

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

# POSTERIOR ABDOMINAL WALL

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# Objectives

- Describe the arrangement of muscles and fascia in the posterior abdominal wall
- Describe the structures found in the posterior abdominal wall
- Describe the posterior abdominal viscera

# Posterior abdominal wall

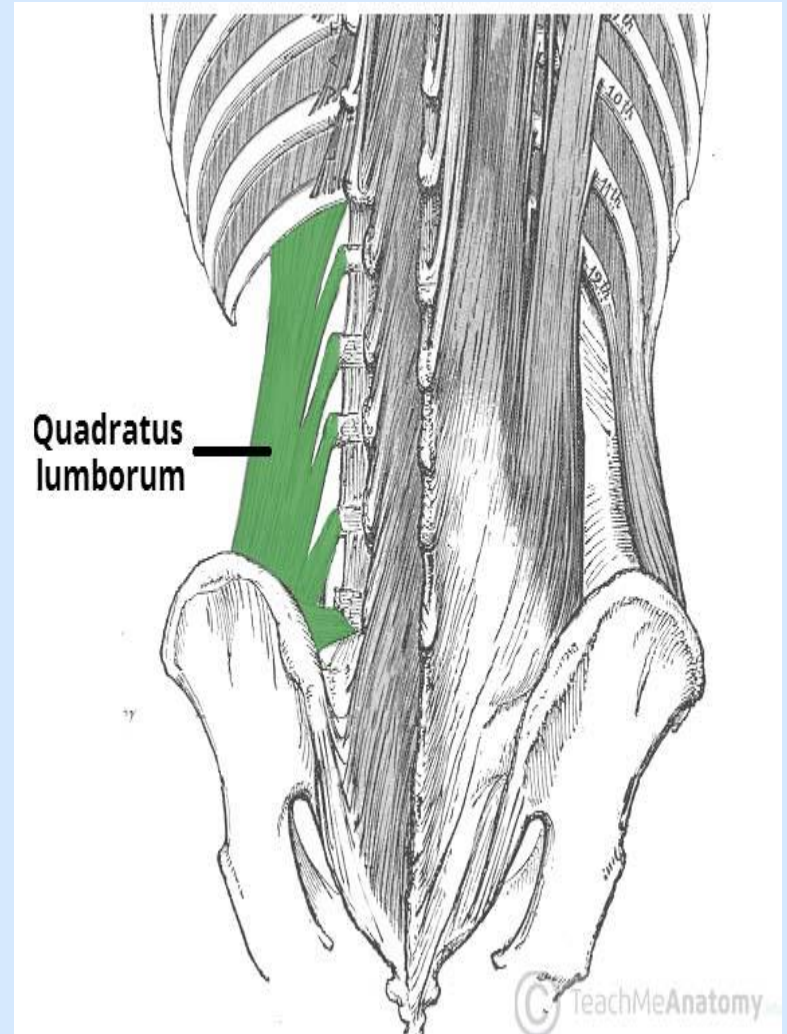
- The posterior abdominal wall is a complex region of anatomy. It is formed by the lumbar vertebrae, pelvic girdle, posterior abdominal muscles and their associated fascia. Major vessels, nerves and organs are located on the inner surface of the posterior abdominal wall.

# Posterior abdominal muscles

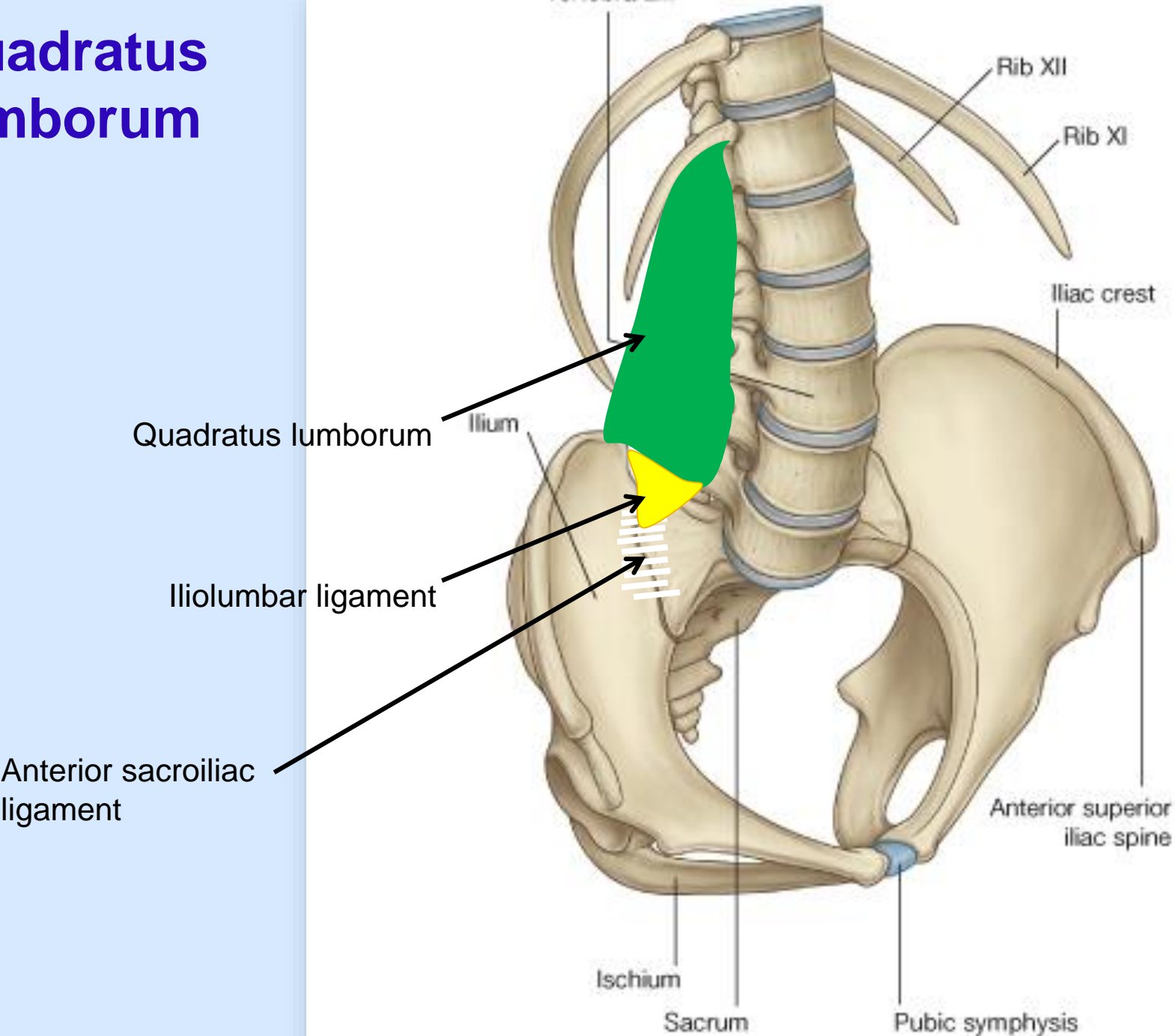
- There are five muscles in the posterior abdominal wall: the iliacus, psoas major, psoas minor, quadratus lumborum and the diaphragm.

# Quadratus Lumborum

- The quadratus lumborum muscle is located laterally in the posterior abdominal wall. It is a thick muscular sheet which is quadrilateral in shape. The muscle is positioned superficially to the psoas major.



# Quadratus lumborum



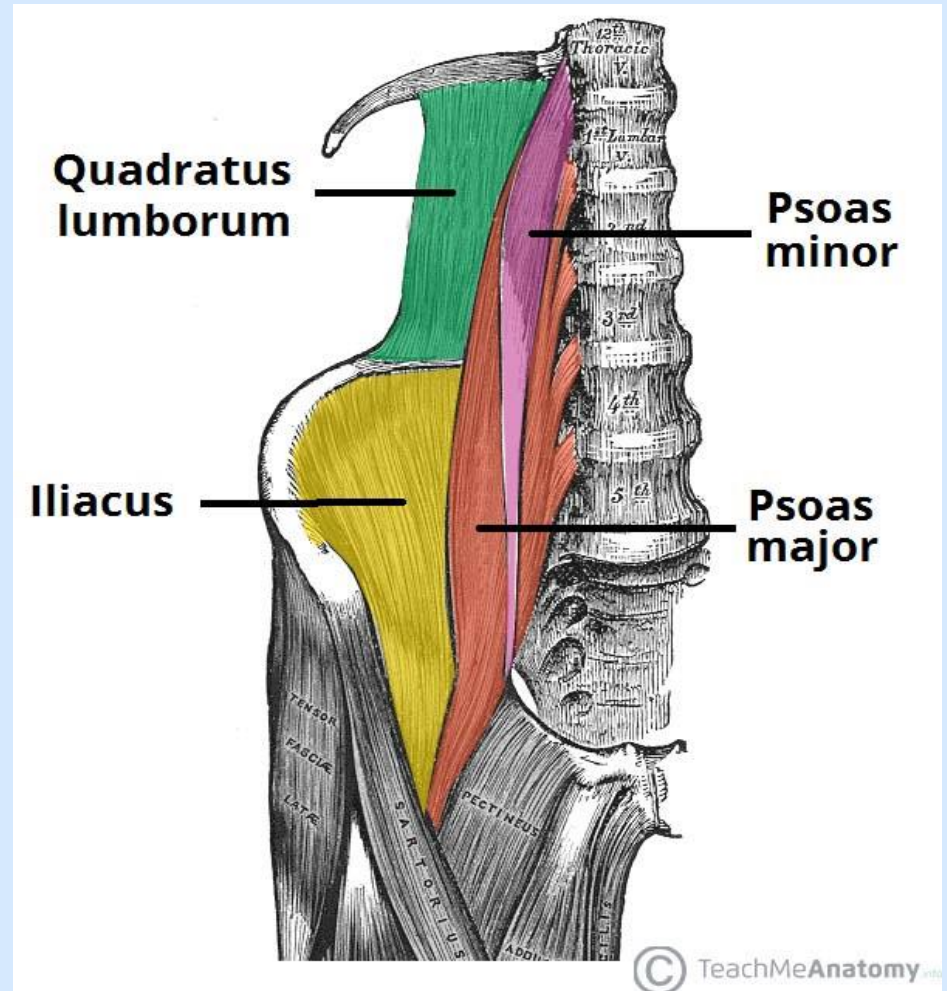


- It originates from the iliac crest and iliolumbar ligament. The fibres travel superomedially, the transverse processes of L1 – L4 and to the inferior border of the 12<sup>th</sup> rib.
- **Actions:** Extension and lateral flexion of the vertebral column. It also fixes the 12th rib during inspiration, so that the contraction of diaphragm is not wasted.
- **Innervation:** Anterior rami of T12- L4 nerves.

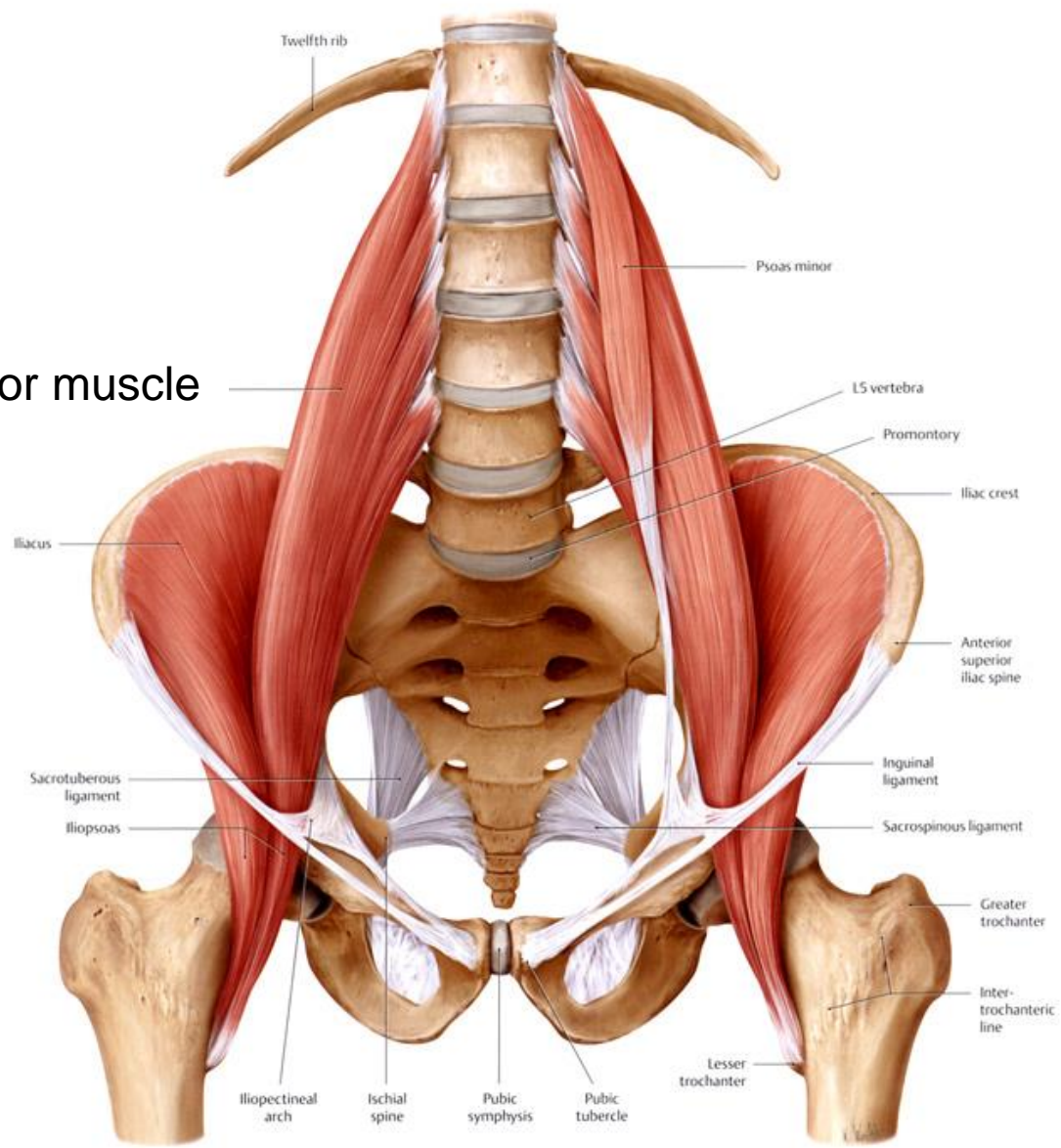


# Psoas Major

- The psoas major is located near the midline of the posterior abdominal wall, immediately lateral to the lumbar vertebrae.



# Psoas major muscle

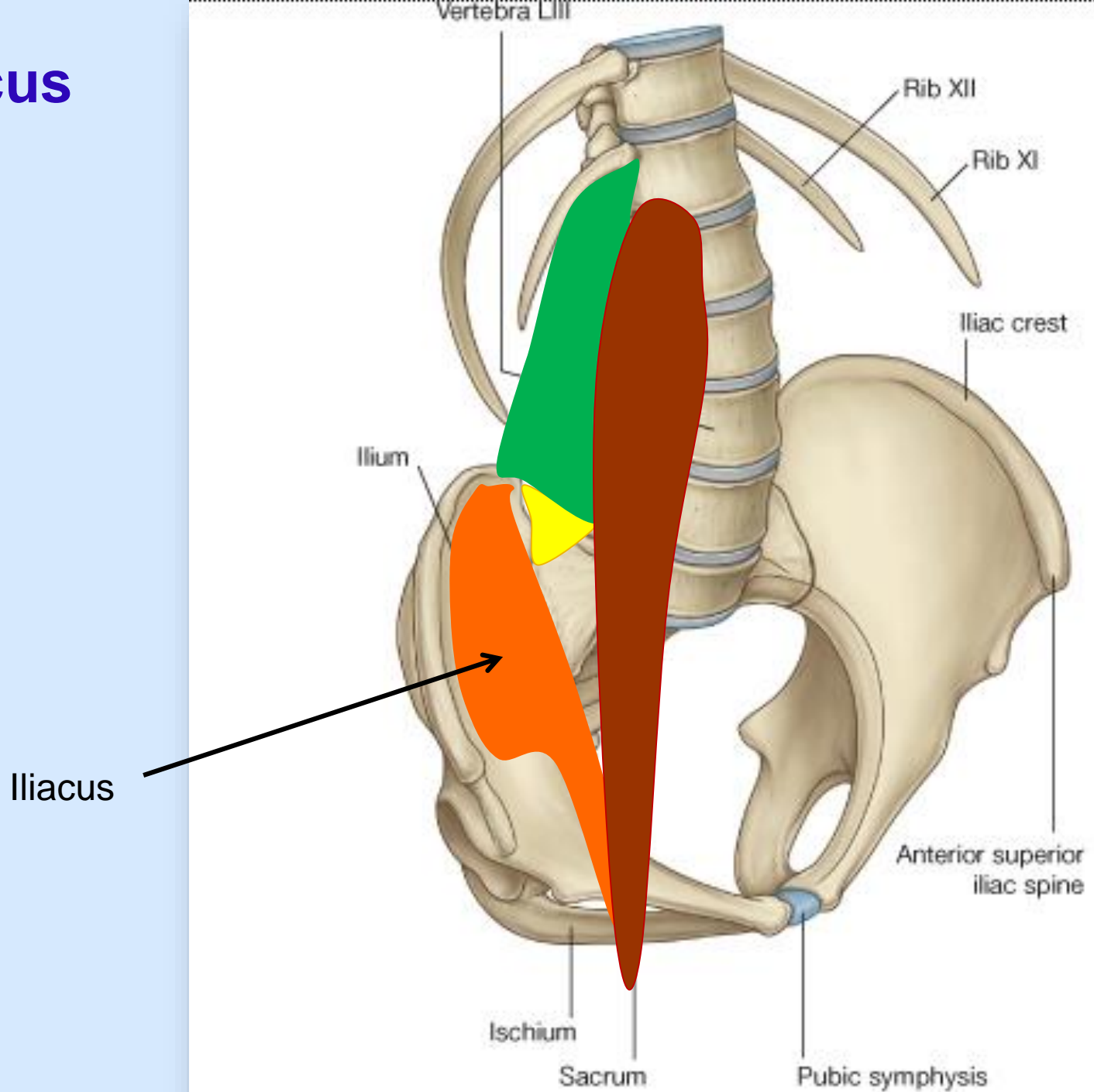


- **Attachments:** Originates from the transverse processes and vertebral bodies of T12 – L5. It then moves inferiorly and laterally, running deep to the inguinal ligament, and attaching to the lesser trochanter of the femur.
- **Actions:** Flexion of the thigh at the hip and lateral flexion of the vertebral column.
- **Innervation:** Anterior rami of L1 – L3 nerves.

# ILIACUS

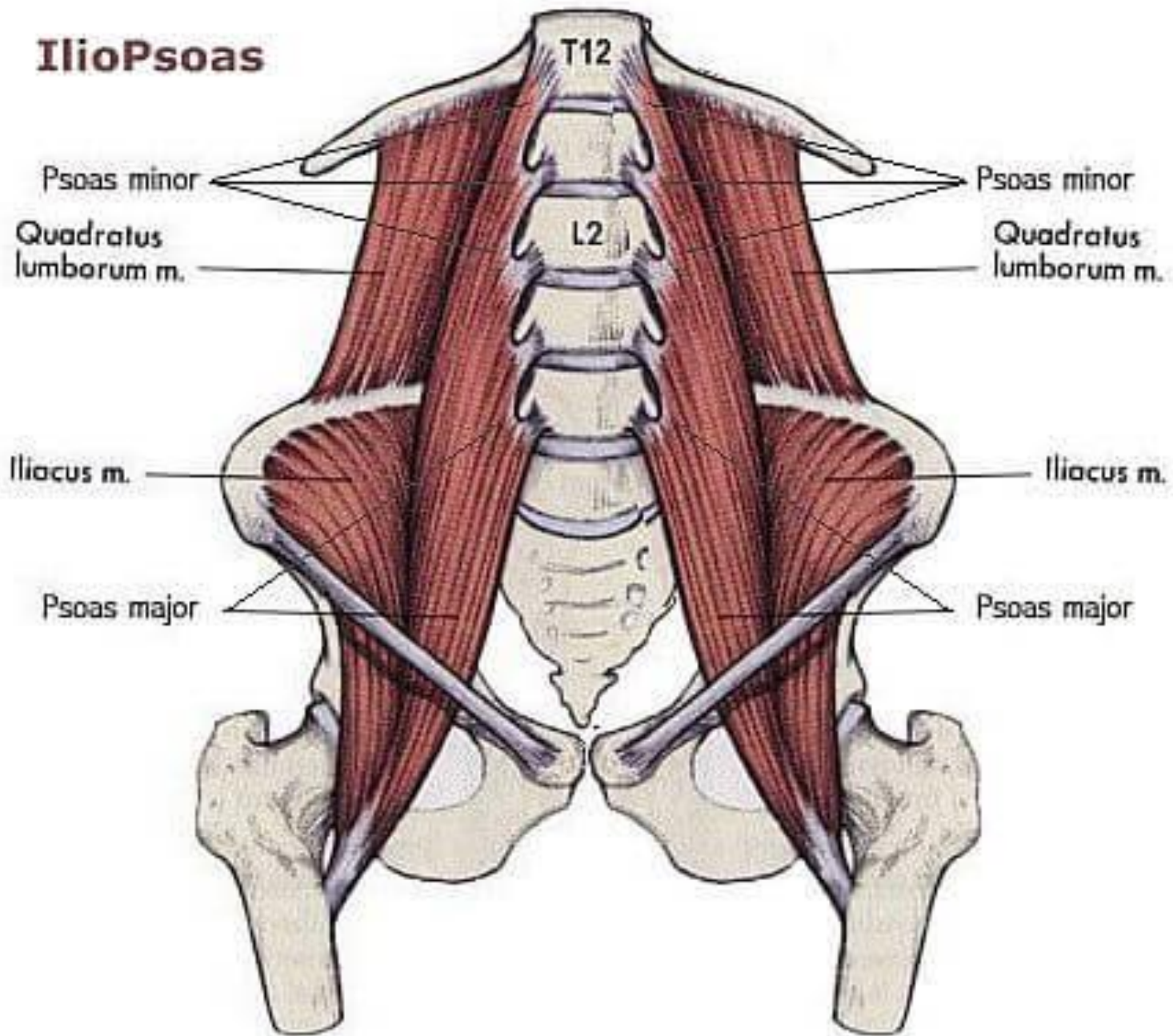
- The iliacus muscle is a fan-shaped muscle that is situated inferiorly on the posterior abdominal wall. It combines with the psoas major to form the iliopsoas – the major flexor of the thigh.
- **Attachments:** Originates from surface of the iliac fossa and anterior inferior iliac spine. Its fibres combine with the tendon of the psoas major, inserting into the lesser trochanter of the femur.
- **Actions:** Flexion of the thigh at the hip joint.
- **Innervation:** Femoral nerve (L2 – L4).

# Iliacus





# IlioPsoas



# Diaphragm

- The posterior aspect of the diaphragm is considered to be part of the posterior abdominal wall.



**Table 4-2. Posterior abdominal wall muscles**

<b>Muscle</b>	<b>Origin</b>	<b>Insertion</b>	<b>Innervation</b>	<b>Function</b>
Psoas major	Lateral surface of bodies of TXII and LI to LV vertebrae, transverse processes of the lumbar vertebrae, and the intervertebral discs between TXII and LI to LV vertebrae	Lesser trochanter of the femur	Anterior rami of L1 to L3	Flexion of thigh at hip joint
Psoas minor	Lateral surface of bodies of TXII and LI vertebrae and intervening intervertebral disc	Pectineal line of the pelvic brim and iliopubic eminence	Anterior rami of L1	Weak flexion of lumbar vertebral column
Quadratus lumborum	Transverse process of LV vertebra, iliolumbar ligament, and iliac crest	Transverse processes of LI to LIV vertebrae and inferior border of rib XII	Anterior rami of T12 and L1 to L4	Depress and stabilize rib XII and some lateral bending of trunk
Iliacus	Upper two-thirds of iliac fossa, anterior sacro-iliac and iliolumbar ligaments, and upper lateral surface of sacrum	Lesser trochanter of femur	Femoral nerve (L2 to L4)	Flexion of thigh at hip joint

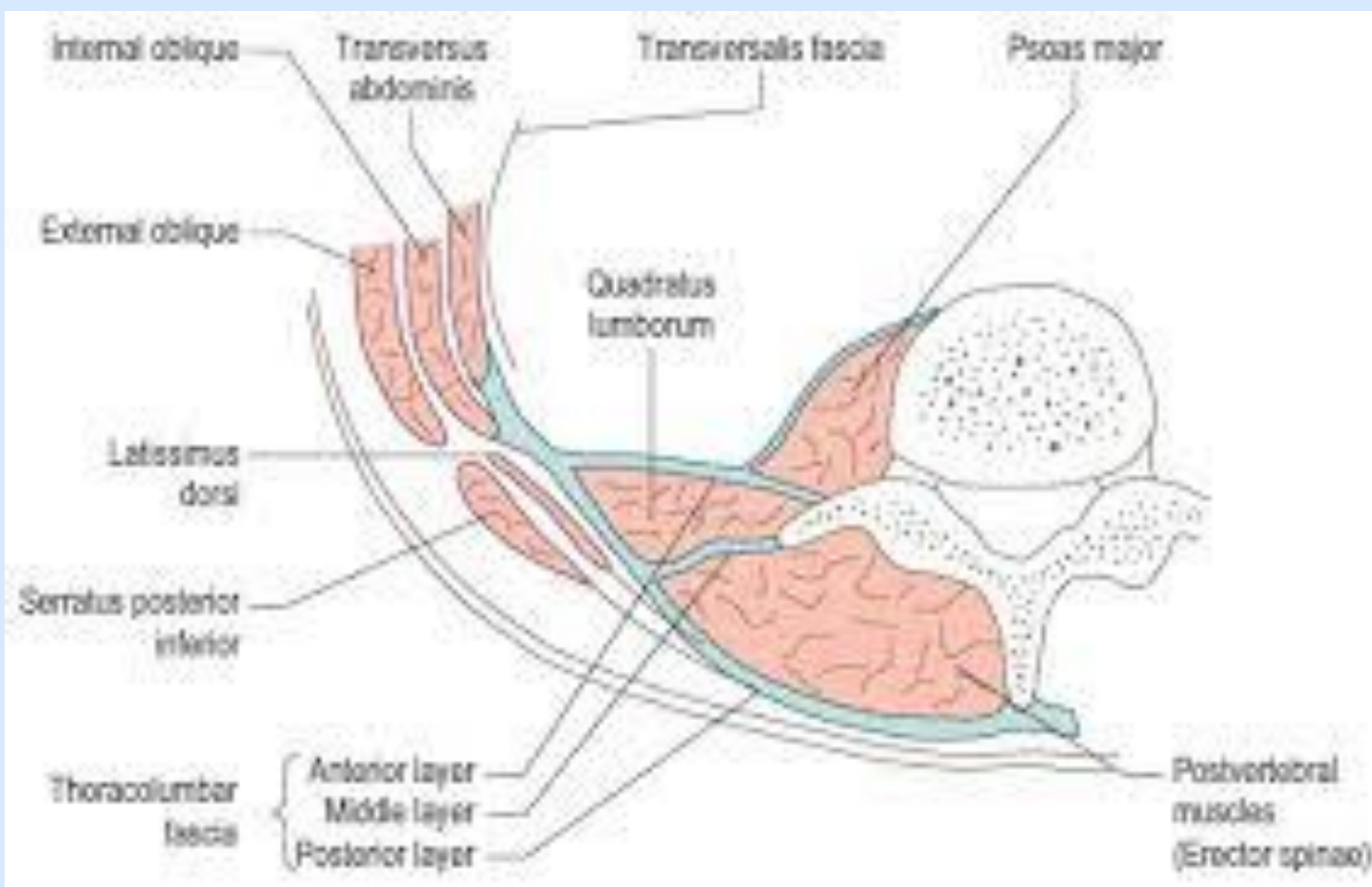
# FASCIA OF THE POSTERIOR ABDOMINAL WALL

- A layer of fascia (sheet of connective tissue) lies between the **parietal peritoneum** and the muscles of the posterior abdominal wall. This fascia is continuous with the **transversalis fascia** of the anterolateral abdominal wall.

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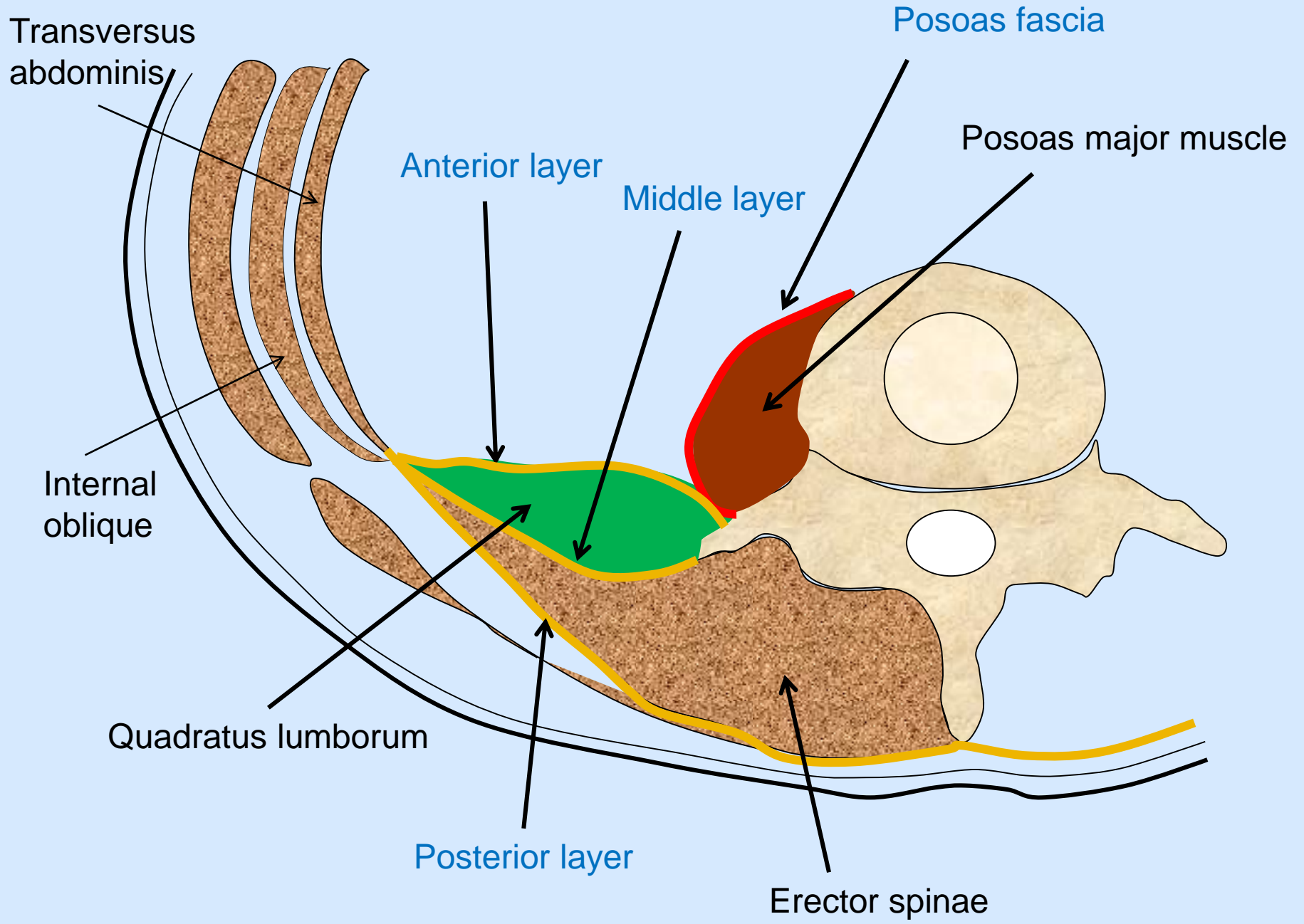
# Psoas Fascia

- The psoas fascia covers the psoas major muscle. It is attached to the **lumbar vertebrae** medially, continuous with the **thoracolumbar fascia** laterally and continuous with the **iliac fascia** inferiorly



# Thoracolumbar fascia

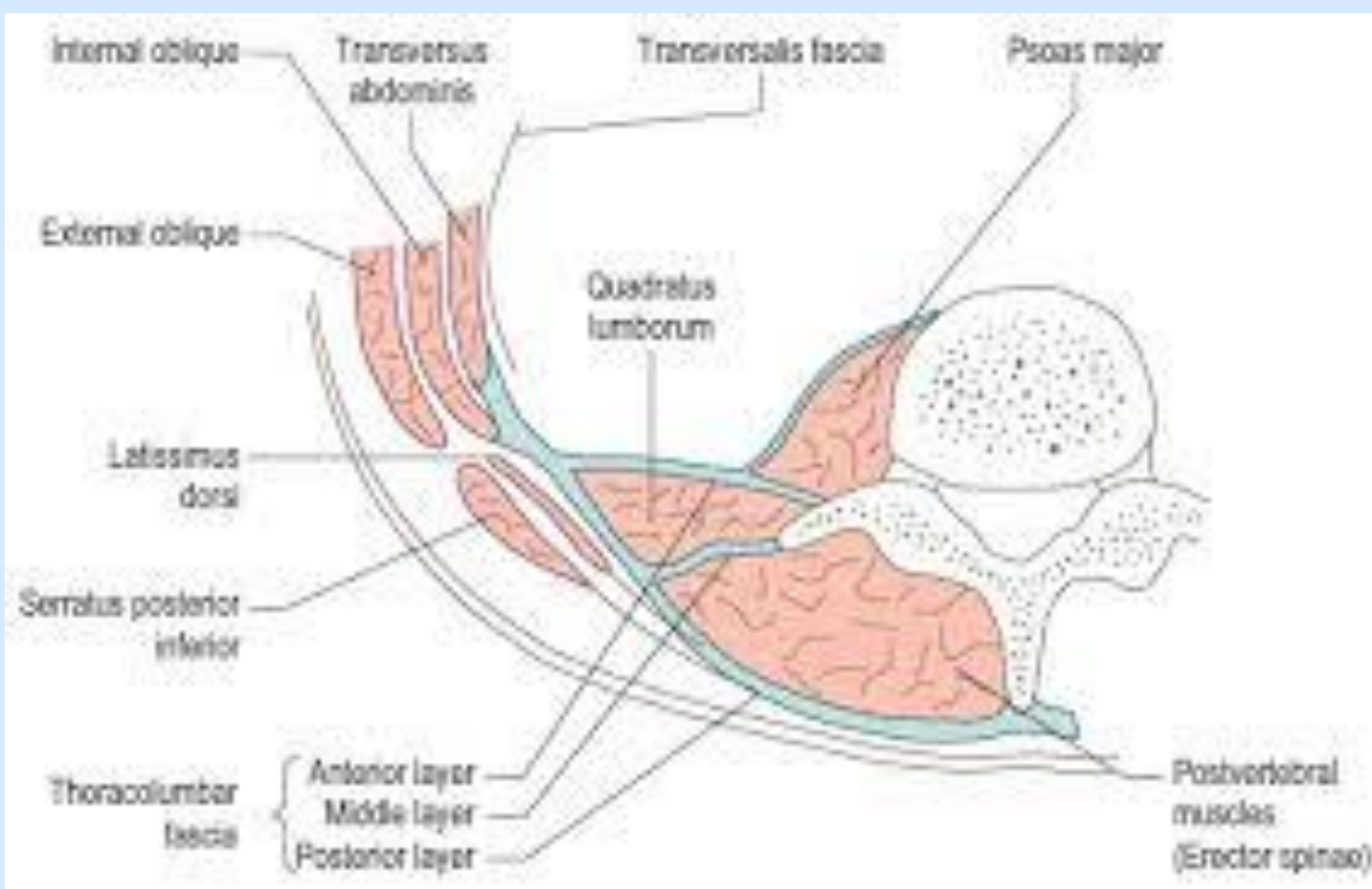
- Extends from the back of sacrum to the neck of femur ` Binds erector spinae to vertebral column and encloses the quadratus lumborum
- Very strong in the lumbar region
- Laterally it gives origin to internal oblique and transversus abdominis muscles

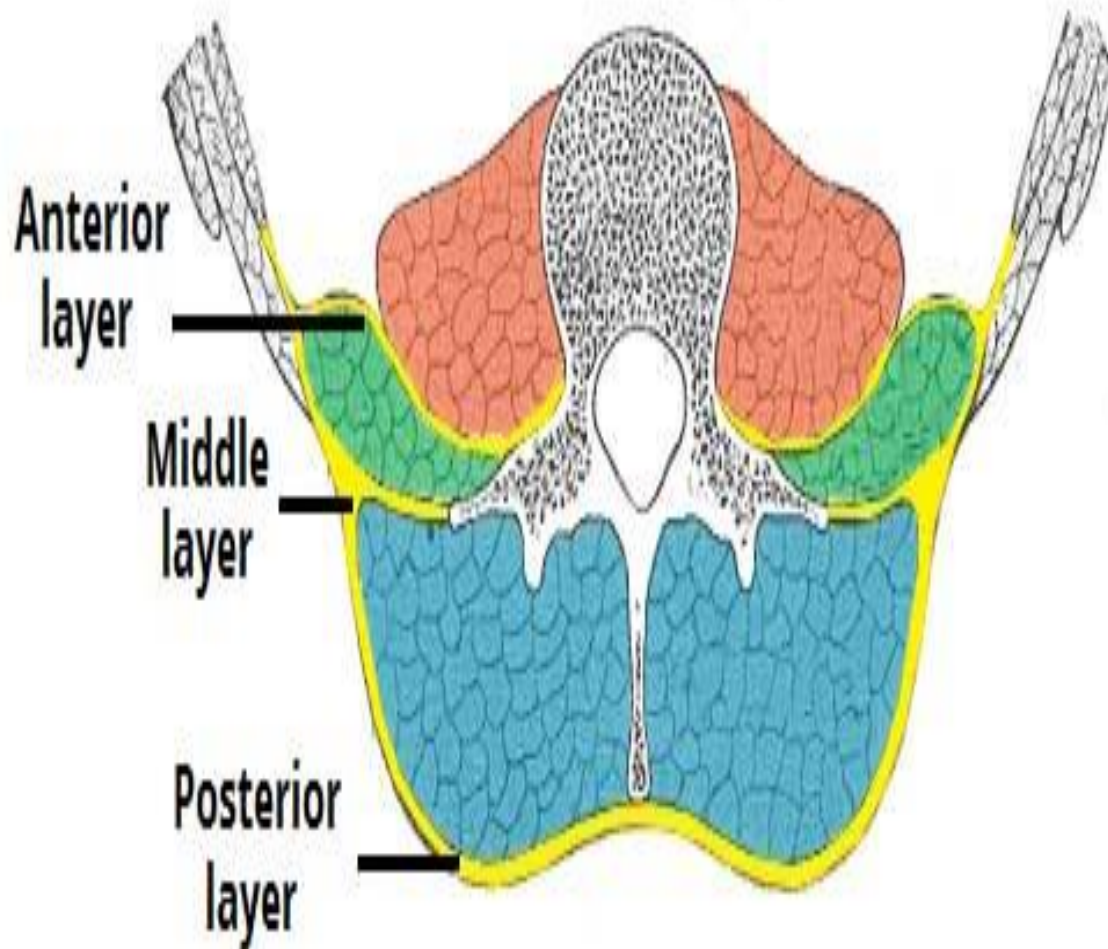



# Thoracolumbar fascia

- The thoracolumbar fascia consists of the three layers; posterior, middle and anterior. Muscles are enclosed between these layers:
- **Quadratus lumborum** – between the anterior and middle layers.
- Deep back muscles – between the middle and posterior layers.
- The posterior layer extends between the 12<sup>th</sup> rib and the **iliac crest** posteriorly. Laterally the fascia meets the internal oblique and transversus abdominis muscles, but not the external oblique. As it forms these attachments it covers the **latissimus dorsi**.





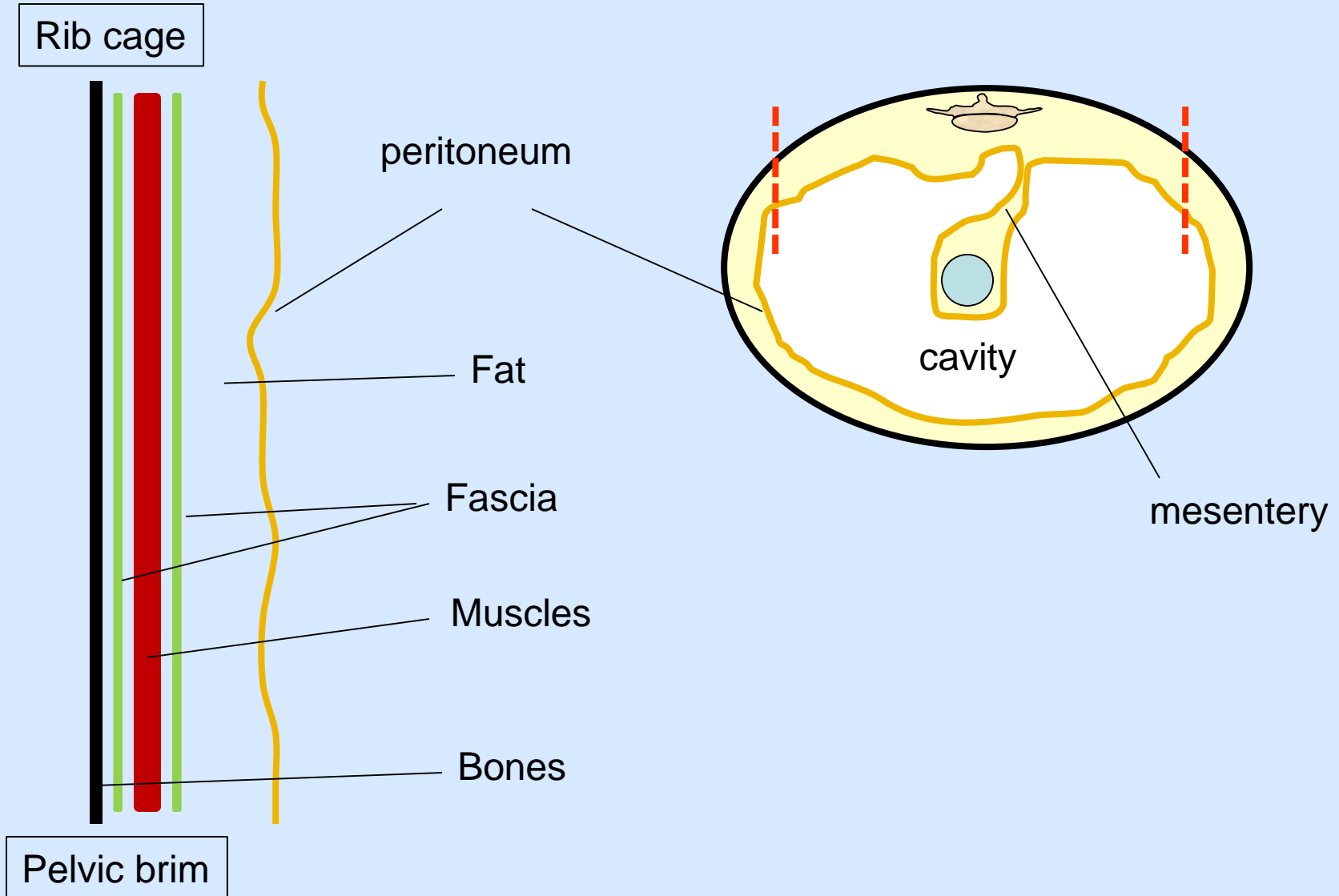


-  Psoas major
-  Quadratus lumborum
-  Deep back muscles

# Thoracolumbar fascia

- The anterior layer attaches to the anterior aspect of the **transverse processes** of the lumbar vertebrae, the 12th rib and the iliac crest. Laterally the fascia is continuous with the aponeurotic origin of the transversus abdominis muscle. Superiorly the fascia thickens to become the **lateral arcuate ligament**, which joins the iliolumbar ligaments inferiorly.

# Structures forming the posterior abdominal wall



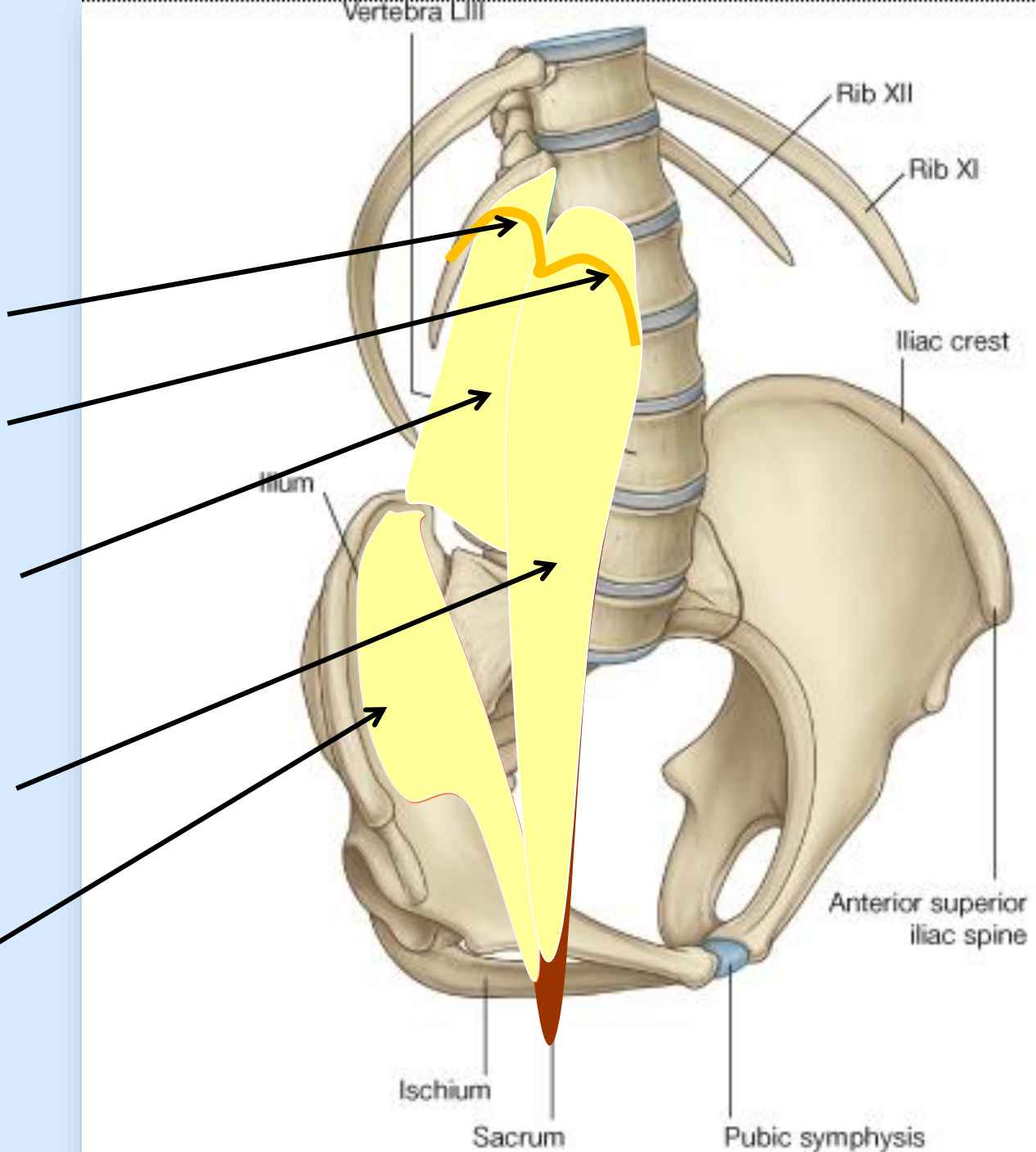
Lateral arcuate ligament

Medial arcuate ligament

Anterior layer of lumbar fascia

Psoas fascia

Iliac fascia



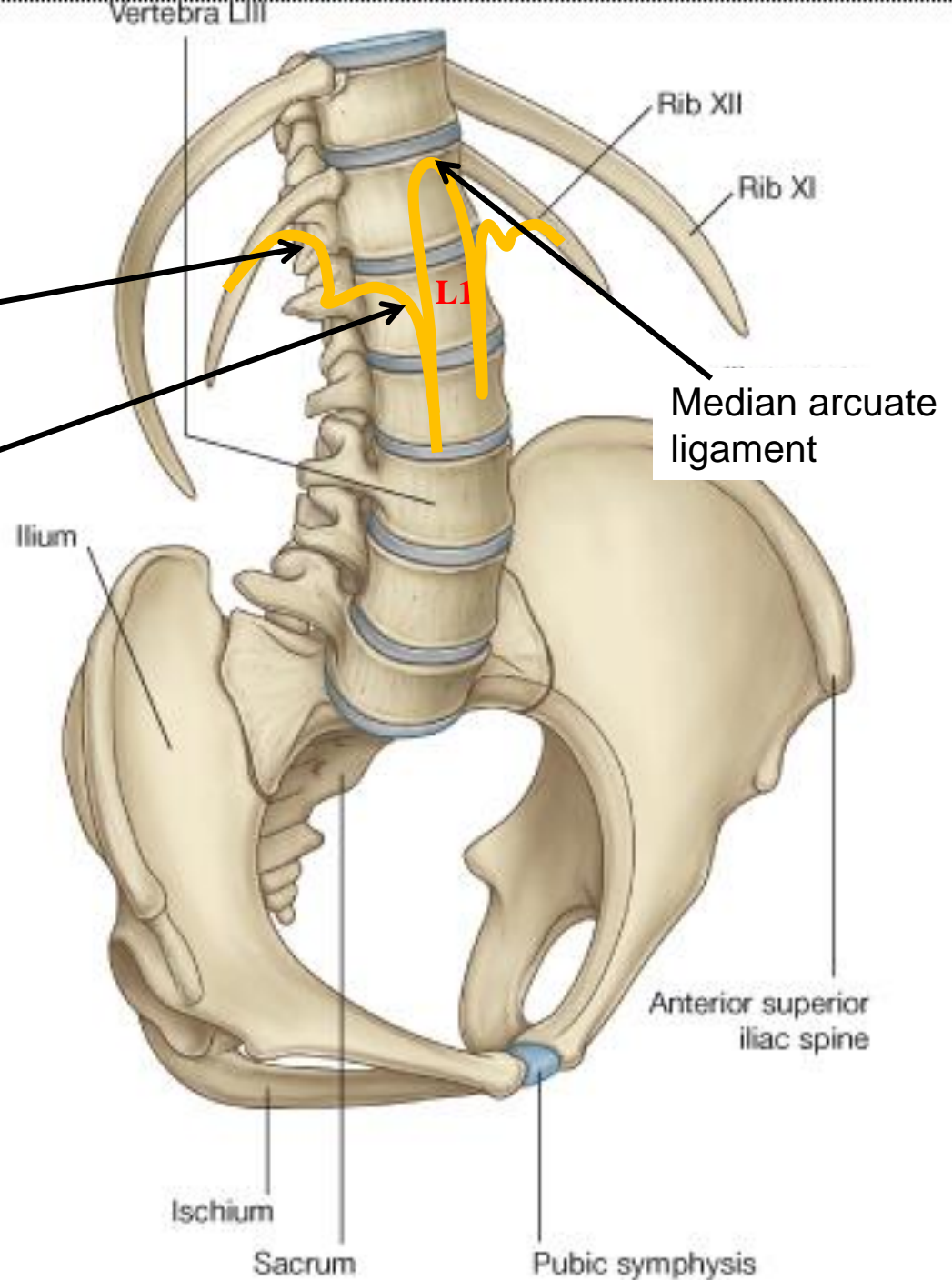
# Arcuate ligaments

Lateral arcuate ligament

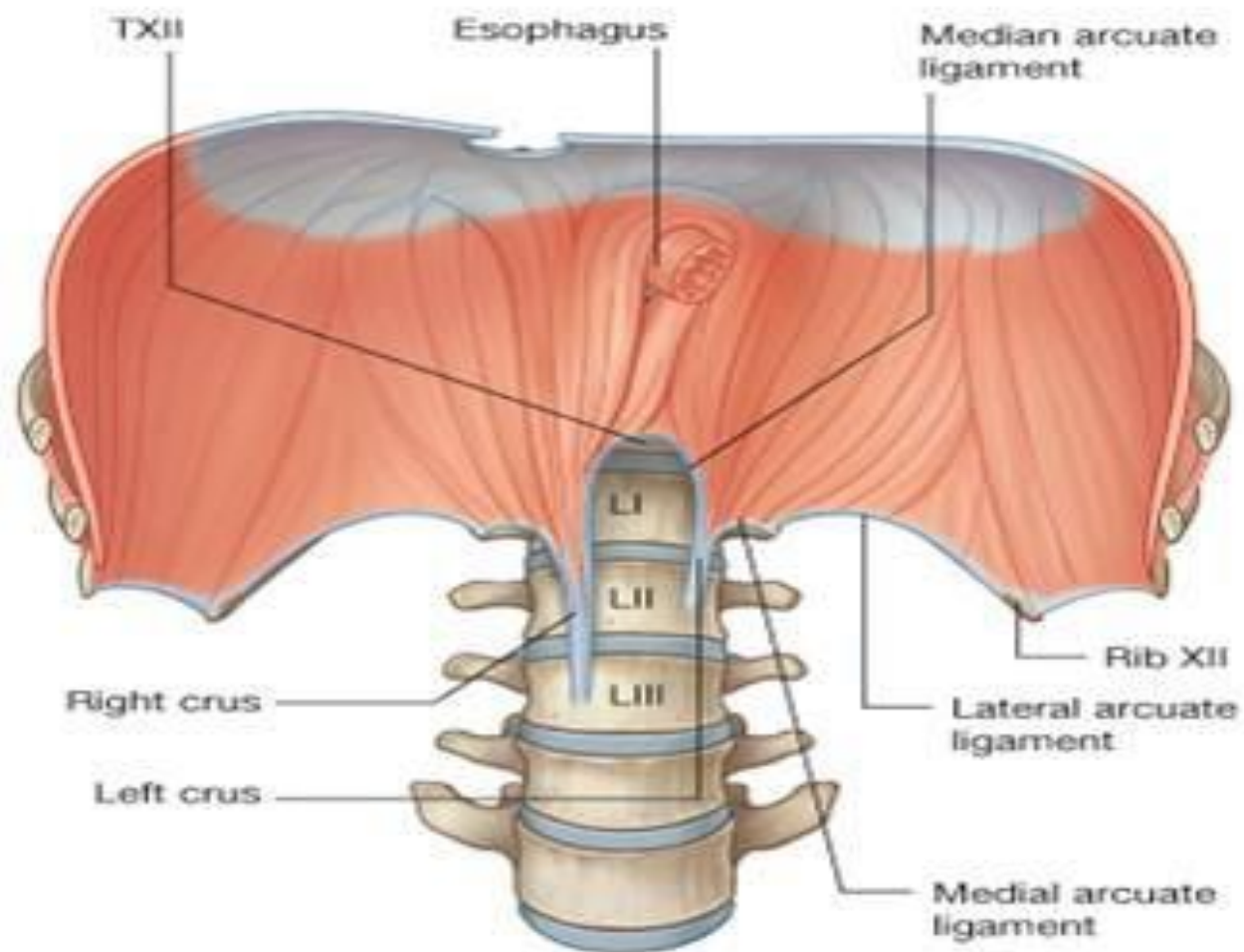
Medial arcuate ligament

## Median arcuate ligament

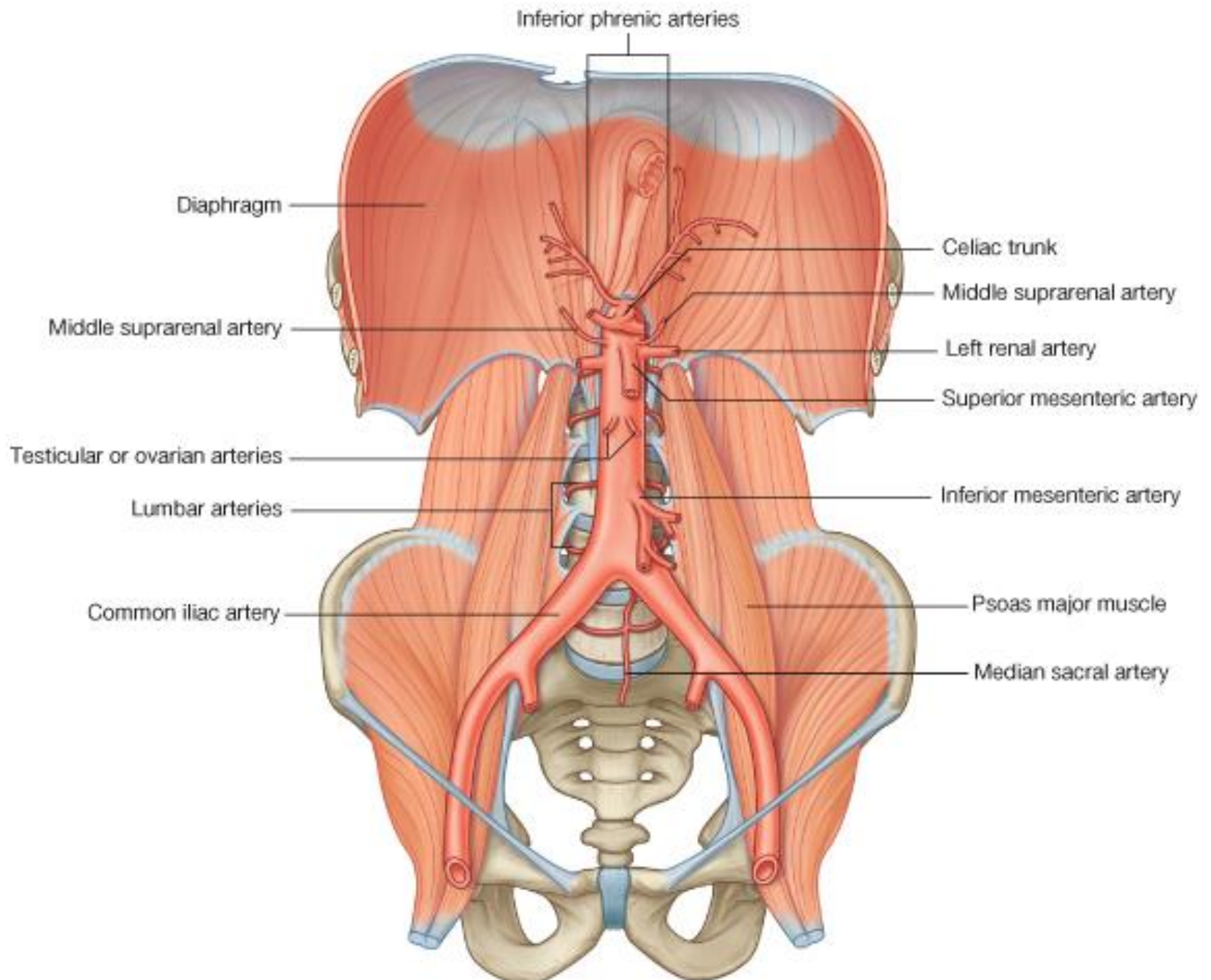
Formed by tendinous fibres from medial edges of left and right crura of the diaphragm



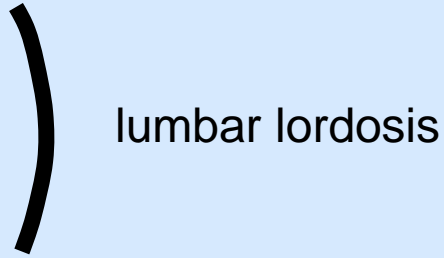








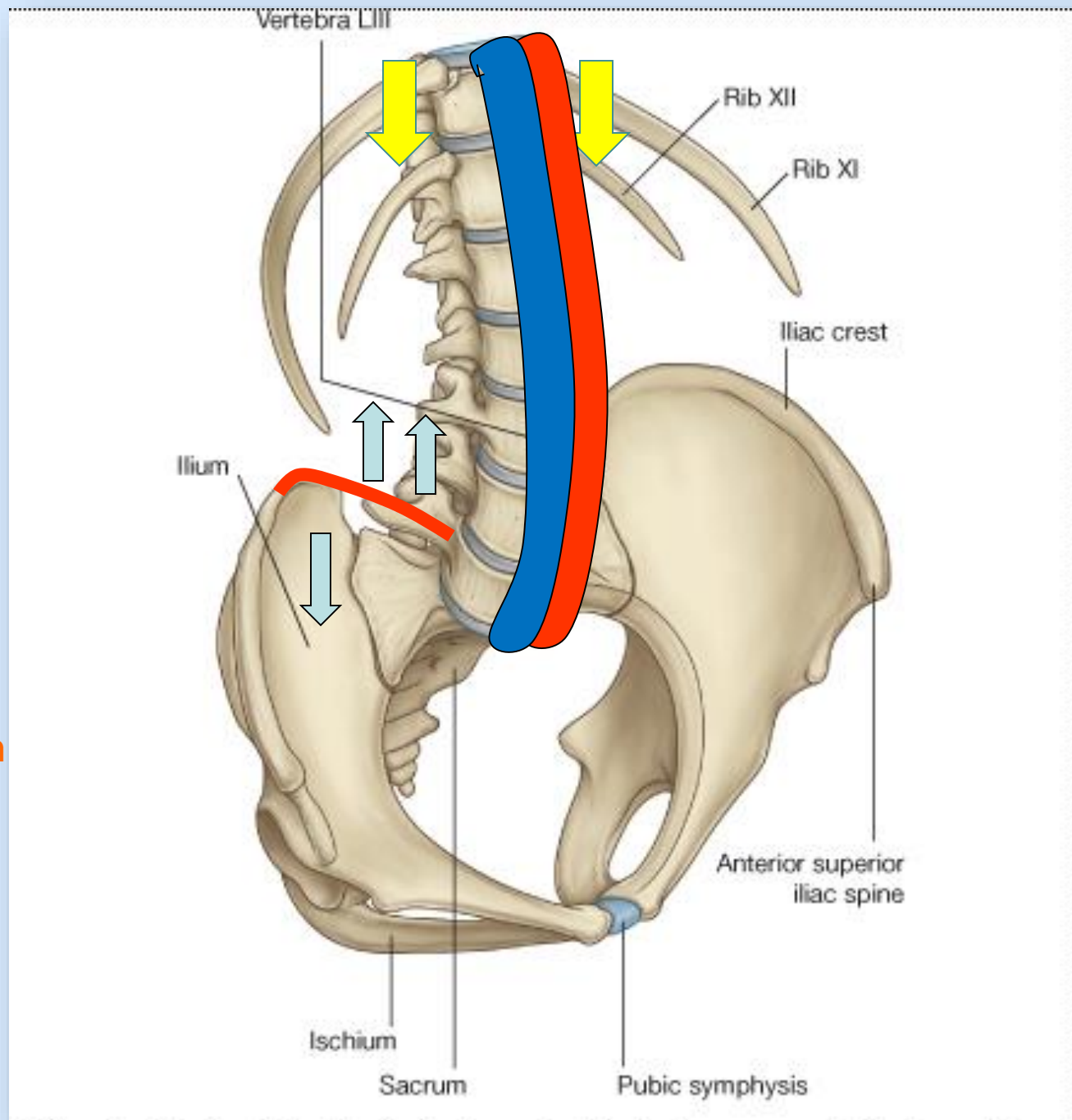
# Paravertebral gutters



Forward projection is enhanced by aorta and IVC

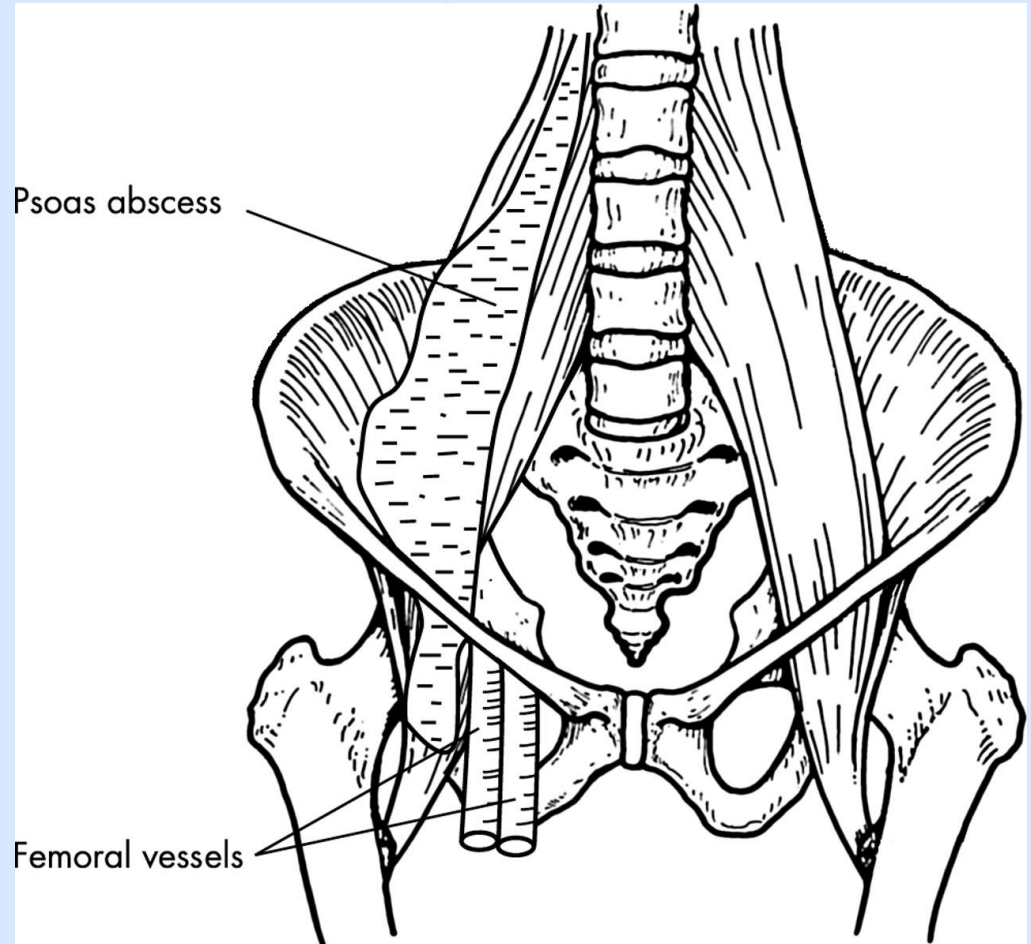
Floor is formed by **psosas** and **quadratus lumborum** above and **iliacus** below the iliac crest

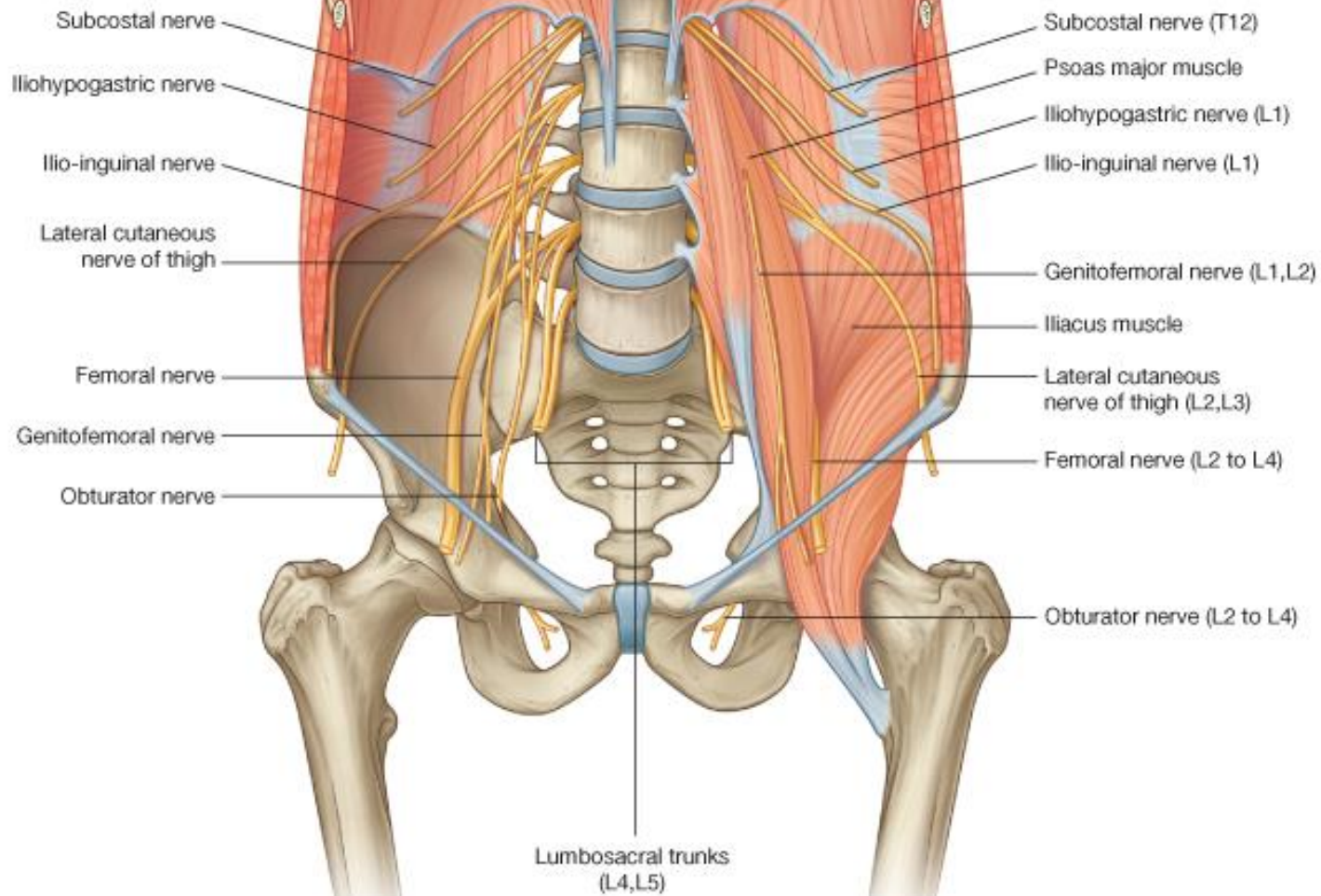
**Posterior part of the diaphragm** also contributes



# Psoas abscess

- A focus of pus in the lumbar intervertebral disks can track down along the muscle and present as a lump in the groin
- Tuberculosis of the spine gives rise to a psoas abscess







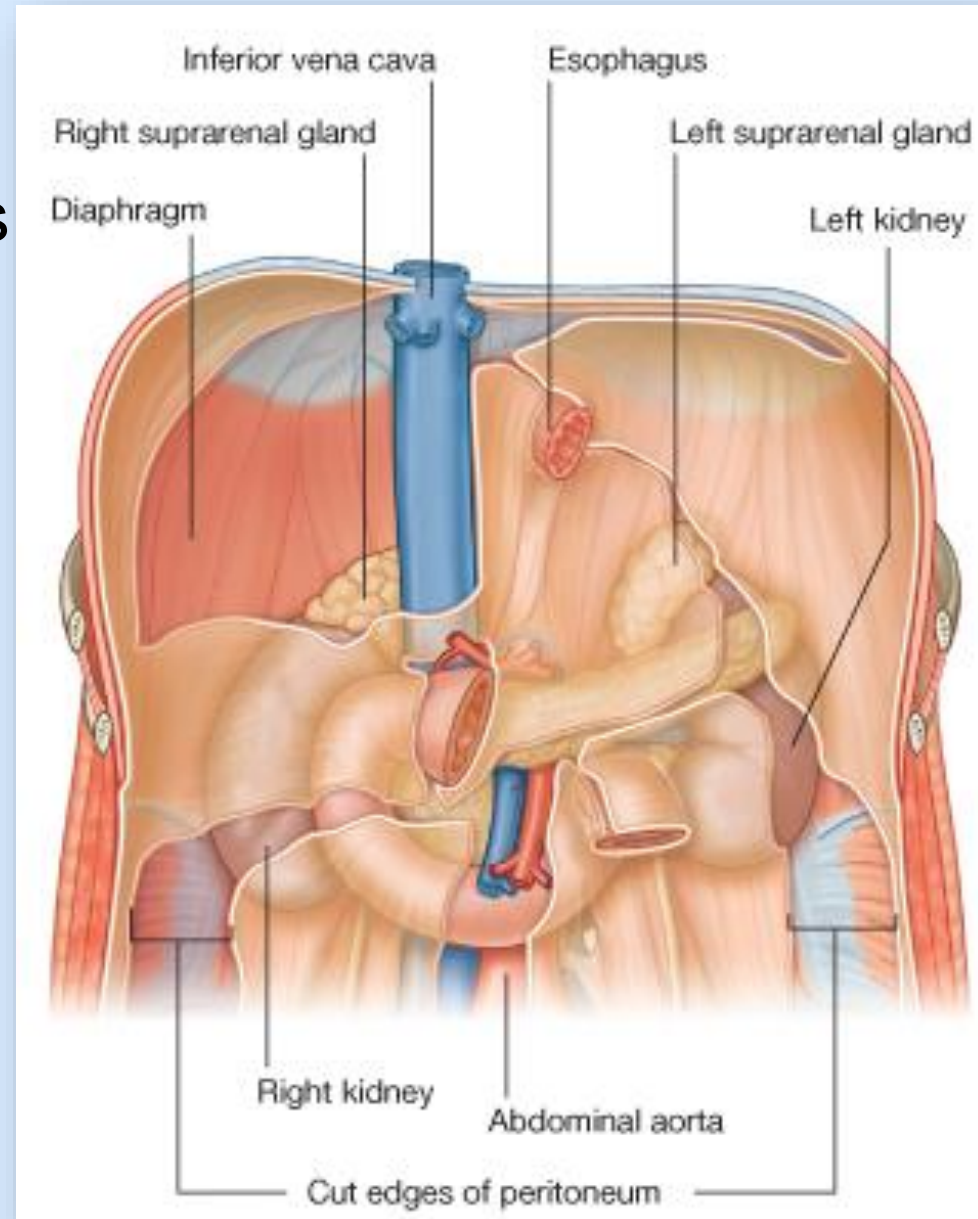
# Organs in the posterior abdominal wall

Duodenum 2<sup>nd</sup> and 3<sup>rd</sup> parts

Pancreas

Kidneys and ureters

Suprarenal glands



# Vessels

- Aorta and its branches
- Inferior vena cava and its tributaries
- Portal vein and its tributaries
- Lymphatics and lymph nodes

# Blood Vessels.

## Abdominal Aorta

- Visceral branches
- Posterior branches
- Terminal Branches

## Inferior Vena Cava

- Common iliac veins
- Lumbar veins
- Right testicular or ovarian vein
- Renal veins
- Right suprarenal vein
- Inferior phrenic veins
- Hepatic veins

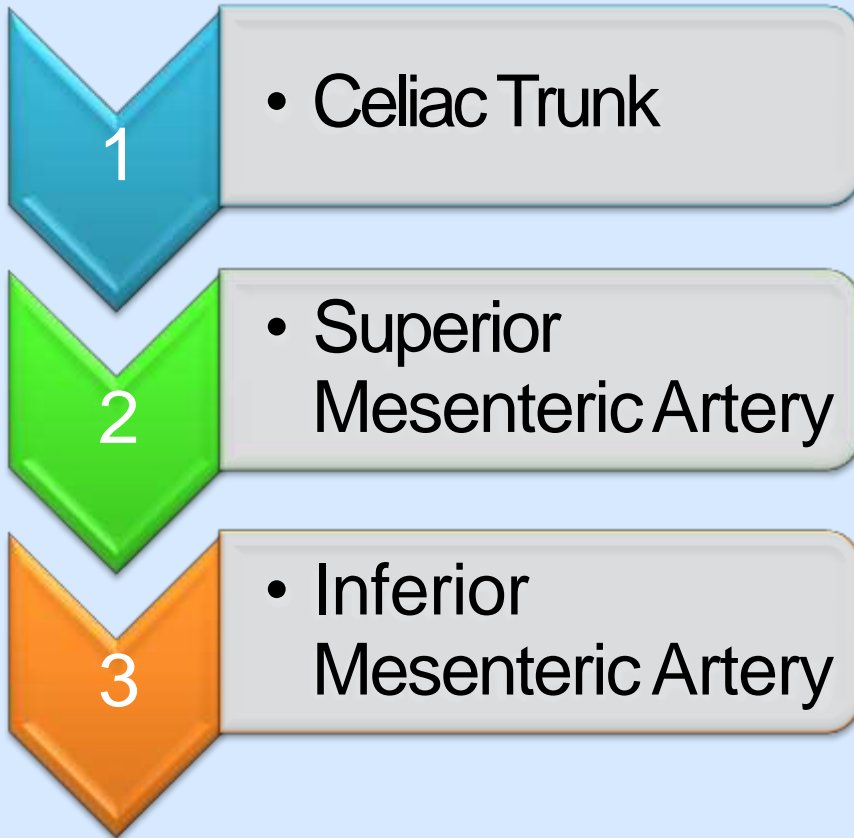
# Abdominal Aorta

- begins at midline at aortic opening of the diaphragm, opposite lower border of vertebra T12 and passes down from L1 until L4 then divides into right & left common iliac arteries.

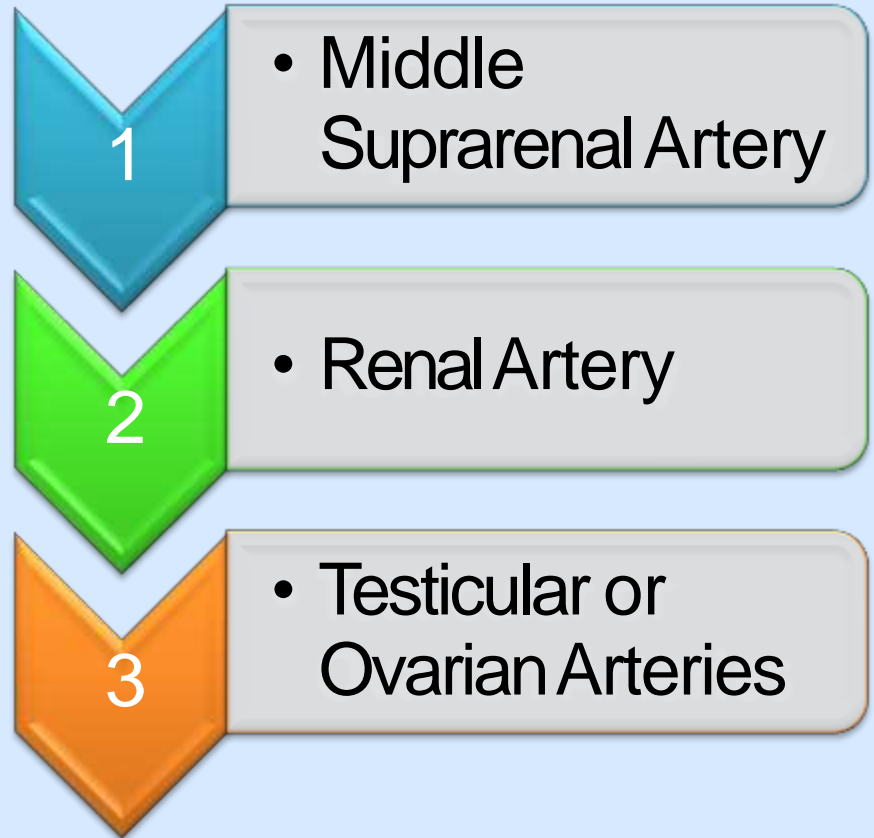


# 1) Visceral Branches

## UNPAIRED

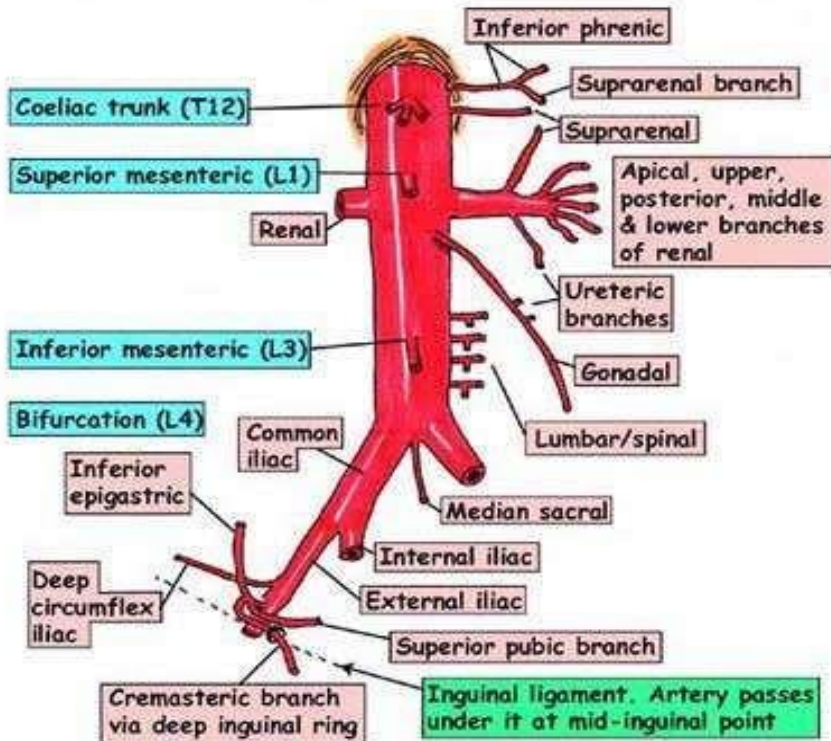


## PAIRED



## 2) Posterior Branches

ABDOMINAL AORTA AND  
RIGHT EXTERNAL ILIAC ARTERY



Inferior Phrenic  
Artery

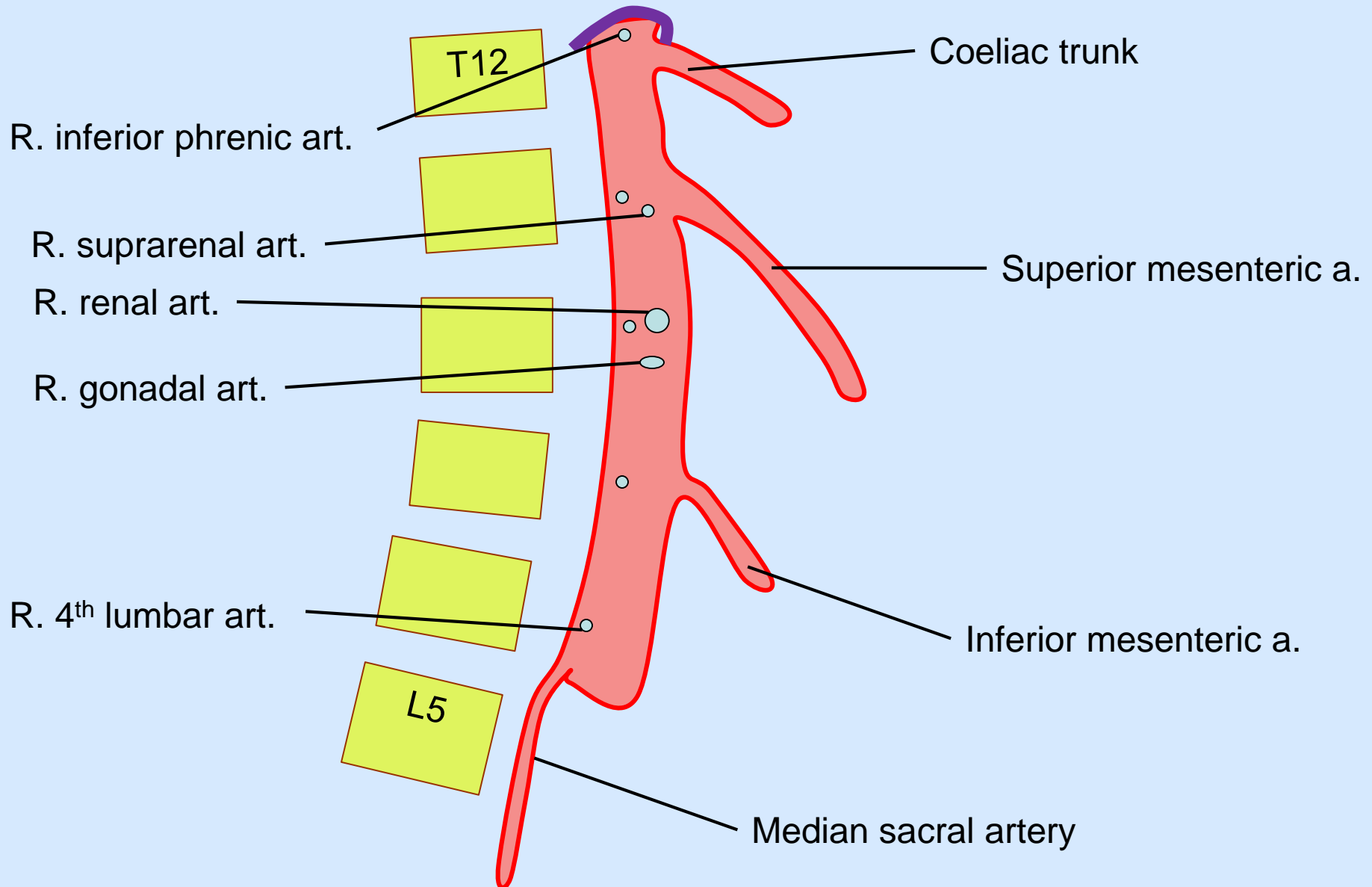
Lumbar Artery

Median Sacral  
Artery

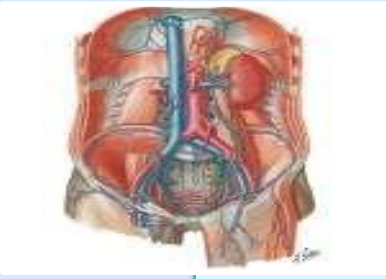
### Relations of aorta

Left lateral: sympathetic chain. Right lateral: IVC, Cysterna chyli  
Both lateral: Azygos veins, para-aortic nodes, coeliac ganglia  
Anterior: Pancreas, splenic vein, left renal vein, 3rd part  
duodenum, mesentery, nodes, autonomic plexus, lesser  
sac, stomach, omentum, small bowel  
Posterior: T12-L4, left lumbar veins

# Branches of abdominal aorta



Tributaries to the inferior  
vena cava includes:



- Common iliac veins
- Lumbar veins
- Right testicular or ovarian vein
- Renal veins
- Right suprarenal vein
- Inferior phrenic veins
- Hepatic veins

# Venous Tributaries

## Lumbar Veins

5<sup>th</sup> lumbar vein generally drains into the iliolumbar vein, a tributary of the common iliac

The 3<sup>rd</sup> & 4<sup>th</sup> lumbar veins usually drain into the inferior vena cava

The 1<sup>st</sup> & 2<sup>nd</sup> lumbar veins may empty into the ascending lumbar veins

# NERVE SUPPLY

The quadratus lumborum is **supplied** by the lumbar arteries; branches of the **abdominal** aorta, subcostal arteries and the lumbar division of the iliolumbar artery.

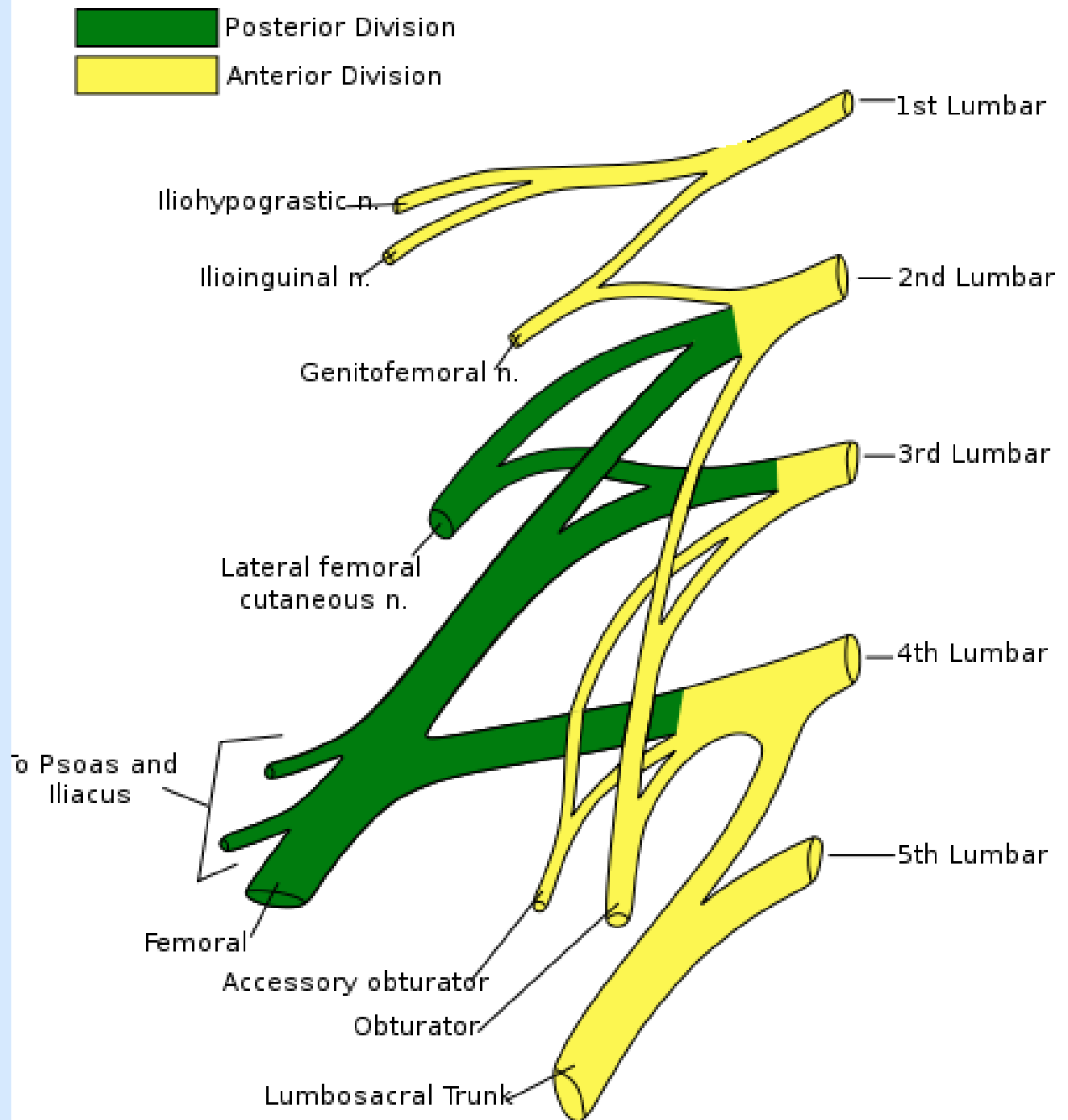
L1-L3 ventral rami pierce and innervate the psoas **muscles**, while the femoral **nerve** (L2-L3) gives somatic **innervation** to iliacus.

# Lumbar plexus

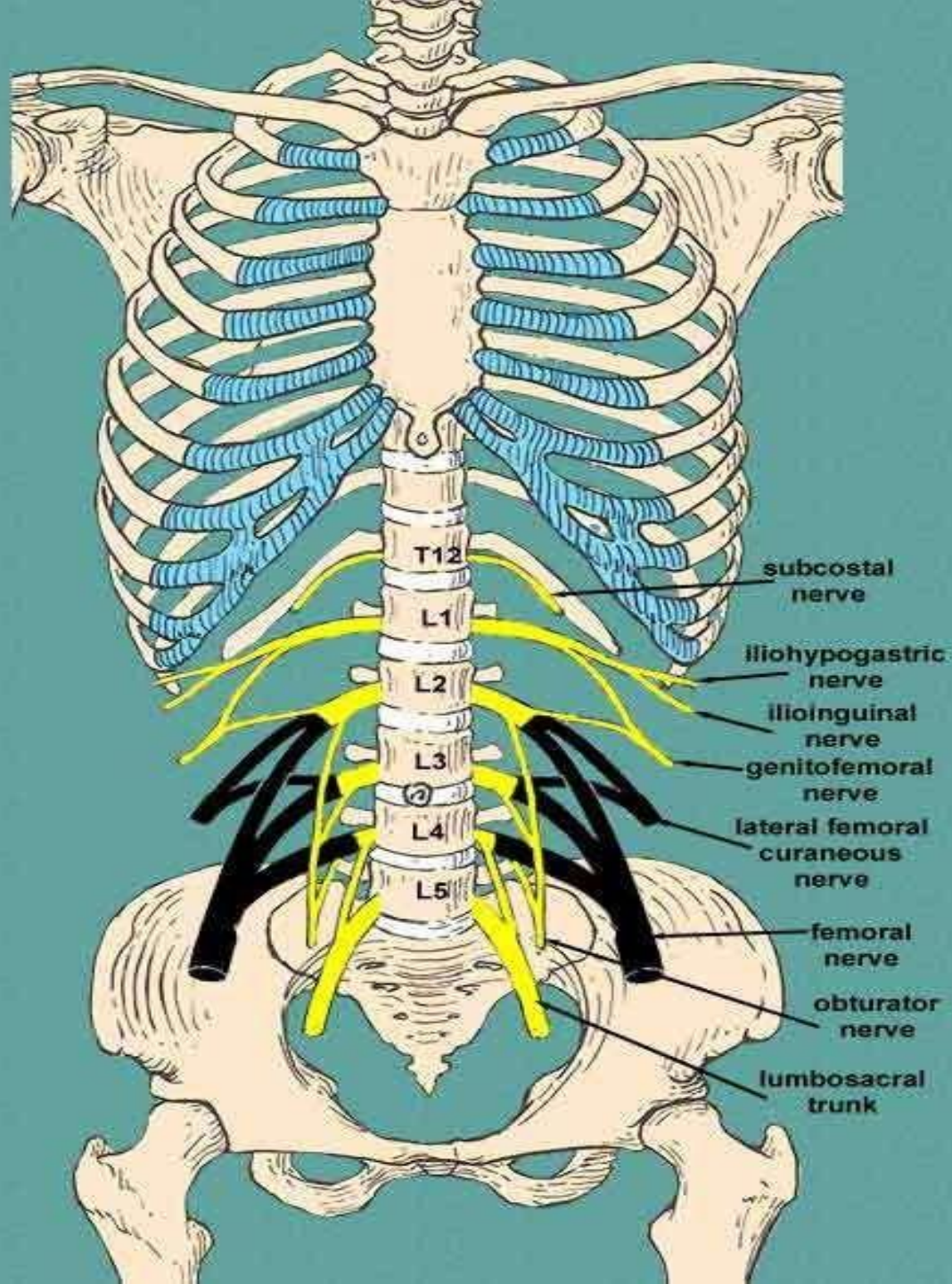
1<sup>st</sup> – 4<sup>th</sup> lumbar spinal segments

Embedded in the psoas

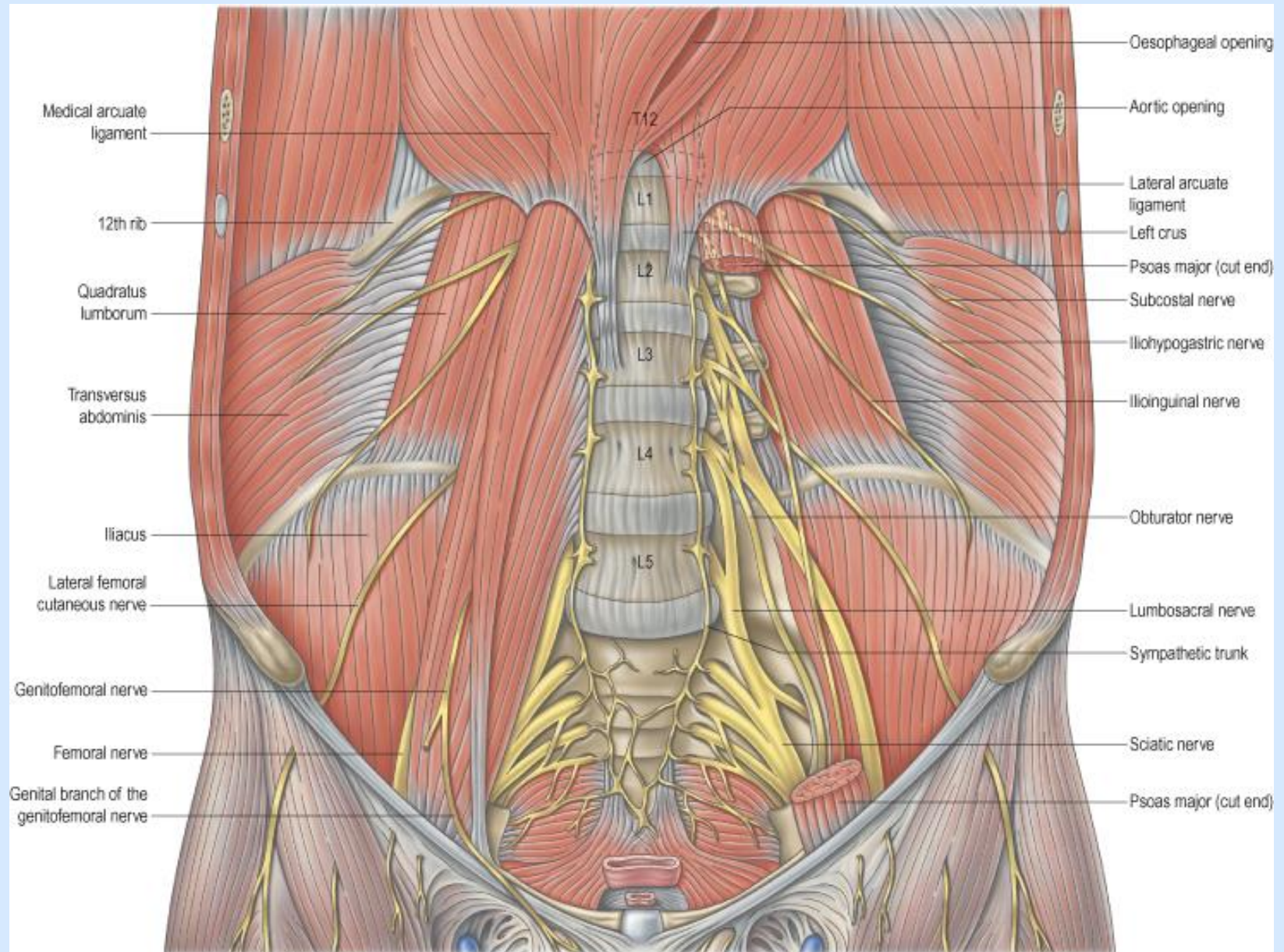
Branches related laterally, medially or anteriorly to psoas









# Branches of lumbar plexus & psoas muscle



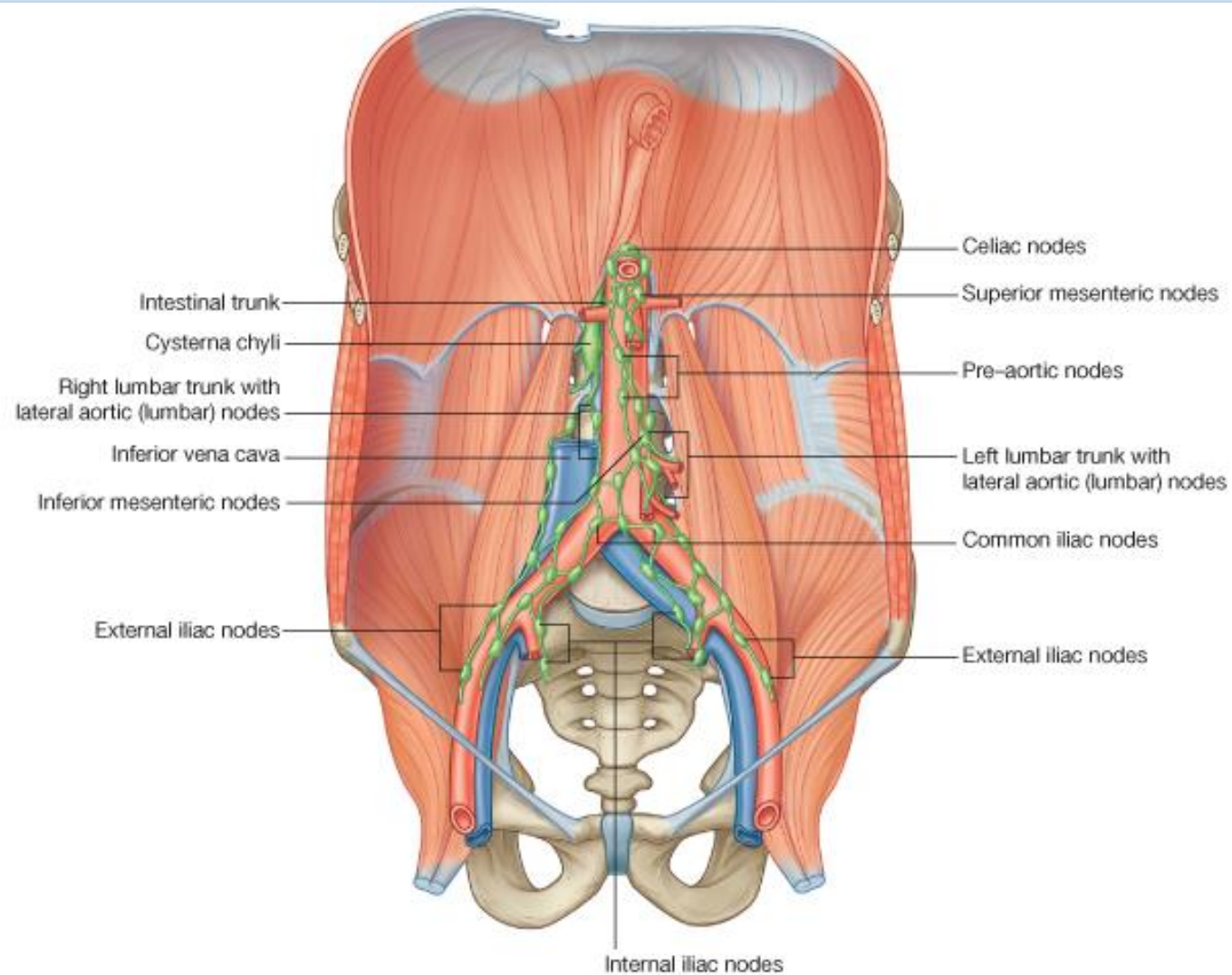


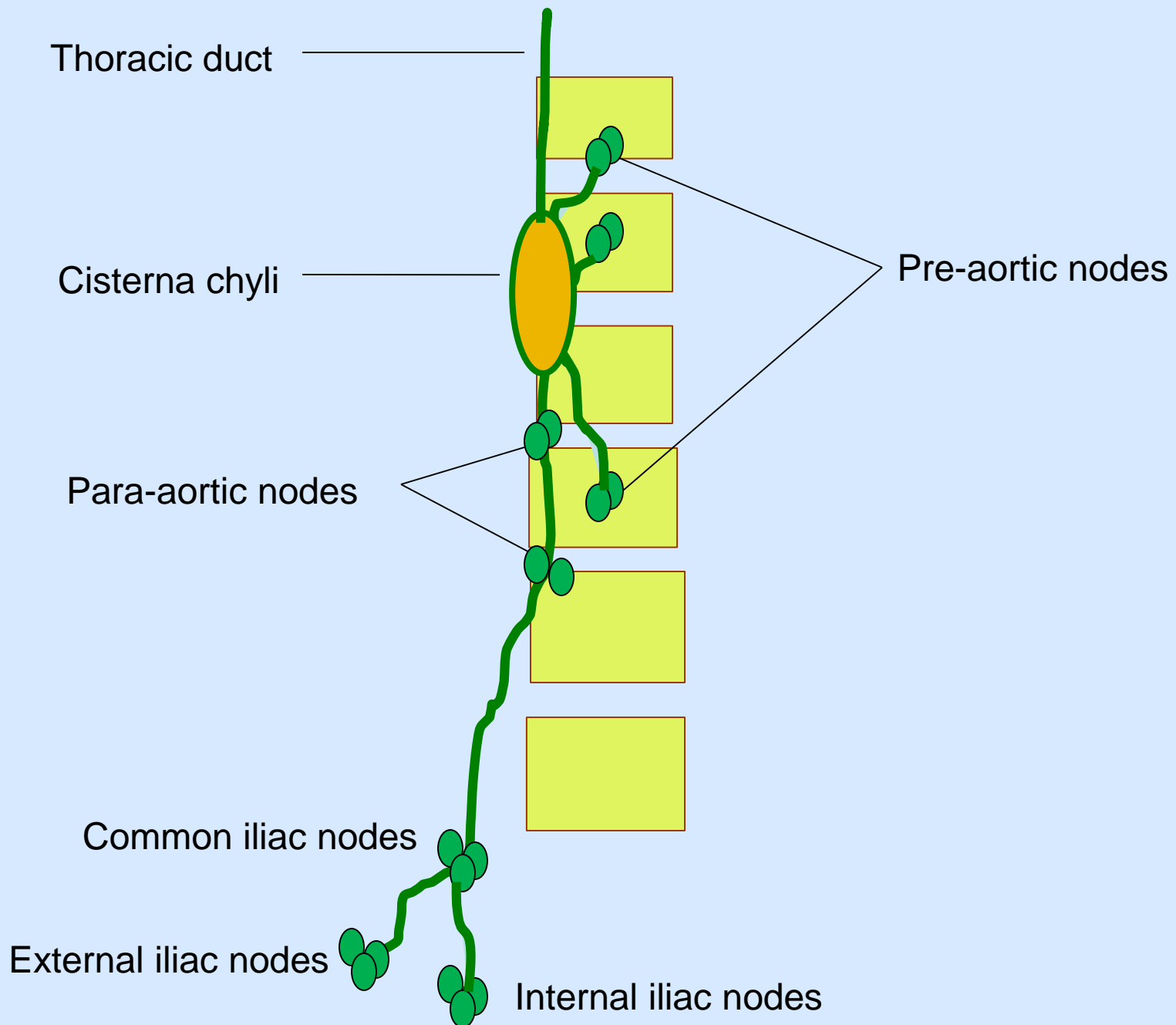
# Lymph nodes

Lymphatics follow arteries

- Single ventral arteries  Pre-aortic nodes
  - Paired arteries to other viscera
  - Paired arteries to body wall
- 
- Para-aortic nodes

# Lymph nodes





# LUMBAR PLEXUS..

- The lumbar plexus lies in the posterior part of the substance of the psoas major muscle.
- Formed by the ventral rami of the upper four lumbar nerves.
- The first lumbar nerve receives a contribution from subcostal nerve, and fourth lumbar nerve gives a contribution to lumbosacral trunk, which take part in the formation of the sacral plexus.

# Branches of lumbar plexus:

- 1.) **The iliohypogastric nerve (L1)** emerges at the lateral border of the psoas, runs downwards and laterally in front of the quadratus lumborum, and behind the kidney and colon, pierces the transversus abdominis a little above the iliac crest, and runs in the abdominal wall.



- 2.) **The ilioinguinal nerve (L1)** has the same course as the iliohypogastric nerve, but on a slightly lower level.
- 3.) **The genitofemoral nerve (L1 , L2 ventral division)** emerges on the anterior surface of the psoas muscle near its medial border and runs downwards in front of the muscle. Near the deep inguinal ring it lies in front of the external iliac artery and divides into femoral and genital branches.

- 4.) **The lateral cutaneous nerve** of the thigh (L2, L3 dorsal division) emerges at the lateral border of the psoas, runs downwards and laterally across the right iliac fossa, over the iliacus and reaches the anterior superior iliac spine.
- 5.) **The femoral nerve** (L2, L3, L4; dorsal division) emerges at the lateral border of the psoas below the iliac crest, and runs downwards and slightly laterally in the furrow between the psoas and iliacus. It lies under cover of the fascia iliaca.

- **6.) The obturator nerve (L2, L3, L4; ventral divisions)** emerges on the medial side of the psoas muscle and runs forwards and downwards on the pelvic wall.
- **7.) The lumbosacral trunk (L4, L5; ventral rami)** is formed by union of the descending branch of nerve L4 with nerve L5. It is related medially to the sympathetic chain and laterally to the iliolumbar artery and the obturator nerve.

THANK YOU