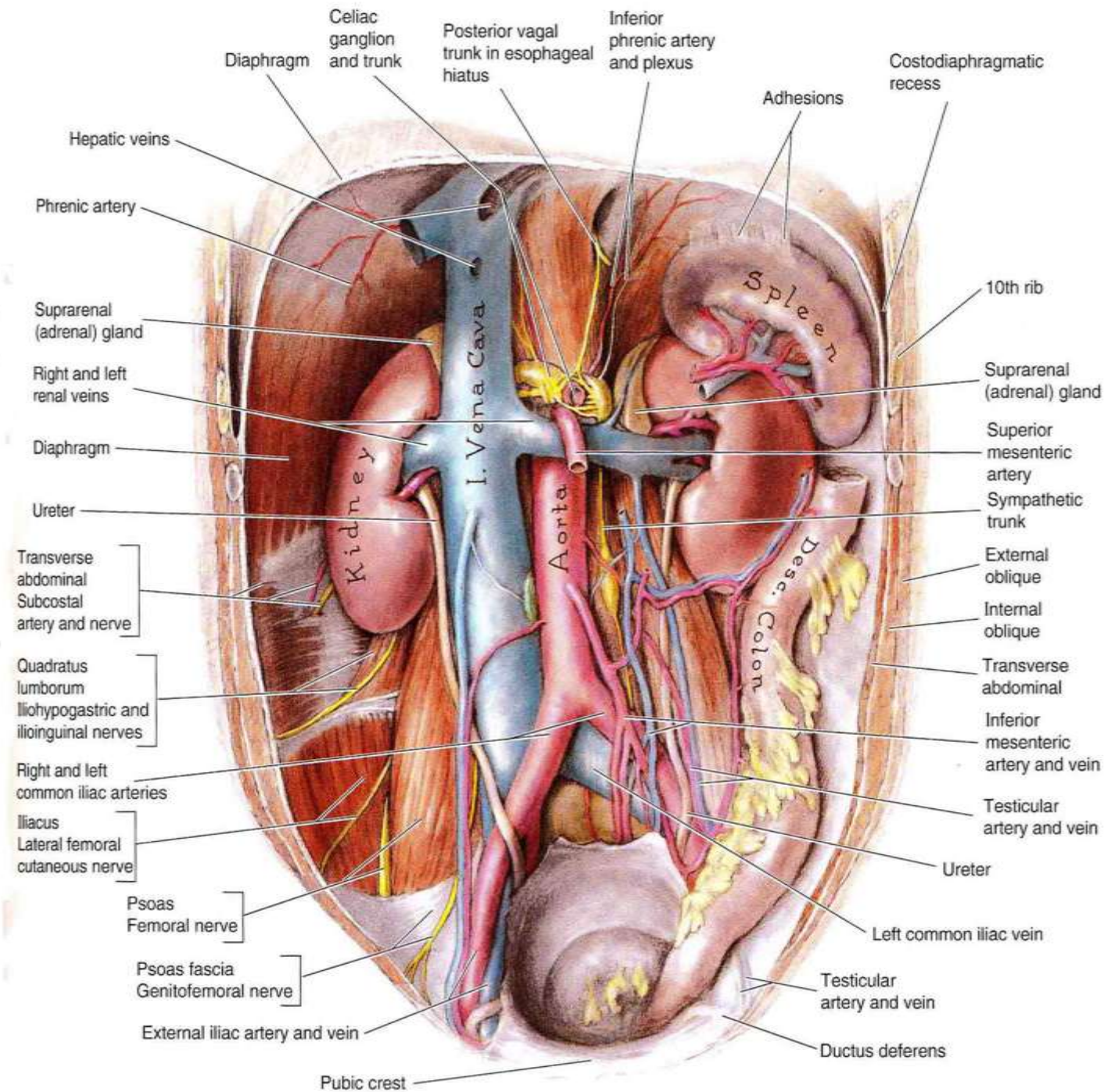


# The posterior abdominal wall

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Diaphragm  
 Celiac ganglion and trunk  
 Posterior vagal trunk in esophageal hiatus  
 Inferior phrenic artery and plexus  
 Adhesions  
 Costodiaphragmatic recess

Hepatic veins  
 Phrenic artery  
 Suprarenal (adrenal) gland  
 Right and left renal veins  
 Diaphragm

10th rib  
 Suprarenal (adrenal) gland

Ureter  
 Transverse abdominal artery and nerve  
 Subcostal artery and nerve  
 Quadratus lumborum  
 Iliohypogastric and ilioinguinal nerves

Superior mesenteric artery  
 Sympathetic trunk  
 External oblique  
 Internal oblique  
 Transverse abdominal

Right and left common iliac arteries  
 Iliacus  
 Lateral femoral cutaneous nerve

Inferior mesenteric artery and vein  
 Testicular artery and vein

Psoas  
 Femoral nerve  
 Psoas fascia  
 Genitofemoral nerve

Ureter  
 Left common iliac vein

External iliac artery and vein

Testicular artery and vein

Pubic crest

Ductus deferens

I. Vena Cava

Aorta

Desc. Colon

Spleen

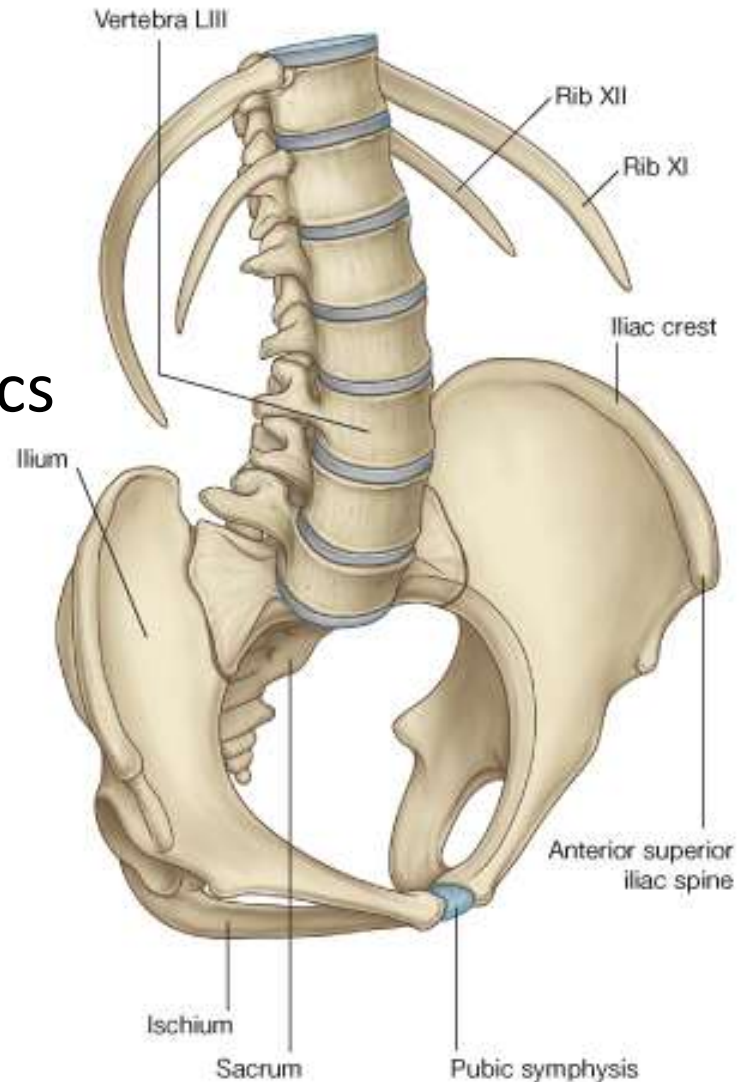
Kidney

# Posterior Abdominal Wall

- Lumbar vertebrae and discs.
- Muscles
  - Psoas, quadratus lumborum, iliacus, transverse, abdominal wall oblique muscles.
- Nerves: Lumbar plexus
  - Ventral rami of lumbar spinal nerves.
- Fascia
- Diaphragm
  - Contributing to the superior part of the posterior wall
- Vessels : IVC, aorta and their branches
- lymph nodes
- Fat

# Lumbar vertebra and discs

Five Vertebrae and Four Discs



# Posterior Abdominal Wall

## *Fascia*

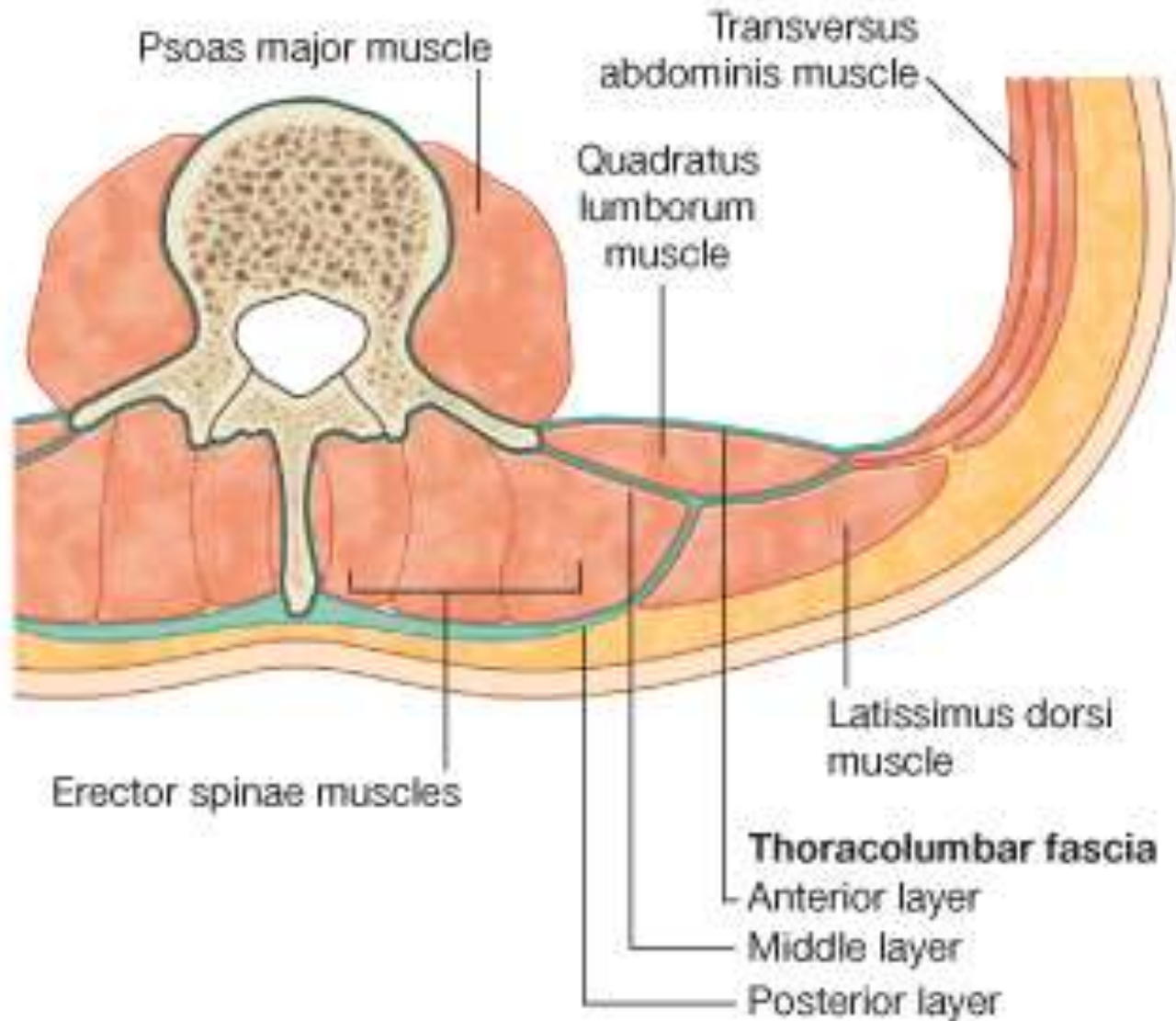
Between the parietal peritoneum and the muscles

- The psoas fascia or psoas sheath: Covers the psoas muscle
- The quadratus lumborum fascia: Covers the quadratus lumborum muscle
- The thoracolumbar fascia.

# Thoracolumbar fascia

- In the lumbar region, it consists of three layers:
  - Posterior** layer is thick and is attached to the spinous processes of the lumbar and sacral vertebrae, and the supraspinous ligament. From these attachments, it extends laterally to cover the erector spinae
  - Middle** layer is attached medially to the tips of the transverse processes of the lumbar vertebrae and intertransverse ligaments; inferiorly, it is attached to the iliac crest and, superiorly, to the lower border of rib XII
  - Anterior** layer covers the anterior surface of the quadratus lumborum muscle and is attached medially to the transverse processes of the lumbar vertebrae, inferiorly; it is attached to the iliac crest and, superiorly; it forms the lateral arcuate ligament for the attachment of the diaphragm.

# Thoracolumbar fascia



# Posterior Abdominal Wall

## *Muscles*

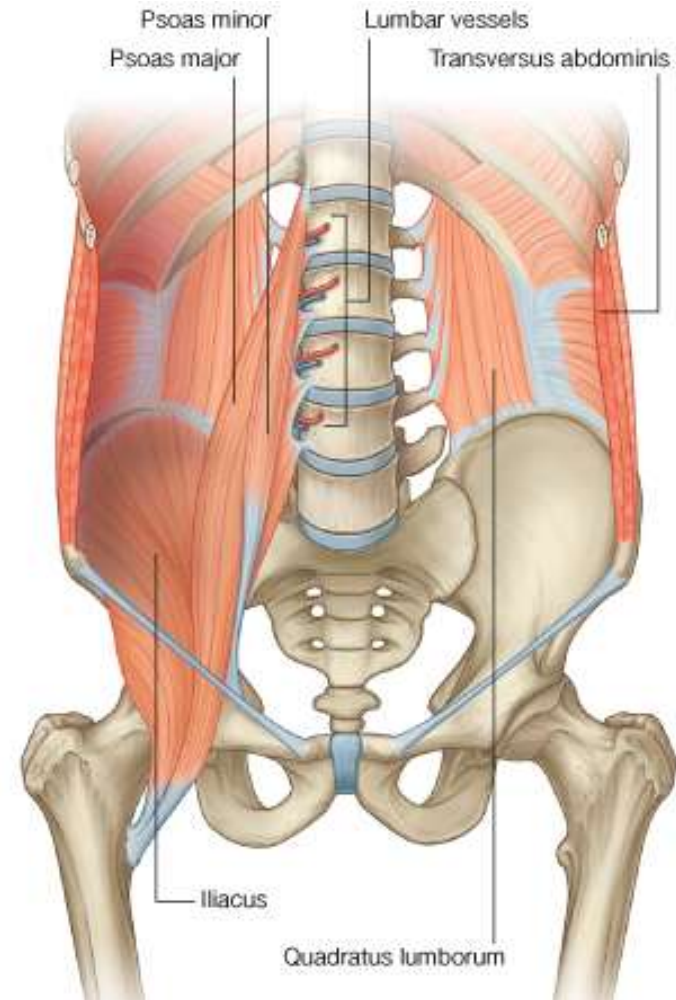
### **Three paired muscles**

- Psoas major
- Psoas minor
- Iliacus
- Quadratus Lumborum



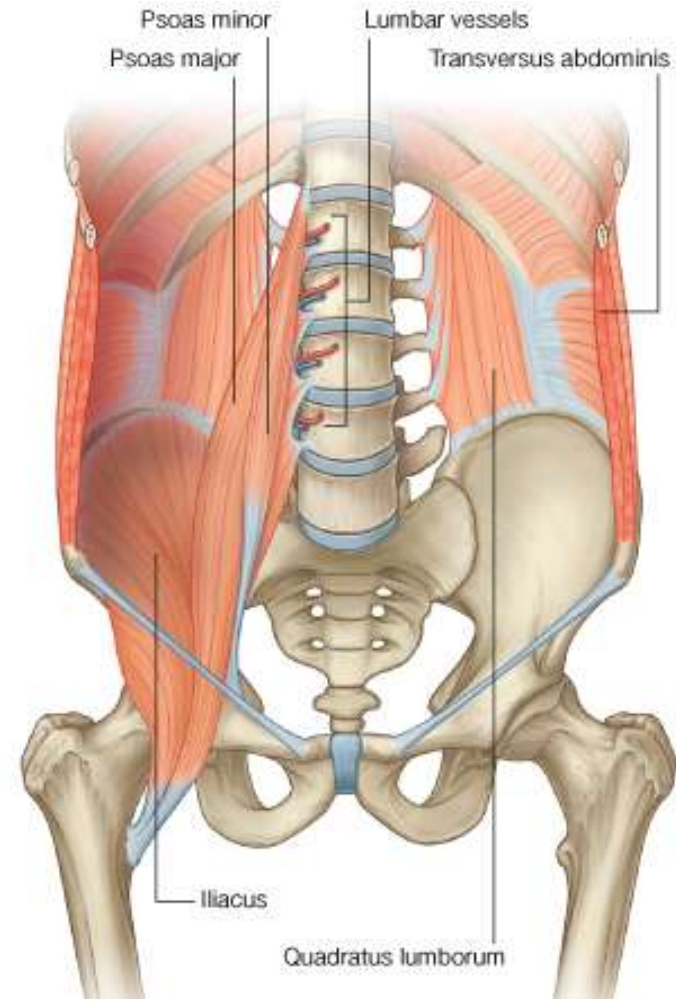
# Muscles of the Posterior Abdominal Wall

- Psoas major
  - **O**: Lumbar transverse processes, intervertebral discs, and adjacent bodies from TXII to LV
  - **I**: Lesser trochanter of femur via iliopsoas tendon
  - **N**: Anterior rami of L1 to L3
  - **A**: Thigh flexion, trunk flexion, lateral flexion



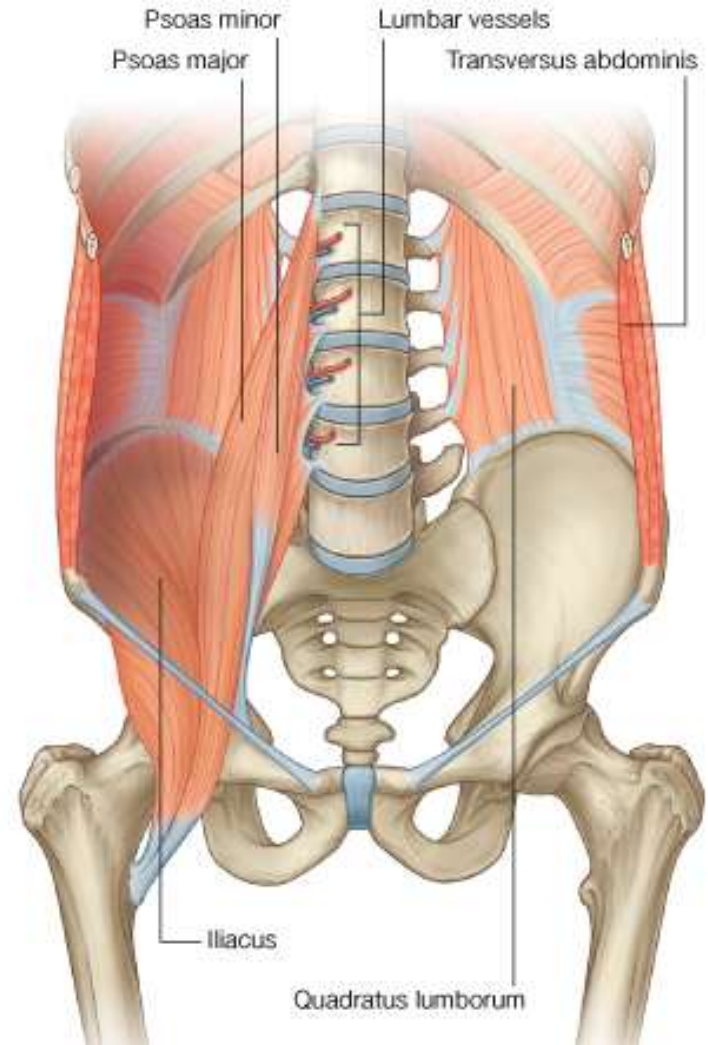
# Muscles of the Posterior Abdominal Wall

- Psoas minor
  - **O**: bodies and transverse processes of vertebrae L1 and L2
  - **I**: descends on the anterior surface of the psoas major and inserts on the iliopubic eminence
  - **N**: Anterior rami of L1 & L2
  - **A**: Flexion of the lumbar vertebrae
- It is absent in about 40% of the population



# Muscles of the Posterior Abdominal Wall

- Quadratus lumborum
  - **O**: iliac crest, lumbar fascia
  - **I**: transverse processes of lumbar vertebrae and the 12<sup>th</sup> rib
  - **N**: Anterior rami of T12 and L1 to L4
  - **A**: Lateral Flexion of the vertebral column. Also an accessory muscle of respiration



## Muscles of the Posterior Abdominal Wall

### Iliacus

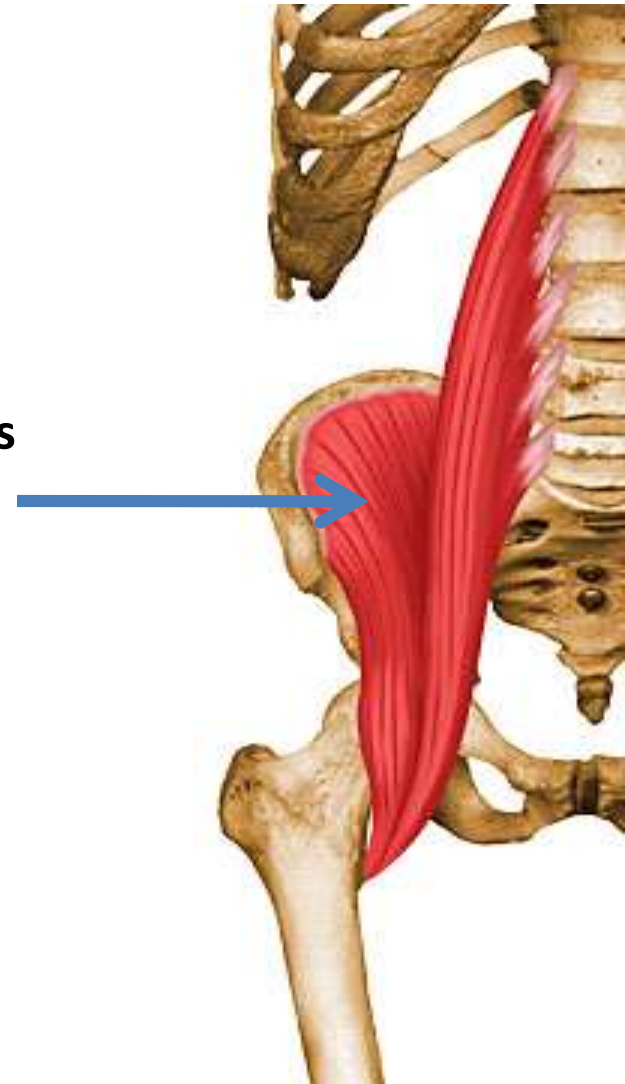
**O:** Iliac fossa

**I:** Lesser trochanter of femur

**A:** Flexes the thigh at the hip

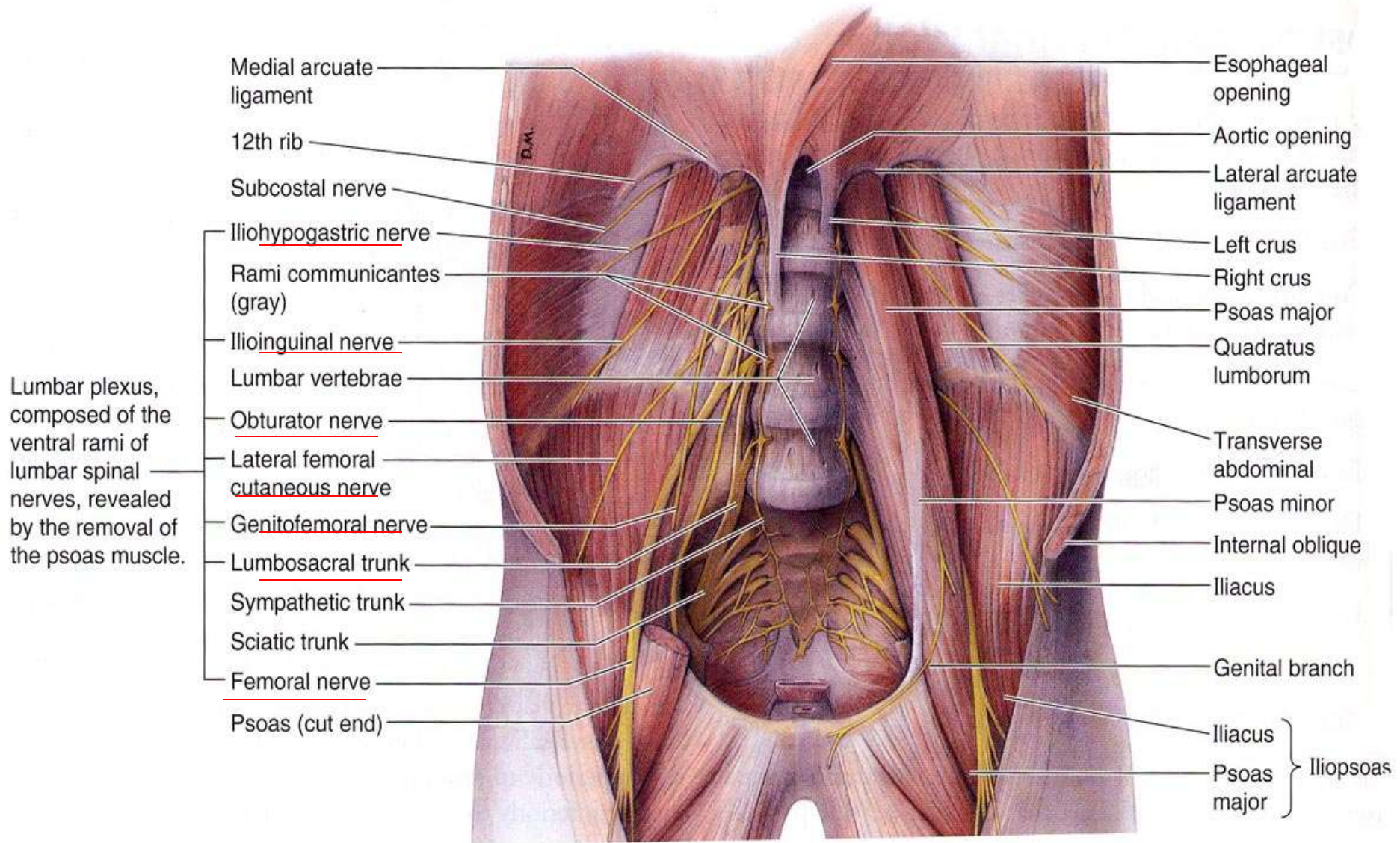
**N:** Femoral Nerve

Iliacus





# Nerves of the Posterior Abdominal Wall



# The lumbar plexus

- Derived from the ventral rami of spinal nerves L1 to L5
- Formed within the substance of the psoas major
- Component nerves are:
  - Ilioinguinal (L1)
  - Iliohypogastric (L1)
  - Genitofemoral (L1, L2)
  - Lateral femoral cutaneous (L2, L3)
  - Femoral nerve (L2,3,4)
  - Obturator nerve (L2,3,4)

# The lumbar plexus

- Iliohypogastric and ilioinguinal nerves (L1)
  - Both emerge from the lateral border of psoas muscle, beneath the subcostal nerve.
  - Ilioinguinal is inferior to the iliohypogastric
  - Both cross laterally over the quadratus lumborum and then penetrate the transversus abdominis above the iliac crest to enter the neurovascular plane

# The lumbar plexus

- Iliohypogastric and ilioinguinal nerves (L1)
  - The iliohypogastric supplies the skin of the lower abdomen including the groin
  - The ilioinguinal nerve enters the inguinal canal and is a component of the spermatic cord
  - Emerges from the superficial inguinal ring to supply the skin of the upper medial thigh and anterior scrotum/labium majus



# The lumbar plexus

- Genitofemoral nerve (L1, 2)
  - Emerges from the anterior surface of the psoas major and descends on it
  - Consists of a genital and a femoral branch
  - The genital branch enters the deep inguinal ring and, in the male, descends in the spermatic cord, supplying the cremaster muscle; distal to the superficial inguinal ring, it gives rise to cutaneous branches that supply the skin of the upper medial thigh and anterior scrotum/labium majus
  - The femoral branch of the genitofemoral nerve accompanies the femoral artery and supplies the skin of the thigh

# The lumbar plexus

- Lateral femoral cutaneous nerve (L2, 3)
  - Emerges about midway along the lateral border of the psoas major
  - Takes an oblique course across the iliacus muscle;
  - Enters the thigh through or deep to the attachment of the inguinal ligament at the anterior superior iliac spine
  - supplies the skin of the lateral thigh

# The lumbar plexus

- Femoral nerve (L,2, 3, 4)
  - Descends in the gutter between the psoas major and iliacus
  - Enters the thigh deep to the inguinal ligament  
Supplies the flexor muscles and skin of the lower limb

# The lumbar plexus

- Obturator nerve (L2, 3, 4):
  - Descends along the medial border of the psoas major
  - Courses forward in the obturator groove of the pelvic bone and then leaves the pelvis through the obturator canal
  - Supplies muscles and skin of the lower limb

# The lumbar plexus

- Lumbosacral trunk (L4, 5)
  - Descends on the ala of the sacrum medial to the psoas major
  - Contributes to the sacral plexus in the pelvis

# *Lumbar sympathetic trunk*

- Descend along the medial borders of the psoas major muscles; the left sympathetic trunk lies to the left of the abdominal aorta and the right sympathetic trunk lies posterior to the inferior vena cava
- The first two lumbar sympathetic ganglia are connected to their respective ventral rami by white and gray rami communicantes
- the last three lumbar sympathetic ganglia are connected to their respective ventral rami by gray rami communicantes only
- This is because preganglionic sympathetic fibers do not exit the spinal cord below level L2
- Medial branches of the lumbar sympathetic ganglia form the lumbar splanchnic nerves

# Posterior Abdominal Wall Blood Vessels

- Aorta and its branches
- Inferior Vena Cava and its tributaries

# Abdominal Aorta

- Begins at the aortic hiatus of the diaphragm as a midline structure at approximately the lower level of T12 vertebra.
- Passes downward on the anterior surface of the bodies of L1-L4 vertebrae, ending just to the left of midline at the lower level of L4 vertebra.
- Divides into the right and left common iliac arteries.
- Covered on the anterior surface by the prevertebral plexus of nerves and ganglia



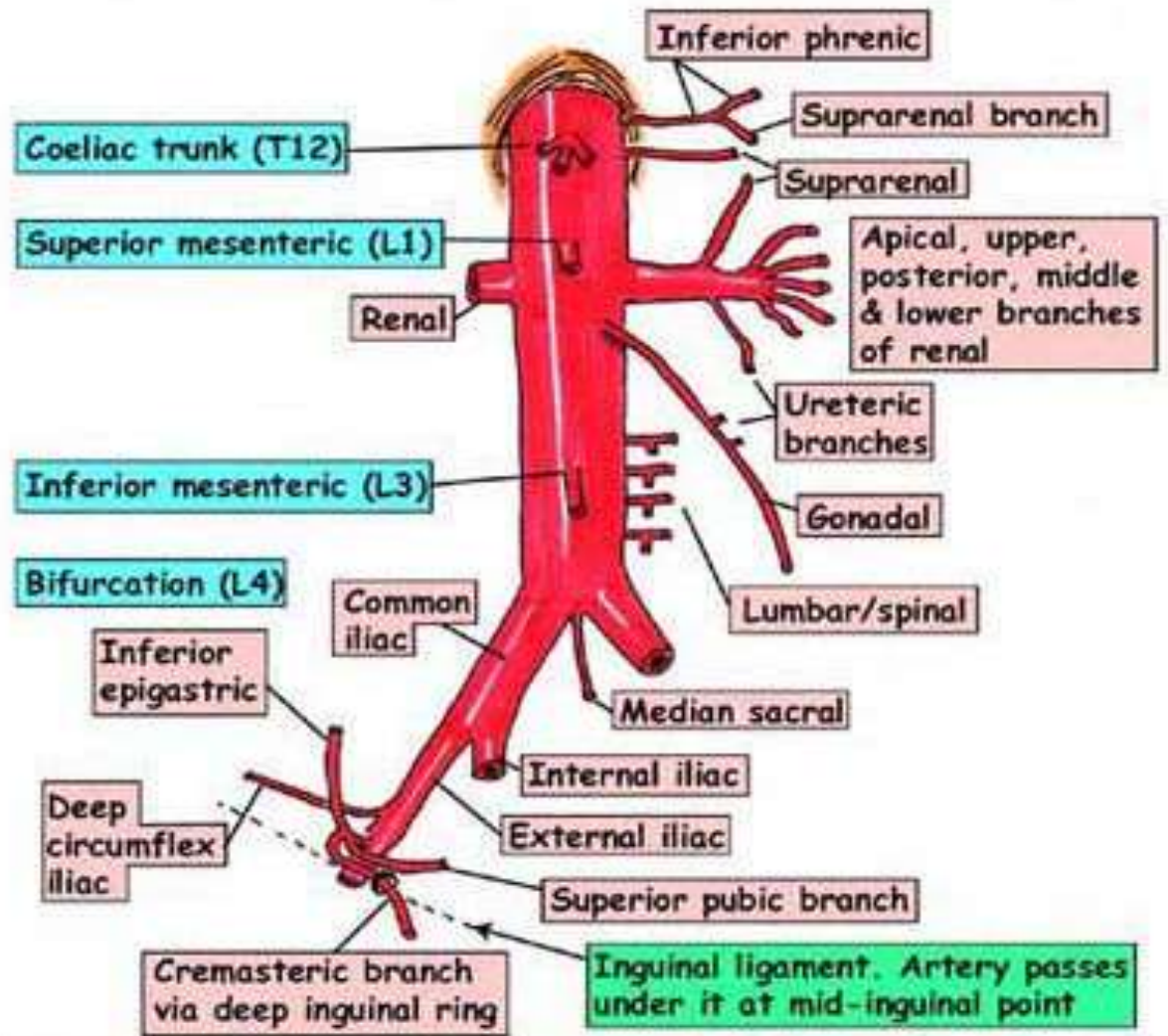
# Abdominal Aorta: relations

- **Anteriorly:** The pancreas and splenic vein, the left renal vein, and the third part of the duodenum
- **Posteriorly:** Several lumbar veins passing to the inferior vena cava
- **Right side:** The cisterna chyli, thoracic duct, azygos vein, right crus of the diaphragm, and the inferior vena cava
- **Left side:** The left crus of the diaphragm

# Abdominal Aorta: Branches

- Broadly divided into:
  - Visceral branches supplying organs (paired and unpaired)
  - Posterior branches supplying the diaphragm or body wall
  - Terminal branches

# The abdominal aorta

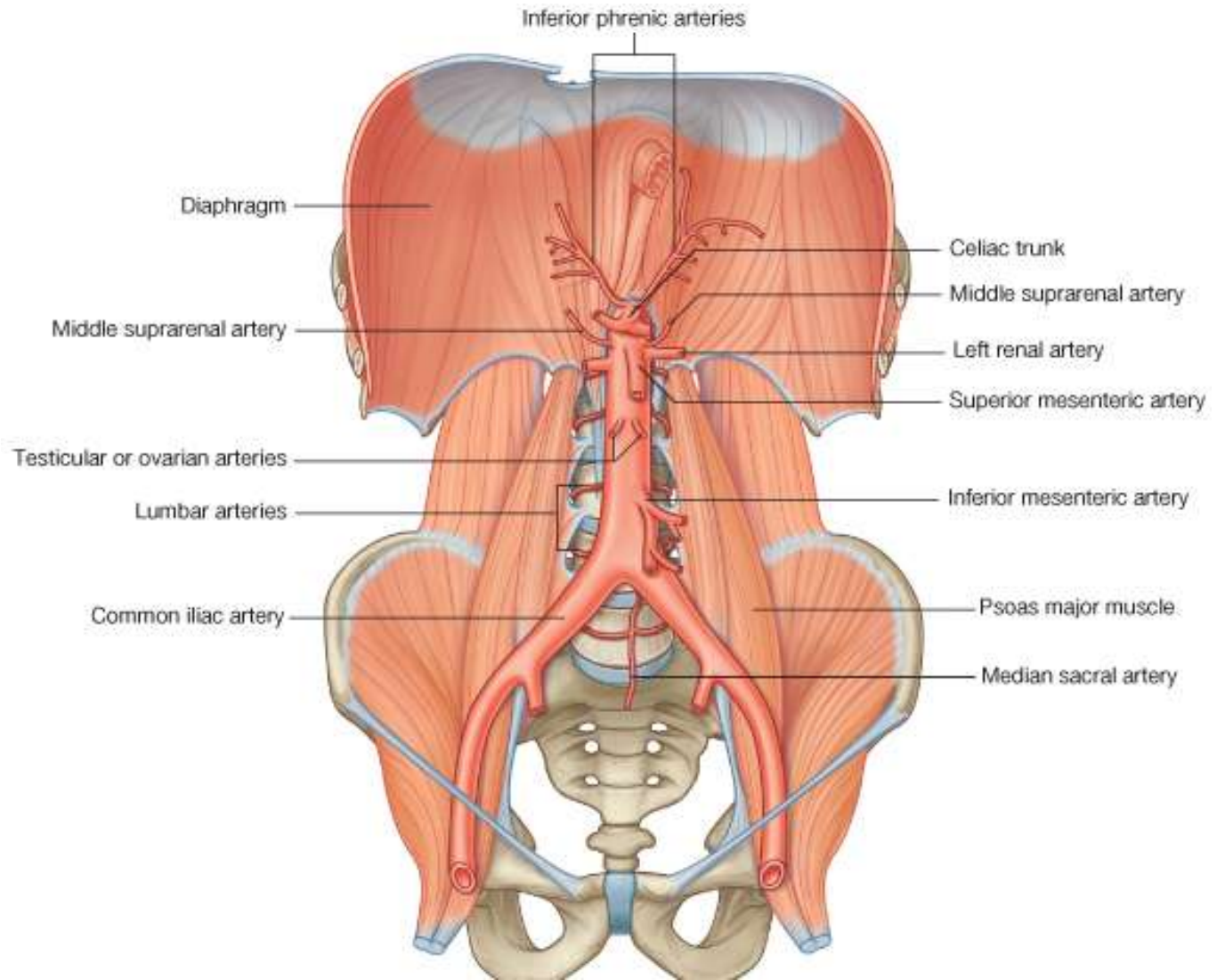


## Relations of aorta

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

# Abdominal Aorta: Branches

- Visceral Branches:
- Paired
- Unpaired



# Abdominal Aorta: Branches

- Unpaired Vessels
  - Three in number:
    - i. The celiac trunk, which supplies the foregut
    - ii. The superior mesenteric artery, which supplies the midgut
    - iii. the inferior mesenteric artery, which supplies the hindgut

# Abdominal Aorta: Branches

- Paired Vessels

- Also three in number:

- i. **Middle suprarenal arteries**-small, lateral branches of the abdominal aorta arising just above the renal arteries that are part of the multiple vascular supply to the suprarenal gland
- ii. **Renal arteries** -Arise just inferior to the origin of the superior mesenteric artery between vertebrae LI and LII to supply the kidneys
- iii. **Testicular or ovarian arteries**-anterior branches of the abdominal aorta that arise below the origin of the renal arteries at L2, and pass downward and laterally on the anterior surface of the psoas major muscle.

# Abdominal Aorta: Branches

- **Posterior Vessels**
  - Also three in number:
    - i. **Inferior phrenic arteries (L1):** arise immediately inferior to the aortic hiatus of the diaphragm. Supplies the suprarenal glands and the diaphragm
    - ii. **The lumbar arteries:** Four in number. Equivalent to intercostal arteries in the chest
    - iii. **Median sacral artery:** Single vessel arising just superior to the bifurcation. Descends anterior to the sacrum in the midline

# Abdominal Aorta: Branches

- Bifurcation:
  - Right and left Common Iliac Arteries



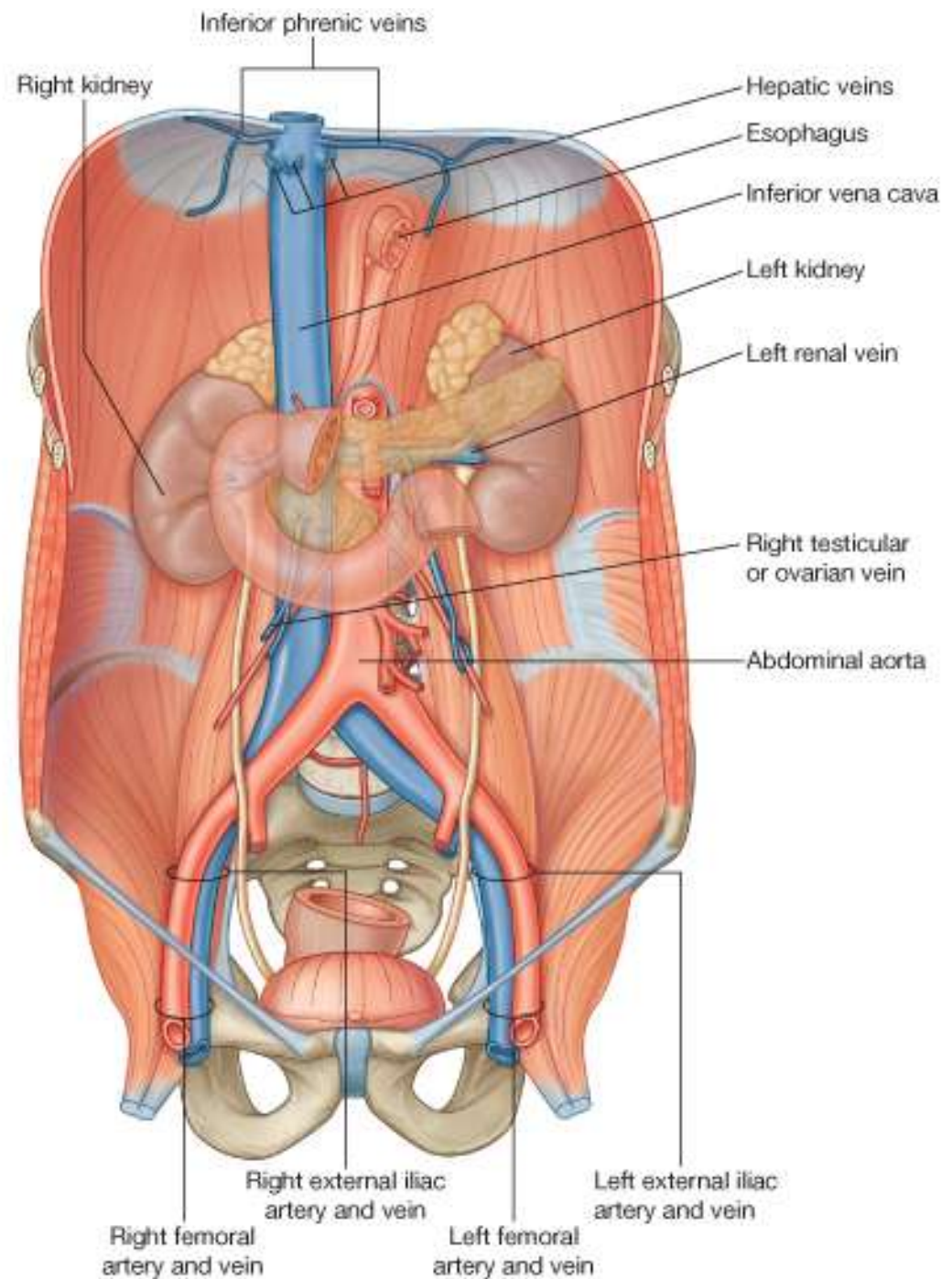
# Inferior vena cava

- Drains blood from all structures below the diaphragm to the right atrium of the heart.
- Formed when the two common iliac veins come together at the level of the 5<sup>th</sup> lumbar vertebra just to the right of midline.
- It ascends through the posterior abdominal region anterior to the vertebral column immediately to the right of the abdominal aorta and leaves the abdomen by piercing the central tendon of the diaphragm at the level of the 8<sup>th</sup> thoracic vertebra.

# Inferior vena cava

- Structures crossing the vein from below up:
  - i. Right common iliac artery
  - ii. The root of the mesentery
  - iii. Right testicular or ovarian artery
  - iv. 3<sup>rd</sup> part of the duodenum
  - v. The head of the pancreas
  - vi. The 1<sup>st</sup> part of the duodenum
  - vii. The bile duct
  - viii. The portal vein
  - ix. The liver which overlaps and on occasion completely surrounds the vena cava

# Structures related to the Inferior vena cava



# Inferior vena cava: Tributaries

- From below up:
  - i. The common iliac veins
  - ii. The lumbar veins
  - iii. The right testicular or ovarian vein
  - iv. The renal veins
  - v. The right suprarenal vein
  - vi. The inferior phrenic veins
  - vii. The hepatic veins

# Inferior vena cava: Tributaries

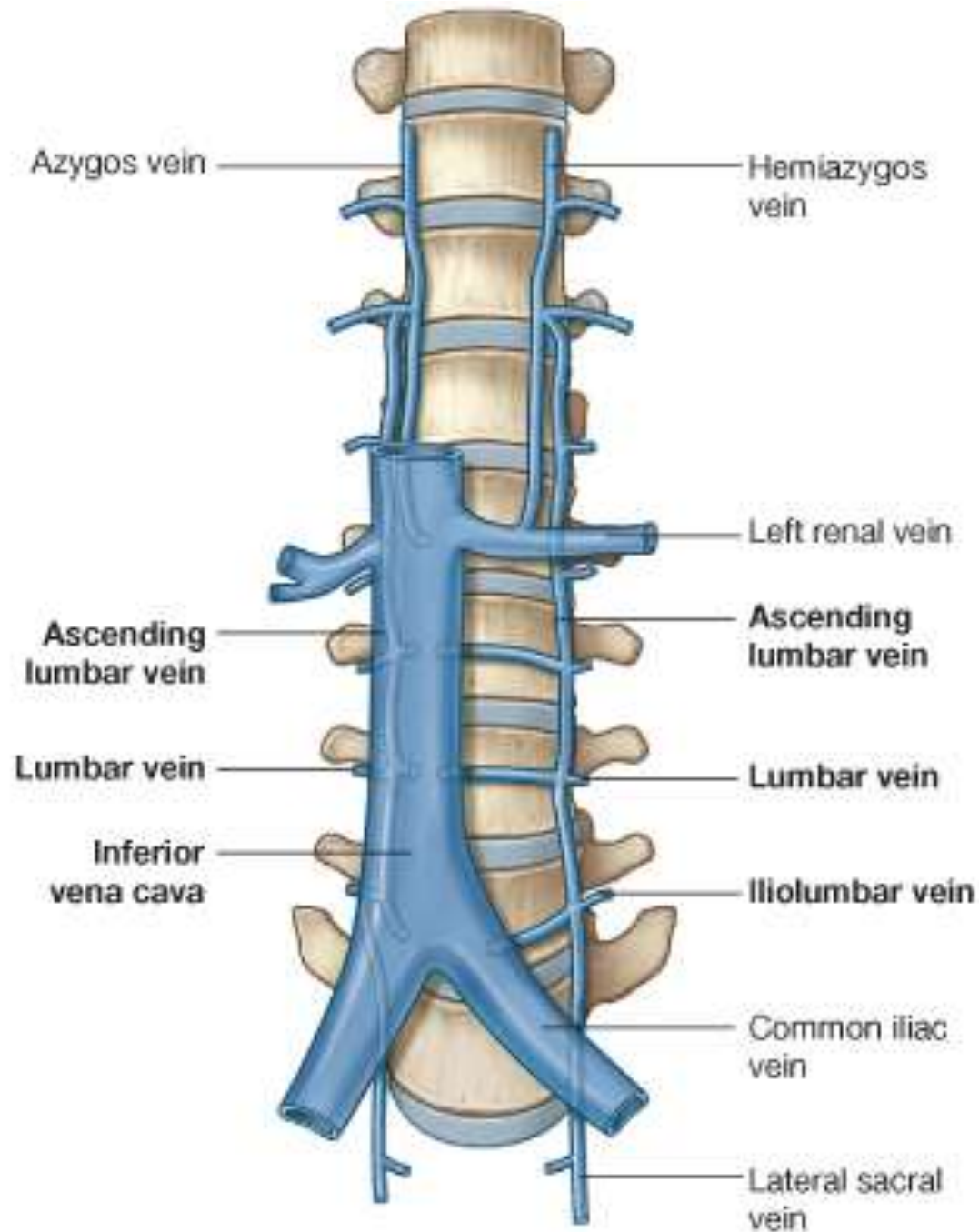
- There are no tributaries from the abdominal part of the gastrointestinal tract, the spleen, the pancreas, or the gallbladder because veins from these structures are components of the portal venous system, which first passes through the liver.

# Inferior vena cava: Tributaries

- The 5<sup>th</sup> lumbar vein generally drains into the iliolumbar vein, a tributary of the common iliac vein
- The 3<sup>rd</sup> and 4<sup>th</sup> lumbar veins usually drain into the inferior vena cava
- The 1<sup>st</sup> and 2<sup>nd</sup> lumbar veins may drain into the ascending lumbar veins, which are long, anastomosing venous channels that connect the external iliac, iliolumbar, and lumbar veins with the azygos and hemiazygos veins of the thorax.
- If the inferior vena cava becomes blocked the ascending lumbar veins become important collateral channels between the lower and upper parts of the body.

# Inferior vena cava: Tributaries

- If the inferior vena cava becomes blocked the ascending lumbar veins become important collateral channels between the lower and upper parts of the body.



Any Question?

