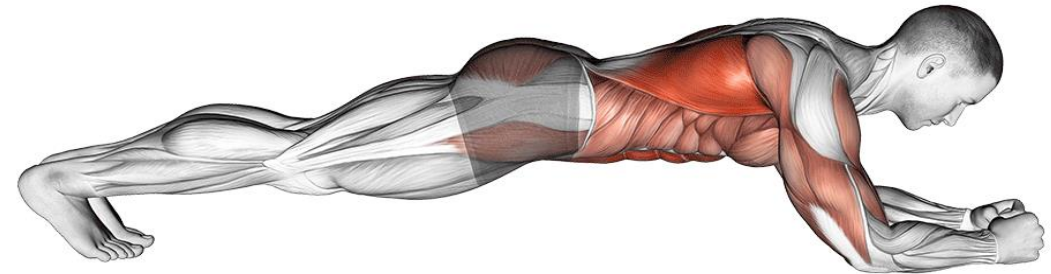
- 1- The anterolateral abdominal wall**
- 2- The posterior abdominal wall**

The anterolateral muscles are those that compose the front and the sides of our abdomen. There are

**five muscles** in this group:

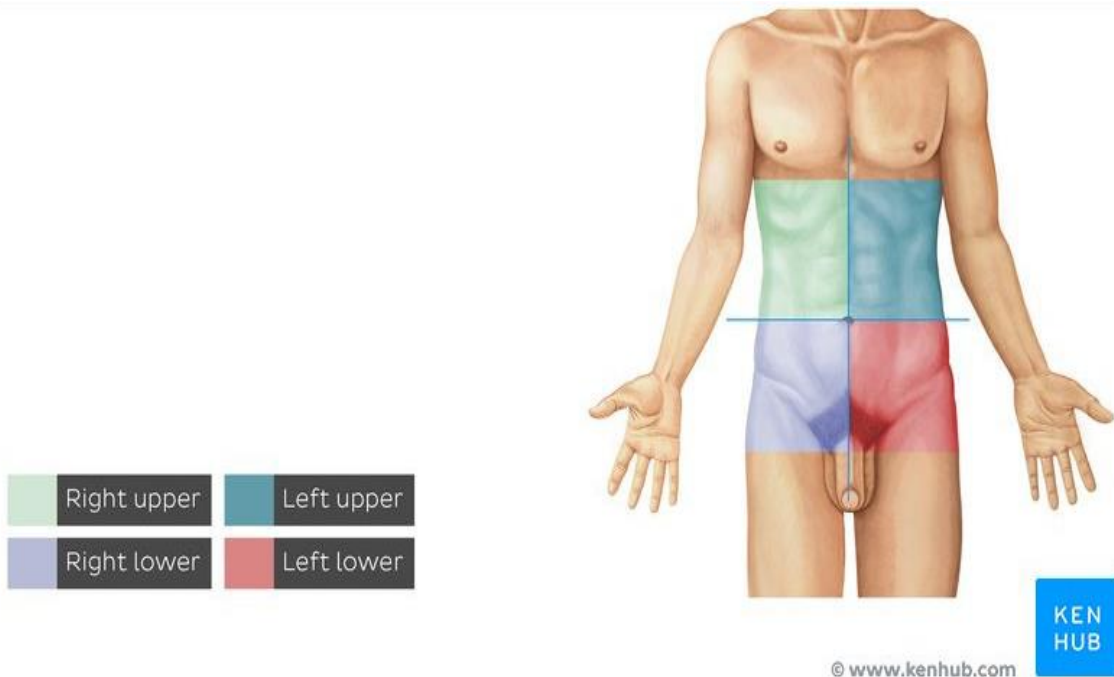
- 1- External abdominal oblique
- 2- Internal abdominal oblique
- 3- Transversus abdominis
- 4- Rectus abdominis
- 5- Pyramidalis

*These muscles not only compose the walls of the abdomen, but they also support the abdominal viscera and participate in the formation of important anatomical passageways that allow structures from the abdomen and pelvis to reach the perineum and lower limb (e.g. superficial inguinal ring).*



The posterior abdominal muscles are those that compose the back portion of your abdomen. The posterior group consists of:

- 1- Quadratus lumborum: true posterior wall muscle
- 2- Iliacus: which continues into the lower limb
- 3- Psoas major: which continues into the lower limb
- 4- Psoas minor: if present

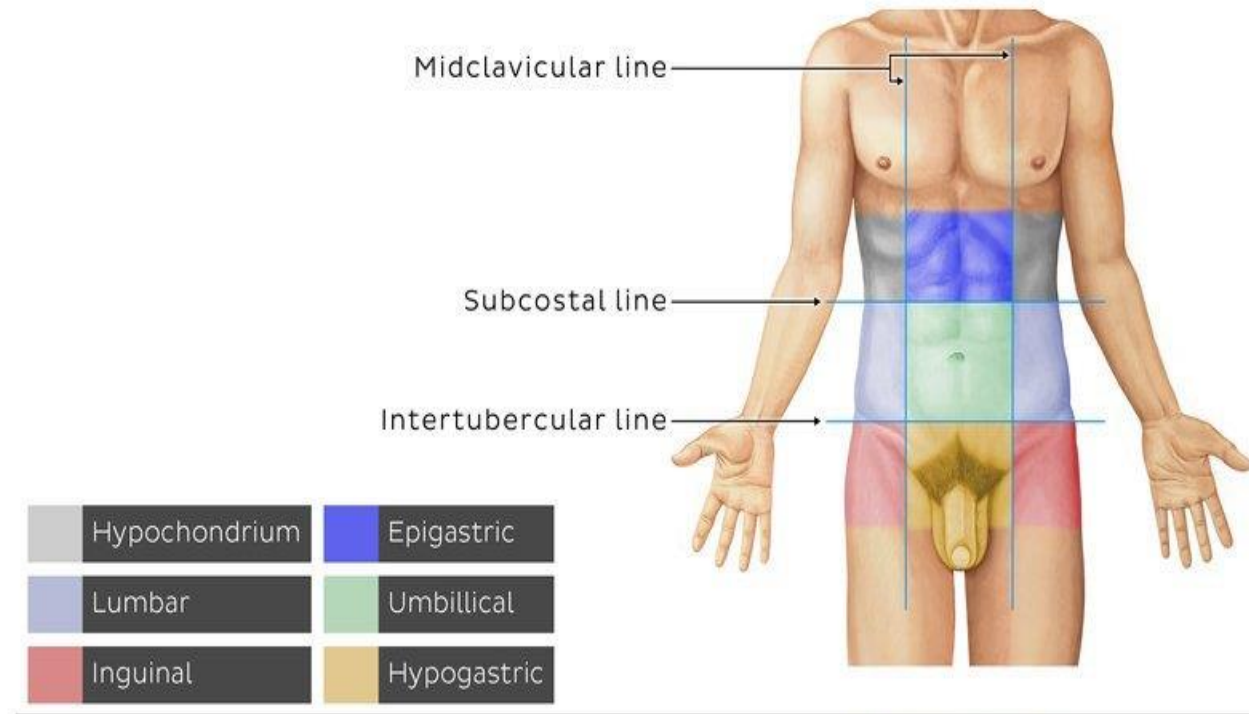


### Four quadrants

which are divided by the horizontal transumbilical and vertical median planes.

The four resulting areas are called right upper, left upper, right lower and left lower quadrants.

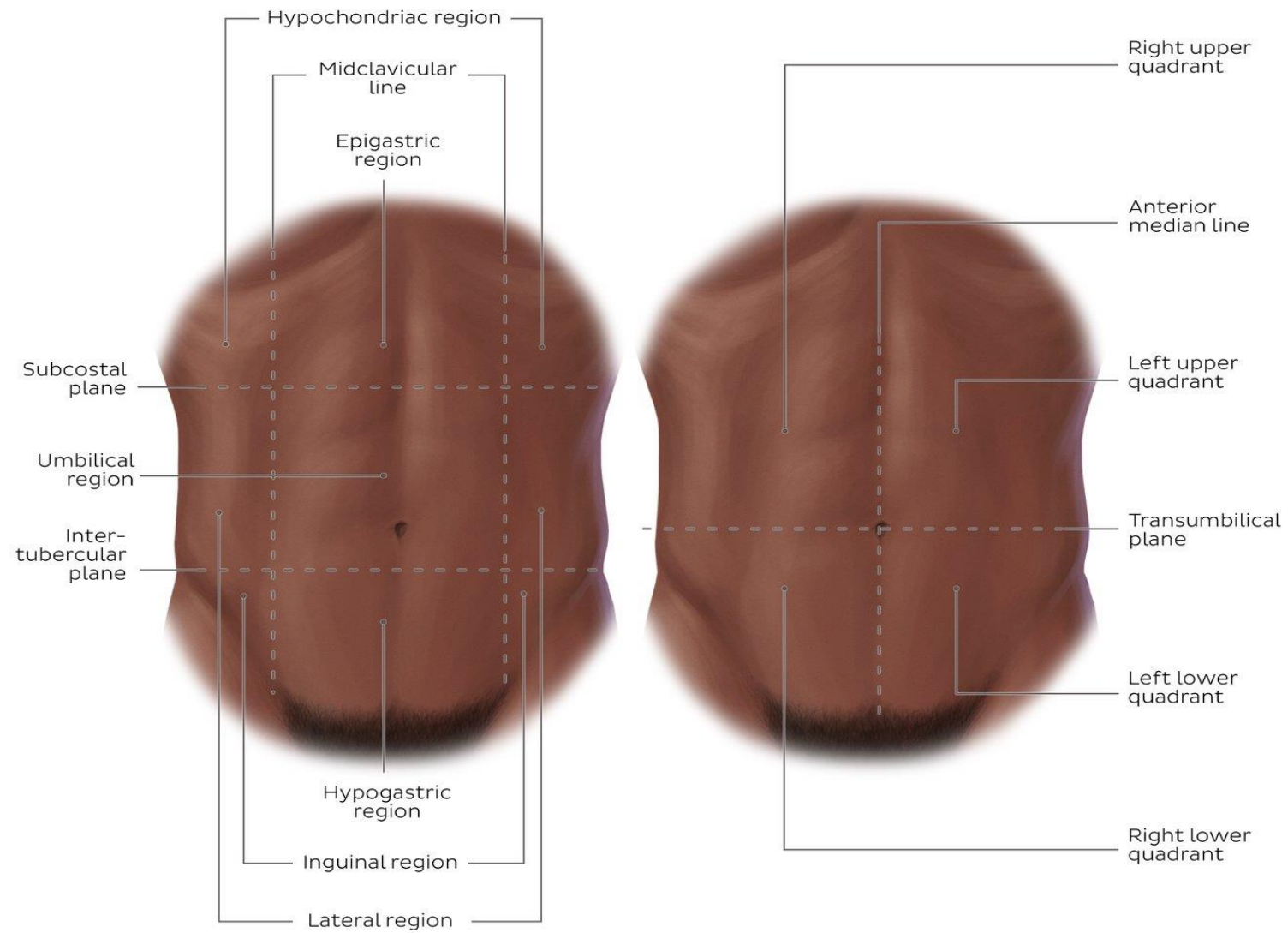
*The anterolateral abdominal wall can be divided into several topographical areas, which are used to describe the location of abdominal organs and the pain associated with them:*



### Nine abdominopelvic regions

which are divided horizontally by the superior subcostal plane, which passes right under the costal margins of the 10th ribs, and the inferior intertubercular plane, which connects the tubercles of the iliac crest.

Vertically they are divided by the two midclavicular planes which pass through the midpoint of each clavicle and halfway between the pubic symphysis and the anterior superior iliac spine. The four planes create nine abdominal regions as you see in the picture: hypochondriac (right, left) and epigastric regions superiorly, flanks (right, left) and umbilical region in the middle, groin (right, left) and hypogastric region inferiorly.



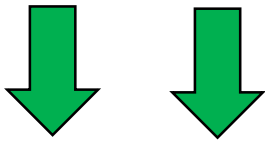


# Layers of the abdominal wall:

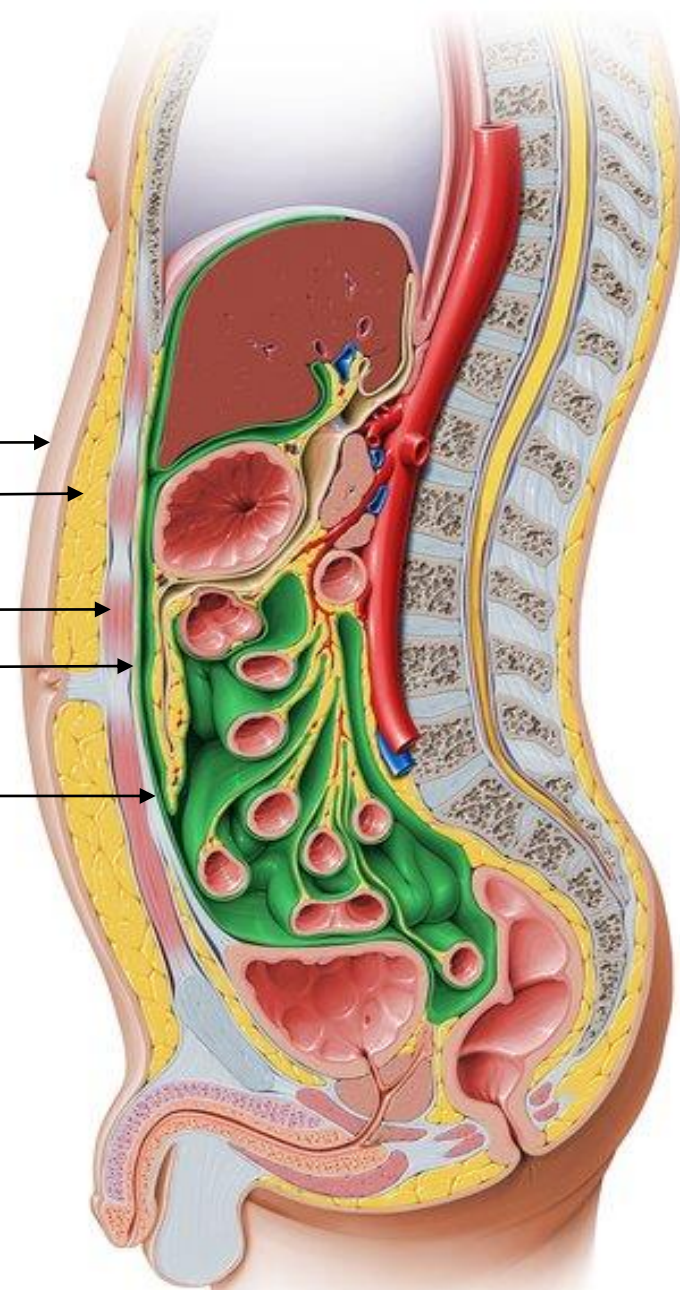
From superficial to deep:

- Skin
- Superficial fascia
- Deep fascia
- Muscles
- Transversalis fascia
- Extraperitoneal fat (extraperitoneal fascia)
- Peritoneum

Highlighted in green



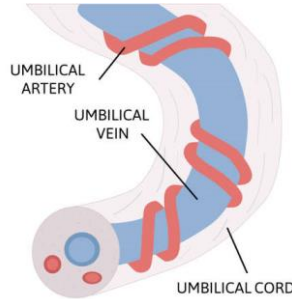
*Protection of the internal abdominal organs*  
*Stabilization and rotation of the trunk*  
*Increase of intra-abdominal pressure (involved in coughing, defecating, vomiting)*



# Skin

- ✓ The skin is loosely attached to the underlying structures except at the umbilicus, where it is tethered to the scar tissue.
- ✓ The natural lines of cleavage in the skin are constant and run downward and forward almost horizontally around the trunk.

*The umbilicus is a scar representing the site of attachment of the umbilical cord in the fetus; it is situated in the linea alba*

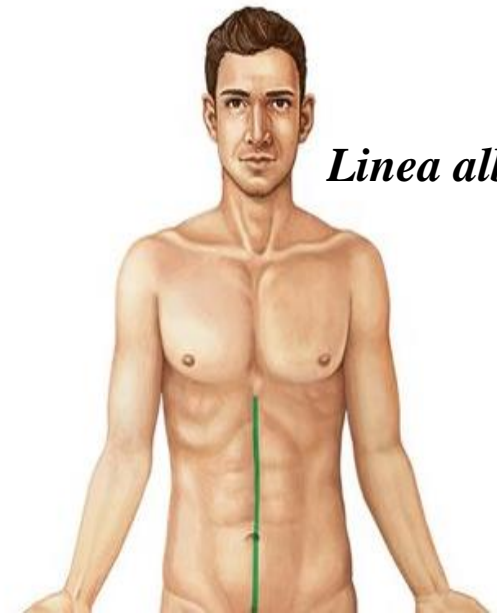
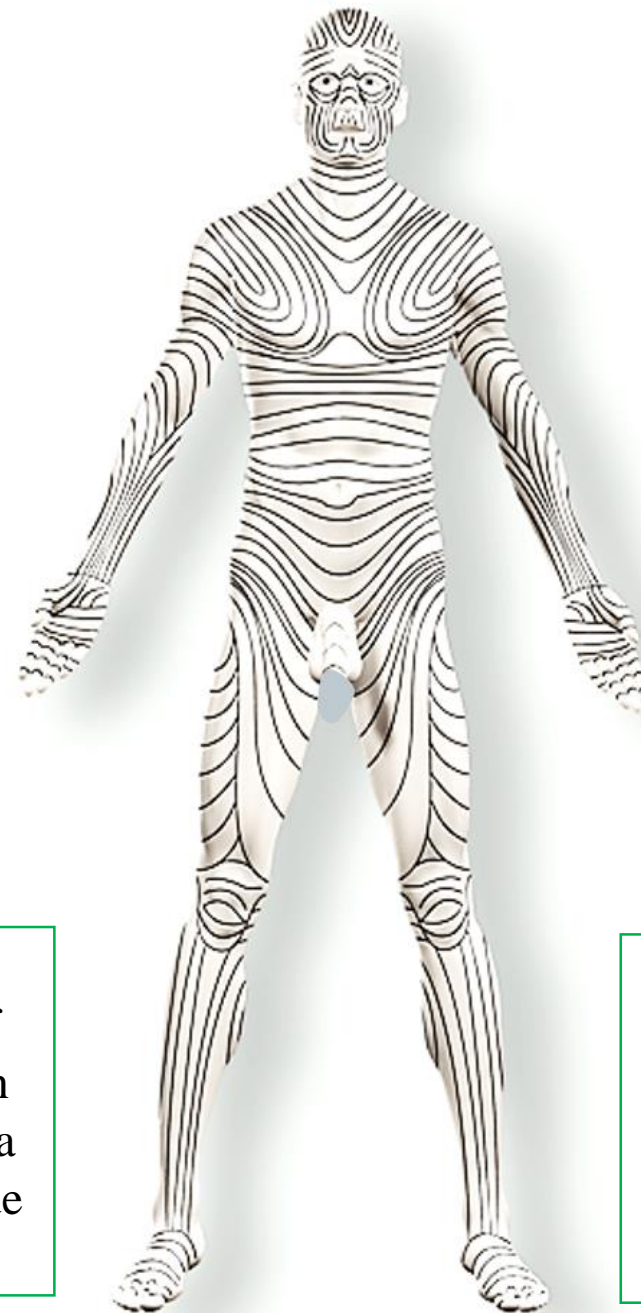


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## Clinical notes: Surgical Incisions

If possible, all surgical incisions should be made in the lines of cleavage where the bundles of collagen fibers in the dermis run in parallel rows. An incision along a cleavage line will heal as a narrow scar, whereas one that crosses the lines will heal as wide or heaped-up scars.

## Cleavage lines

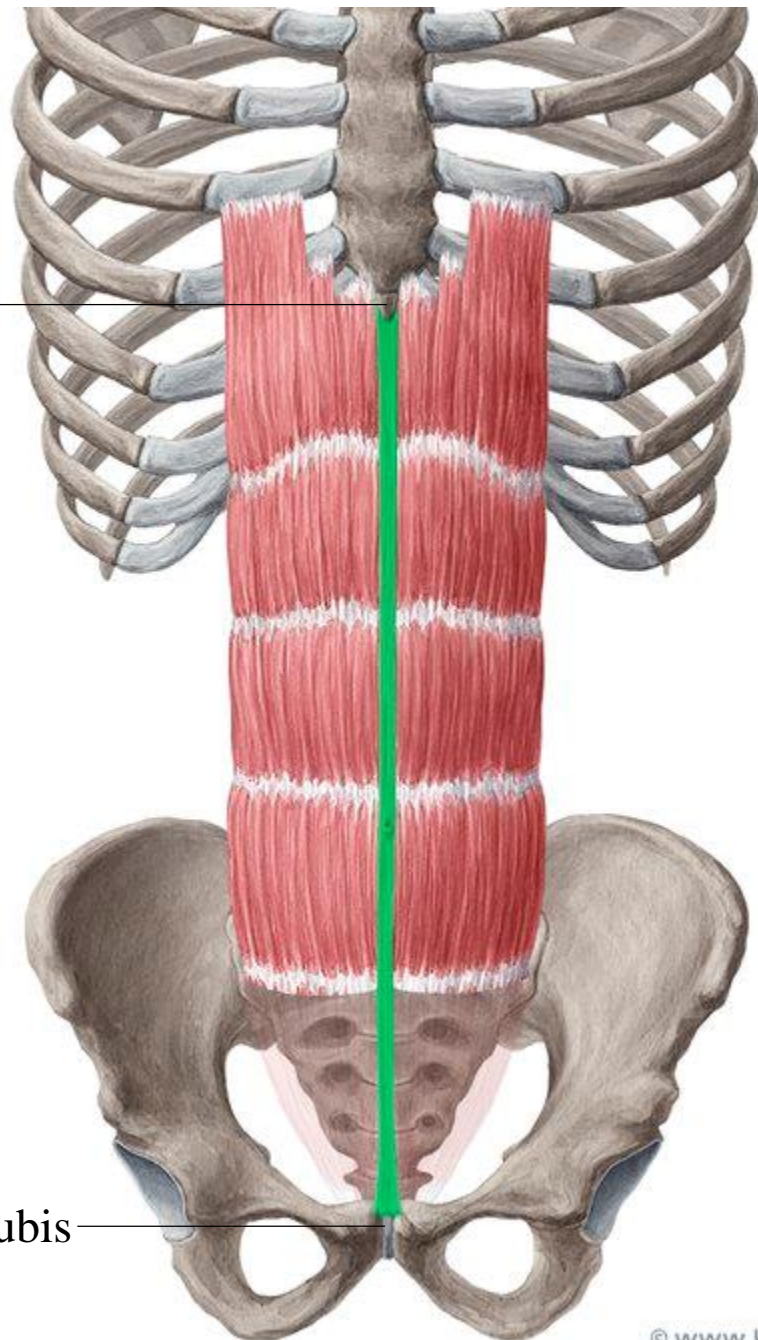


*Linea alba*

## Infection of the Umbilicus

In the adult, the umbilicus often receives scant attention in the shower and is consequently a common site of infection.

Xiphoid process



**Linea alba** (Latin ‘white line’):

- ✓ It is a tendinous, fibrous raphe that runs vertically down the midline of the abdomen.
  - ✓ It extends between the xiphoid process to symphysis pubis, separating the rectus abdominis muscles.
- In leaner, more muscular individuals, it is visible externally as a longitudinal, shallow groove.*
- ✓ It is formed by the interlacing aponeuroses of three vertical abdominal muscles: external oblique, internal oblique and transversus abdominis muscles.

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Symphysis pubis

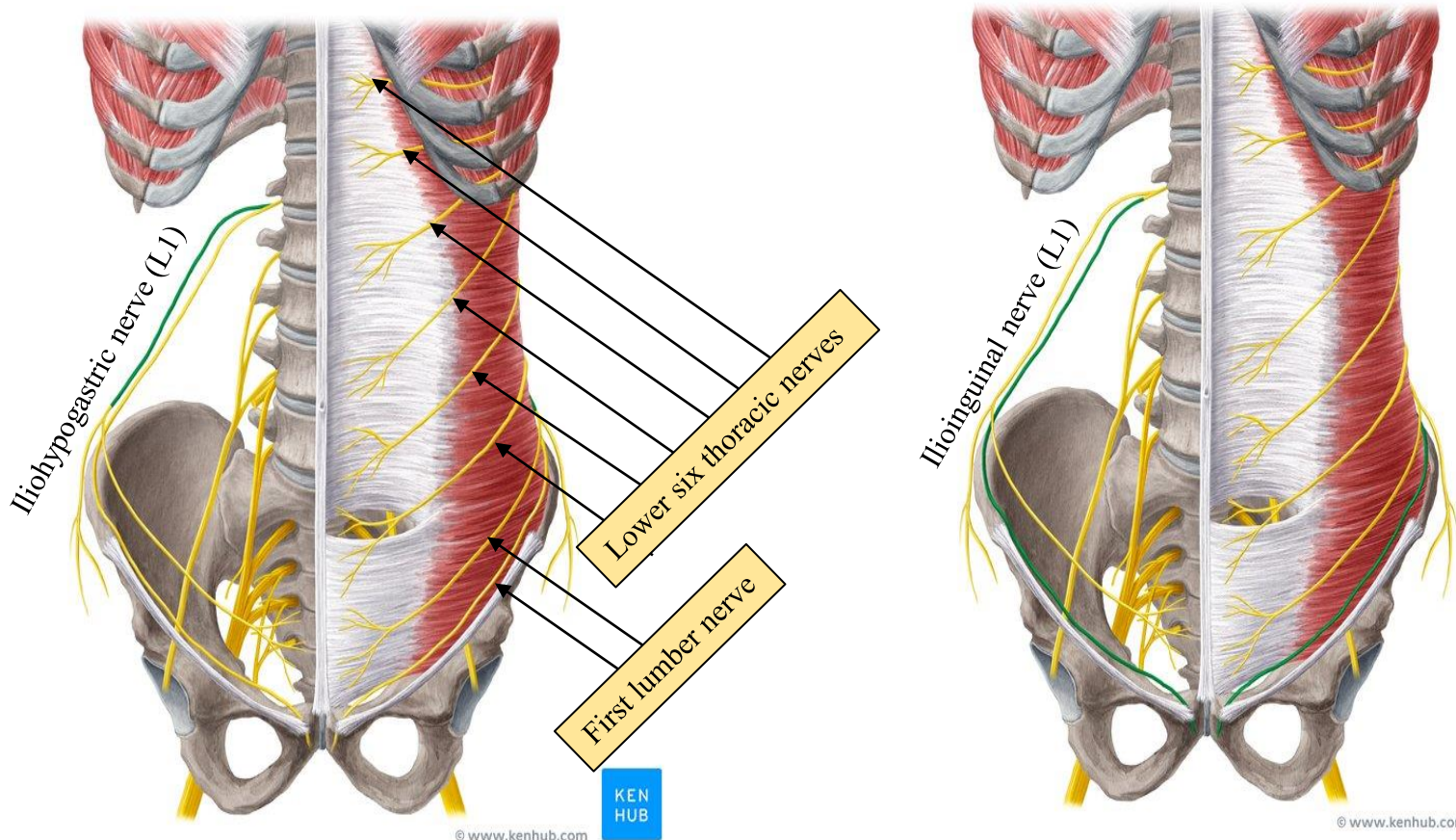


# Nerve Supply

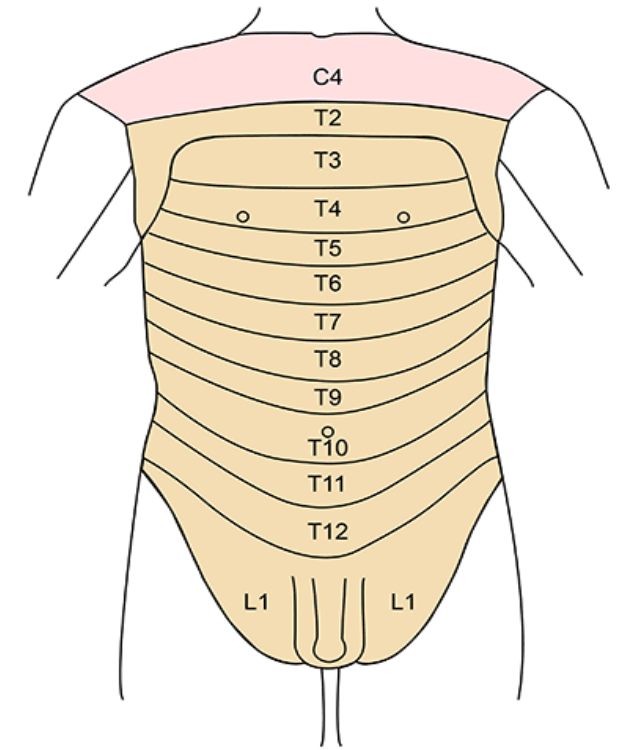
The cutaneous nerve supply to the anterior abdominal wall is derived from the anterior rami of:

1- **The lower six thoracic nerves:** the lower five intercostal and the subcostal nerves

2- **The first lumbar nerves:** the first lumbar nerve is represented by the **iliohypogastric and the ilioinguinal nerves.**



## DERMATOMES OF THORAX AND ABDOMEN



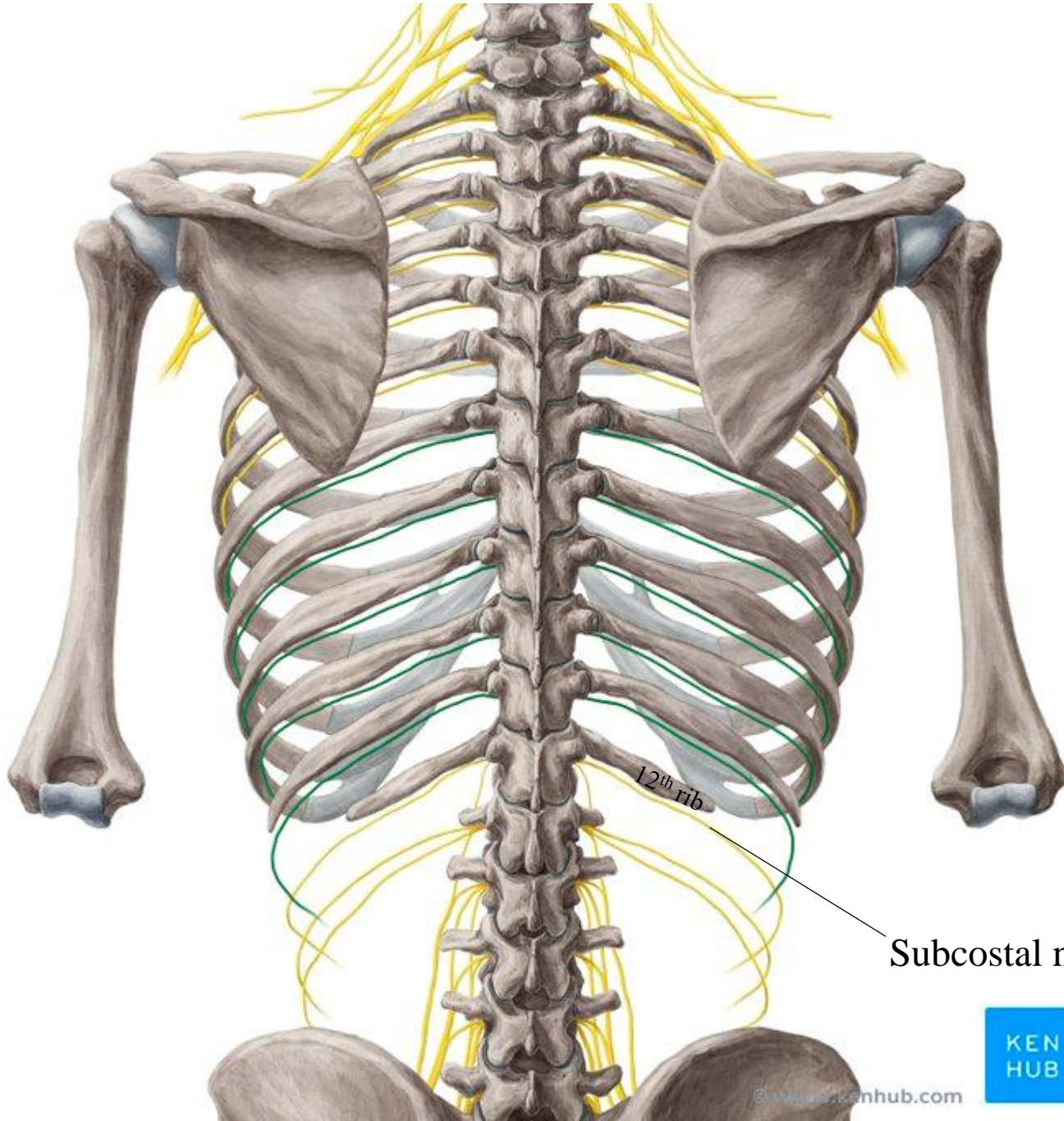
The **dermatome of T7** is located in the epigastrium over the xiphoid process.

The **dermatome of T10** includes the umbilicus.

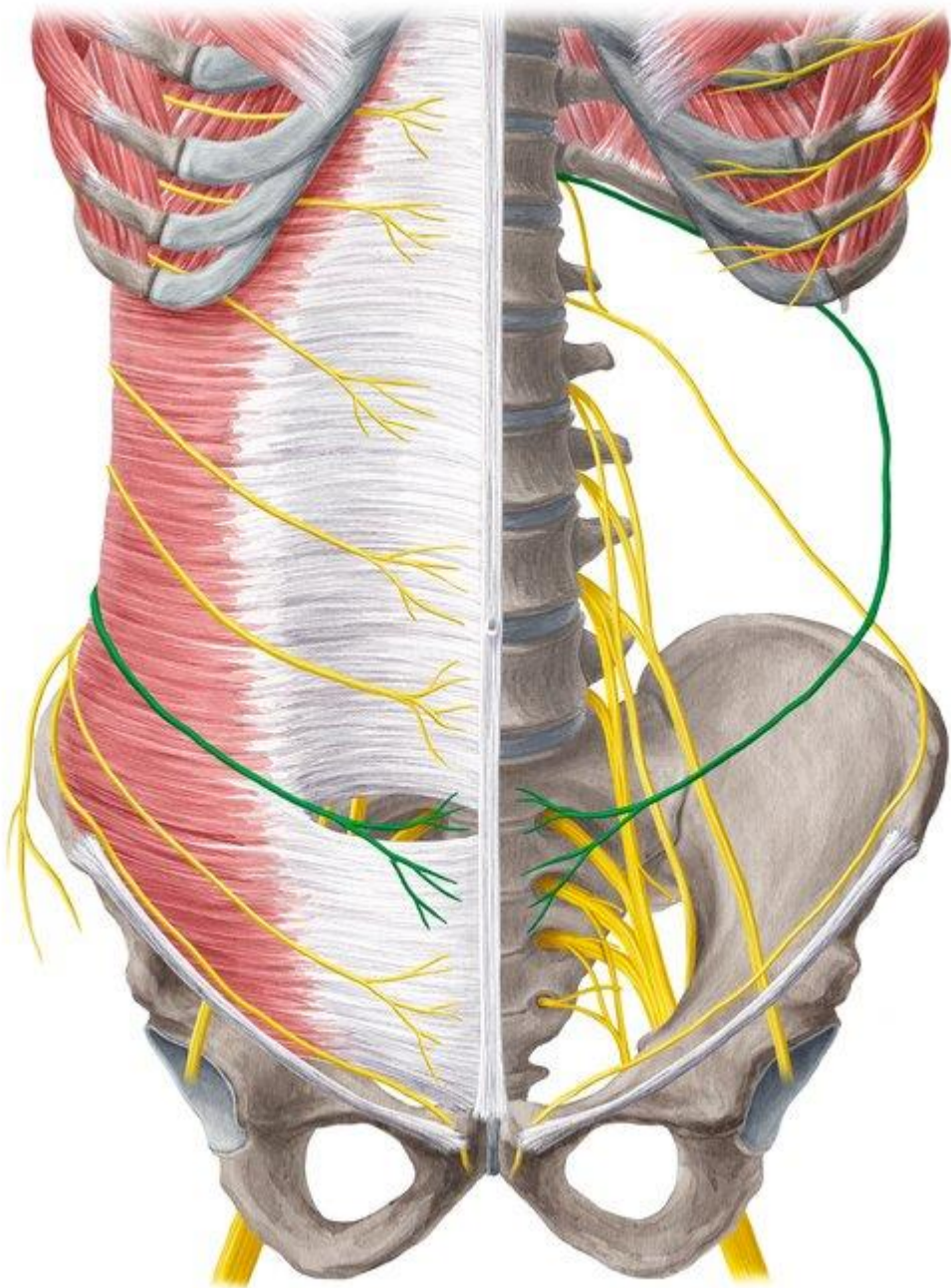
The **dermatome of L1** lies just above the inguinal ligament and the symphysis pubis.



**Anterior rami of Thoracic nerves/  
thoracoabdominal nerves/  
Intercostal nerves**

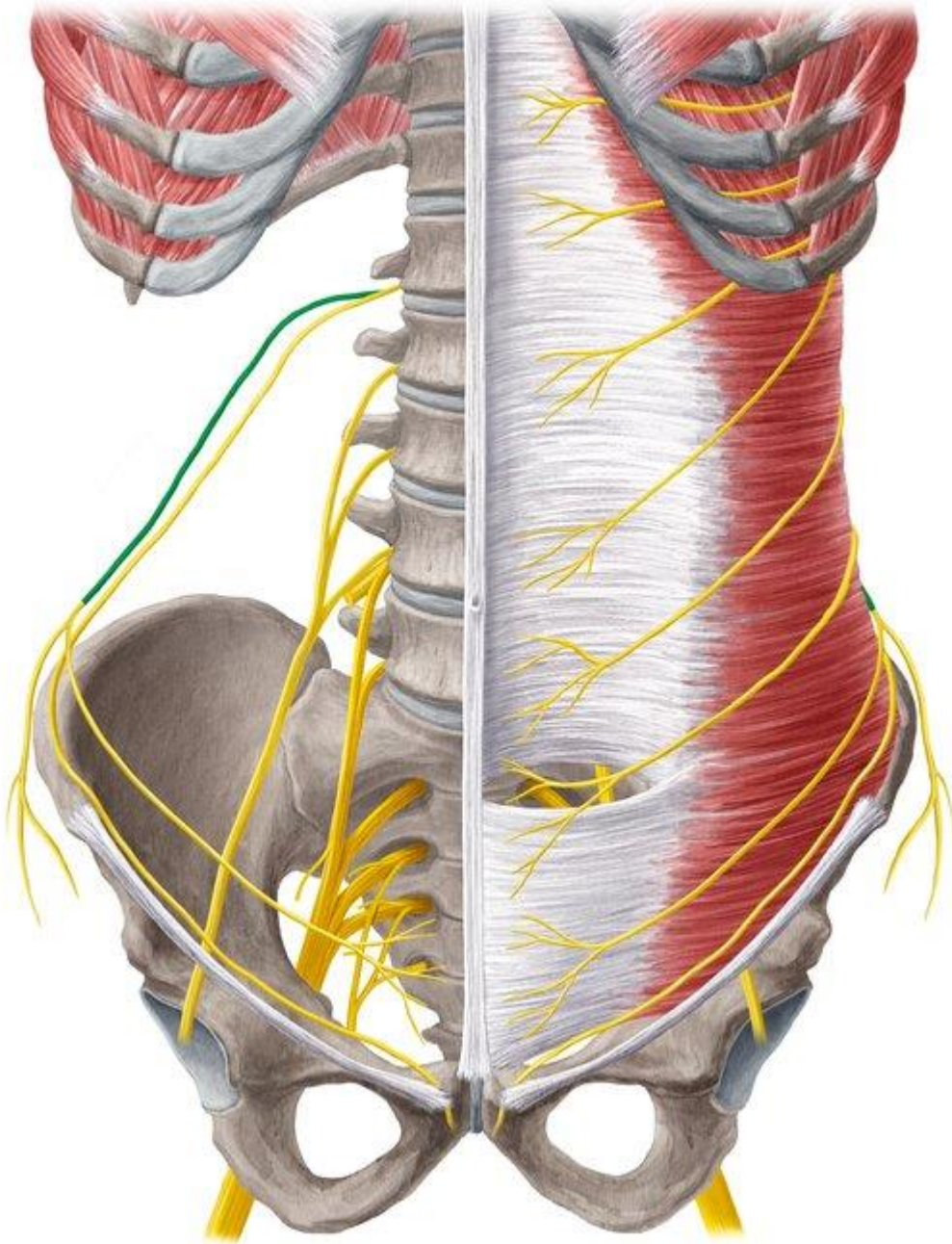


Subcostal nerve (12<sup>th</sup> thoracic)

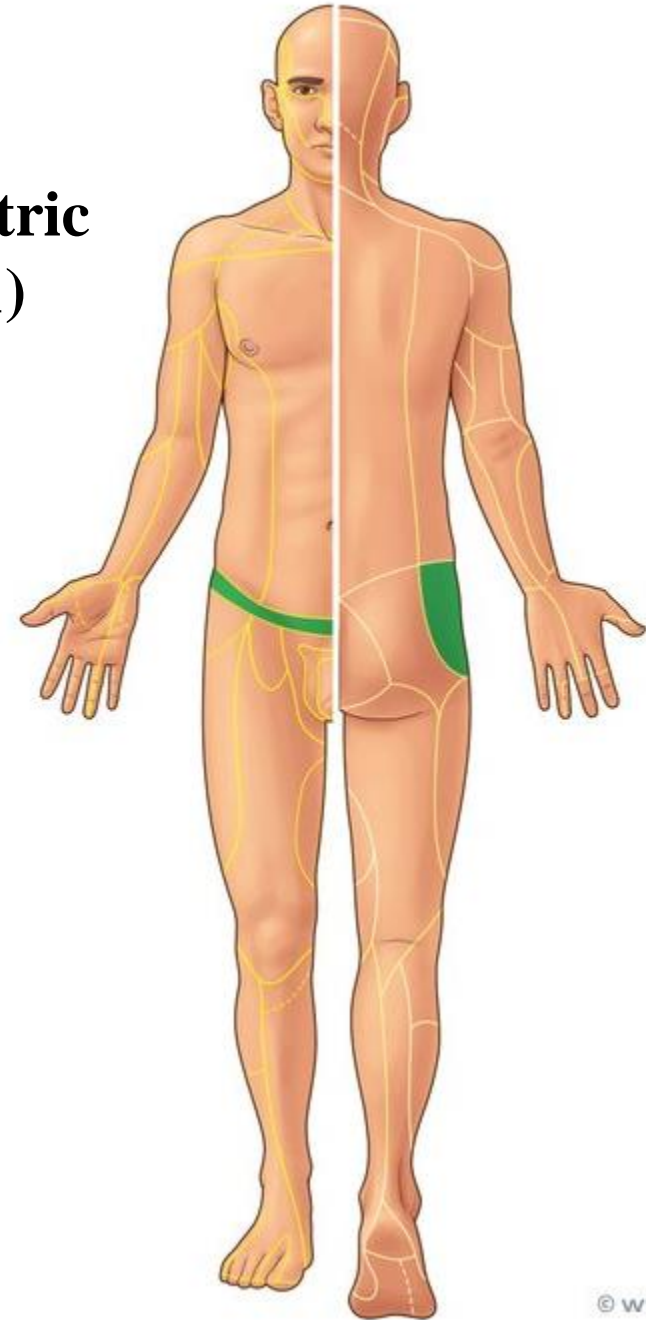


## Subcostal nerve (12<sup>th</sup> thoracic)

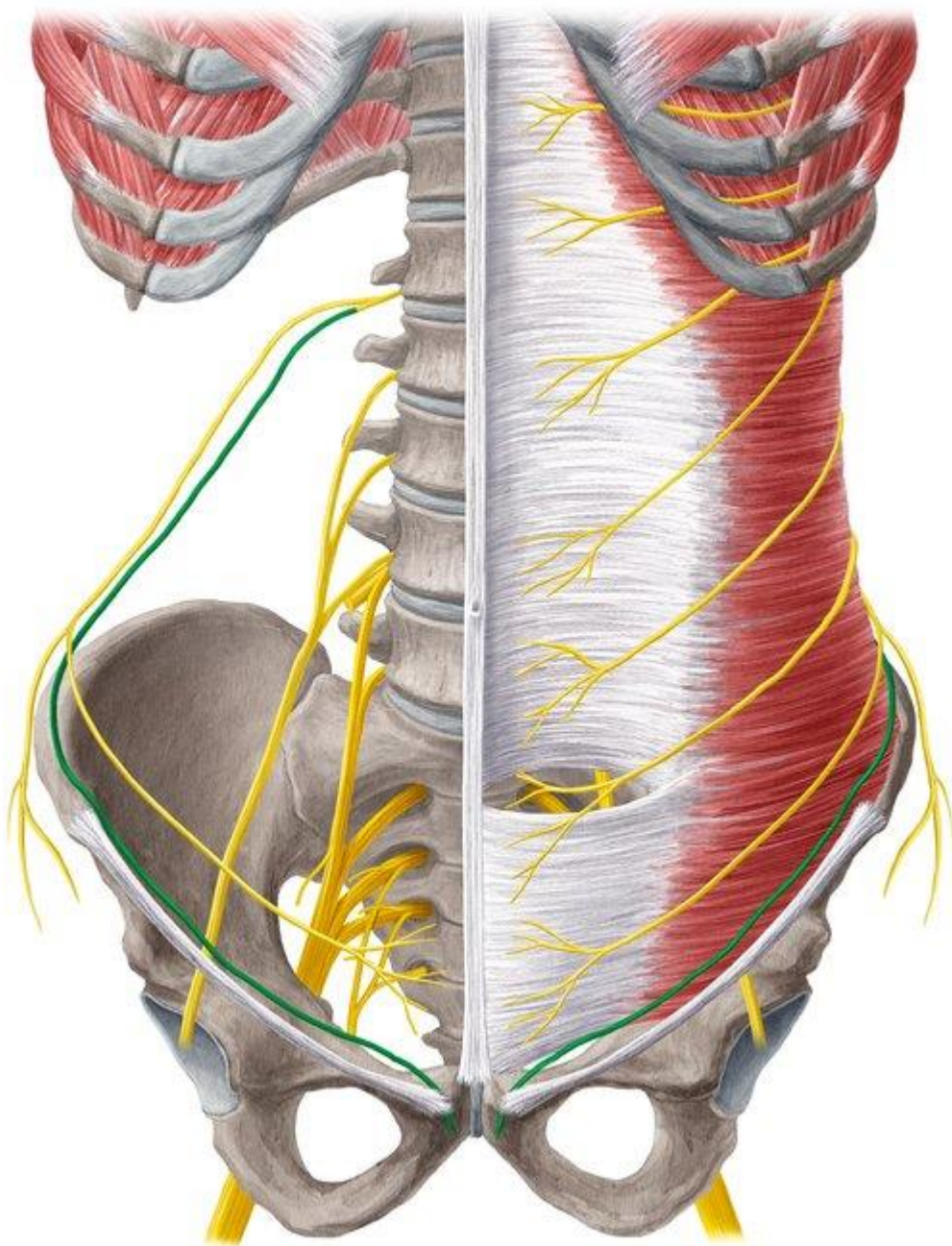




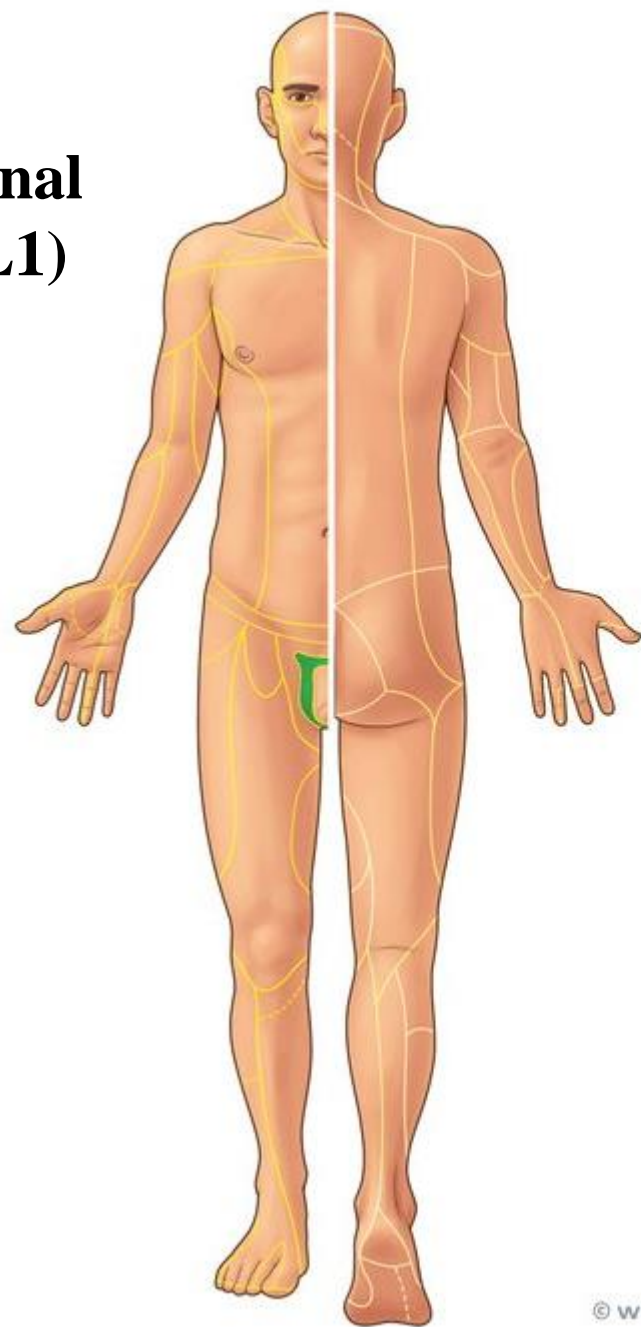
## Iliohypogastric nerve (L1)







## Ilioinguinal nerve (L1)



# Superficial Fascia

The superficial fascia is divided into:

- 1- A superficial fatty layer (Camper's fascia)
- 2- A deep membranous layer (Scarpa's fascia)

The superficial fatty layer is continuous with the superficial fat over the rest of the body and may be extremely thick (3 in. [8 cm] or more in obese patients).

The deep membranous layer is thin and fades out laterally and above, where it becomes continuous with the superficial fascia of the back and the thorax, respectively.

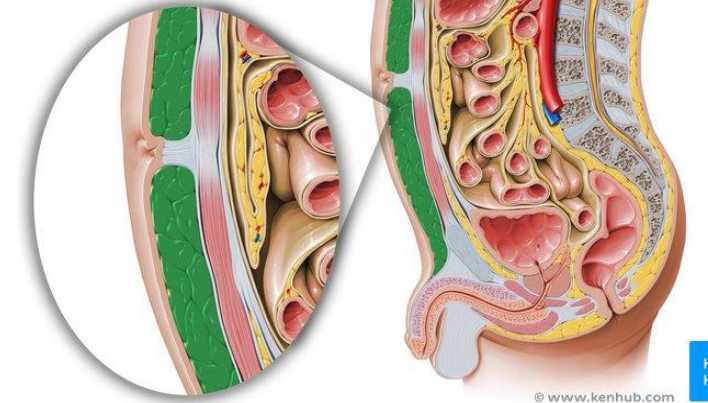
However,

**Inferiorly**, the membranous layer:

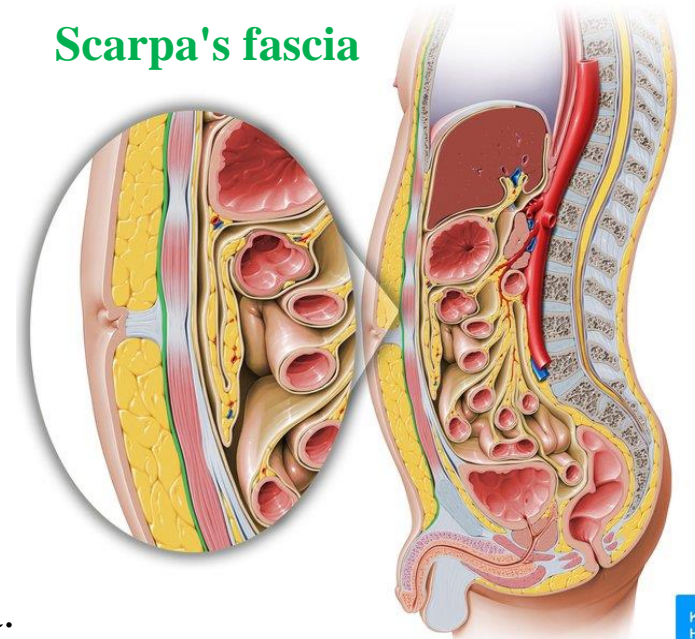
Passes onto the front of the thigh, where it fuses with the deep fascia one fingerbreadth below the inguinal ligament.

Continues inferiorly in the midline into the perineal region as Colles' fascia

Camper's fascia



Scarpa's fascia

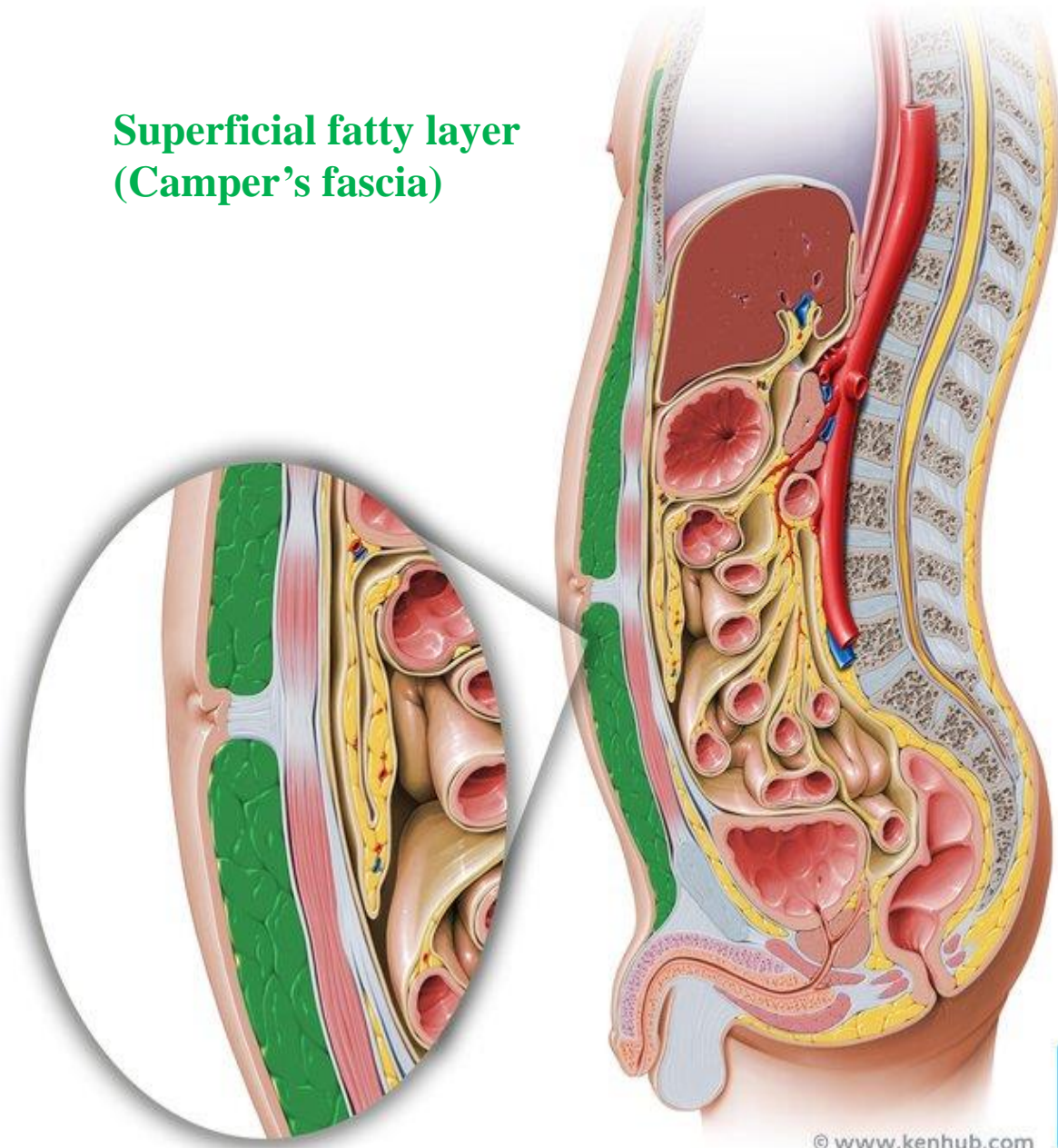


# Deep Fascia

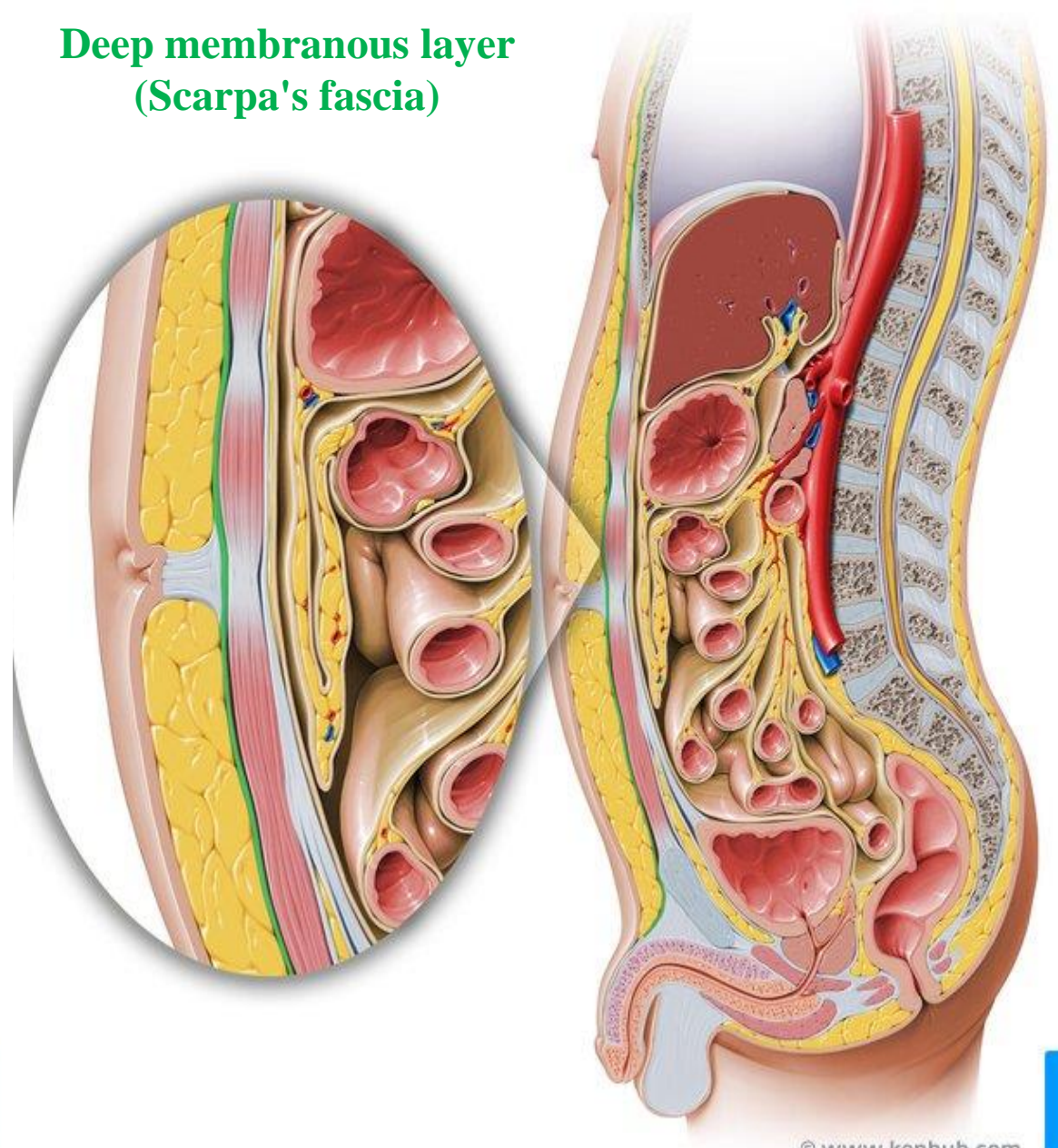
The deep fascia in the anterior abdominal wall is merely a thin layer of connective tissue covering the muscles; it lies immediately deep to the membranous layer of superficial fascia.



**Superficial fatty layer  
(Camper's fascia)**



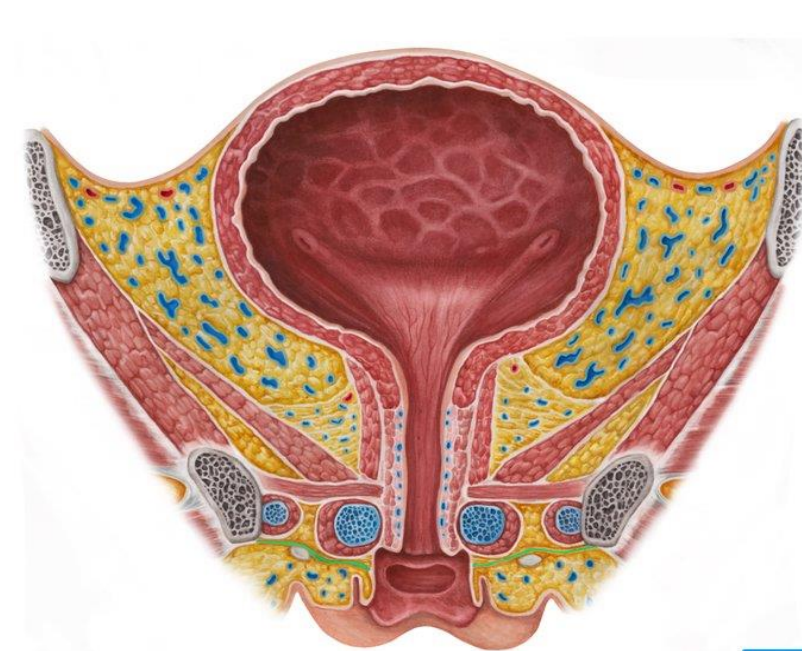
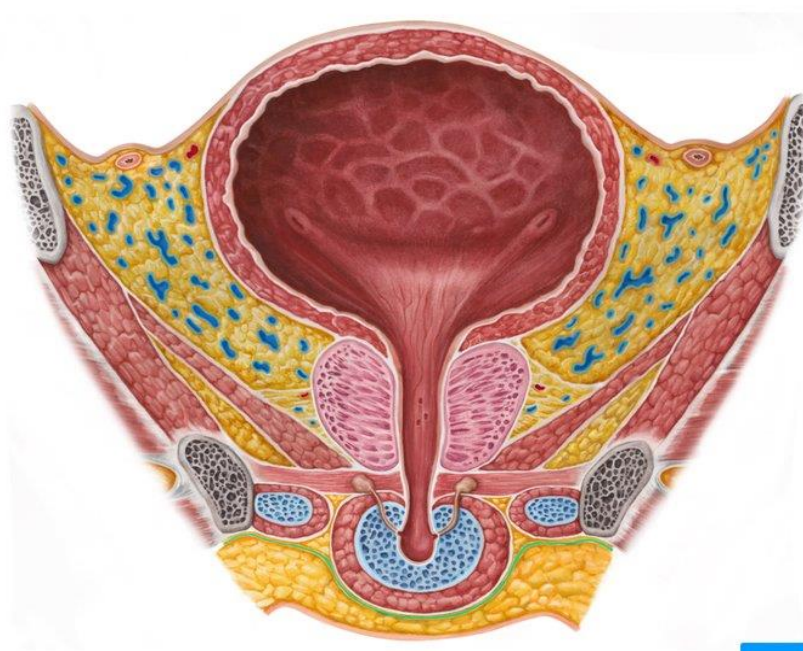
**Deep membranous layer  
(Scarpa's fascia)**





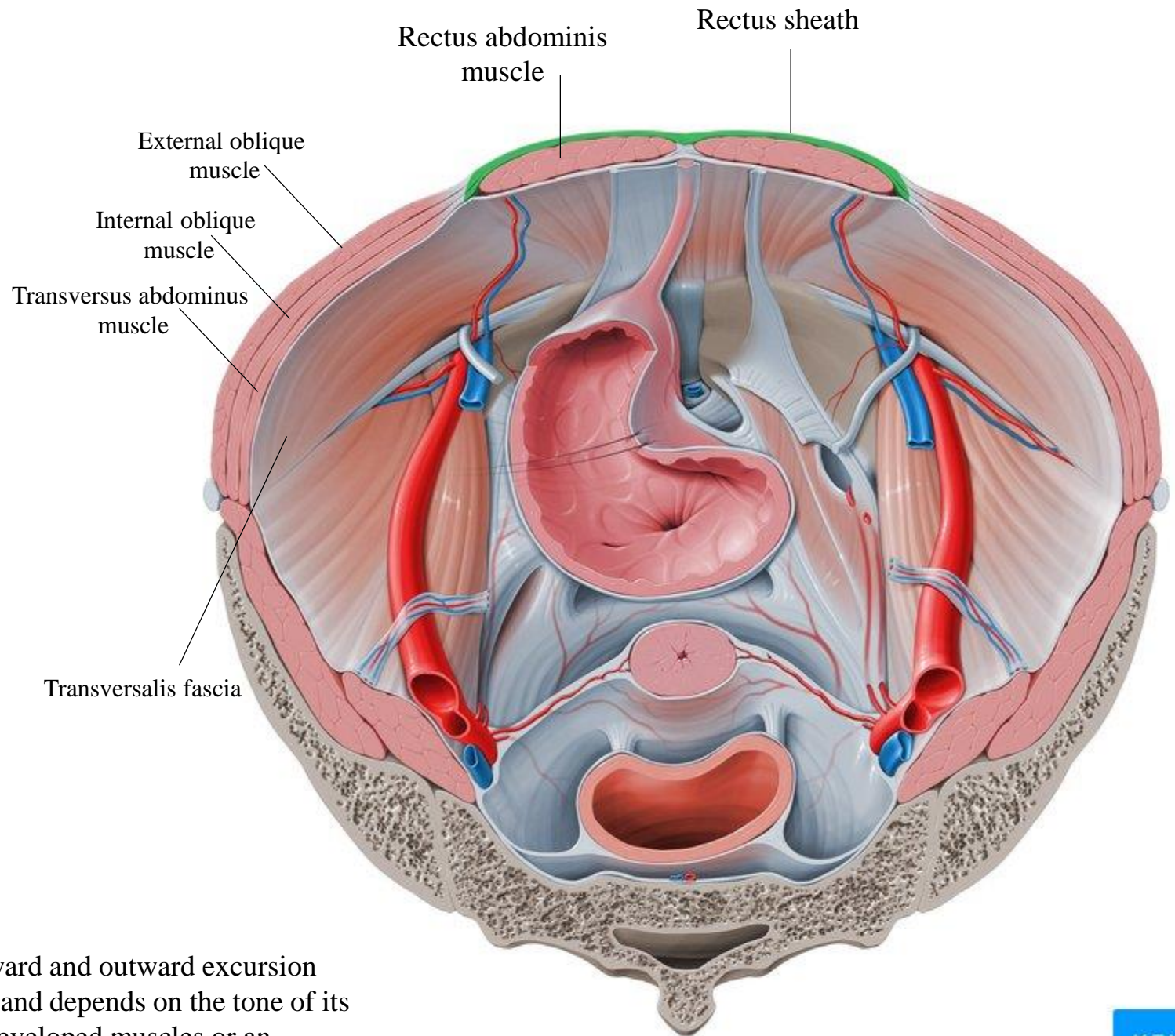
Scarpa's fascia continues into the perineum to form the superficial fascia of the perineum, called **Colles' fascia**.

*The perineum is the space between the anus and the genitals.*



# Muscles of the Anterior Abdominal Wall

- ✓ The muscles of the anterior abdominal wall consist of three broad thin sheets that are aponeurotic in front; from exterior to interior they are the **external oblique, internal oblique, and transversus**.
- ✓ On either side of the midline anteriorly is, a wide vertical muscle, the **rectus abdominis**.
- ✓ As the aponeuroses of the three sheets pass forward, they enclose the rectus abdominis to form **the rectus sheath**.
- ✓ The lower part of the rectus sheath might contain a small muscle called the **pyramidalis**.



## General Appearances of the Abdominal Wall

The normal abdominal wall is soft and pliable and undergoes inward and outward excursion with respiration. The contour is subject to considerable variation and depends on the tone of its muscles and the amount of fat in the subcutaneous tissue. Well-developed muscles or an abundance of fat can prove to be a severe obstacle to the palpation of the abdominal viscera.



# External Oblique Abdominis

*The muscle fibers radiate as they pass downward and forward.*

The external oblique muscle is a broad, thin, muscular sheet.

**Origin:** Lower eight ribs

**Insertion:** Xiphoid process, linea alba, pubic crest, pubic tubercle, iliac crest.

**Nerve supply:** Lower six thoracic nerves and iliohypogastric and ilioinguinal nerves (L1)

**Action:** Supports abdominal contents; compresses abdominal contents; assists in flexing and rotation of trunk; assists in forced expiration, micturition, defecation, parturition, and vomiting

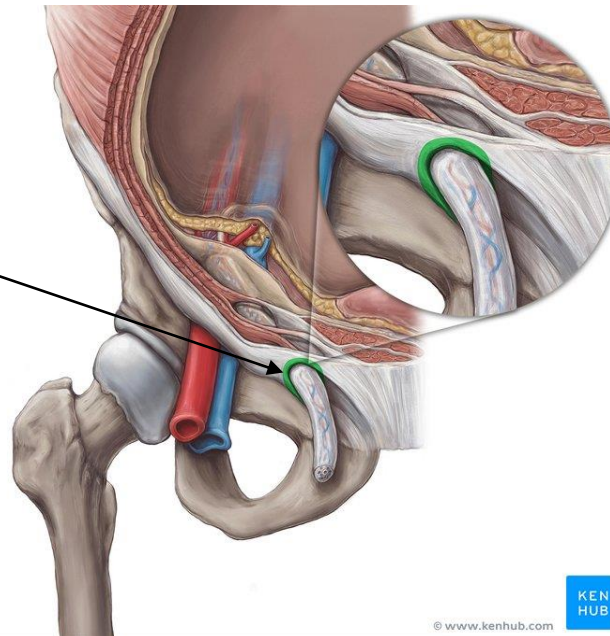
✓ Most of the fibers are inserted by means of a broad aponeurosis.

A triangular-shaped defect in the external oblique aponeurosis lies immediately *above and medial to the pubic tubercle.*

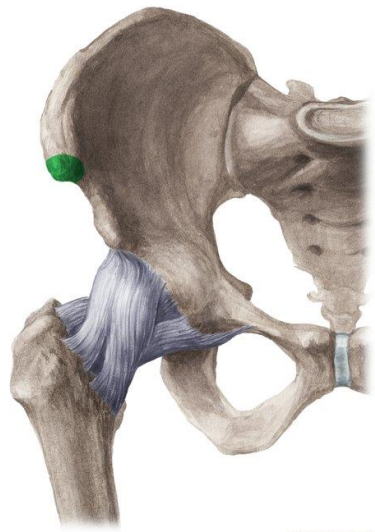
This is known as the **superficial inguinal**

**ring.**

The spermatic cord (or round ligament of the uterus) passes through this opening.



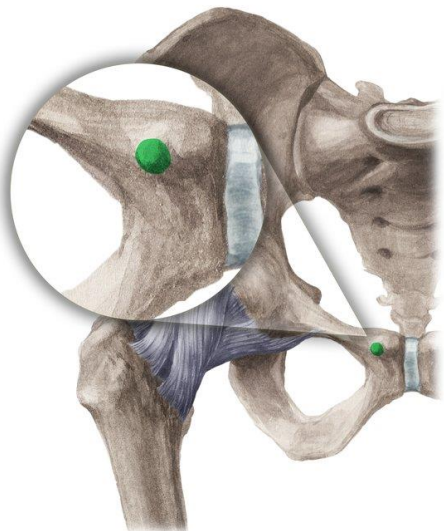




Anterior superior iliac spine



Between the anterior superior iliac spine and the pubic tubercle, the lower border of the aponeurosis is folded backward on itself, forming the **inguinal ligament**.

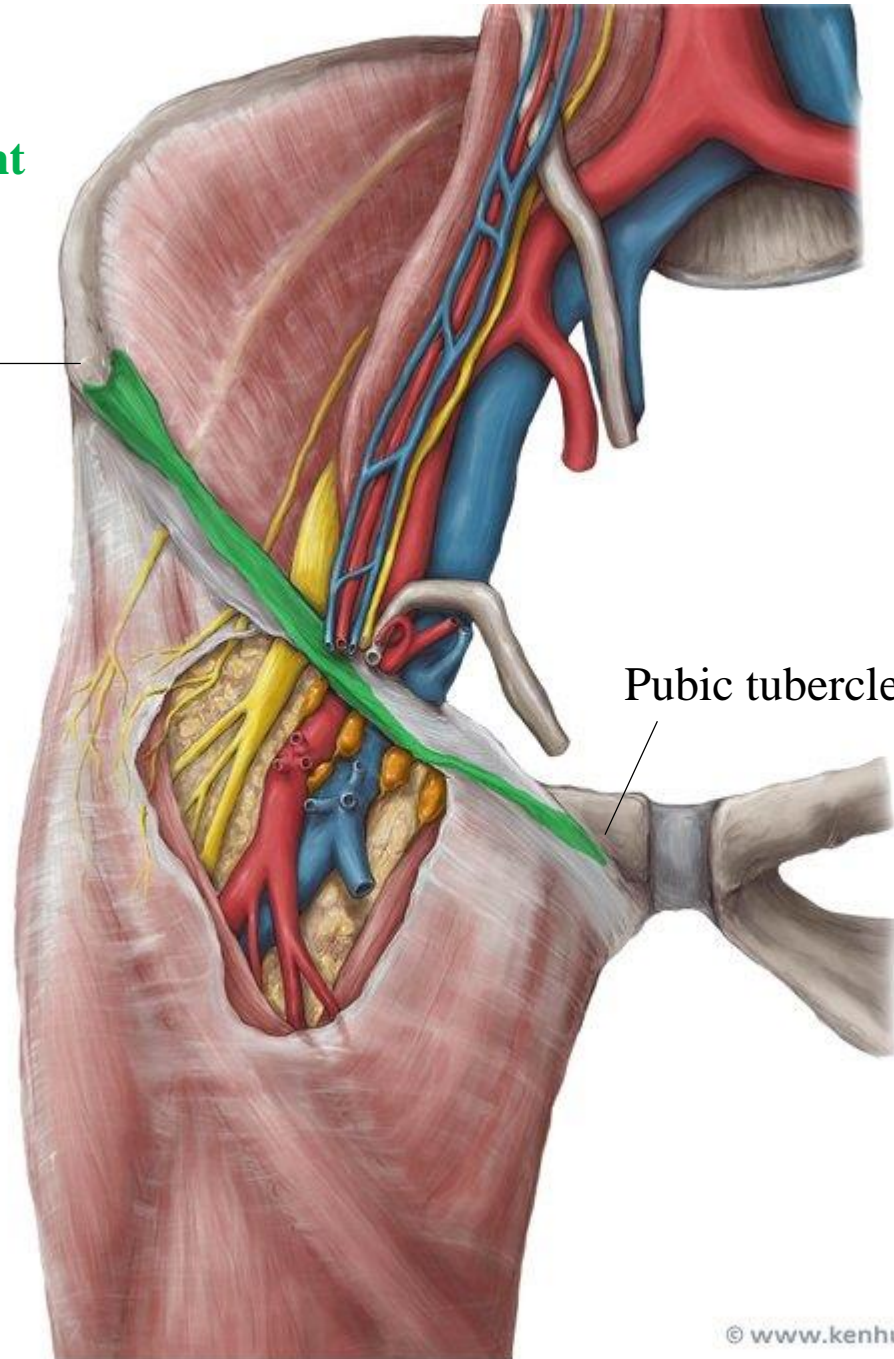


Pubic tubercle



## Inguinal ligament

Anterior superior iliac spine



Pubic tubercle



# Internal Oblique Abdominis

*The muscle fibers radiate as they pass upward and forward.*

The internal oblique muscle is also a broad, thin, muscular sheet that lies deep to the external oblique; most of its fibers run at right angles to those of the external oblique.

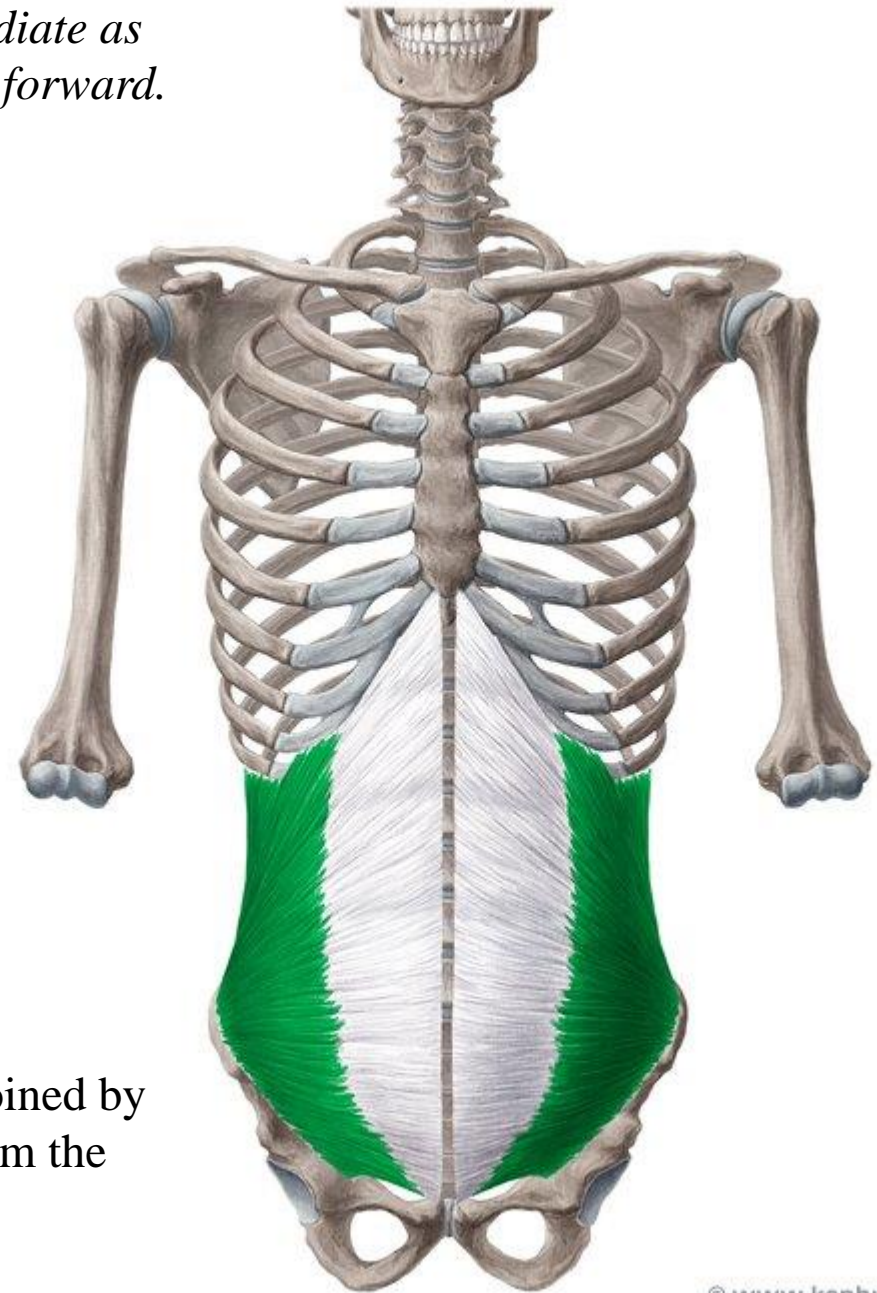
**Origin:** Lumbar fascia, iliac crest, lateral two thirds of inguinal ligament

**Insertion:** Lower three ribs and costal cartilages, xiphoid process, linea alba, symphysis pubis

**Nerve supply:** Lower six thoracic nerves and iliohypogastric and ilioinguinal nerves (L1)

**Action:** Supports abdominal contents; compresses abdominal contents; assists in flexing and rotation of trunk; assists in forced expiration, micturition, defecation, parturition, and vomiting

Near their insertion, the lowest tendinous fibers are joined by similar fibers from the transversus abdominis to form the **conjoint tendon**





# Transversus Abdominis

The transversus muscle is a thin sheet of muscle that lies deep to the internal oblique.

**Origin:** Lower six costal cartilages, lumbar fascia, iliac crest, lateral third of inguinal ligament

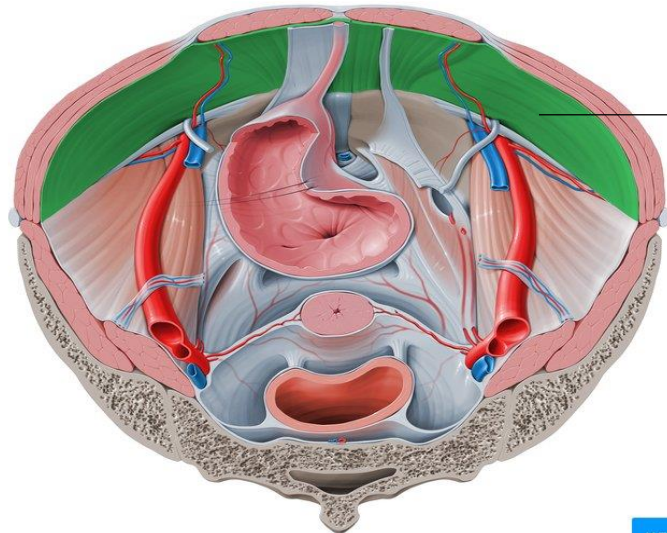
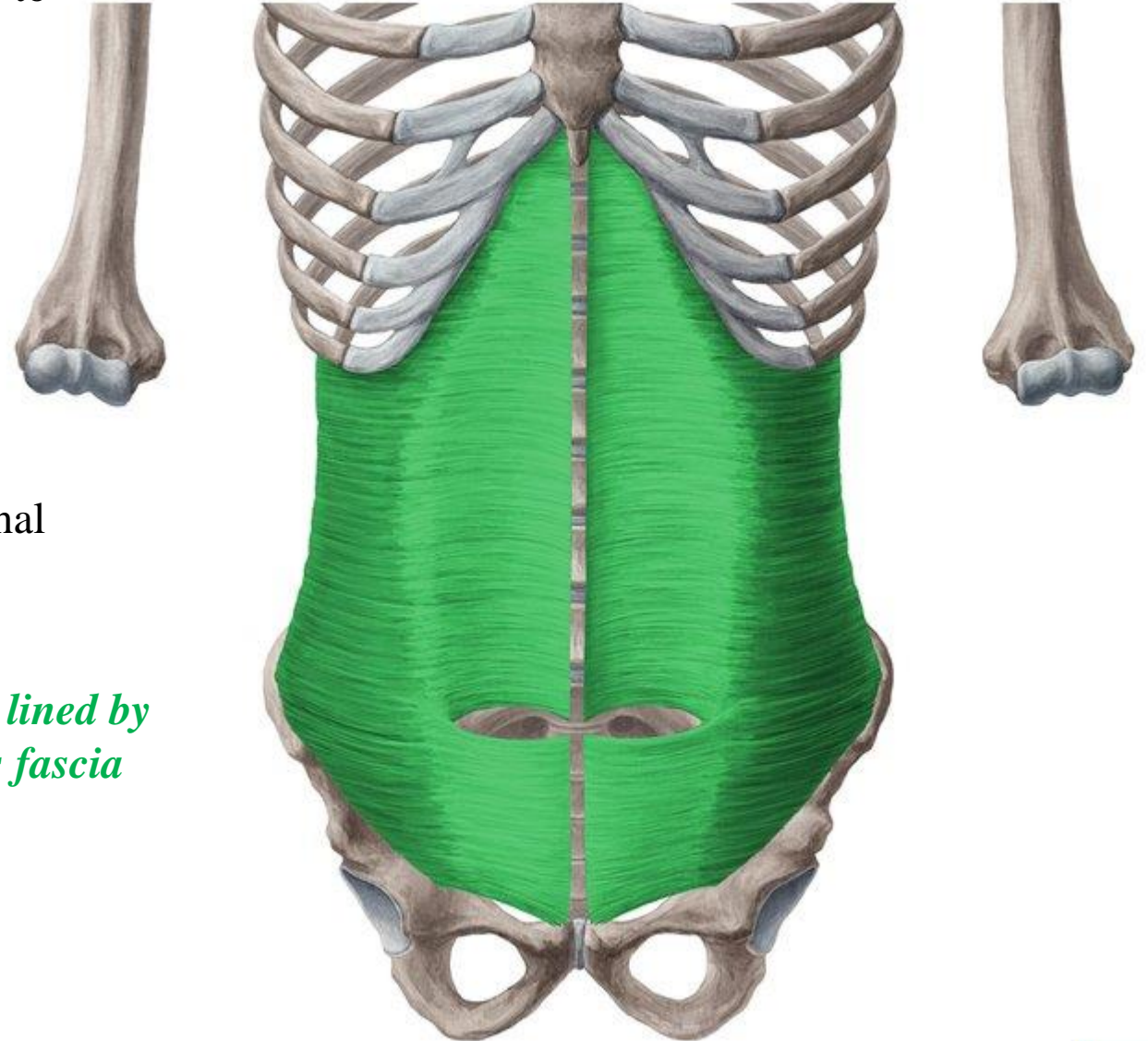
**Insertion:** Xiphoid process, linea alba, symphysis pubis

**Nerve supply:** Lower six thoracic nerves and iliohypogastric and ilioinguinal nerves (L1)

**Action:** Compresses abdominal contents

The lowest tendinous fibers join similar fibers from the internal oblique to form the **conjoint tendon**.

*Its fibers run horizontally forward*



*The muscle is lined by transversalis fascia*



# Rectus Abdominis

The rectus abdominis is a long strap muscle that extends along the whole length of the anterior abdominal wall. It is broader above and lies close to the midline, being separated from its fellow by the linea alba.

**Origin:** Symphysis pubis and pubic crest

**Insertion:** Fifth, sixth, and seventh costal cartilages and xiphoid process

**Nerve supply:** Lower six thoracic nerves

**Action:** Compresses abdominal contents and flexes vertebral column; accessory muscle of expiration

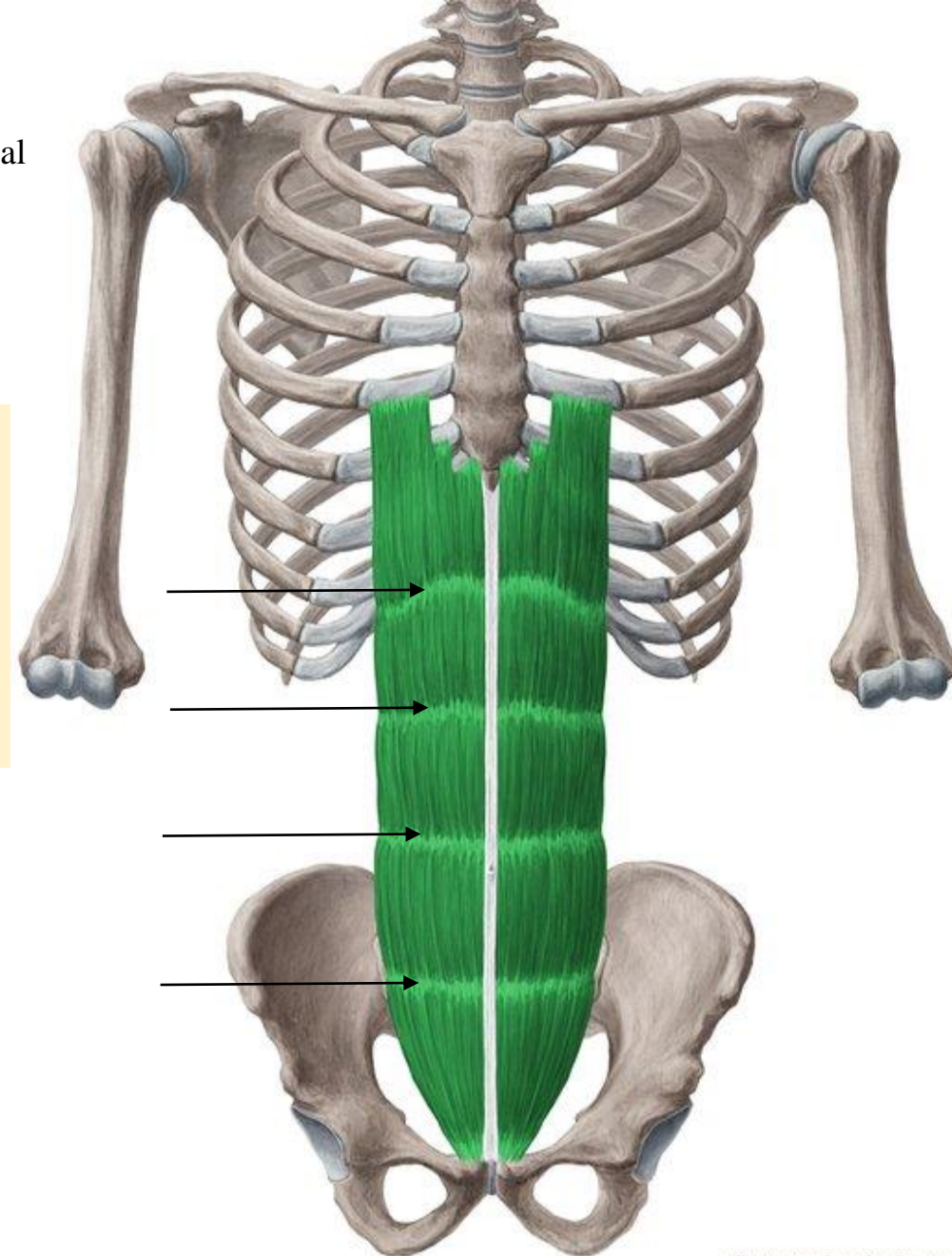
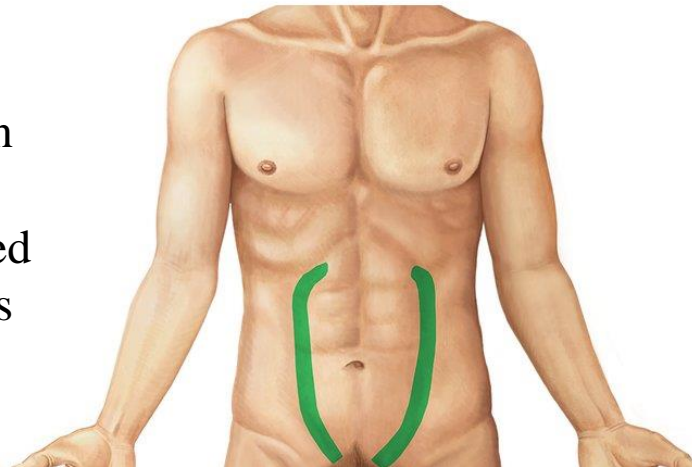
When it contracts, its lateral margin forms a curved ridge that can be palpated and often seen and is termed the **linea semilunaris**. This extends from the tip of the ninth costal cartilage to the pubic tubercle.

The rectus abdominis is enclosed between the aponeuroses of the external oblique, internal oblique, and transversus, which form the **rectus sheath**.

The rectus abdominis muscle is divided into distinct segments by transverse tendinous intersections.



These intersections are strongly attached to the anterior wall of the rectus sheath.



# Pyramidalis

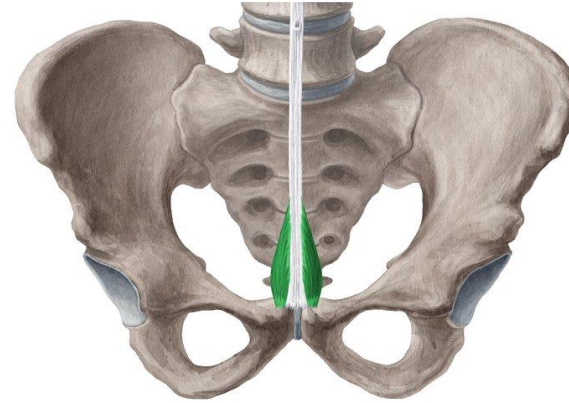
The pyramidalis muscle is often absent. If present, it lies in front of the lower part of the rectus abdominis.

**Origin:** Pubis

**Insertion:** Linea alba

**Nerve supply:** 12th thoracic nerve

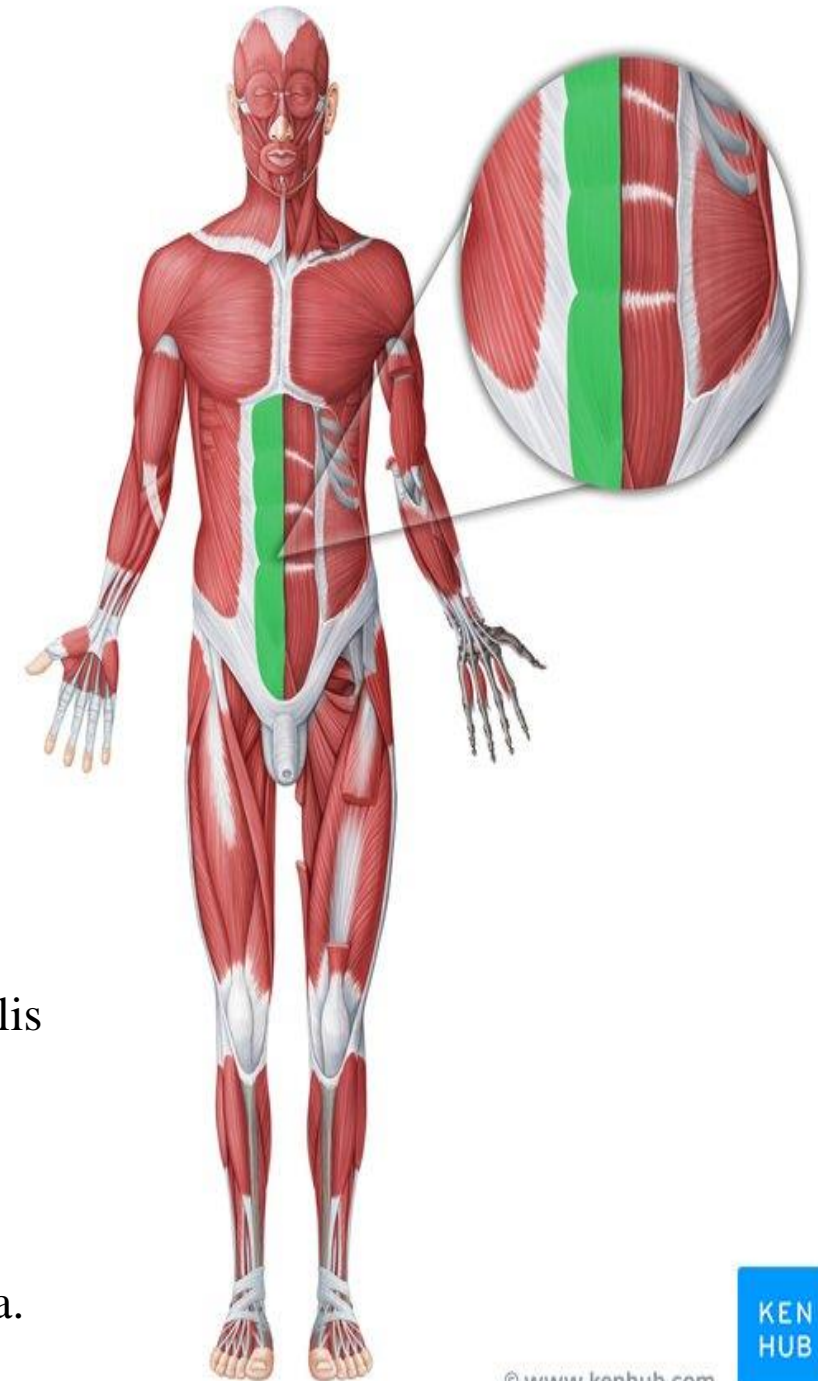
**Action:** Tenses the linea alba



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## Rectus Sheath

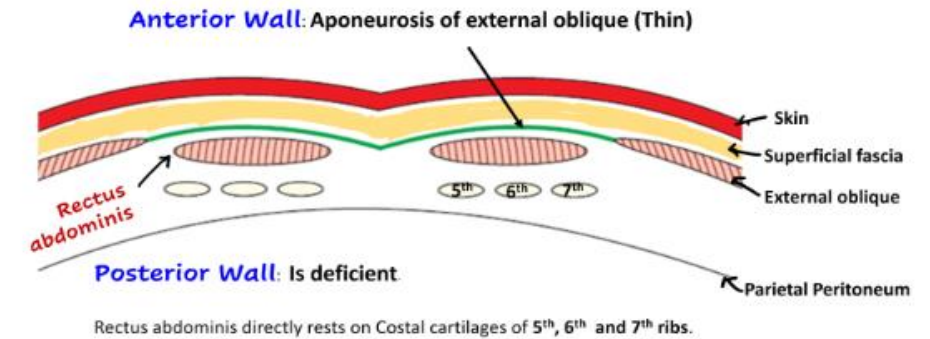
- ✓ It is a long fibrous sheath that encloses the rectus abdominis muscle and pyramidalis muscle (if present)
- ✓ It contains the anterior rami of the lower six thoracic nerves and the superior and inferior epigastric vessels and lymph vessels.
- ✓ It is formed mainly by the aponeuroses of the three lateral abdominal muscles.
- ✓ The rectus sheath is separated from its fellow on the opposite side by the linea alba.



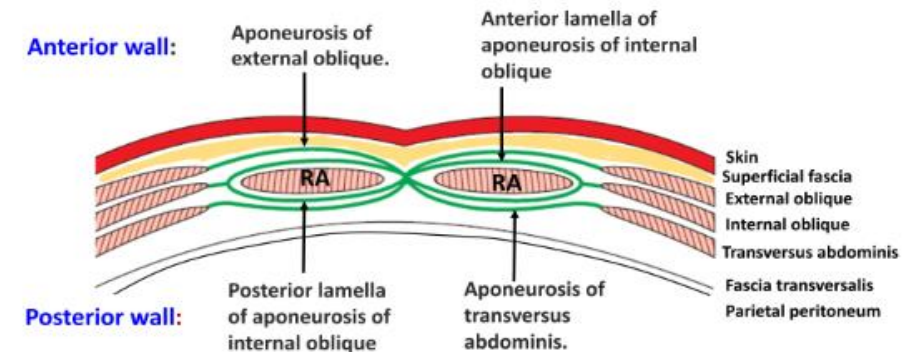
## Formation of Rectus Sheath

For ease of description, the rectus sheath is considered at three levels:

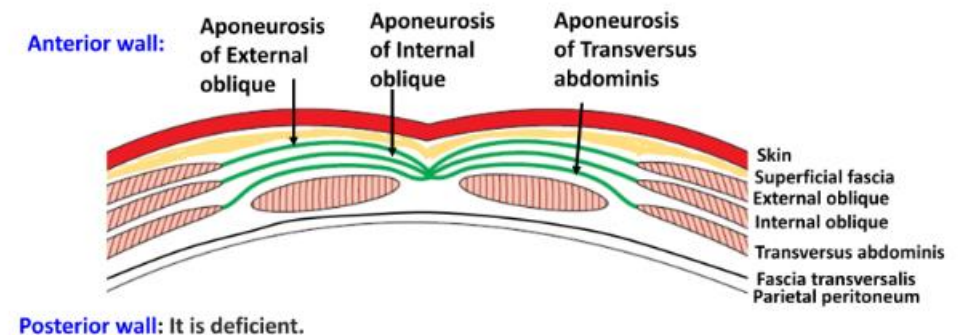
**Above the costal margin**, the anterior wall is formed by the aponeurosis of the external oblique. The posterior wall is deficient and the rectus muscle lies directly on the thoracic wall that is, the fifth, sixth, and seventh costal cartilages and the intercostal spaces.



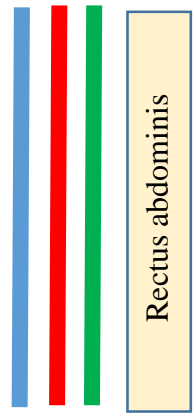
**Between the costal margin and the level of the anterior superior iliac spine**, the aponeurosis of the internal oblique splits to enclose the rectus muscle; the external oblique aponeurosis is directed in front of the muscle, and the transversus aponeurosis is directed behind the muscle.



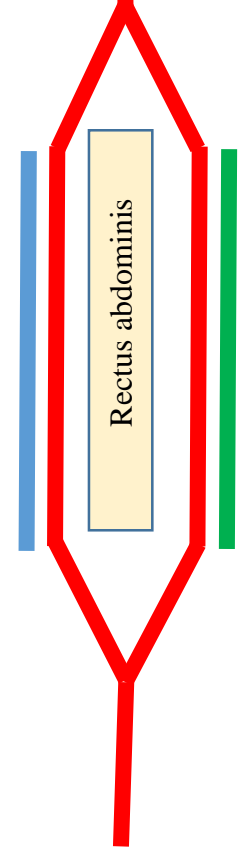
**Between the level of the anterosuperior iliac spine and the pubis**, the aponeuroses of all three muscles form the anterior wall. The posterior wall is absent, and the rectus muscle lies in contact with the fascia transversalis.



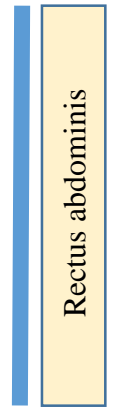
Anterior      Posterior



3



2



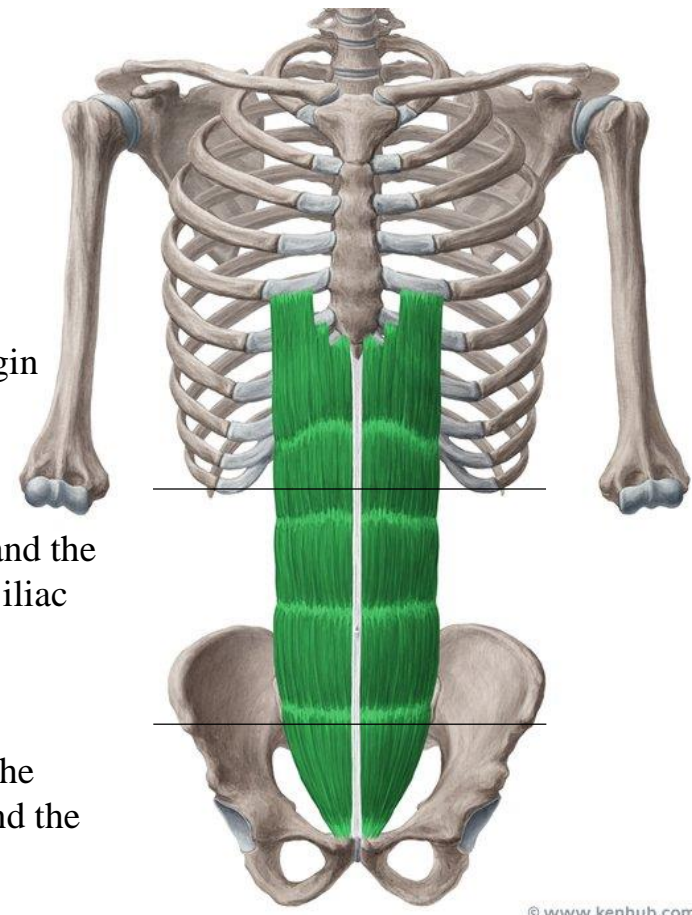
1

**External oblique**  
**Internal oblique**  
**Transversus abdominis**

1- Above the costal margin

2- Between the costal margin and the level of the anterior superior iliac spine

3- Between the level of the anterosuperior iliac spine and the pubis

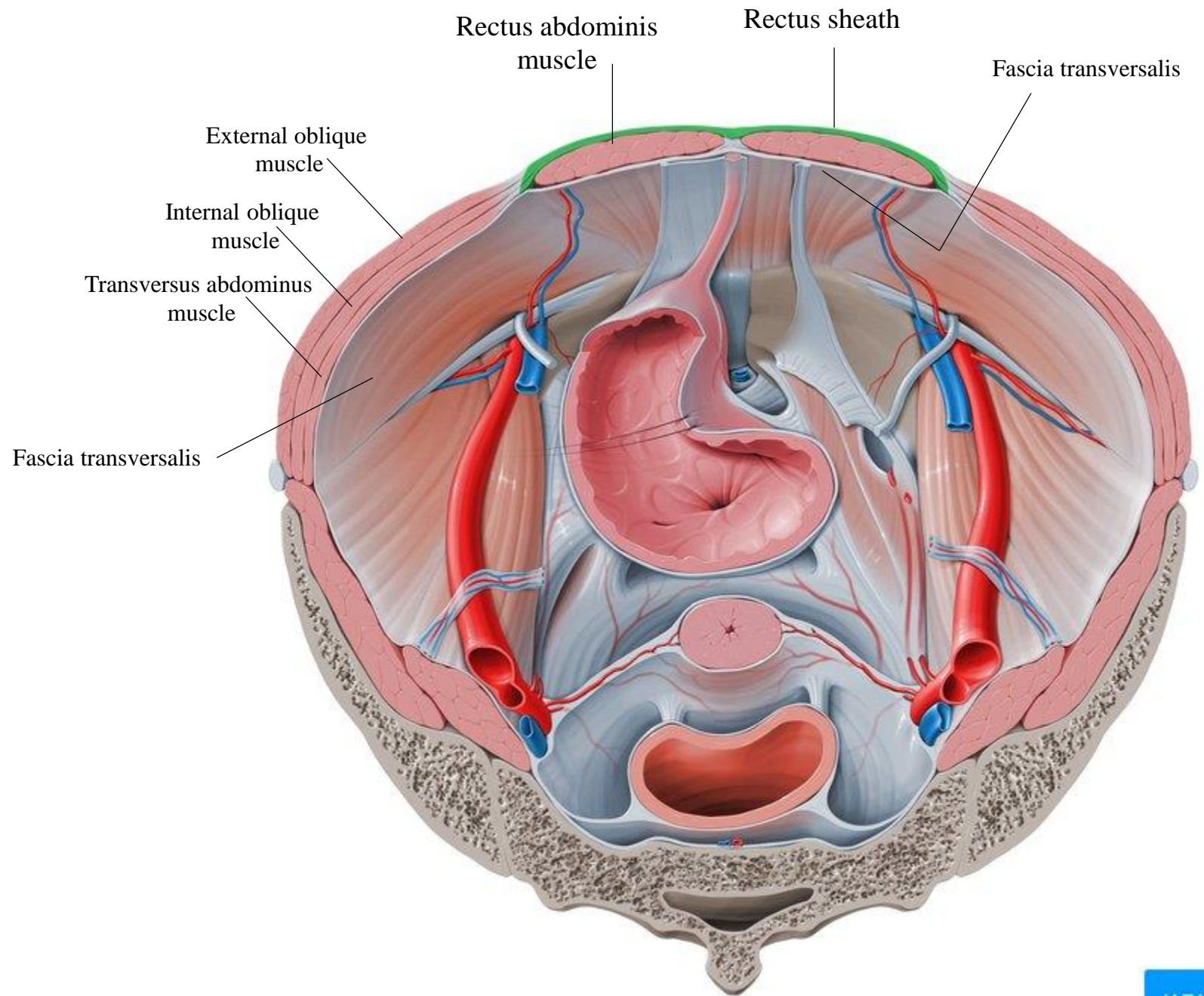




# What is the level of rectus sheath in this image????

Between the level of the anterosuperior iliac spine and the pubis

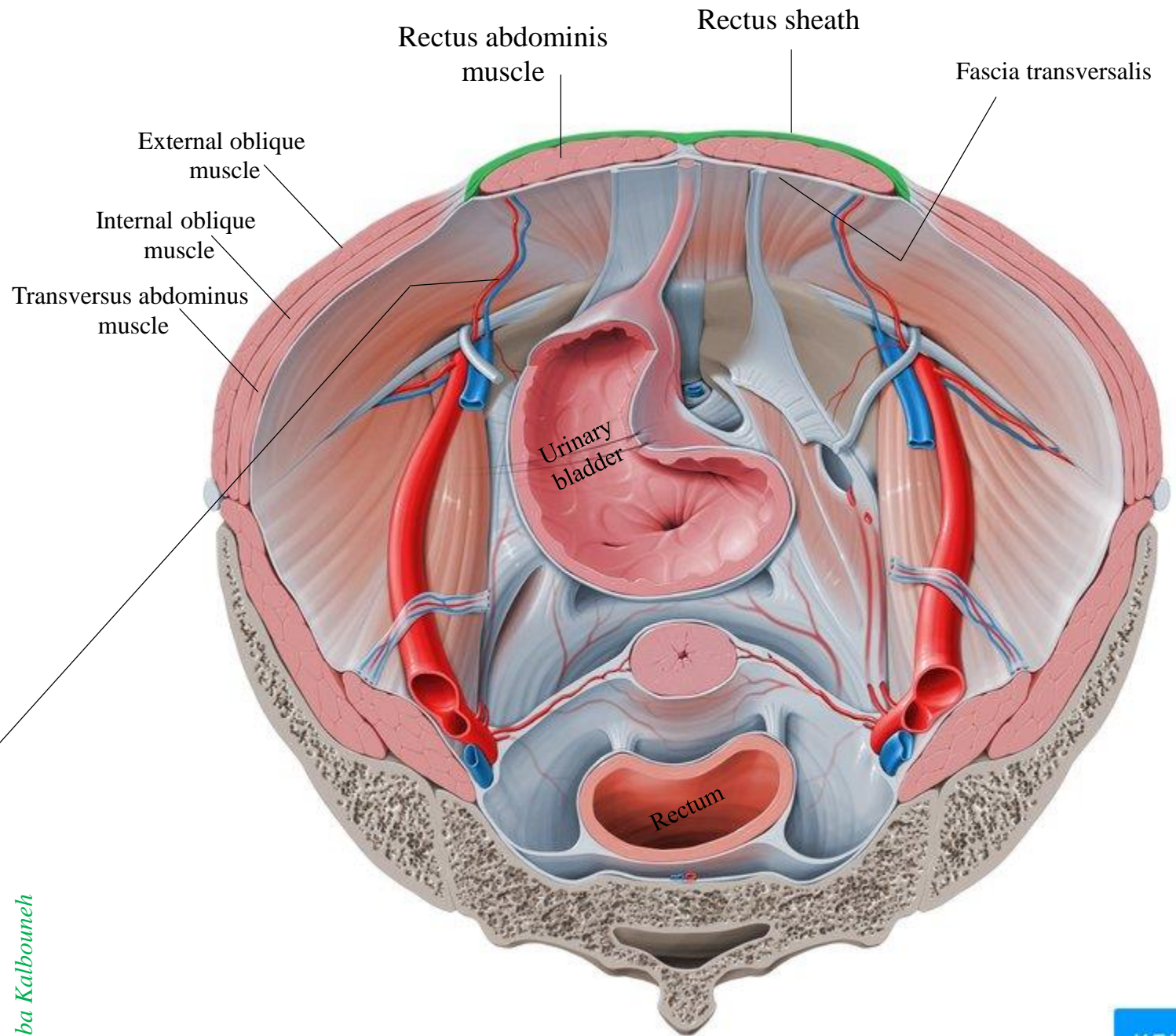
*Note: The posterior wall of the rectus sheath is not attached to the rectus abdominis muscle. while The anterior wall is firmly attached to it by the muscle's tendinous intersections*



It should be noted that where the aponeuroses forming the posterior wall pass in front of the rectus at the level of the anterior superior iliac spine, the posterior wall has a free, curved lower border called **the arcuate line**.

The **arcuate line of rectus sheath** (the **arcuate line** or the **semicircular line of Douglas**) is a line of demarcation corresponding to the free inferior margin of the posterior layer of the rectus sheath inferior to which only the anterior layer of the rectus sheath is present and the rectus abdominis muscle is therefore in direct contact with the transversalis fascia

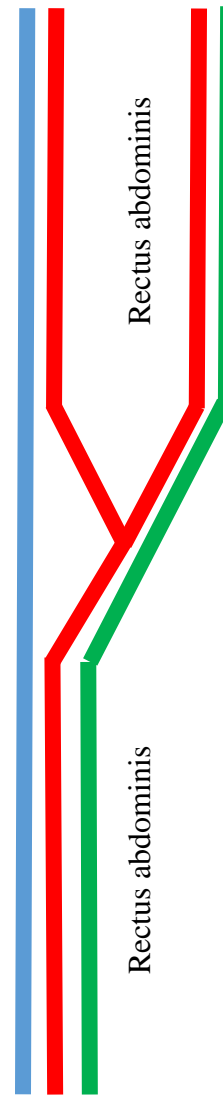
At this site, the **inferior epigastric vessels** enter the rectus sheath and pass upward to anastomose with the superior epigastric vessels.





Anterior

Posterior



**The arcuate line is visible upon the inner surface of the abdominal wall**

at the level of the anterior superior iliac spine,

**External oblique**

**Internal oblique**

**Transversus abdominis**

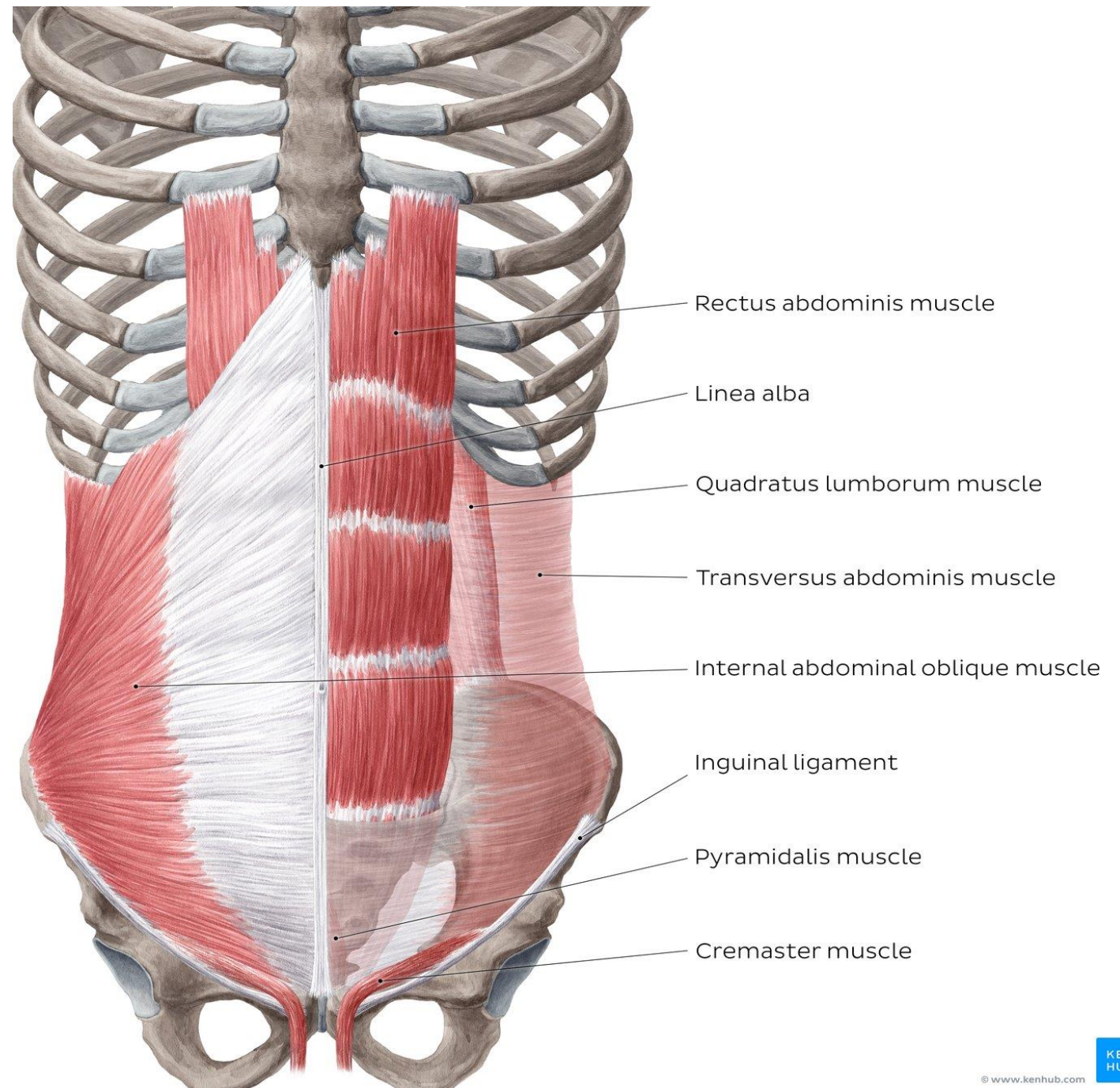
## Functions of the muscles of anterior abdominal wall:

The oblique muscles laterally flex and rotate the trunk.

The rectus abdominis flexes the trunk and stabilizes the pelvis, and the pyramidalis keeps the linea alba taut during the process.

The muscles of the anterior and lateral abdominal walls

- Assist the diaphragm during inspiration by relaxing as the diaphragm descends so that the abdominal viscera can be accommodated.
- Assist in the act of forced expiration that occurs during coughing and sneezing by pulling down the ribs and sternum.
- Their tone plays an important part in supporting and protecting the abdominal viscera.
  - By contracting simultaneously with the diaphragm, with the glottis of the larynx closed, they increase the intra-abdominal pressure and help in micturition, defecation, vomiting, and parturition.





## Fascia Transversalis

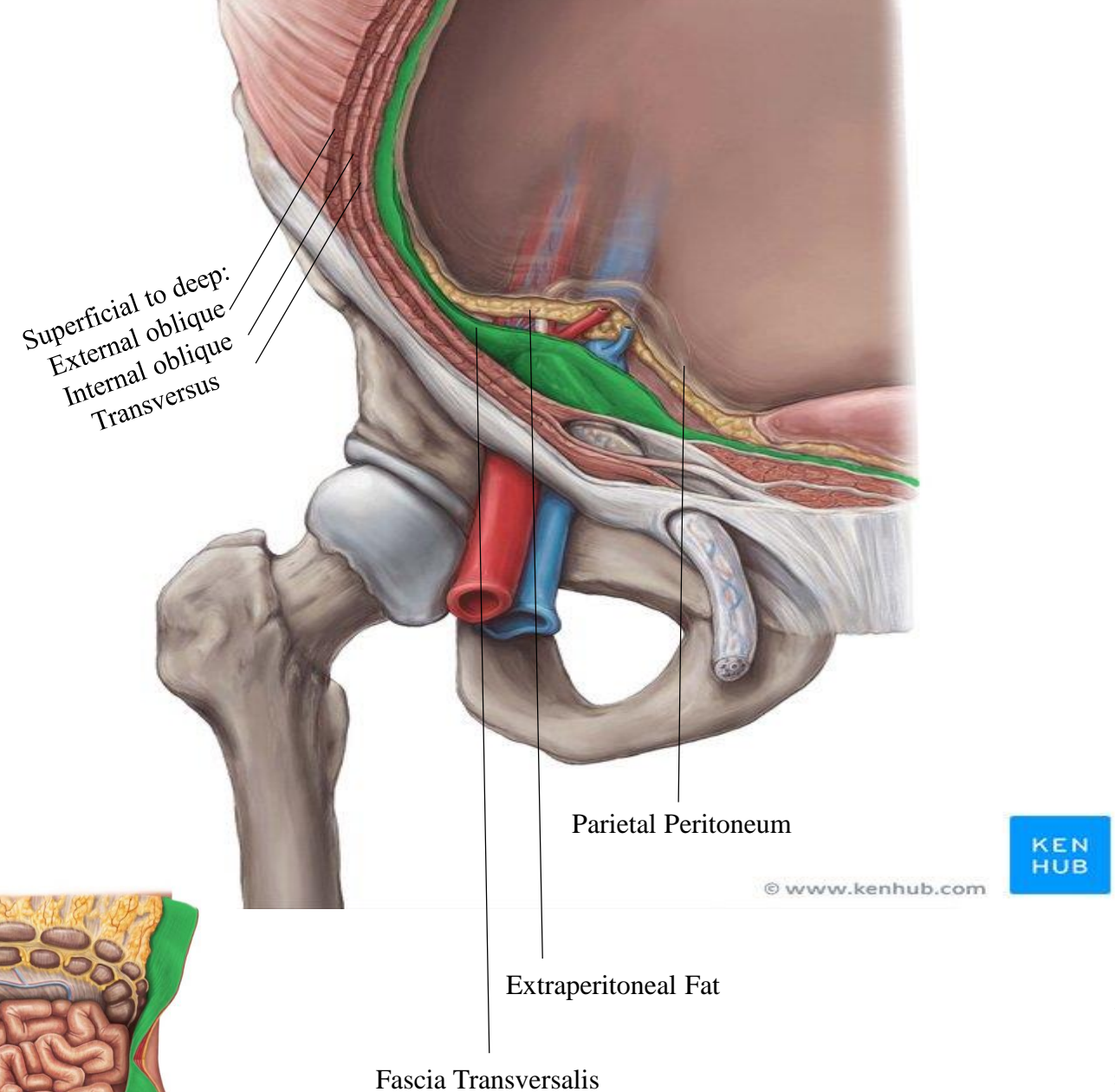
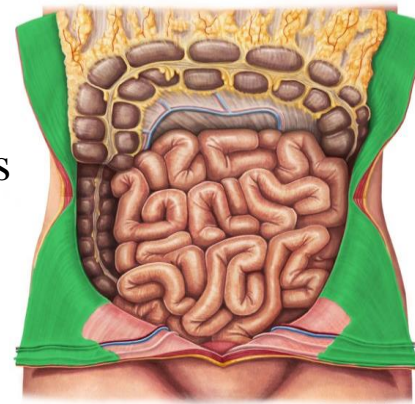
The fascia transversalis is a thin layer of fascia that lines the transversus abdominis muscle and is continuous with a similar layer lining the diaphragm and the iliacus muscle.

## Extraperitoneal Fat

The extraperitoneal fat is a thin layer of connective tissue that contains a variable amount of fat and lies between the fascia transversalis and the parietal peritoneum.

## Parietal Peritoneum

The walls of the abdomen are lined with parietal peritoneum. This is a thin serous membrane and is continuous below with the parietal peritoneum lining the pelvis.



Superficial to deep:  
External oblique  
Internal oblique  
Transversus

Parietal Peritoneum

Extraperitoneal Fat

Fascia Transversalis



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# Muscle Rigidity and Referred Pain

Sometimes it is difficult for a physician to decide whether the muscles of the anterior abdominal wall of a patient are rigid because of underlying inflammation of the parietal peritoneum or whether the patient is voluntarily contracting the muscles because he or she resents being examined or because the physician's hand is cold. This problem is usually easily solved by asking the patient, who is lying supine on the examination table, **to rest the arms by the sides and draw up the knees to flex the hip joints.**

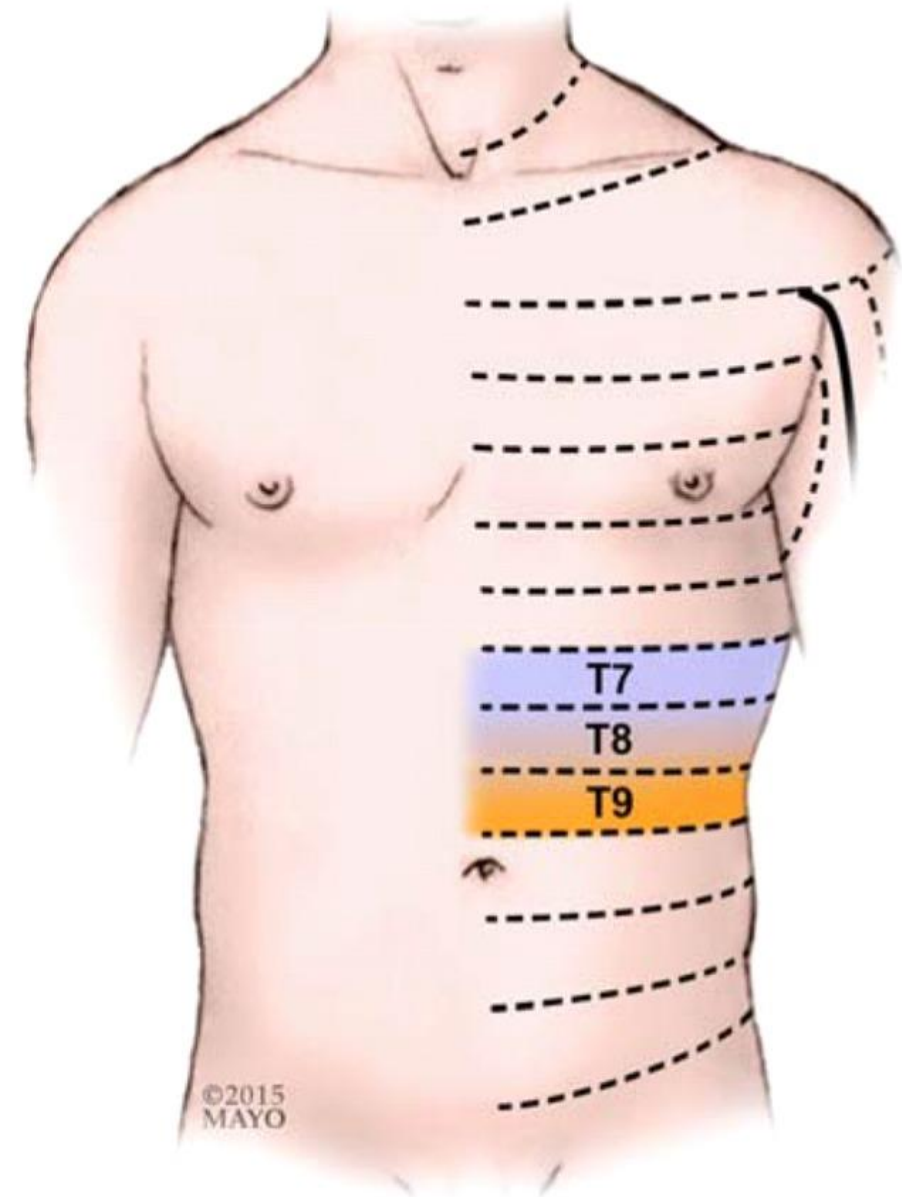
It is practically impossible for a patient to keep the abdominal musculature tensed when the thighs are flexed. Needless to say, the examiner's hand should be warm.

A pleurisy involving the lower costal parietal pleura causes pain in the overlying skin that may radiate down into the abdomen. Although it is unlikely to cause rigidity of the abdominal muscles, it may cause confusion in making a diagnosis unless these anatomic facts are remembered.

It is useful to remember the following:

Dermatomes over:

- The xiphoid process: T7
- The umbilicus: T10
- The pubis: L1

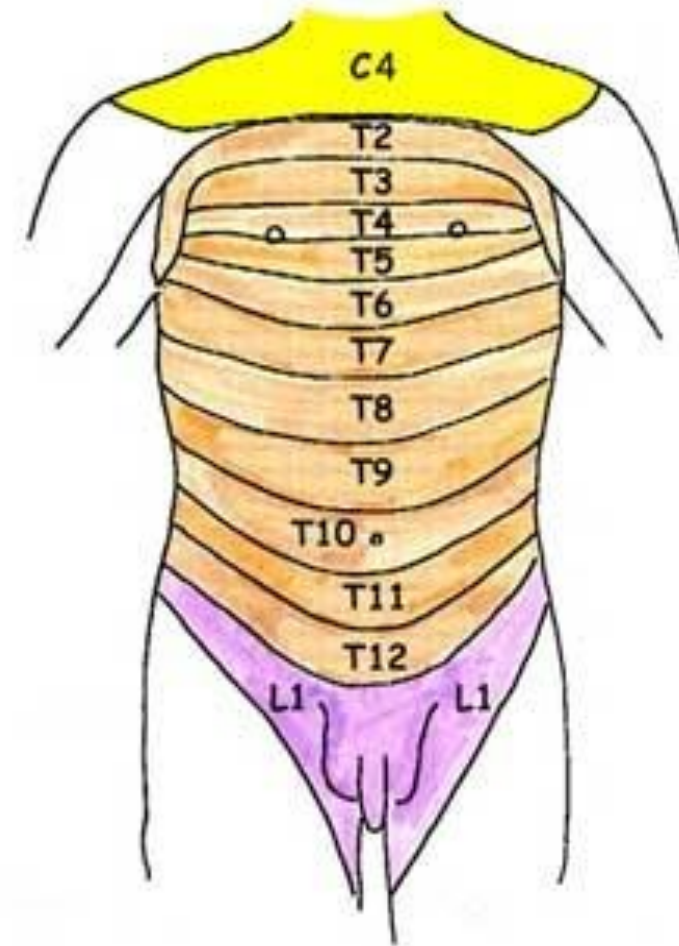




## Summary ..... Nerves of the Anterior Abdominal Wall

- ✓ The nerves of the anterior abdominal wall are **the anterior rami of the lower six thoracic and the first lumbar nerves**. They pass forward in the interval between the internal oblique and the transversus muscles.
- ✓ The thoracic nerves are the lower five intercostal nerves and the subcostal nerves, and the first lumbar nerve is represented by the iliohypogastric and ilioinguinal nerves, branches of the lumbar plexus.
- ✓ They supply the skin of the anterior abdominal wall, the muscles, and the parietal peritoneum.
- ✓ The lower six thoracic nerves pierce the posterior wall of the rectus sheath to supply the rectus muscle and the pyramidalis (T12 only). They terminate by piercing the anterior wall of the sheath and supplying the skin.
- ✓ The first lumbar nerve has a similar course, but it does not enter the rectus sheath. It is represented by the iliohypogastric nerve, which pierces the external oblique aponeurosis above the superficial inguinal ring, and by the ilioinguinal nerve, which emerges through the ring. They end by supplying the skin just above the inguinal ligament and symphysis pubis.

## DERMATOMES OF THORAX AND ABDOMEN



## Arteries of the Anterior Abdominal Wall

### The **superior epigastric artery**:

- ✓ One of the terminal branches of the internal thoracic artery
- ✓ It enters the upper part of the rectus sheath.
- ✓ It descends behind the rectus muscle, supplying the upper central part of the anterior abdominal wall.
- ✓ It anastomoses with the inferior epigastric artery.

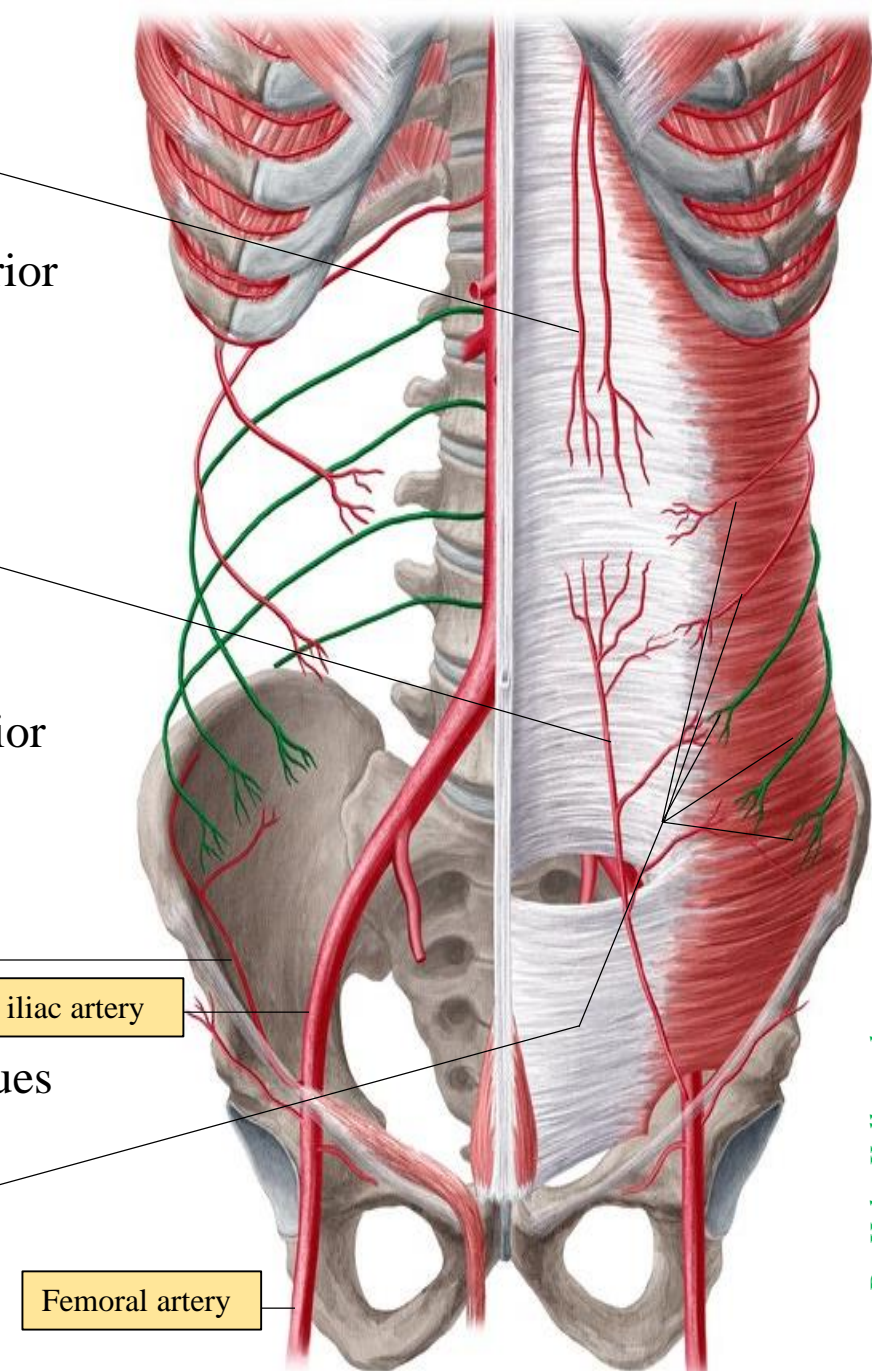
### The **inferior epigastric artery**:

- ✓ Is a branch of the external iliac artery just above the inguinal ligament.
- ✓ It runs upward and medially.
- ✓ It pierces the fascia transversalis to enter the rectus sheath.
- ✓ It ascends behind the rectus muscle, supplying the lower central part of the anterior abdominal wall
- ✓ It anastomoses with the superior epigastric artery.

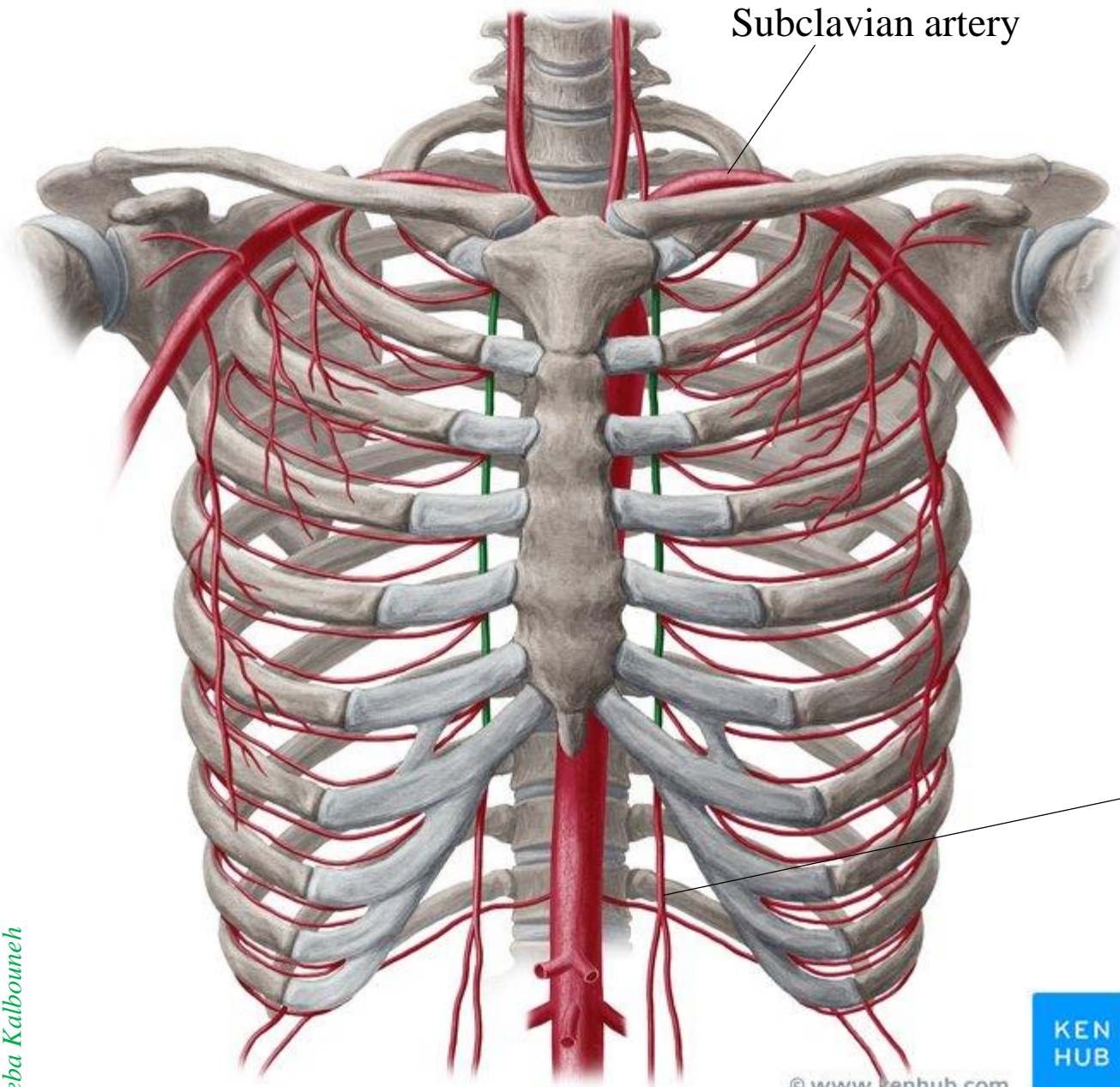
### The **deep circumflex iliac artery**:

- ✓ Is a branch of the external iliac artery just above the inguinal ligament.
- ✓ It runs upward and laterally toward the anterosuperior iliac spine and then continues along the iliac crest. 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.





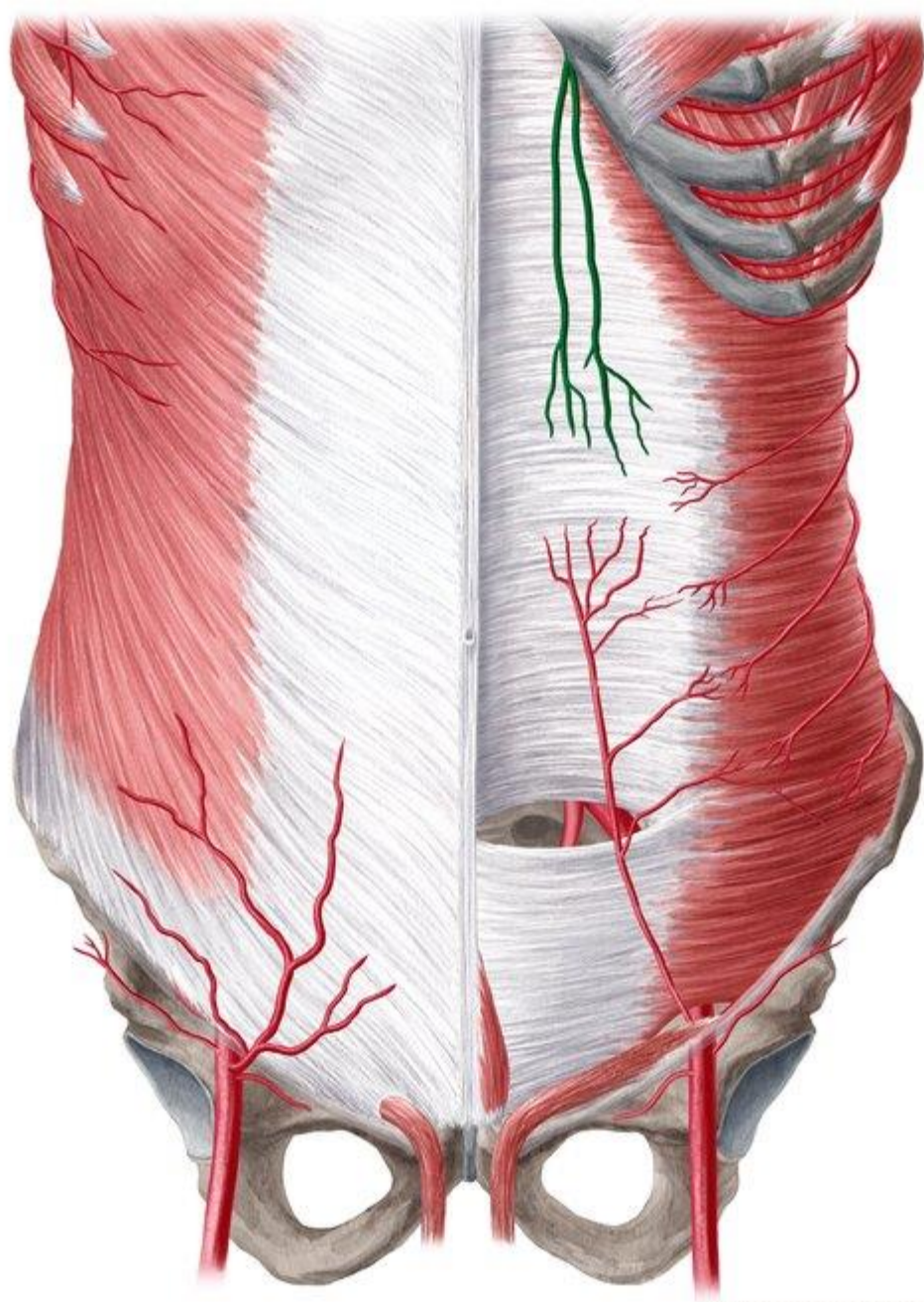


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The **internal thoracic artery** (internal mammary artery) is a long, paired vessel that originates from the proximal part of the subclavian artery.

Terminating at the level of the sixth rib, it divides into two terminal branches:

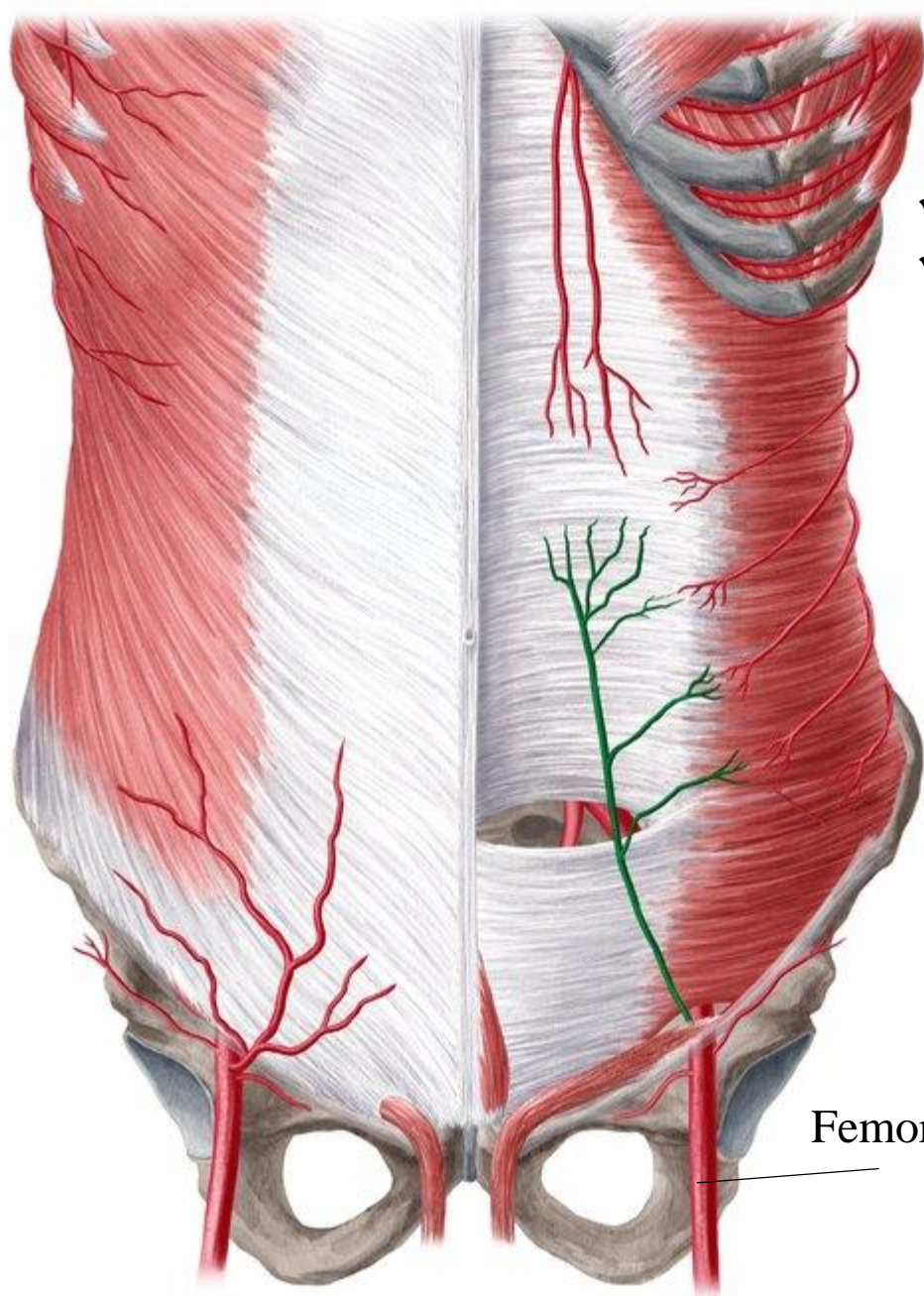
- 1- Superior epigastric artery
- 2- Musculophrenic arteries.



## **Superior epigastric artery**

is a terminal branch of the internal thoracic artery that contributes to the blood supply of the anterior abdominal wall

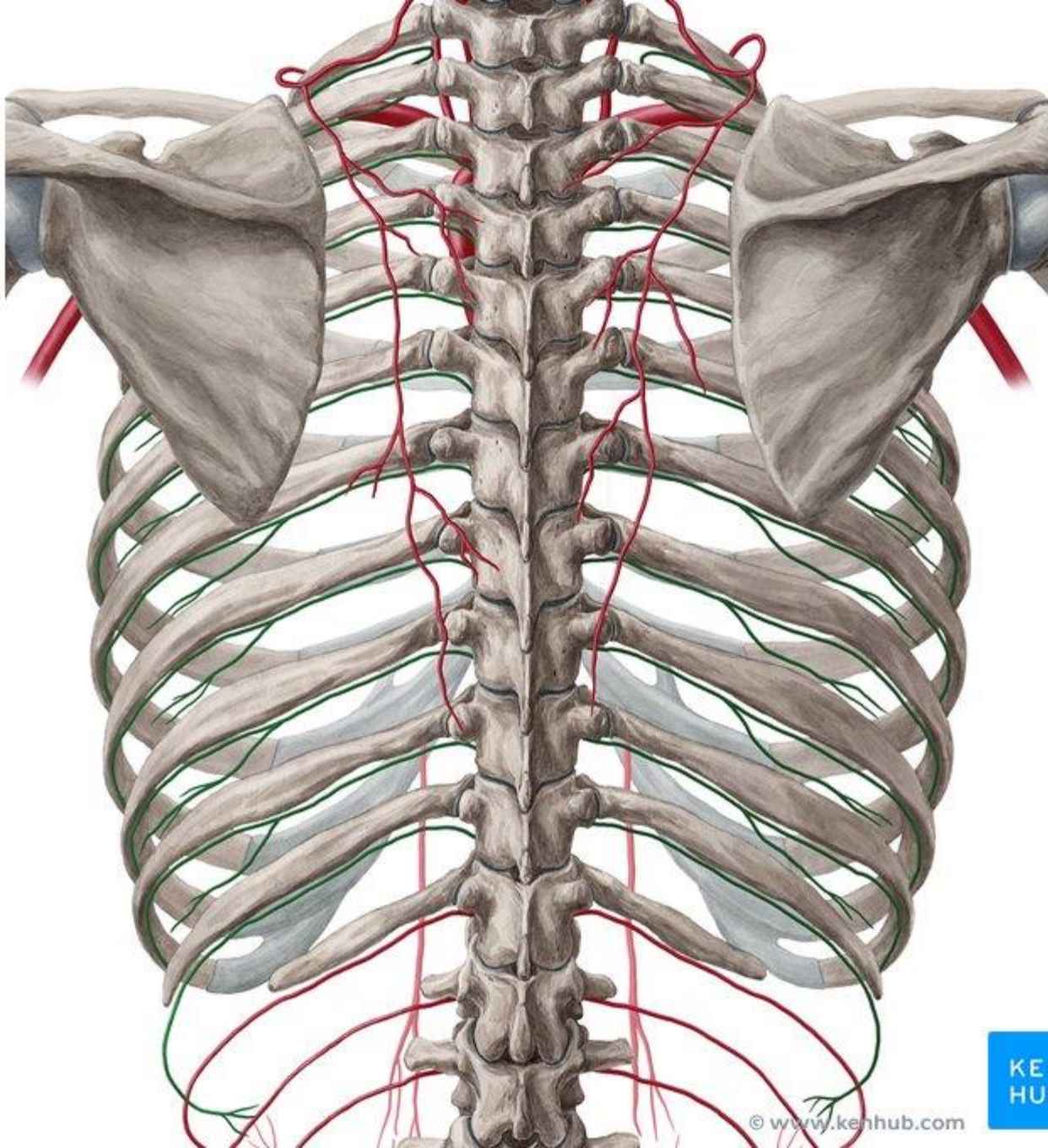




## Inferior epigastric artery

- ✓ It is a branch from external iliac artery
- ✓ It traverses the arcuate line of rectus sheath to enter the rectus sheath, then anastomoses with the superior epigastric artery within the rectus sheath

Femoral artery

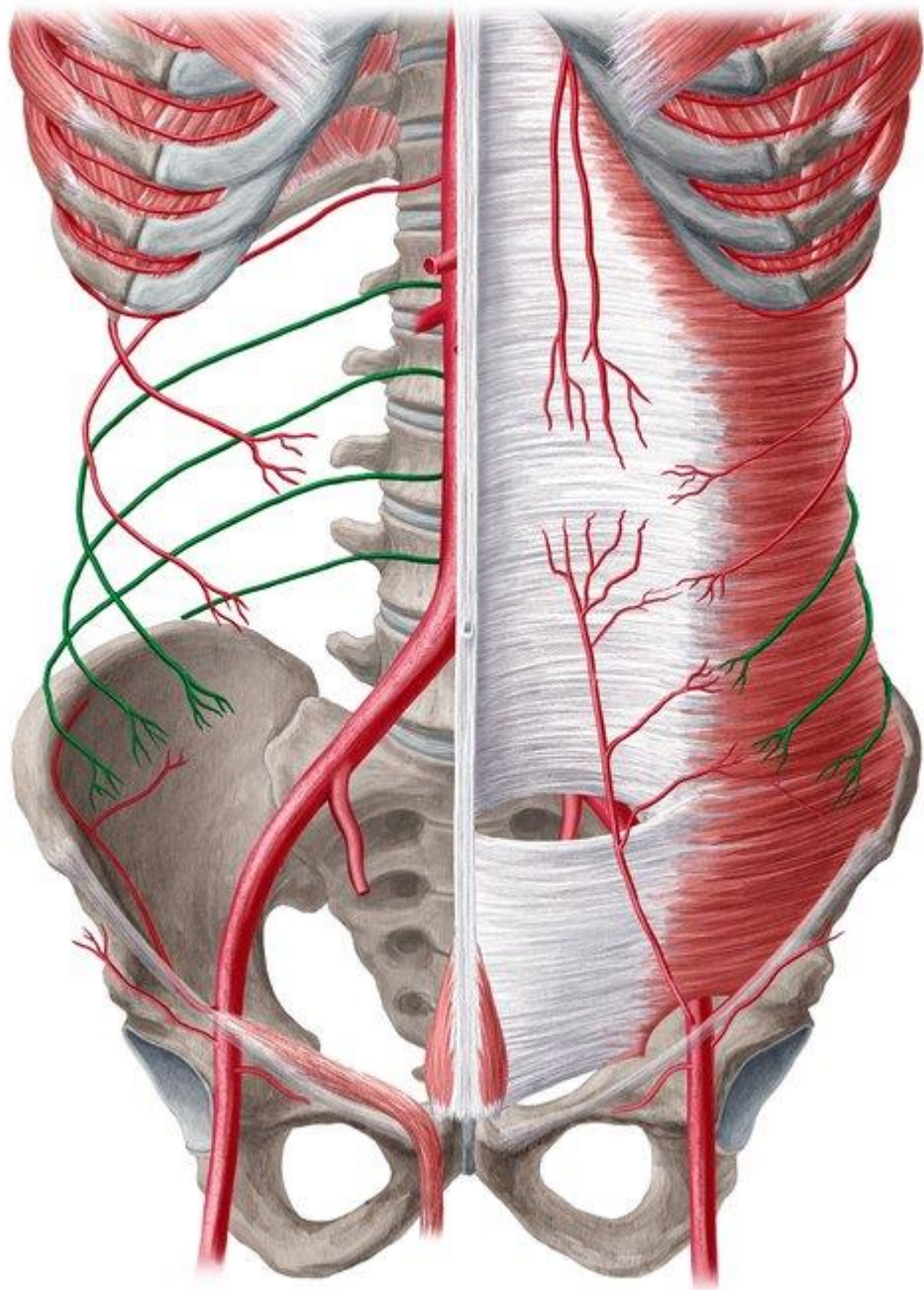


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## Posterior intercostal arteries

- ✓ The first and second posterior intercostal arteries originate from the superior intercostal artery, a branch of the costocervical trunk (a branch from subclavian artery).
- ✓ Third to eleventh posterior intercostal arteries arise directly from the posterior surface of the thoracic aorta.
- ✓ Subcostal artery !!





## Lumbar arteries

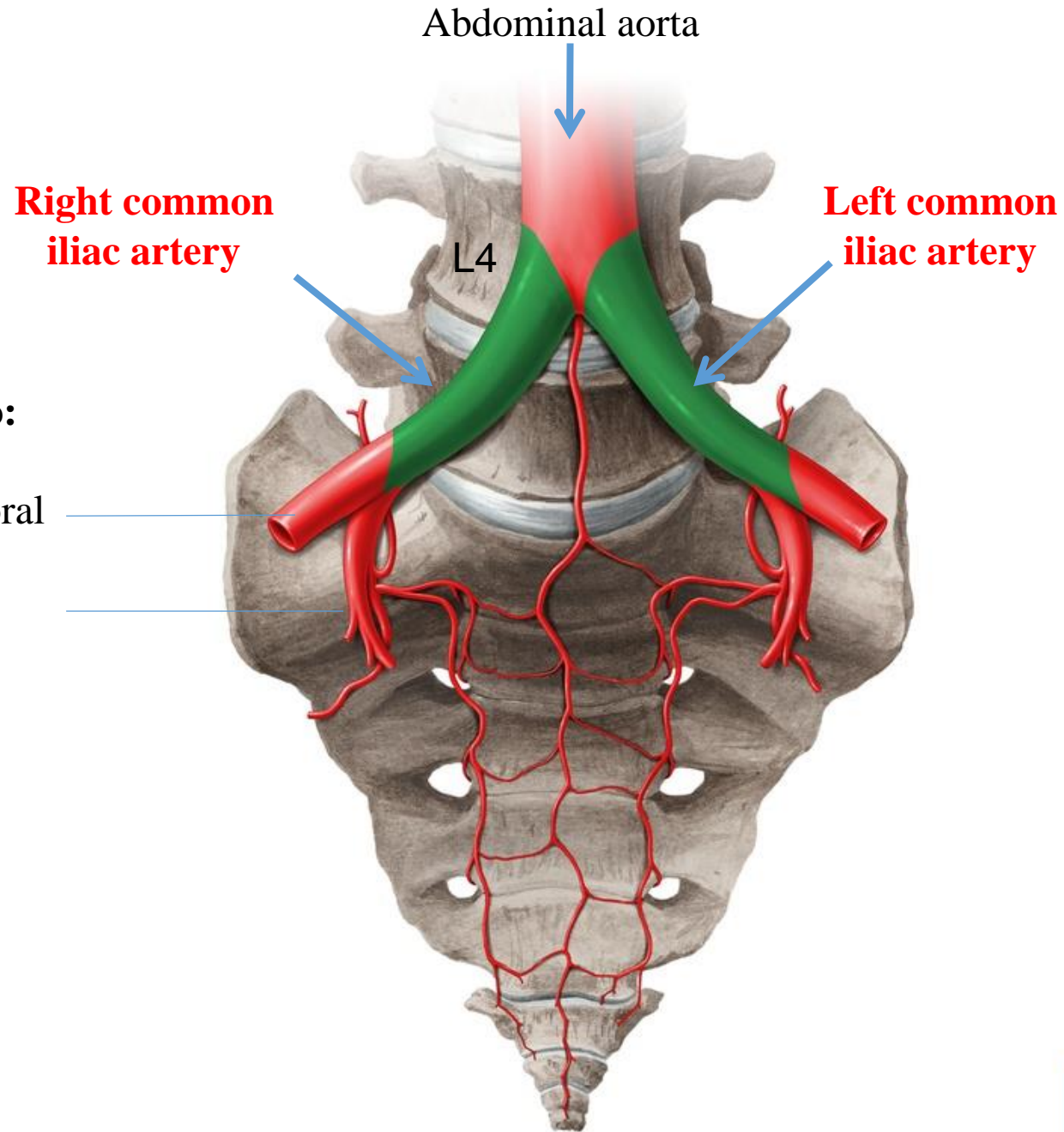
Branches from abdominal aorta

Abdominal aorta bifurcates into the **left and right common iliac arteries**

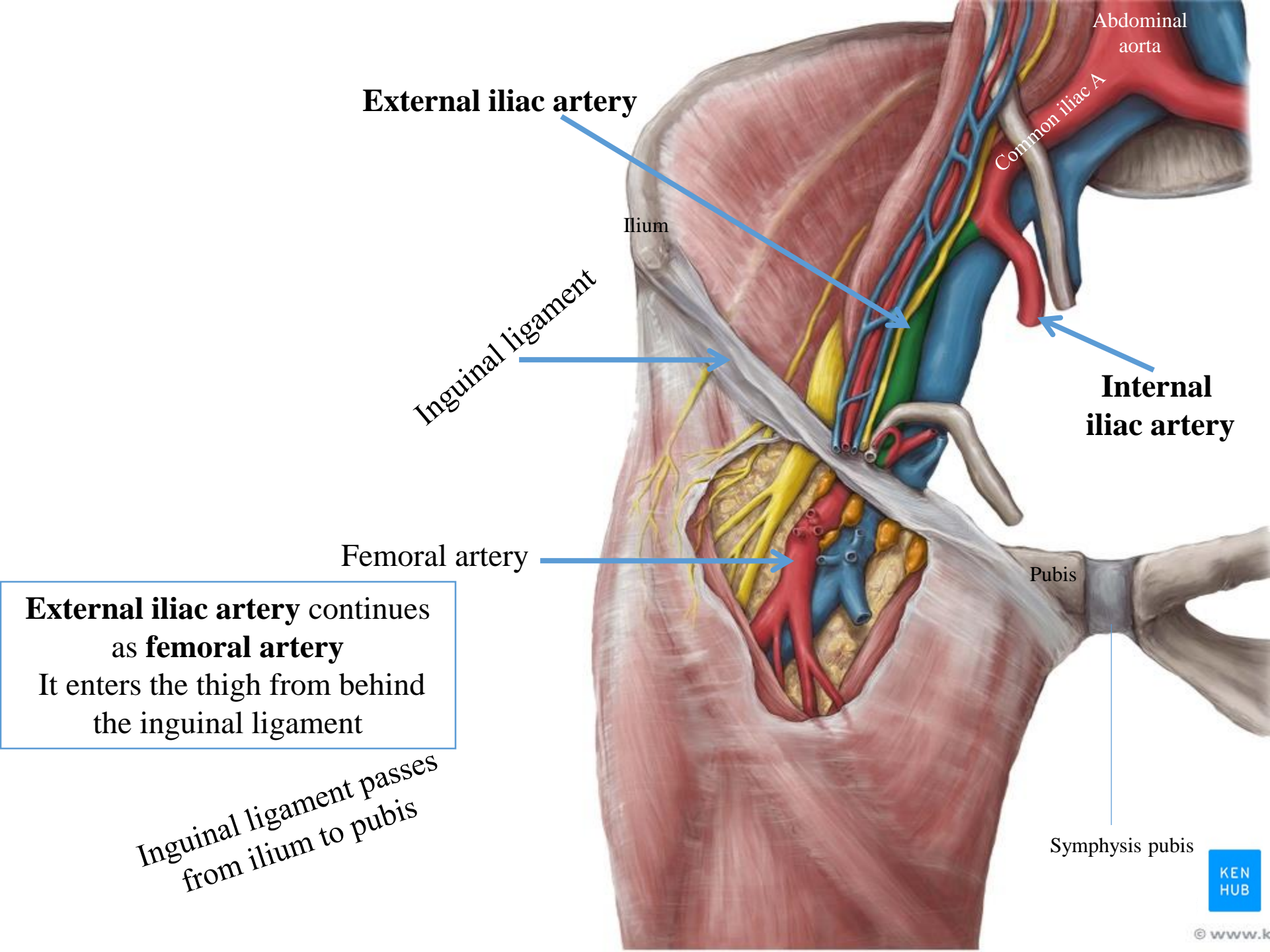
**Each common iliac artery divides into:**

**External iliac artery** continues as femoral artery and supplies the lower limb

**Internal iliac artery** supplies the pelvis







**External iliac artery** continues as **femoral artery**  
It enters the thigh from behind the inguinal ligament

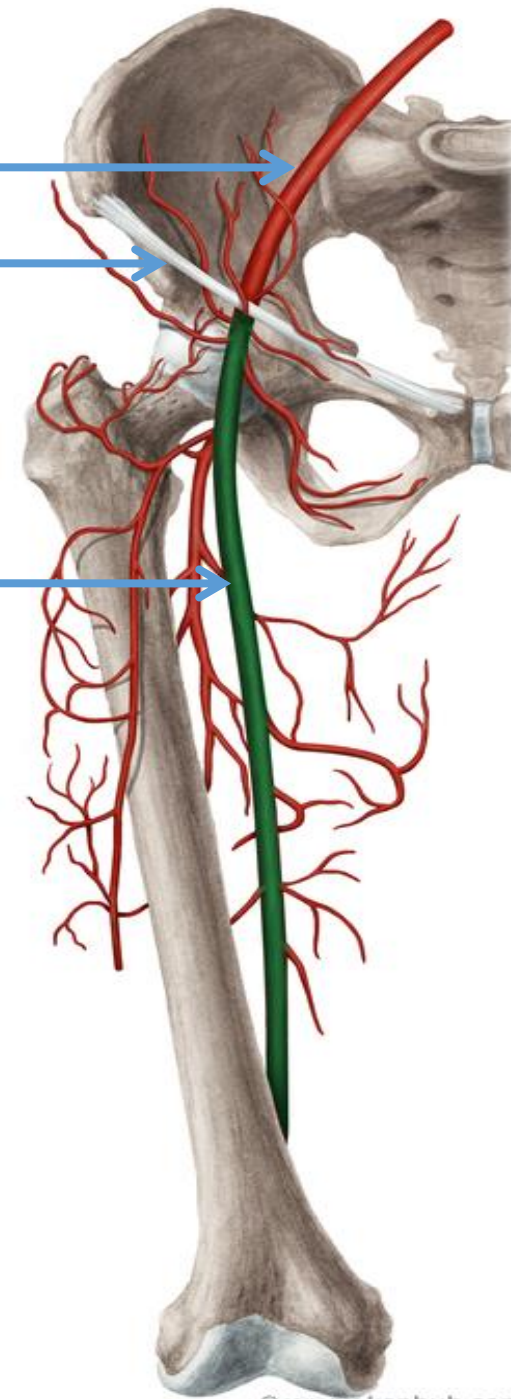
Inguinal ligament passes from ilium to pubis

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External iliac artery

Inguinal ligament

Femoral artery



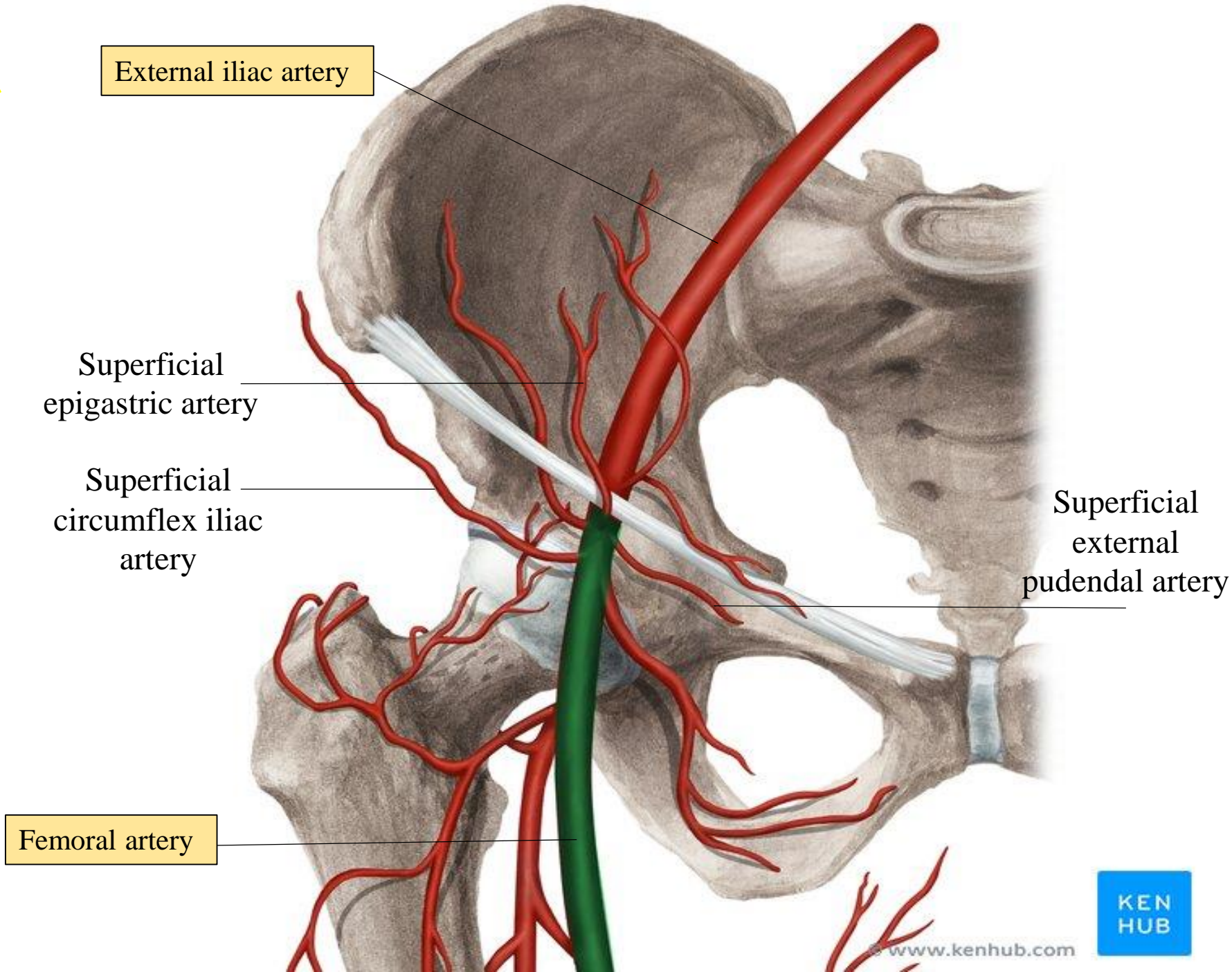
Branches of femoral artery that supply the skin of the anterior abdominal wall over the inguinal area:

- 1- Superficial epigastric artery
- 2- Superficial circumflex iliac artery
- 3- Superficial external pudendal artery



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NOTE: The skin in the inguinal region is supplied by the superficial epigastric, the superficial circumflex iliac, and the superficial external pudendal arteries, branches of the femoral artery.



# Veins of the Anterior Abdominal Wall

## Superficial Veins

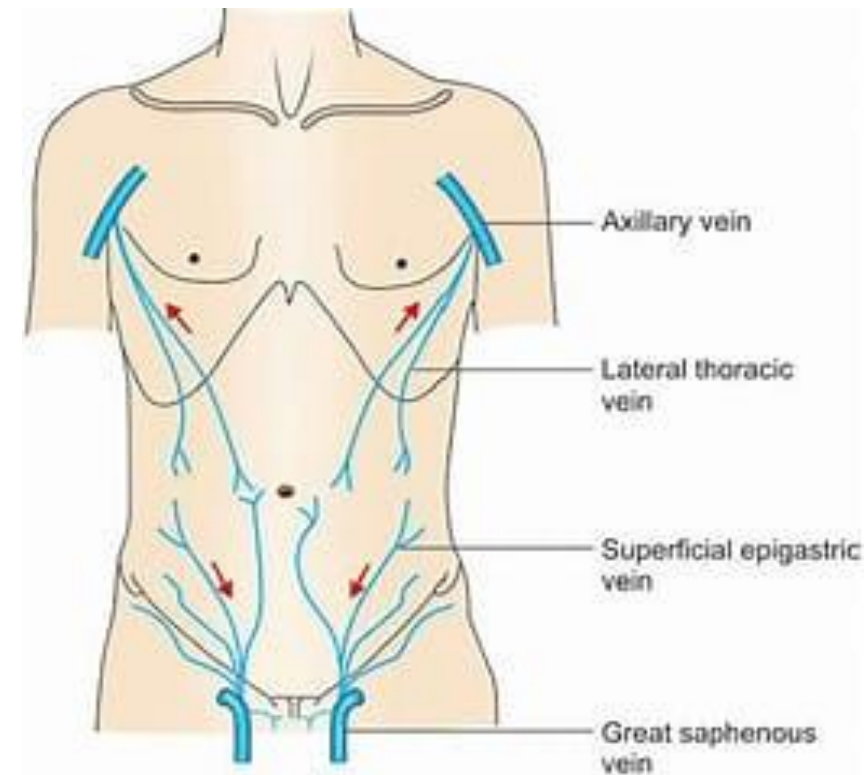
The superficial veins form a network that radiates out from the umbilicus.

### Above the umbilicus:

The network is drained into the axillary vein via the *lateral thoracic vein*.

### Below the umbilicus:

The network is drained into the great saphenous veins (then into femoral vein) via the *superficial epigastric vein*.



A few small veins, the paraumbilical veins, connect the network through the umbilicus and along the ligamentum teres to the portal vein. This forms an important portal-systemic venous anastomosis.



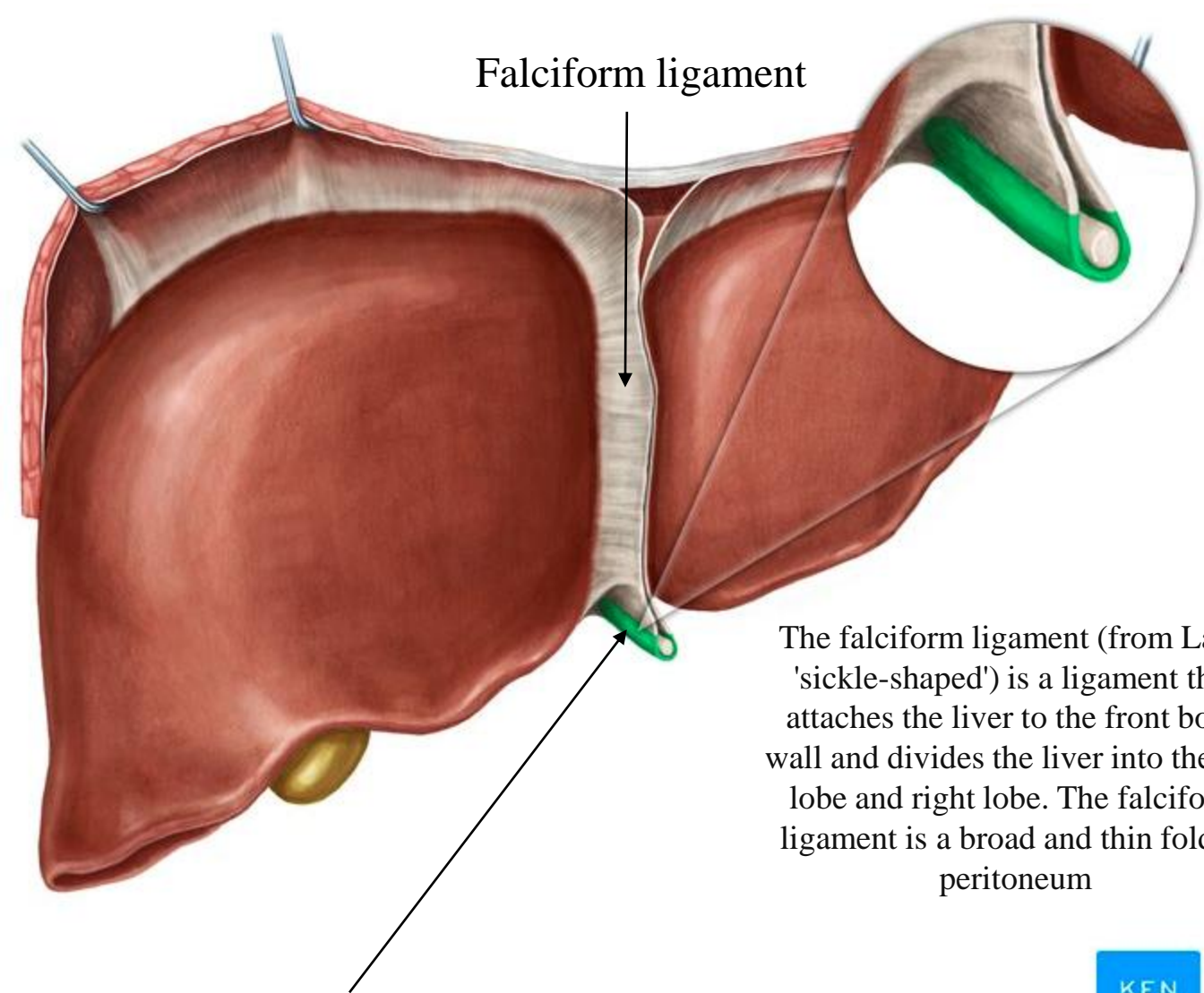
## Portal Vein Obstruction



In cases of portal vein obstruction/ portal hypertension, the superficial veins around the umbilicus and the paraumbilical veins become grossly distended. The distended subcutaneous veins radiate out from the umbilicus, producing in severe cases the clinical picture referred to as **caput medusae**.







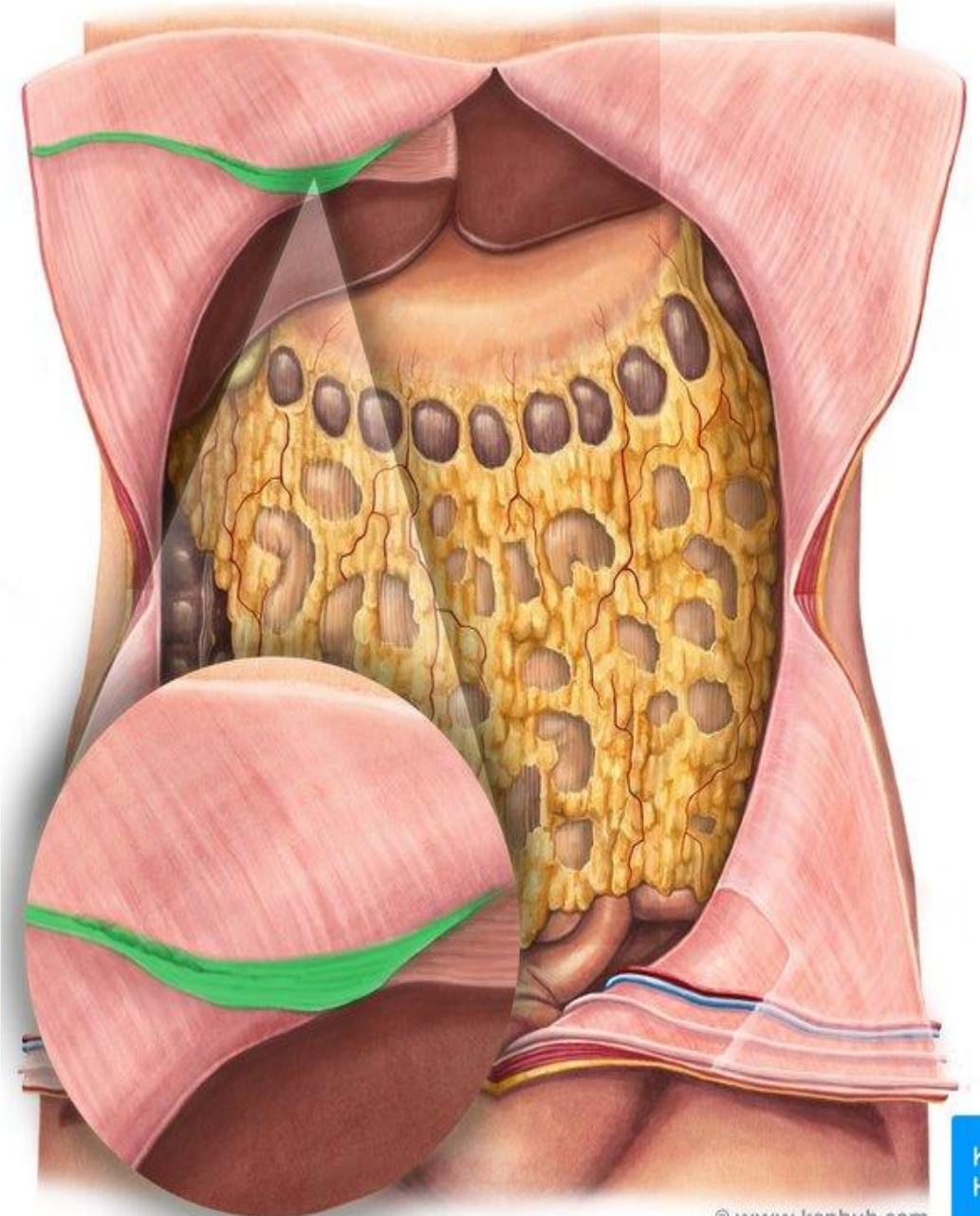
Falciform ligament

The falciform ligament (from Latin 'sickle-shaped') is a ligament that attaches the liver to the front body wall and divides the liver into the left lobe and right lobe. The falciform ligament is a broad and thin fold of peritoneum

The **ligamentum teres**, also known as the round ligament of the liver, is a fibrous cord formed by the obliterated fetal umbilical vein. It is a ligament that connects the liver to the umbilicus

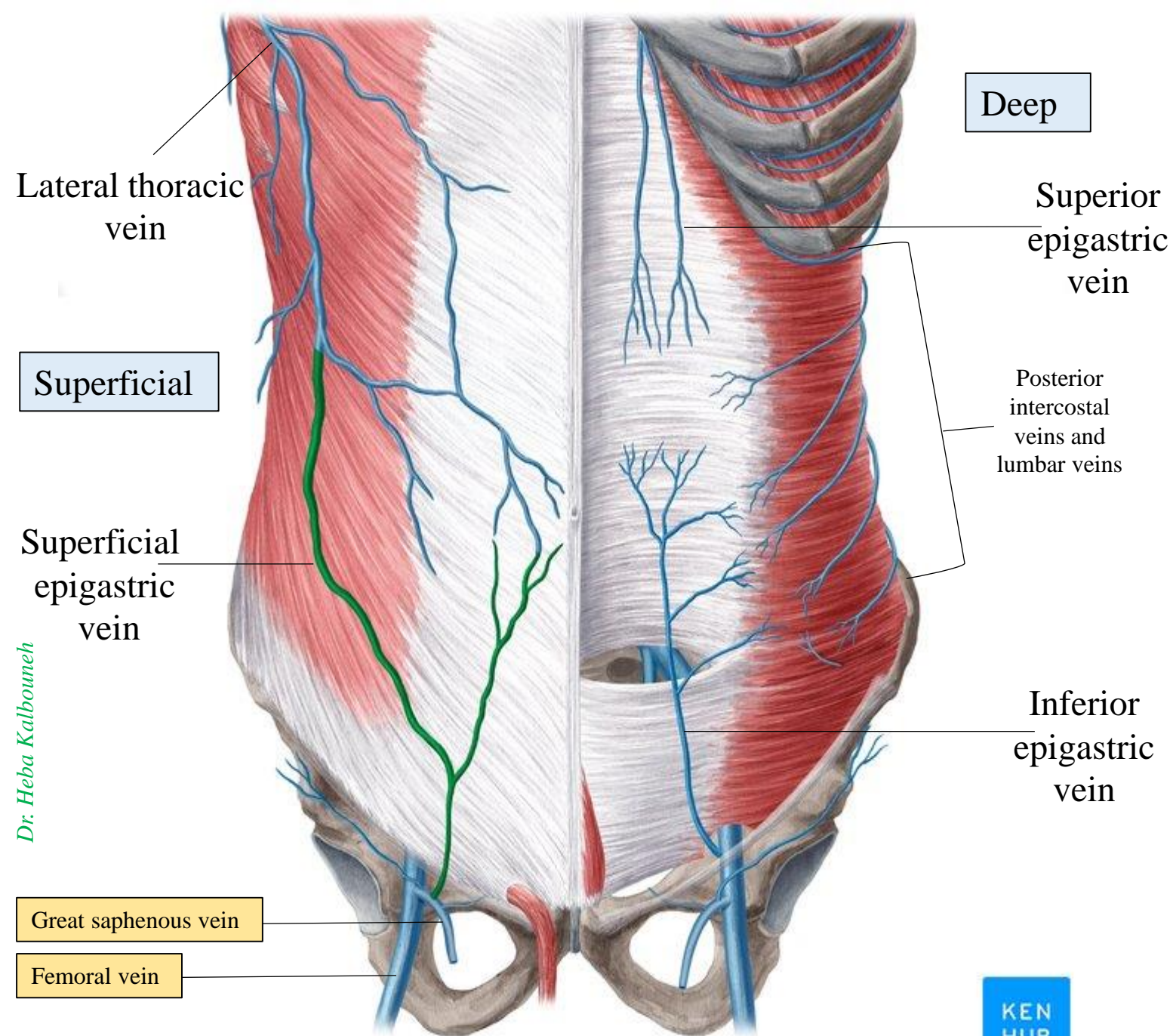


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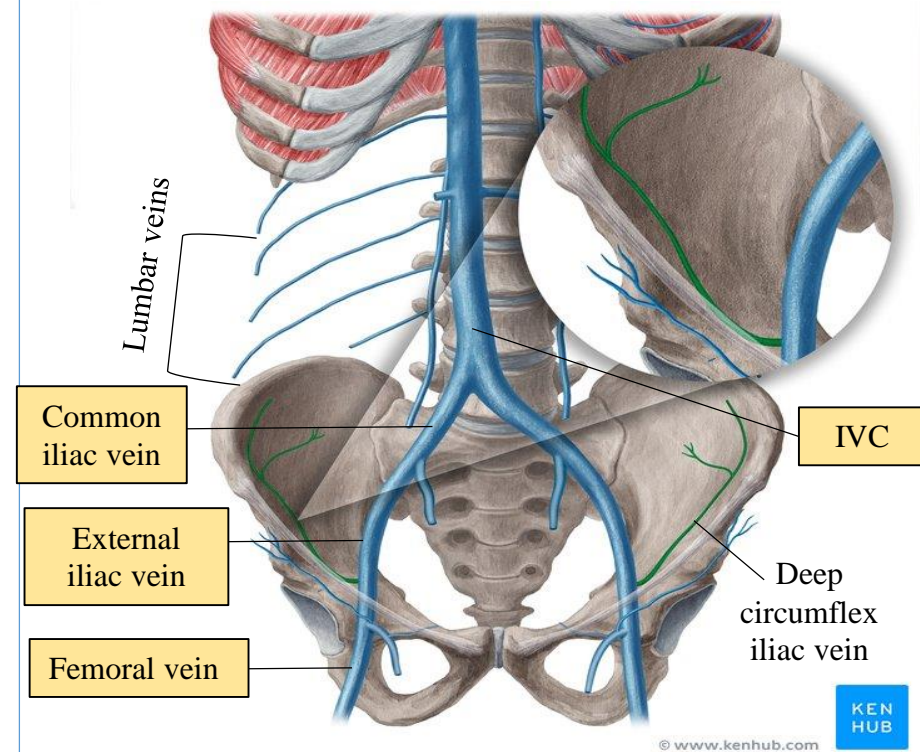




## Veins of the Anterior Abdominal Wall

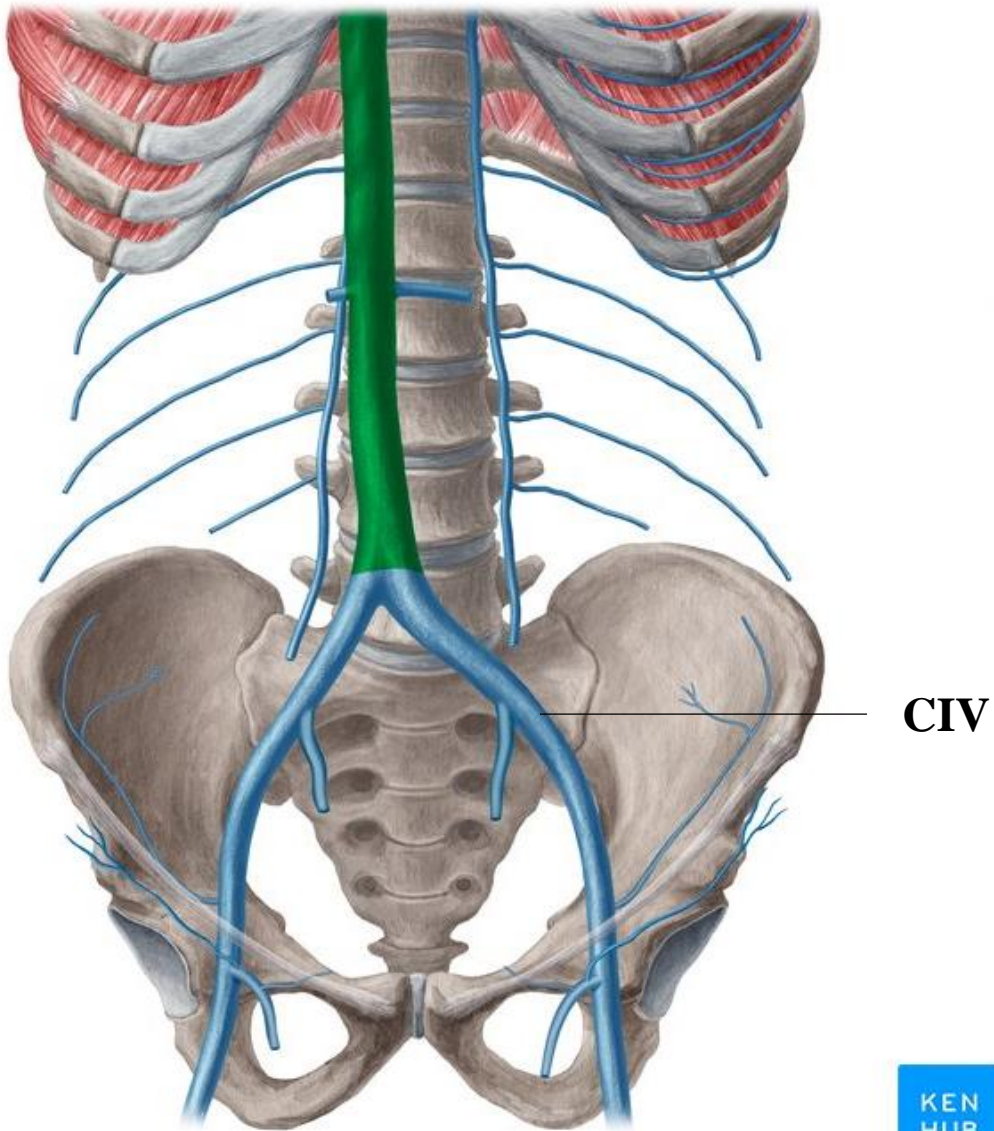
### Deep Veins

The deep veins of the abdominal wall, the superior epigastric, inferior epigastric, and deep circumflex iliac veins, follow the arteries of the same name and drain into the internal thoracic and external iliac veins. The posterior intercostal veins drain into the azygos veins, and the lumbar veins drain into the inferior vena cava.

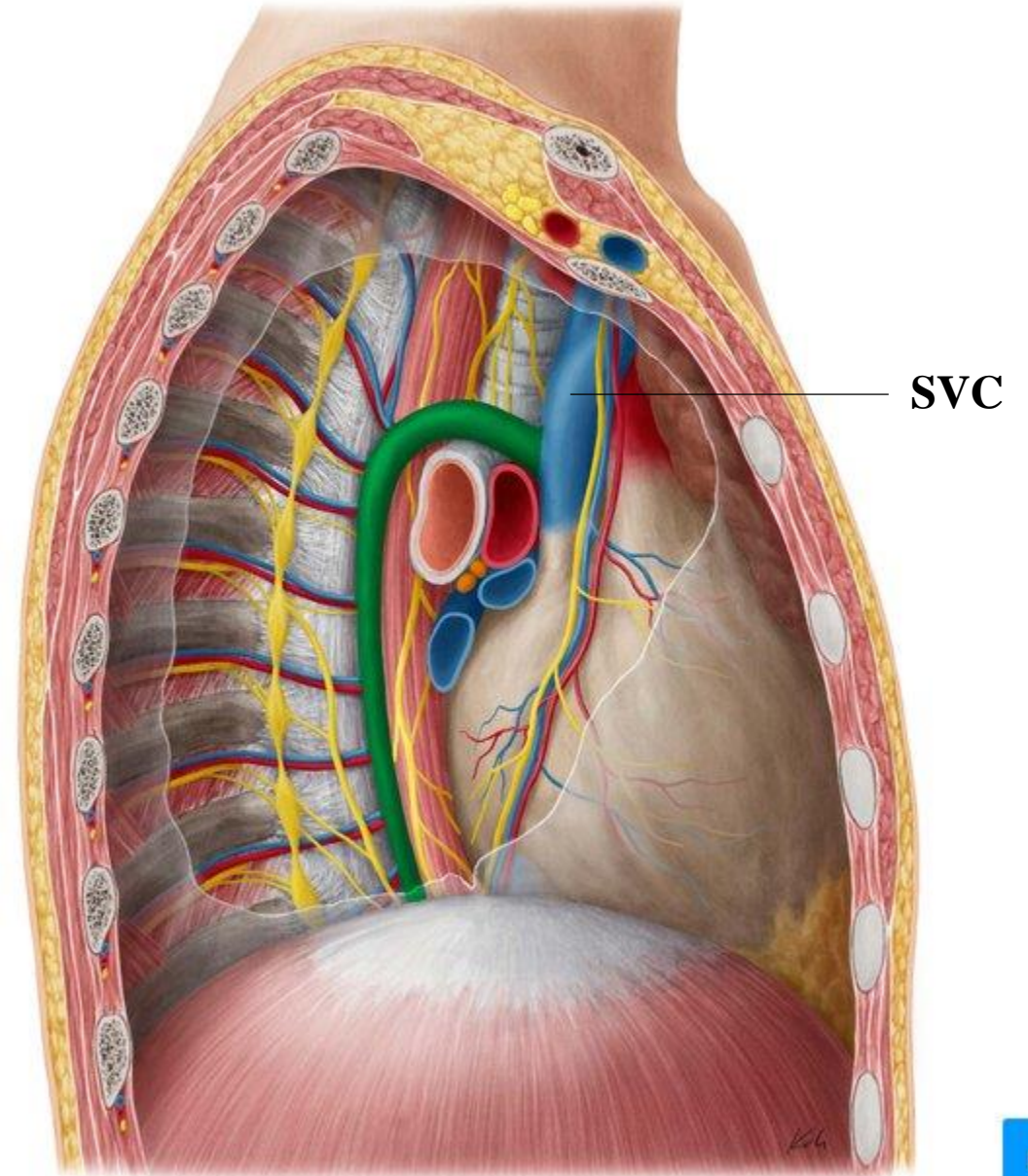




## Inferior vena cava



The **azygos vein** transports deoxygenated blood from the posterior walls of the thorax and abdomen into the superior vena cava.



# Lymph Drainage of the Anterior Abdominal Wall

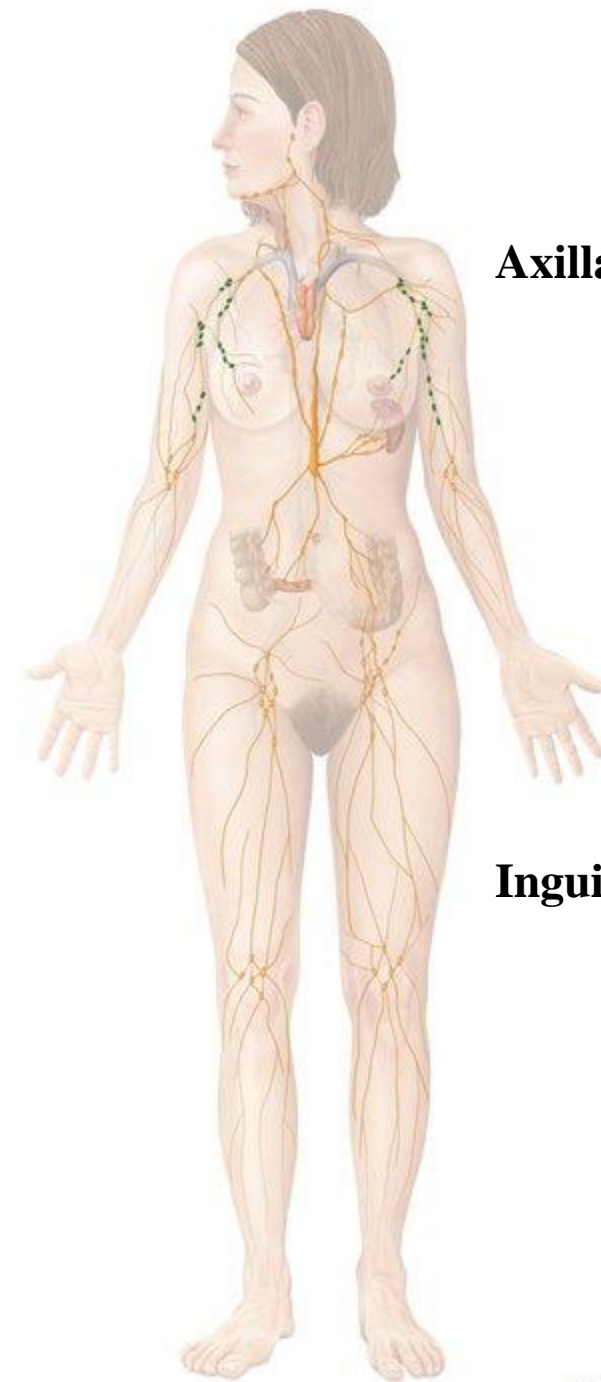
## Superficial Lymph Vessels

- ✓ The lymph drainage of the skin of the anterior abdominal wall above the level of the umbilicus is upward to the **anterior axillary group of nodes**.
- ✓ The lymph drainage of the skin of the anterior abdominal wall below the level of the umbilicus, the lymph drains downward and laterally to the **superficial inguinal nodes**.
- ✓ The lymph of the skin of the back above the level of the iliac crests is drained upward to the **posterior axillary group of nodes**
- ✓ The lymph of the skin of the back below the level of the iliac crests, it drains downward to the **superficial inguinal nodes**

*Knowledge of the areas of the skin that drain into a particular group of lymph nodes is clinically important. For example, it is possible to find a swelling in the groin (enlarged superficial inguinal node) caused by an infection or malignant tumor of the skin of the lower part of the anterior abdominal wall or that of the buttock.*

## Deep Lymph Vessels

The deep lymph vessels follow the arteries and drain into the deep lymph nodes.

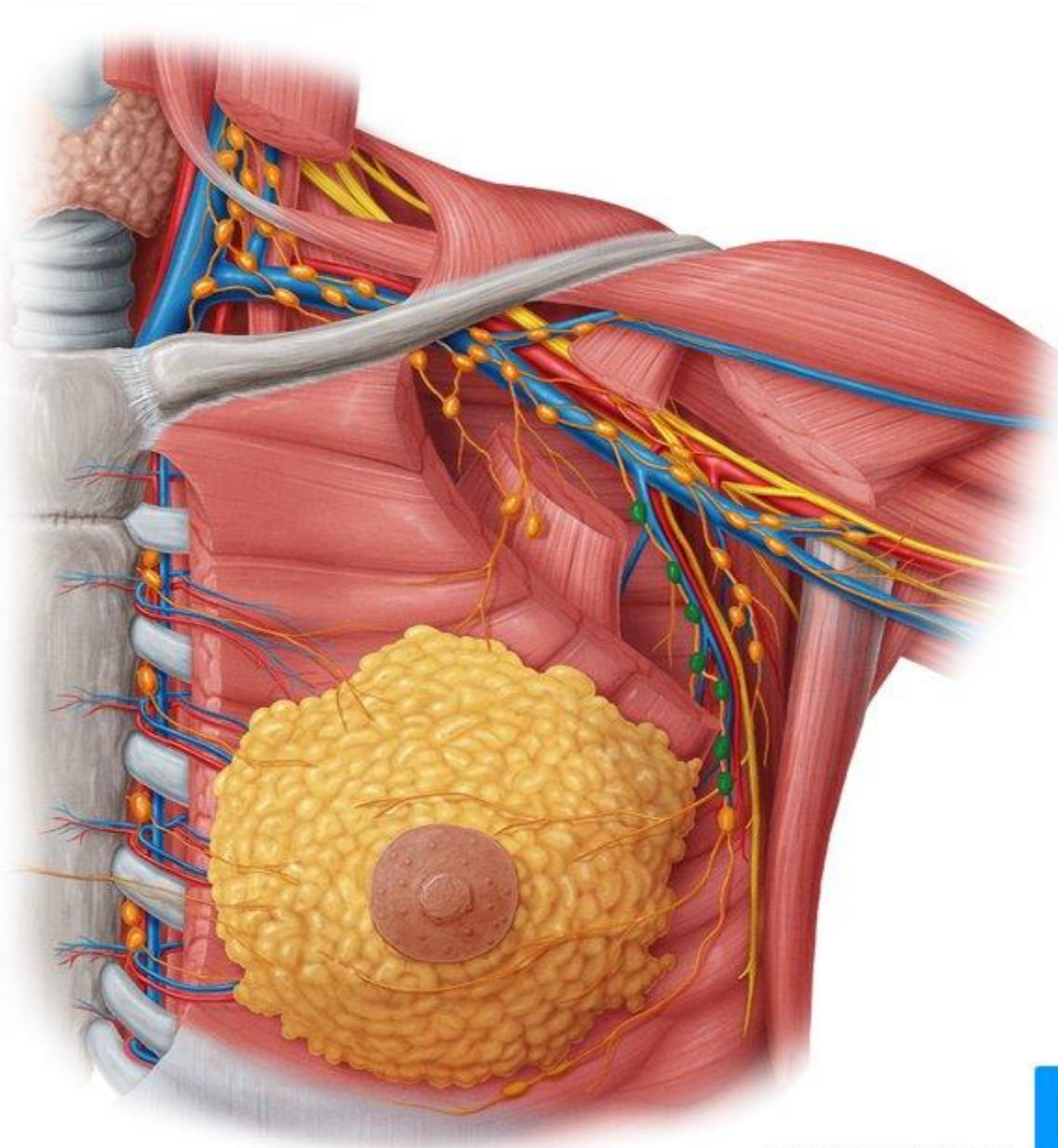


**Axillary lymph nodes**

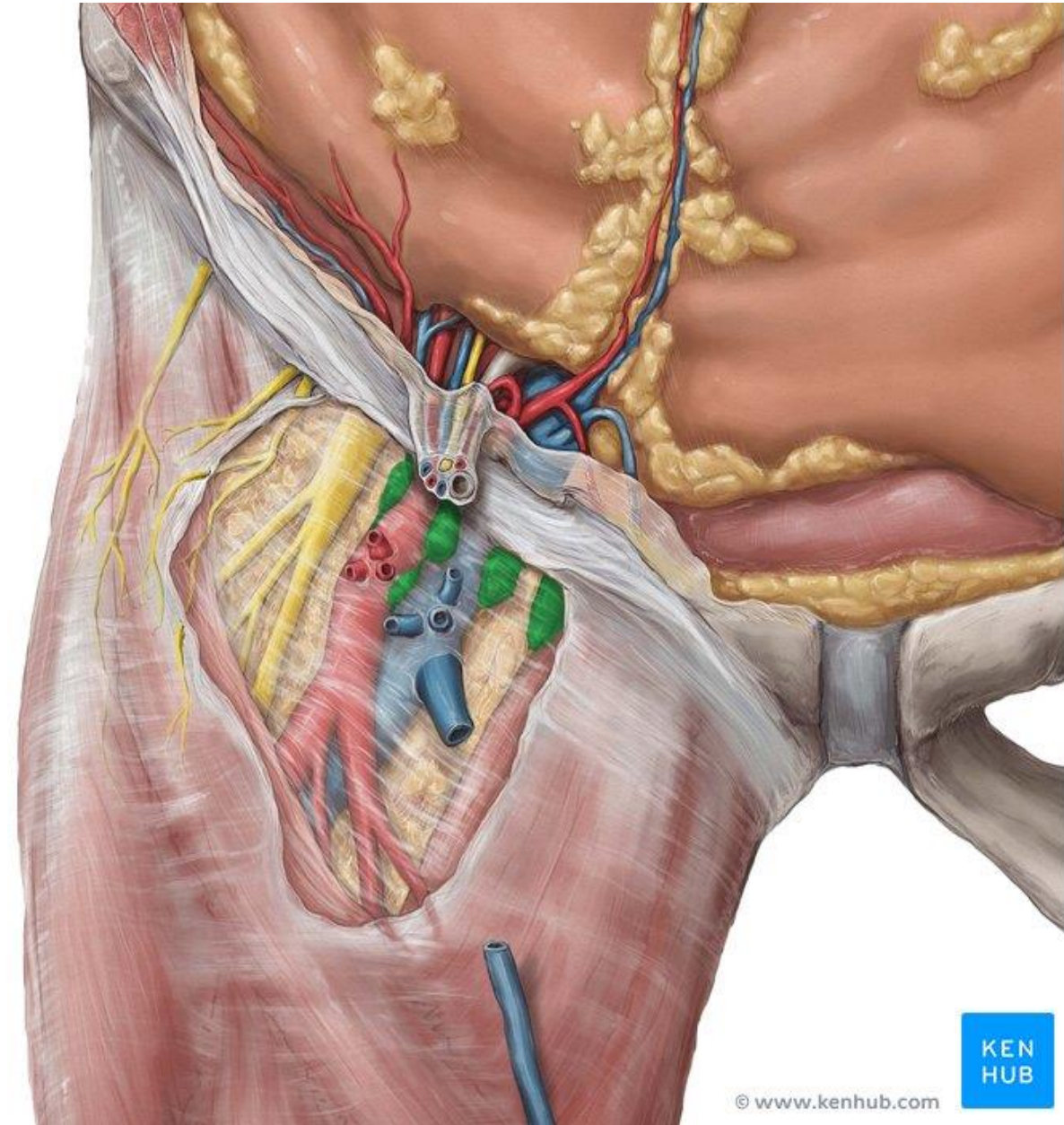
**Inguinal lymph nodes**



## Anterior axillary group of nodes



## Superficial inguinal nodes





# Inguinal Canal

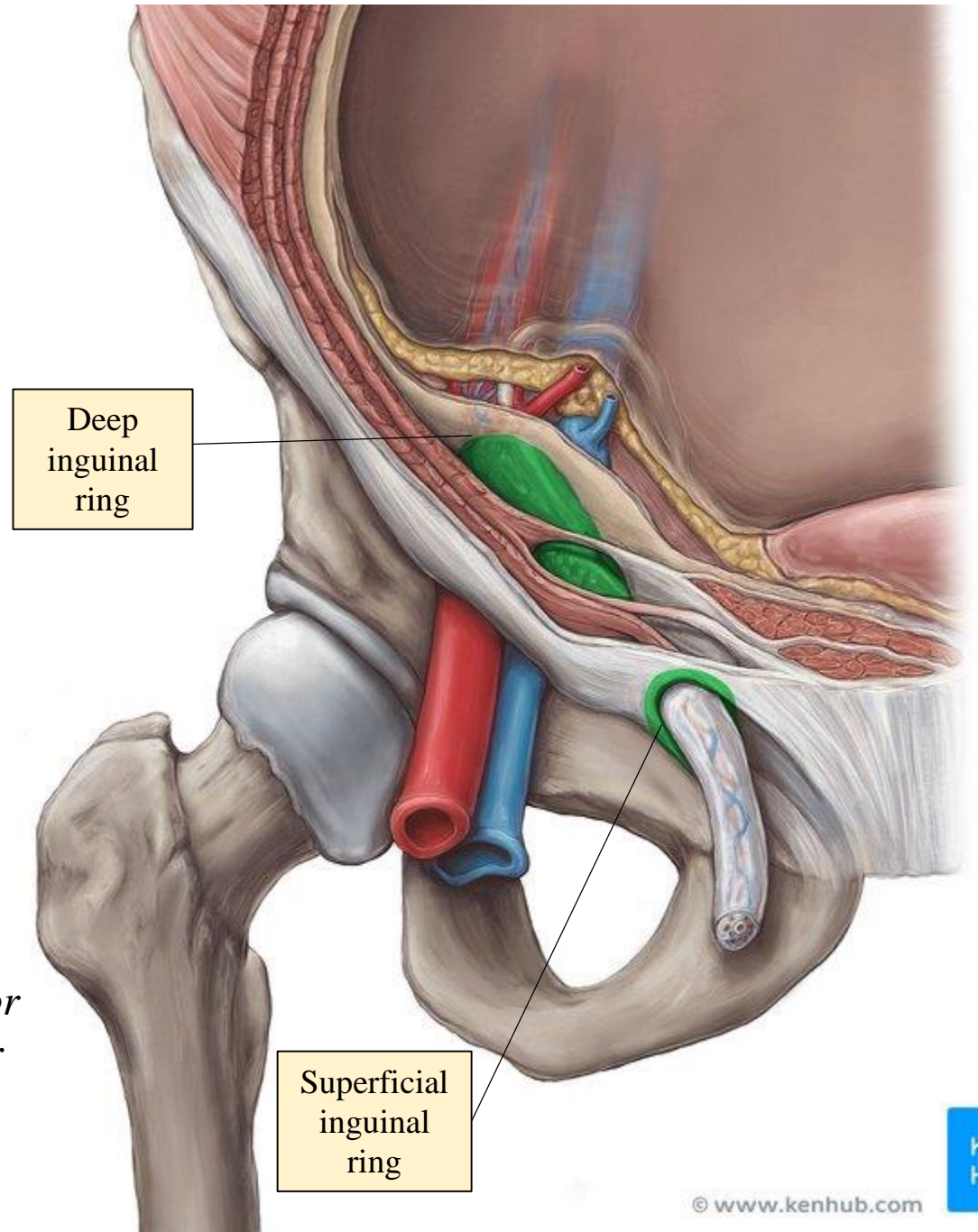
The inguinal canal is an oblique passage through the lower part of the anterior abdominal wall.

- ✓ In the males, it allows structures to pass to and from the testis to the abdomen.
- ✓ In females it allows the round ligament of the uterus to pass from the uterus to the labium majus.

The canal is about 1.5 in. (4 cm) long in the adult and extends from the deep inguinal ring, a hole in the fascia transversalis, downward and medially to the superficial inguinal ring, a hole in the aponeurosis of the external oblique muscle.

It lies parallel to and immediately above the inguinal ligament.

*In the newborn child, the deep ring lies almost directly posterior to the superficial ring so that the canal is considerably shorter at this age. Later, as the result of growth, the deep ring moves laterally.*





# Muscles of the Posterior Abdominal Wall

## Psoas Major

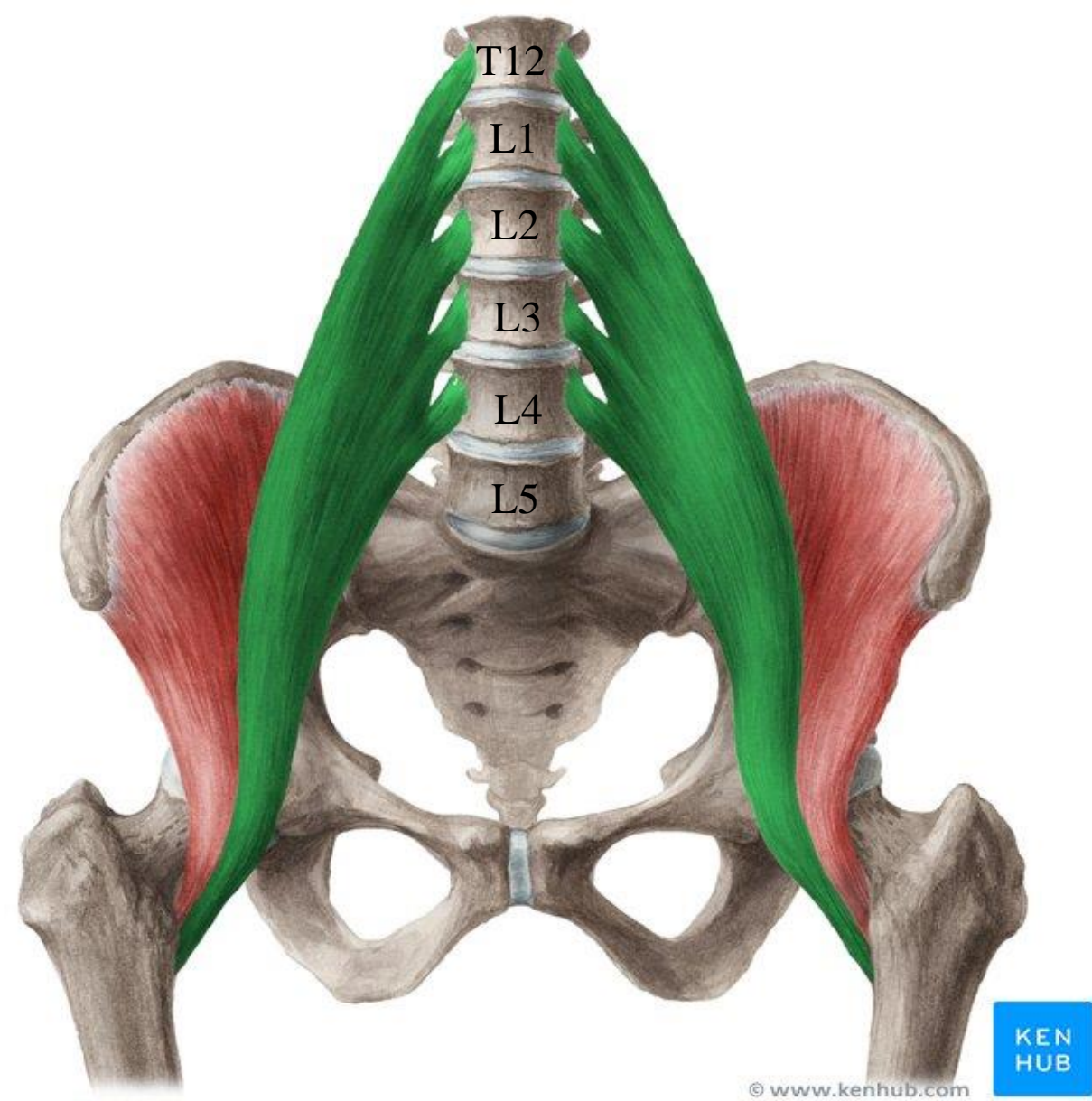
**Origin:** Transverse processes, bodies, and intervertebral discs of 12th thoracic and lumbar vertebrae

**Insertion:** With iliacus into lesser trochanter of femur

**Nerve supply:** Lumbar plexus.

**Action:** The psoas flexes the thigh at the hip joint on the trunk, or if the thigh is fixed, it flexes the trunk on the thigh, as in sitting up from a lying position

*The psoas is enclosed in a fibrous sheath that is derived from the **lumbar fascia**.*



*The fibers run downward and laterally and leave the abdomen to enter the thigh by passing behind the inguinal ligament.*

# Quadratus Lumborum

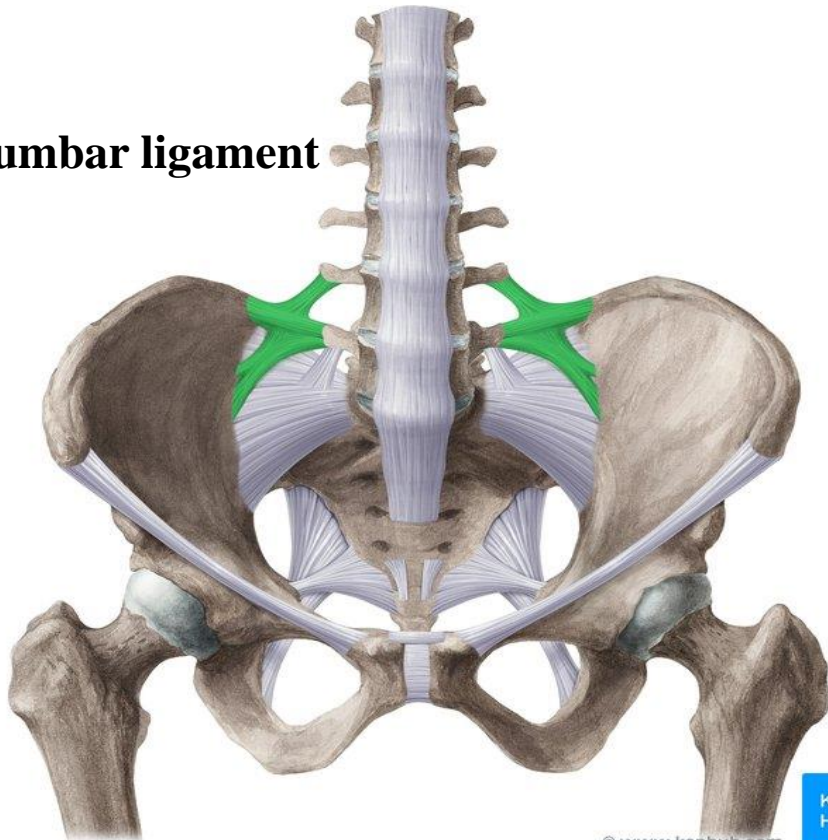
**Origin:** Iliolumbar ligament, iliac crest, tips of transverse processes of lower lumbar vertebrae.

**Insertion:** 12th rib

**Nerve supply:** Lumbar plexus.

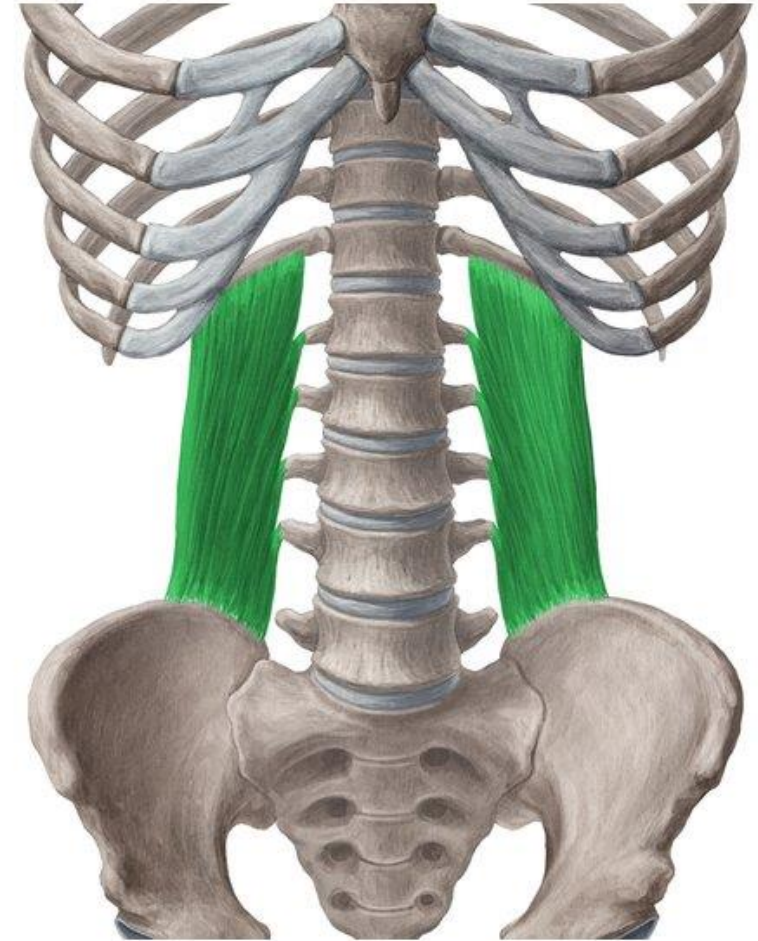
**Action:** Fixes 12th rib during inspiration; depresses 12th rib during forced expiration; laterally flexes vertebral column same side.

## Iliolumbar ligament



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*The quadratus lumborum is a flat, quadrilateral-shaped muscle that lies alongside the vertebral column. Its fibers run upward and medially*



# Iliacus

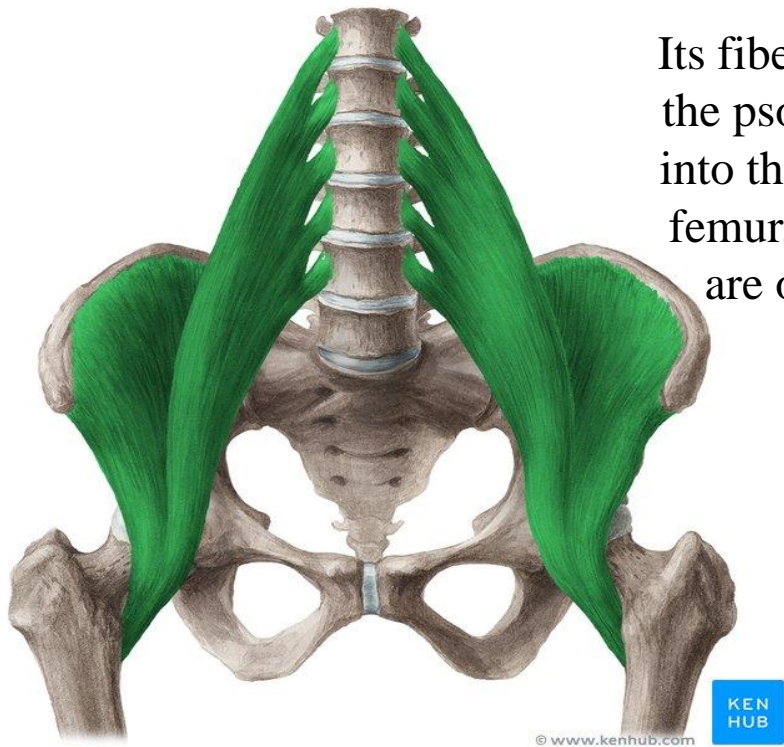
**Origin:** Iliac fossa

**Insertion:** With psoas into lesser trochanter of femur

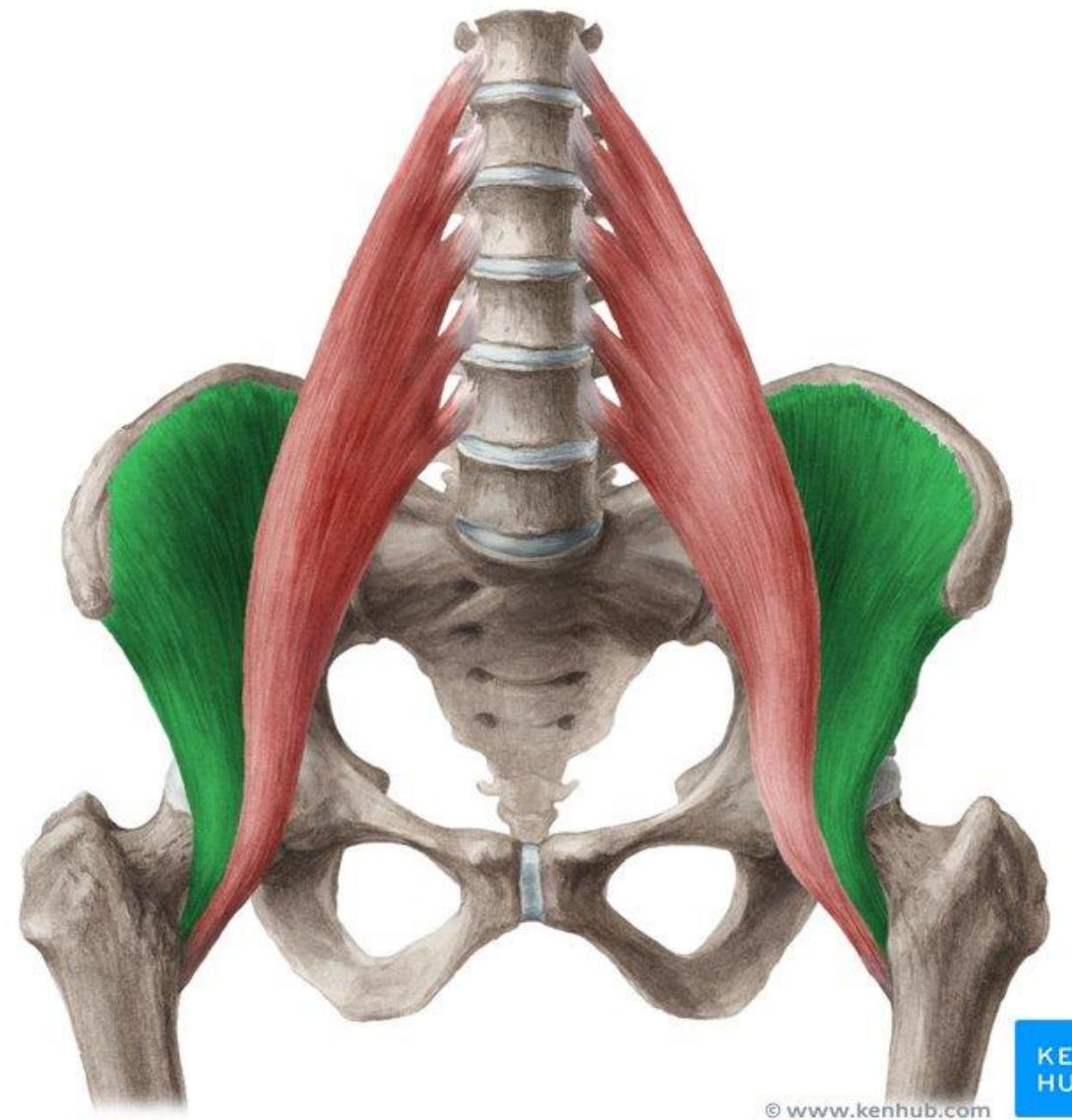
**Nerve supply:** This muscle is supplied by the femoral nerve, a branch of the lumbar plexus.

**Action:** The iliopsoas flexes the thigh on the trunk at the hip joint, or if the thigh is fixed, it flexes the trunk on the thigh.

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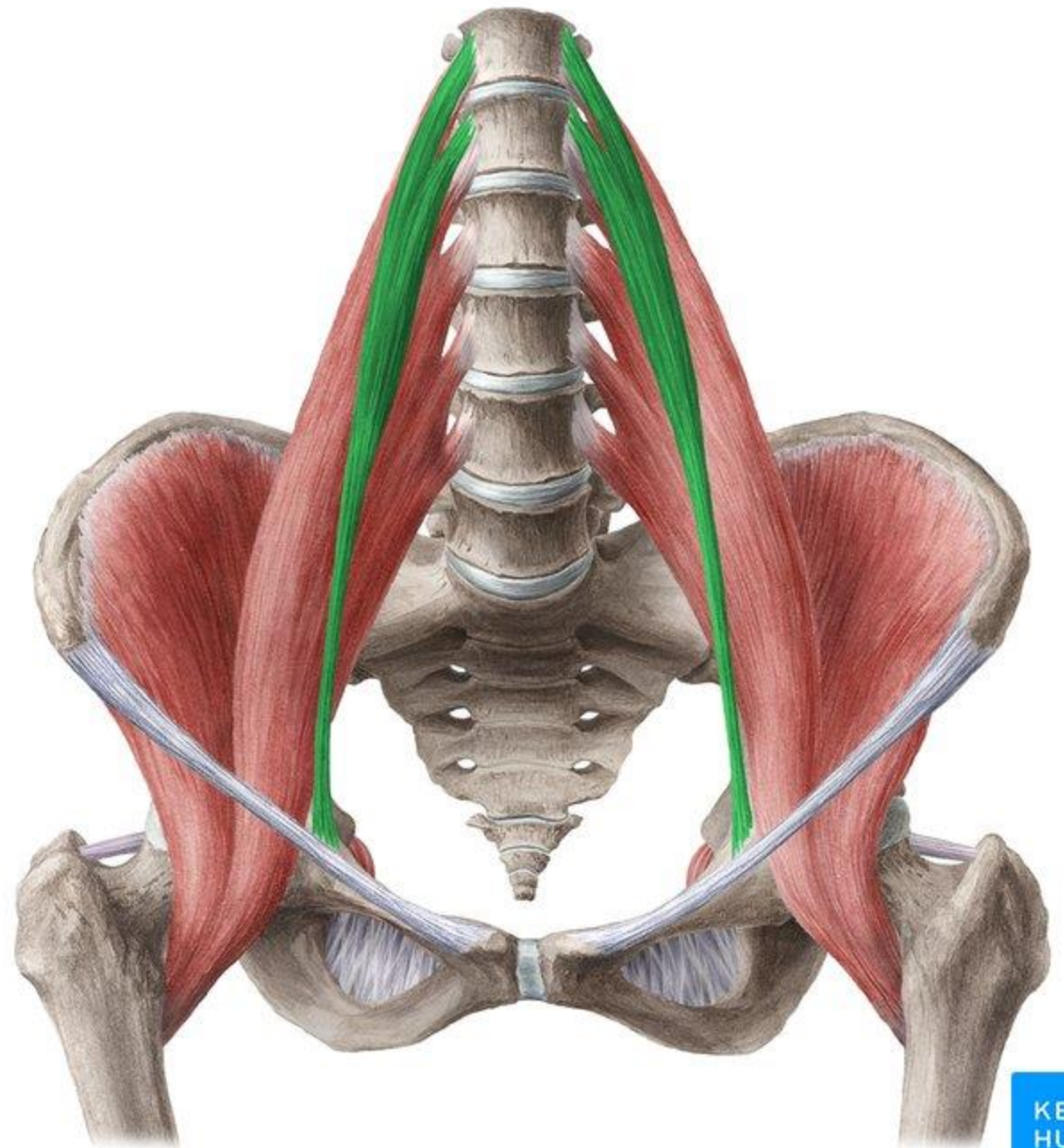
Its fibers join the lateral side of the psoas tendon to be inserted into the lesser trochanter of the femur. The combined muscles are often referred to as the **iliopsoas**.



*The iliacus muscle is fan shaped muscle*

## Psoas minor

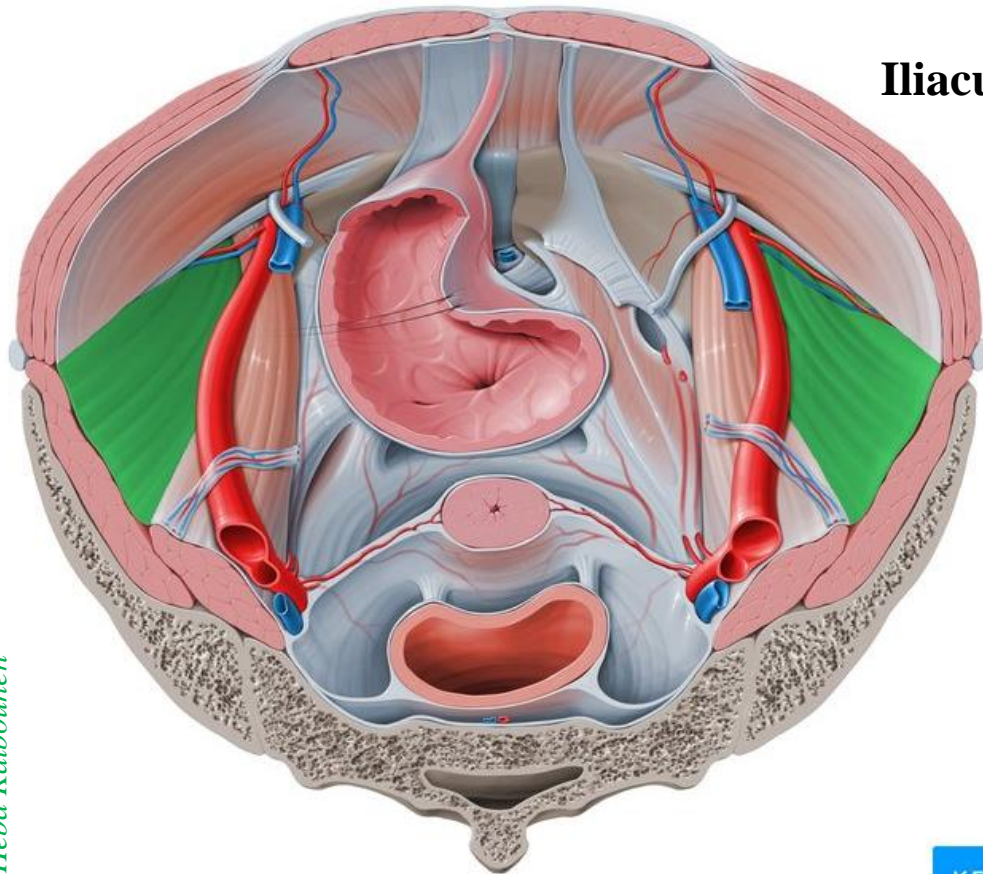
- ✓ The psoas minor is a thin, paired muscle of the posterior abdominal wall.
- ✓ It is located on the anterior aspect of the psoas major muscle, but does not extend with it beyond the inguinal ligament. Despite its close relation to the psoas major muscle, the psoas minor is not considered part of the iliopsoas muscle complex.
- ✓ The psoas minor is an **inconsistent muscle**, found only in a certain part of the population.
- ✓ When present, it acts on the lumbar spine to produce a weak flexion of the trunk.



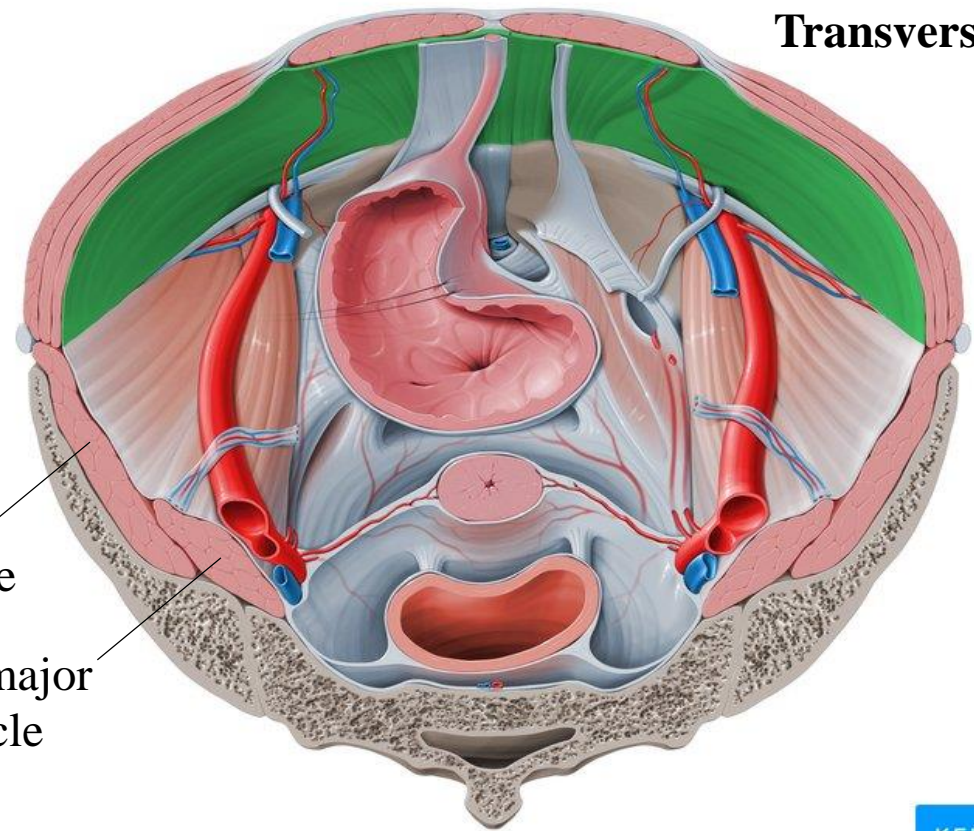


# Fascial Lining of the Abdominal Walls

- The abdominal walls are lined by one continuous layer of connective tissue that lies between the parietal peritoneum and the muscles.
- It is continuous below with a similar fascial layer lining the pelvic walls.
- It is customary to name the fascia according to the structure it overlies. For example, the **diaphragmatic fascia** covers the undersurface of the diaphragm, the **transversalis fascia** lines the transversus abdominis, the **psoas fascia** covers the psoas muscle, the **quadratus lumborum fascia** covers the quadratus lumborum, and the **iliaca fascia** covers the iliacus muscle.



Iliacus fascia



Transversalis fascia

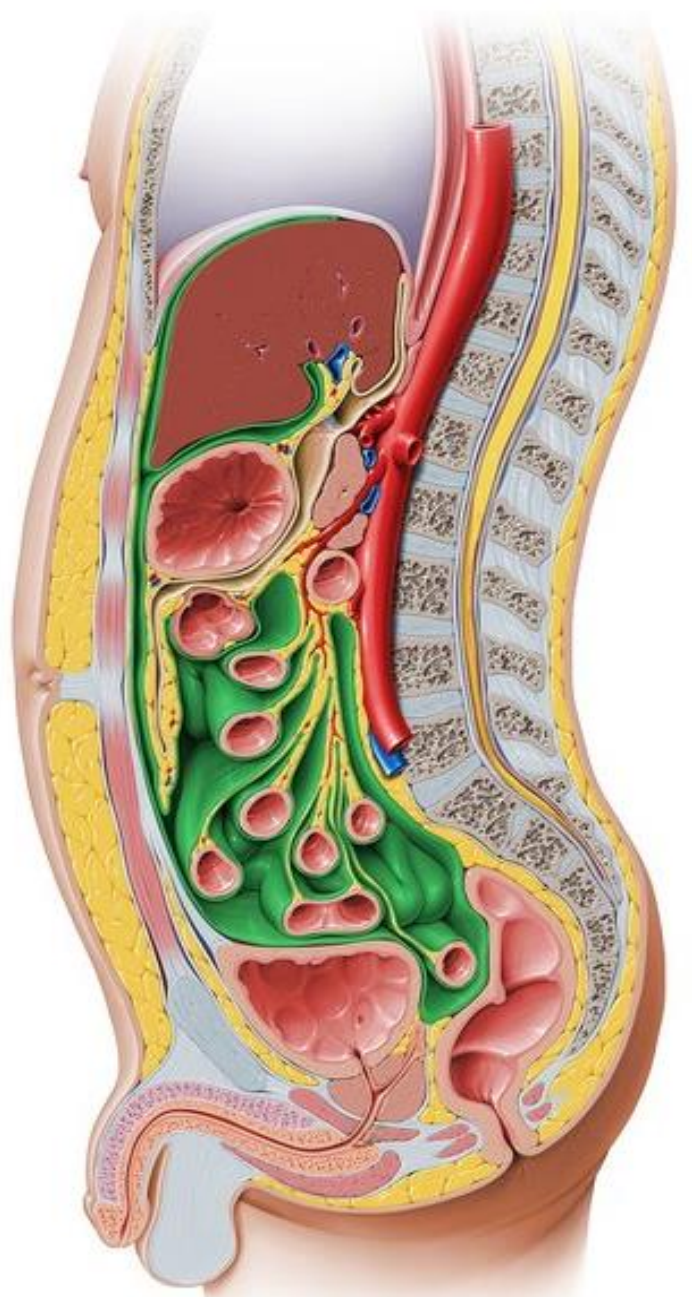
Iliacus muscle

Psoas major muscle

# Peritoneal Lining of the Abdominal Walls

The walls of the abdomen are lined with parietal peritoneum. This is a thin serous membrane consisting of a layer of mesothelium resting on connective tissue. It is continuous below with the parietal peritoneum lining the pelvis.

## Peritoneum



**Intraperitoneal**

**Retroperitoneal**



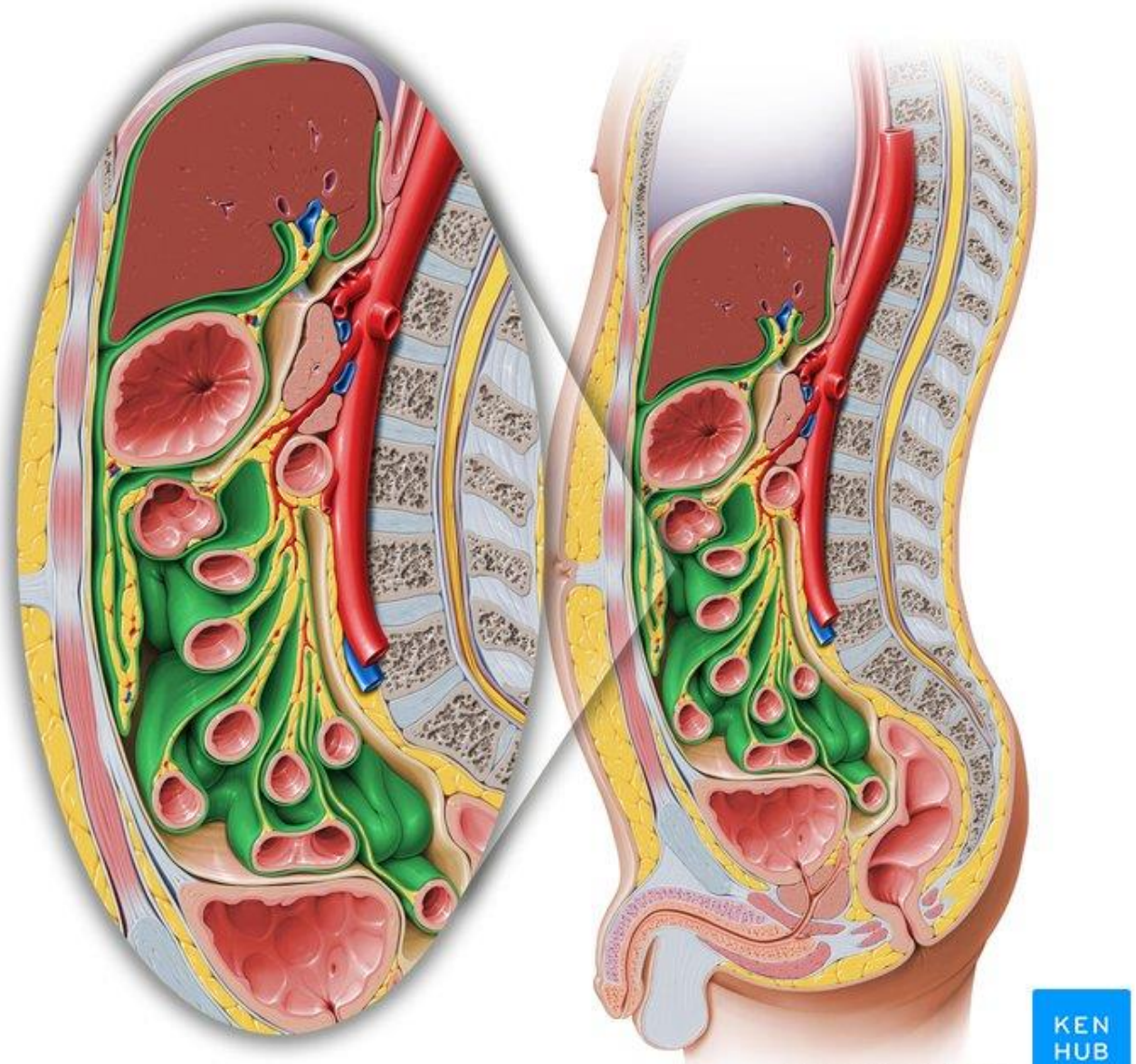
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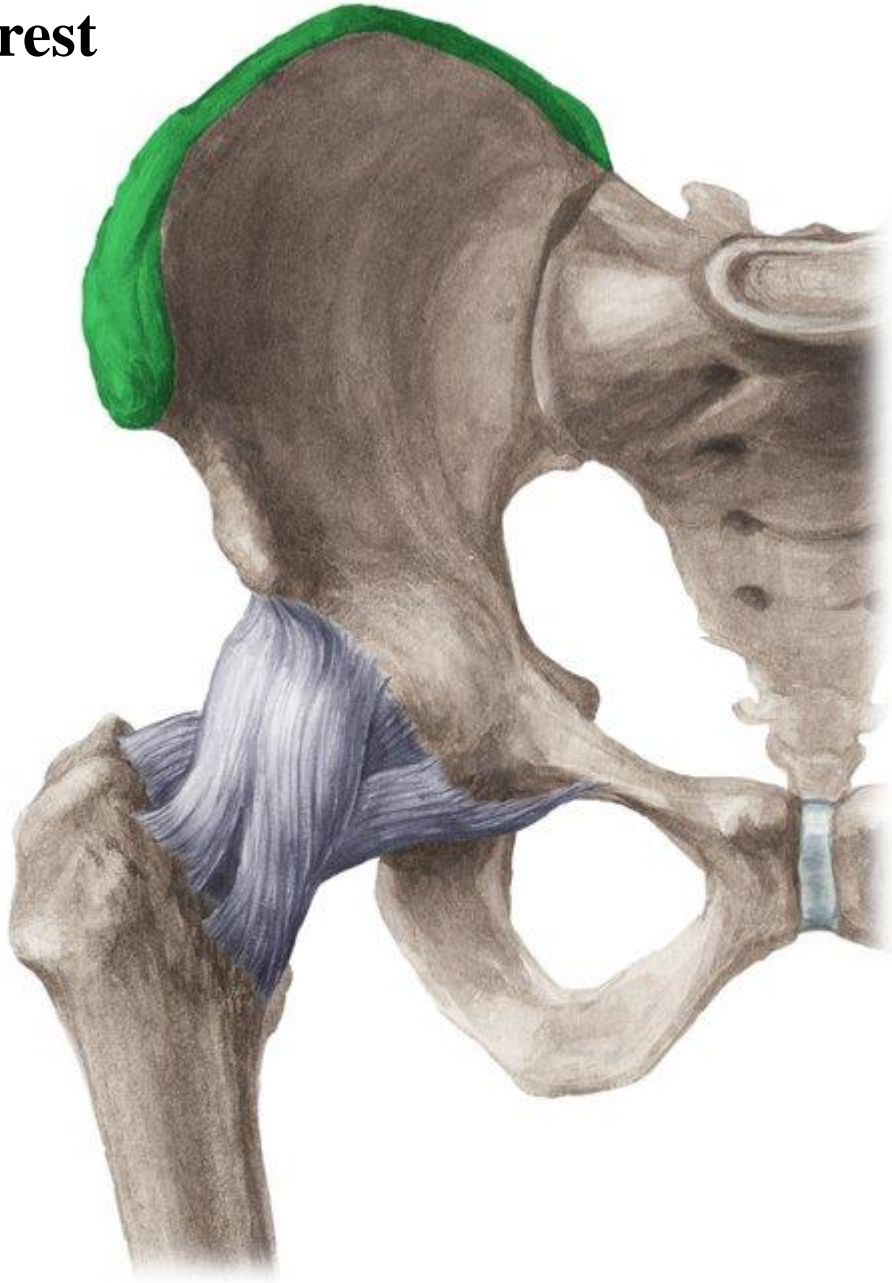
Parietal peritoneum

Visceral peritoneum

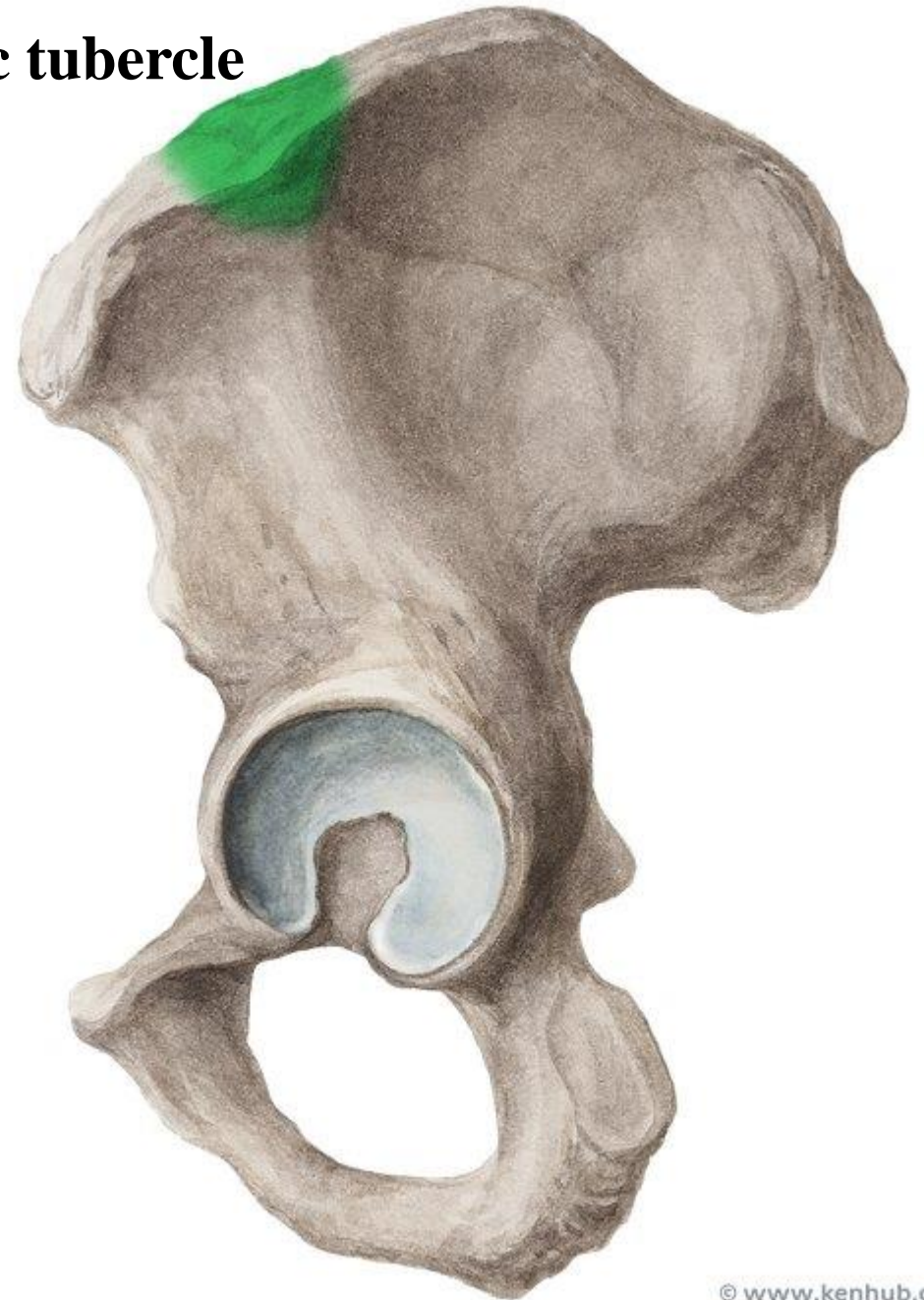




**Iliac crest**

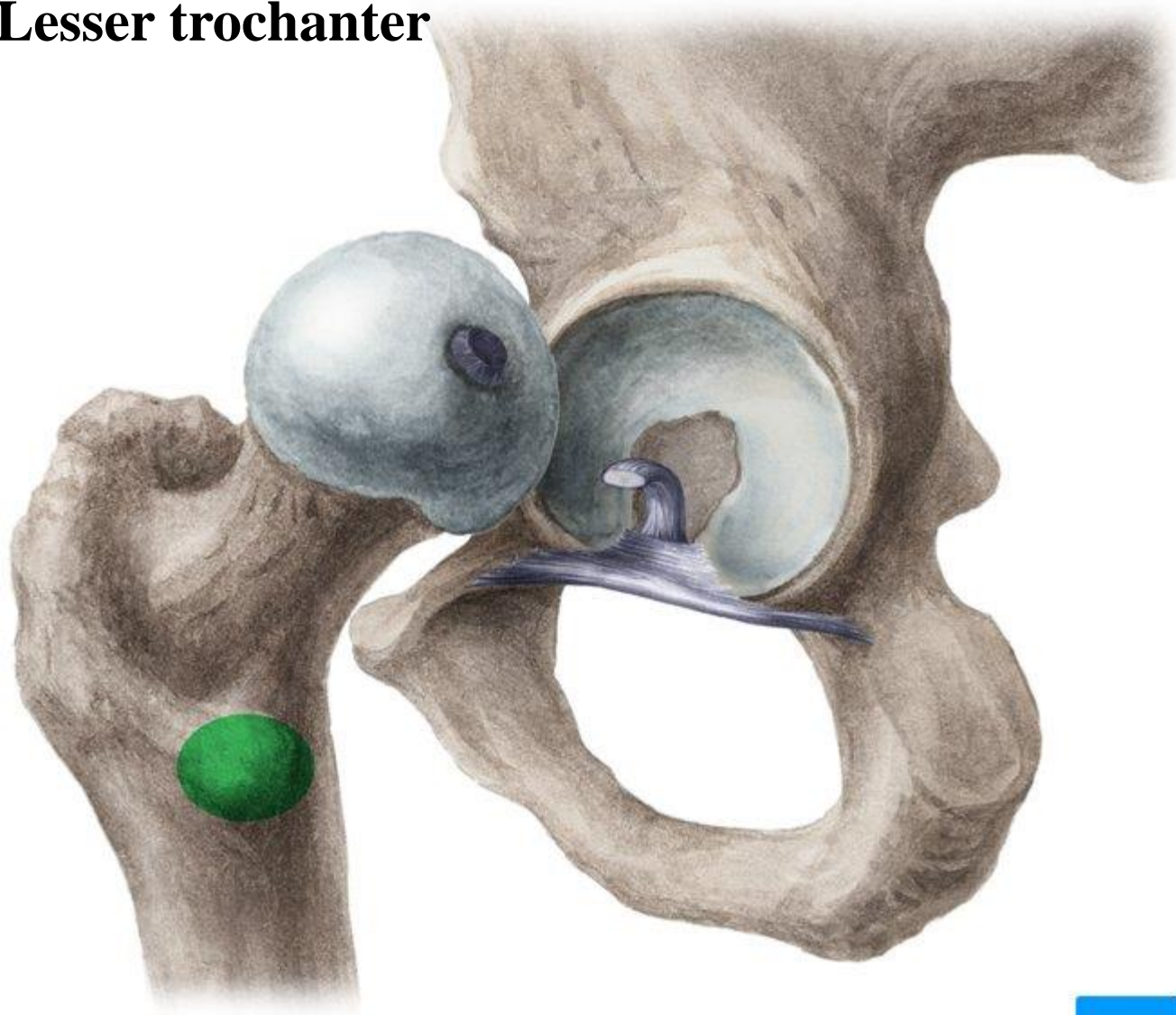


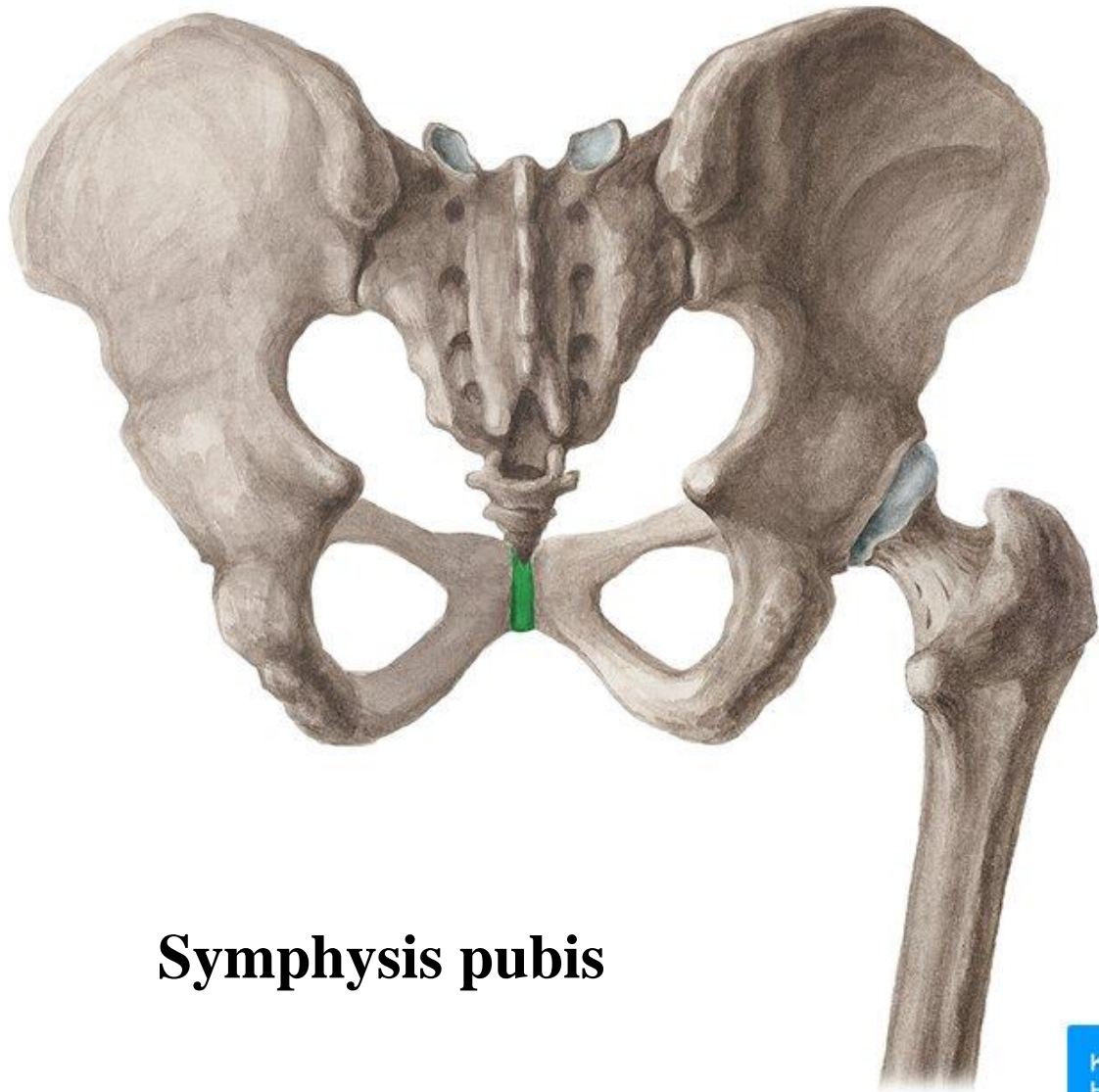
**Iliac tubercle**





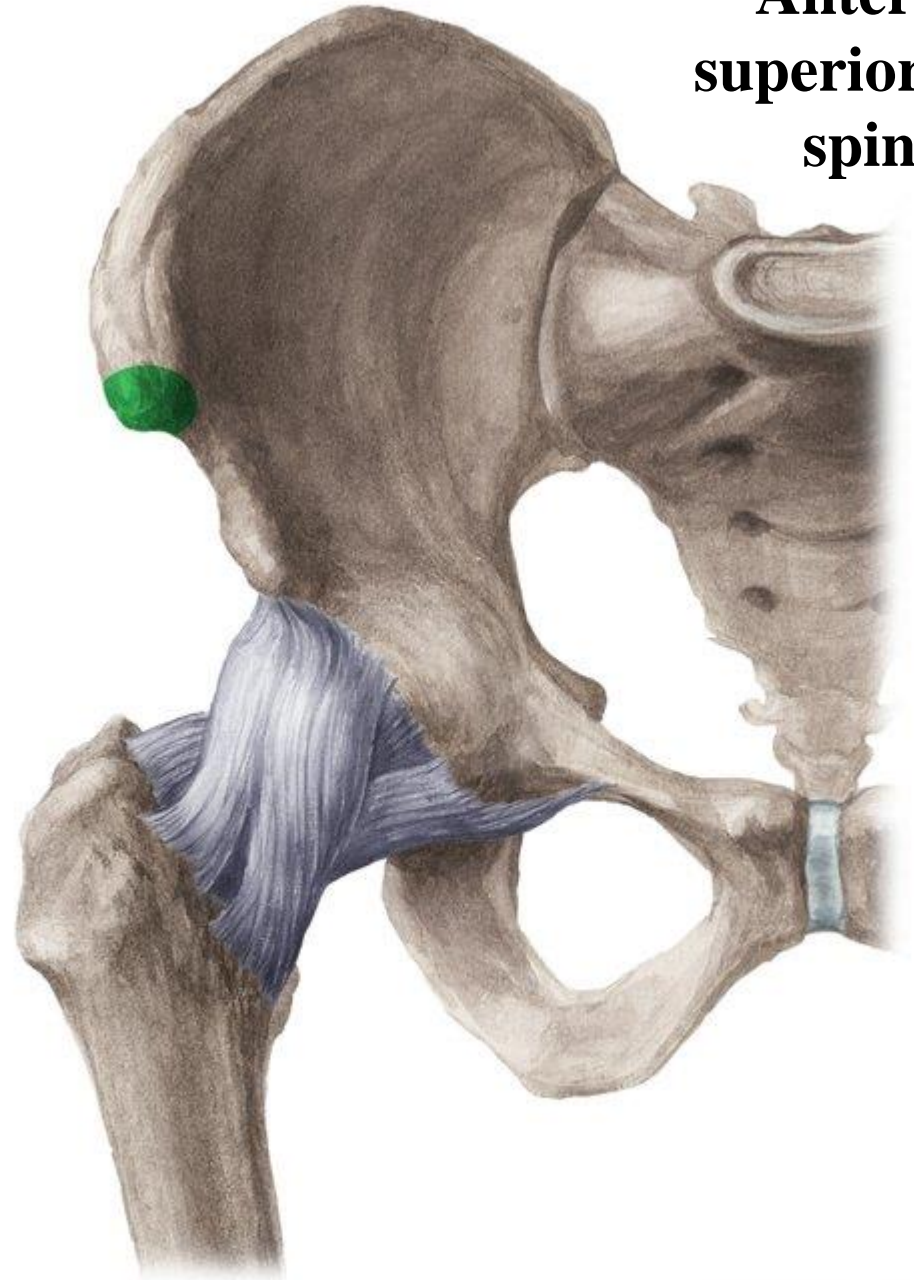
# Lesser trochanter





**Symphysis pubis**

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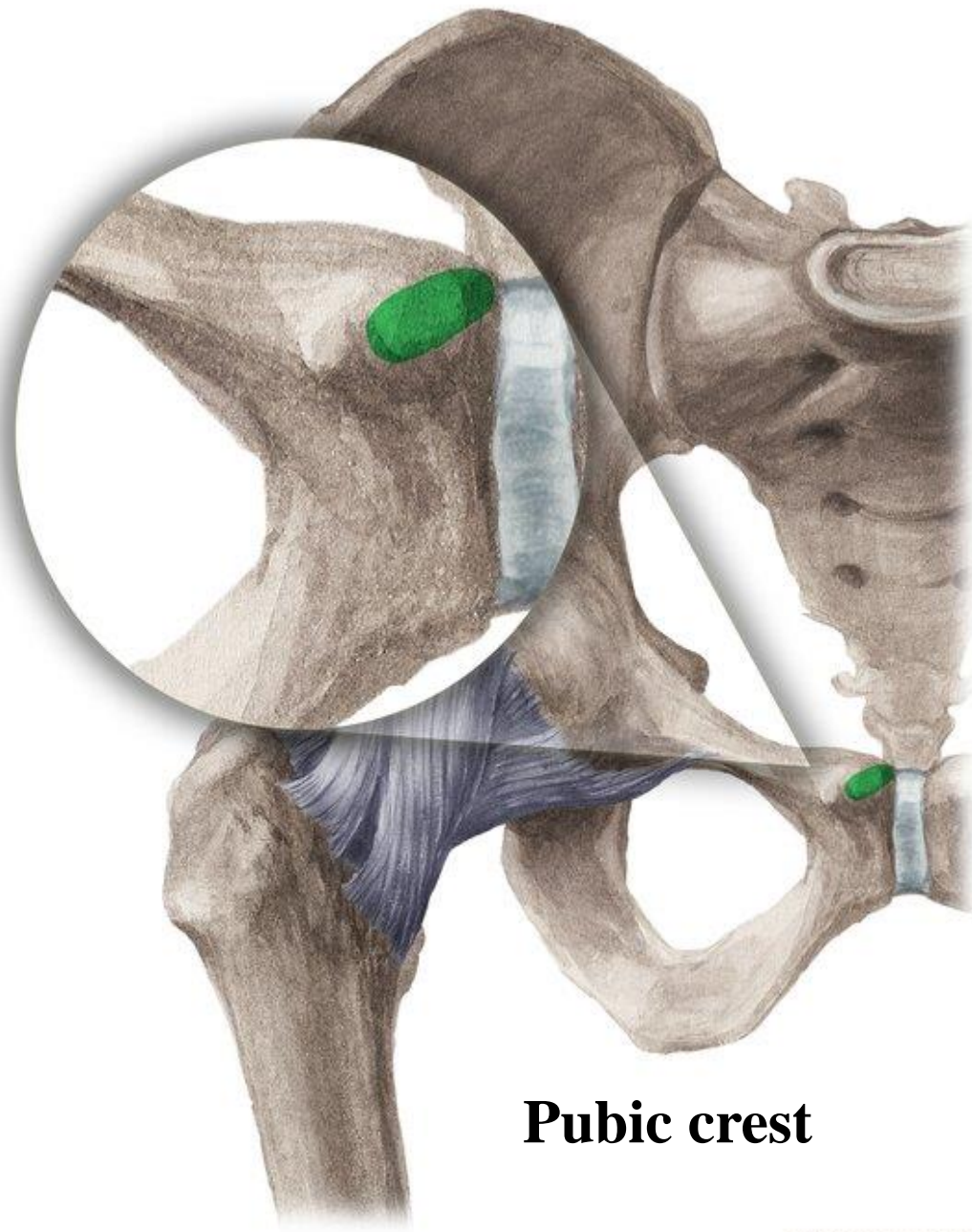
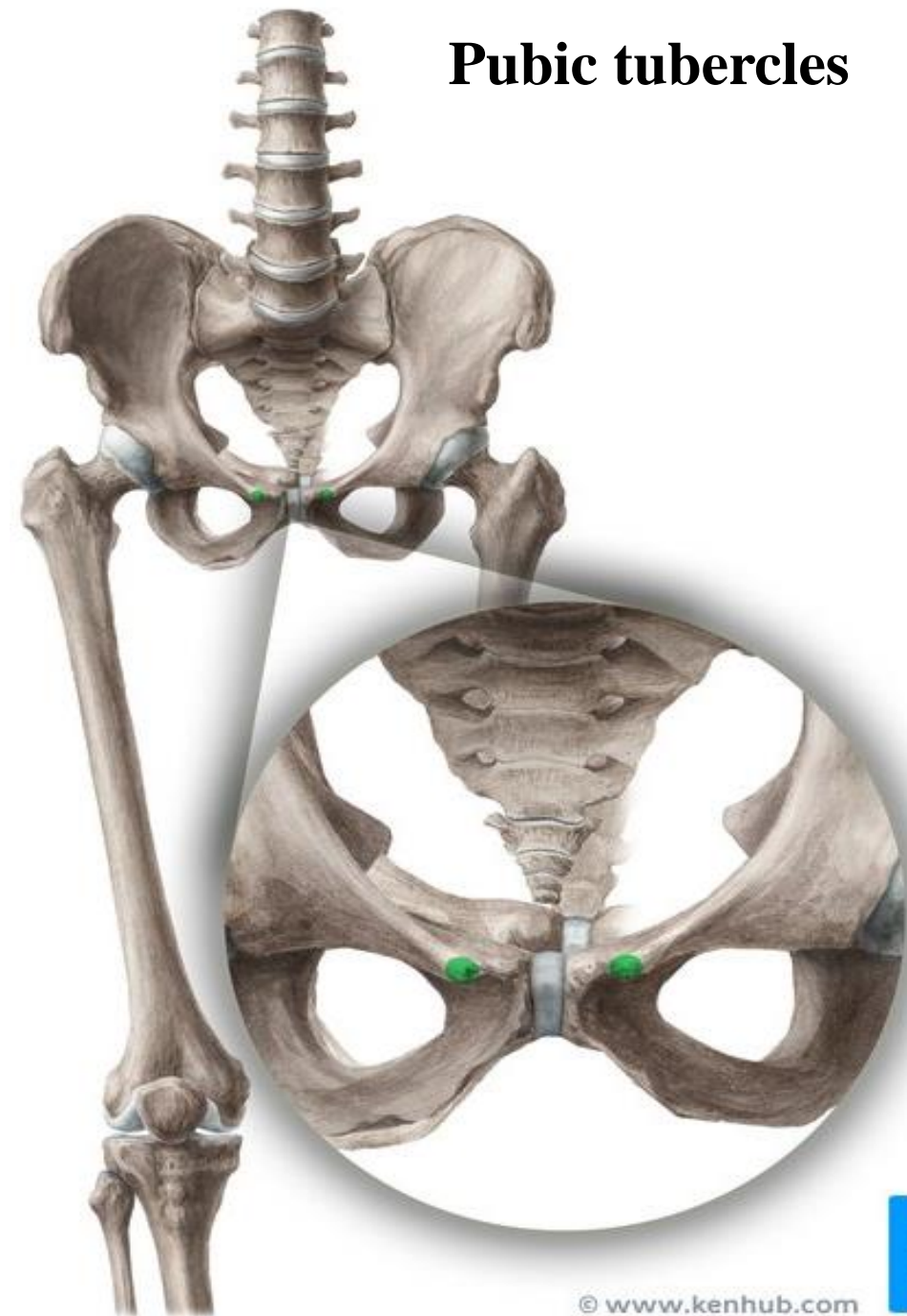
**Anterior  
superior iliac  
spine**

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## Pubic tubercles



## Pubic crest