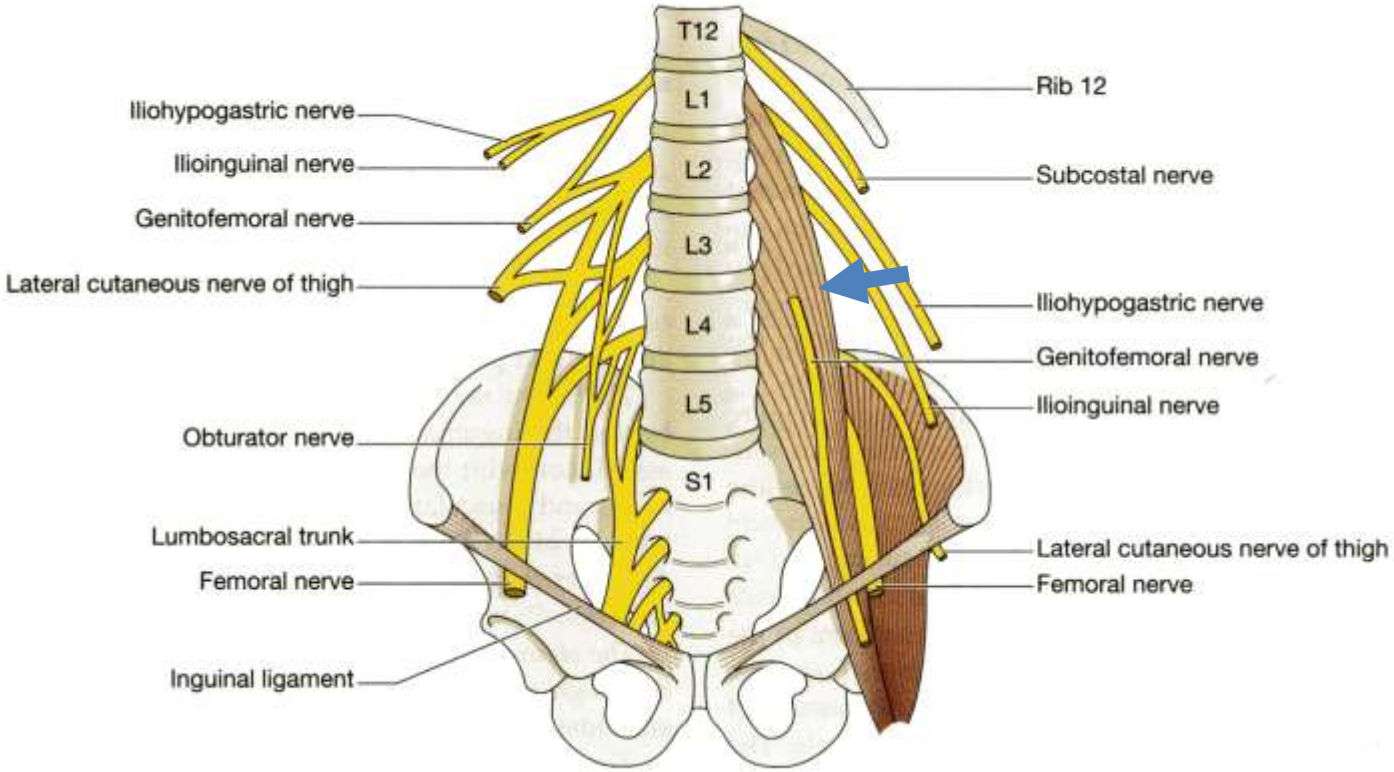
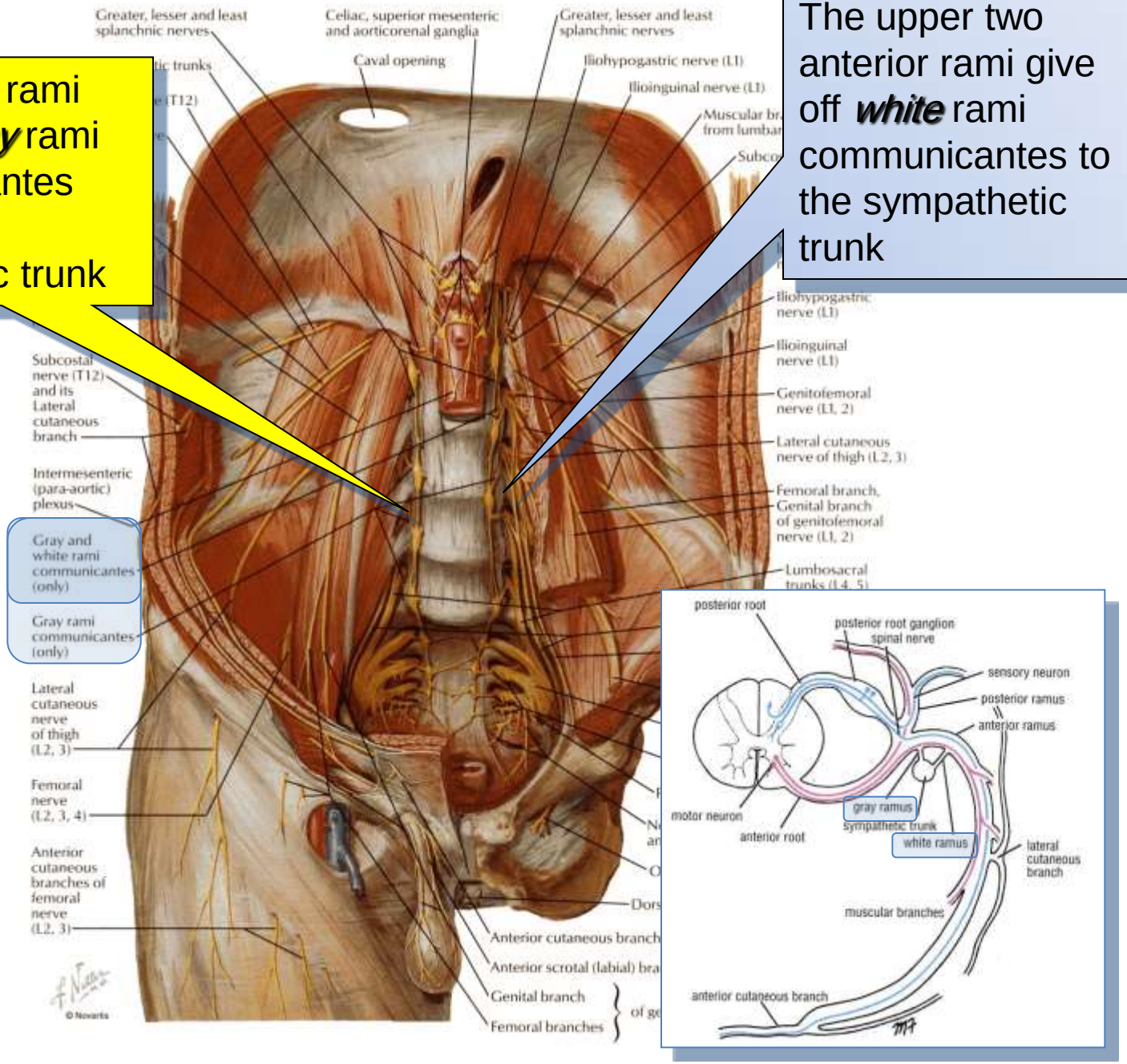
LUMBAR PLEXUS

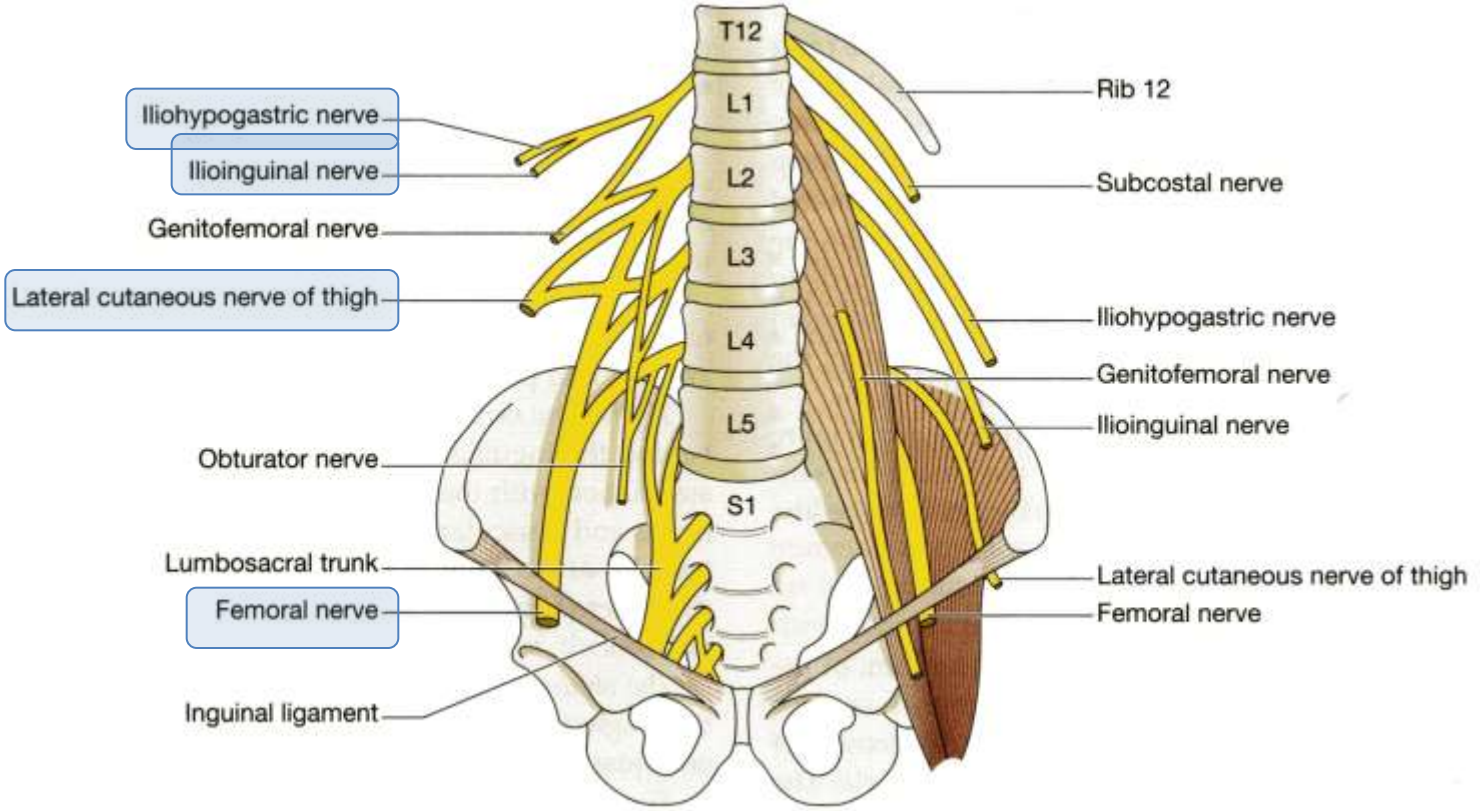


- The **lumbar plexus,** which is *one of the main nervous pathways supplying the lower limb,* is formed **within the psoas major muscle** from the anterior rami of the upper four lumbar nerves.
- The branches of the plexus emerge from the lateral and medial borders of the muscle and from its anterior surface.

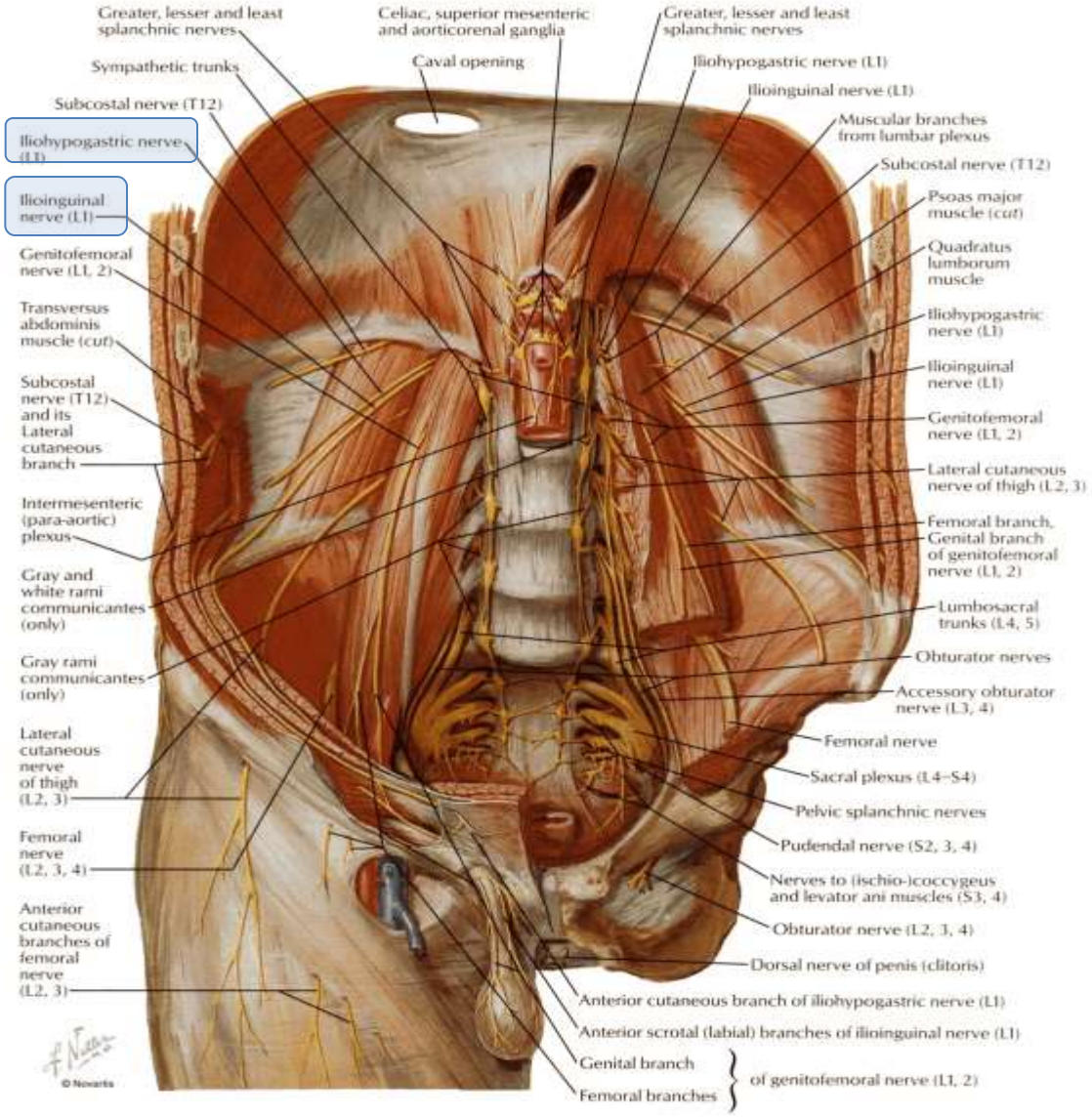
All anterior rami receive ***gray*** rami communicantes from the sympathetic trunk

The upper two anterior rami give off ***white*** rami communicantes to the sympathetic trunk

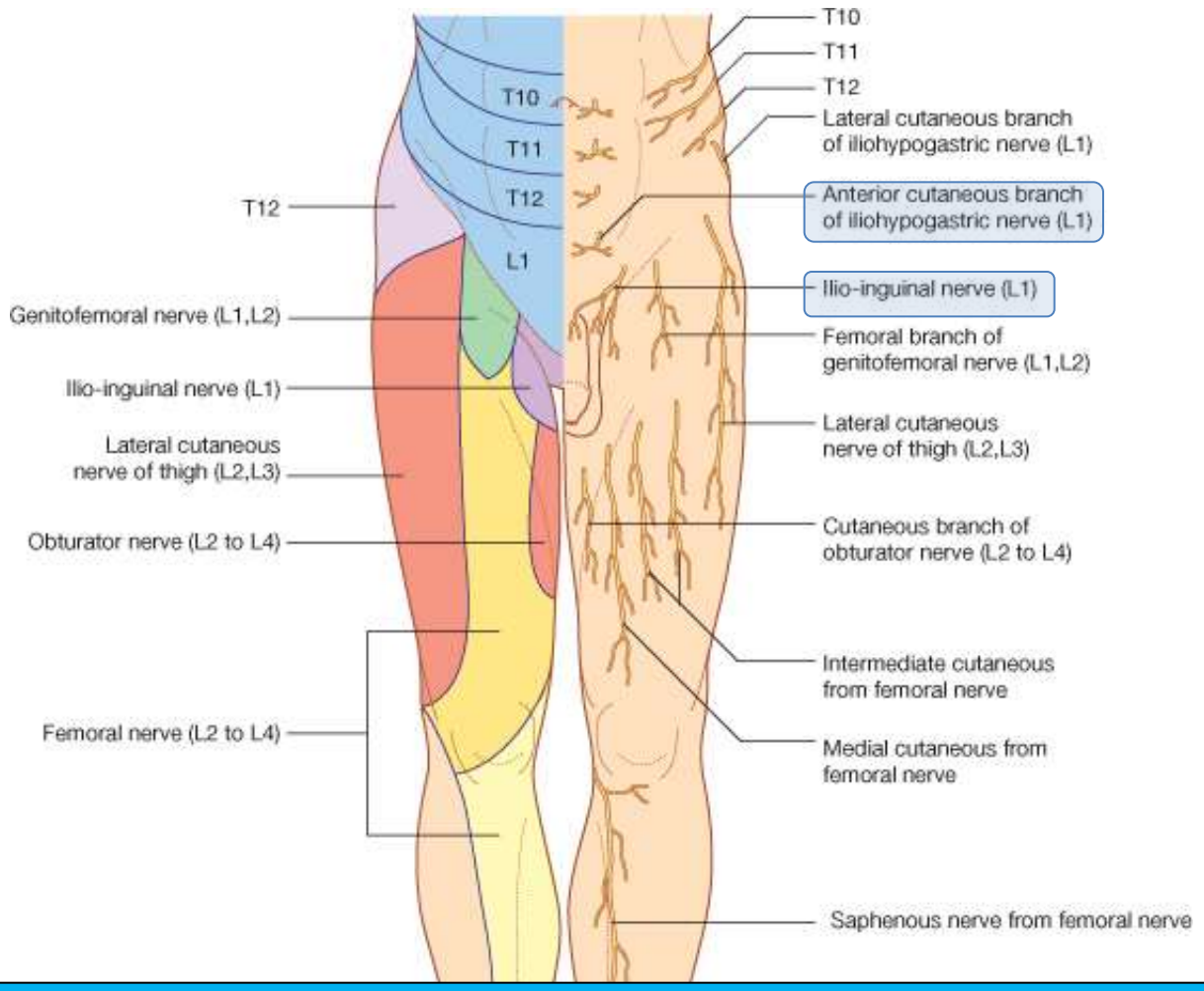




- **<u>The nerves that emerge from the lateral side of the psoas major from above downward are:</u>**
- The Iliohypogastric nerve (L1),
- Ilioinguinal nerve (L1),
- Lateral cutaneous nerve of the thigh (L 2 & 3), and
- Femoral nerve (L 2, 3 & 4)

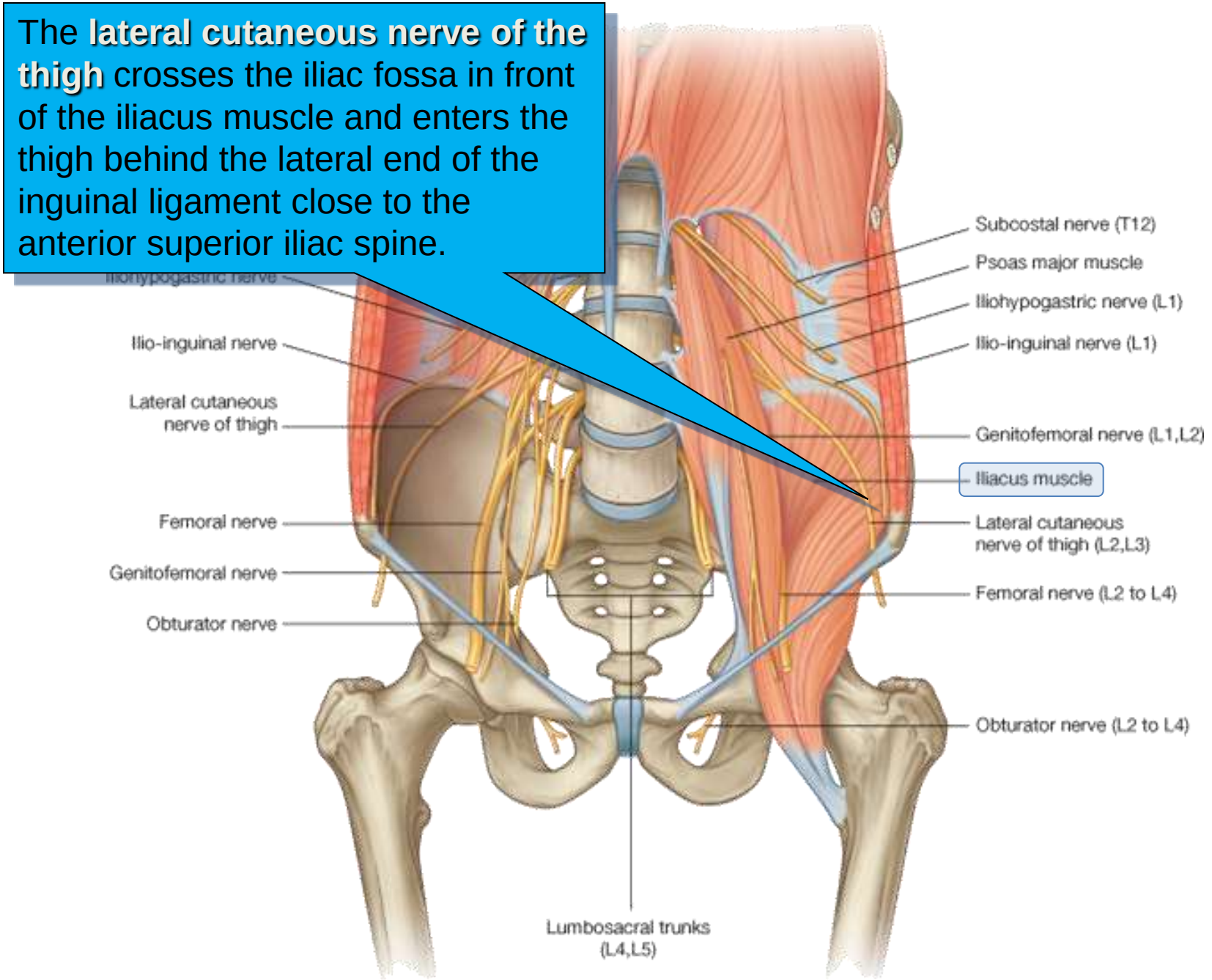


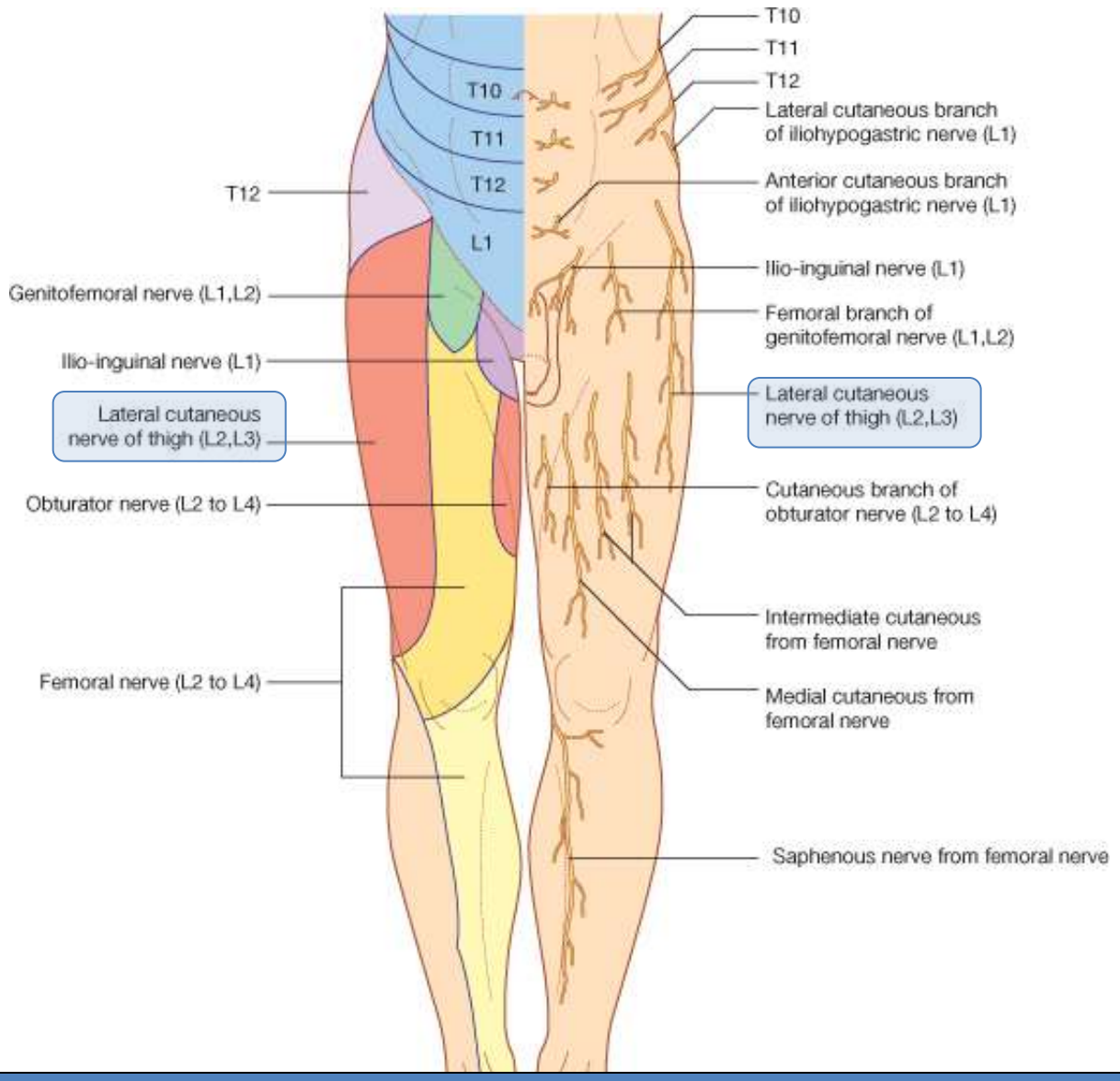
The **iliohypogastric** and **ilioinguinal nerves** (L1) enter the lateral and anterior abdominal walls.



- The **iliohypogastric nerve** supplies the skin of the lower part of the anterior abdominal wall, and
- the **ilioinguinal nerve** passes through the inguinal canal to supply the skin of the groin and the scrotum or labium majus.

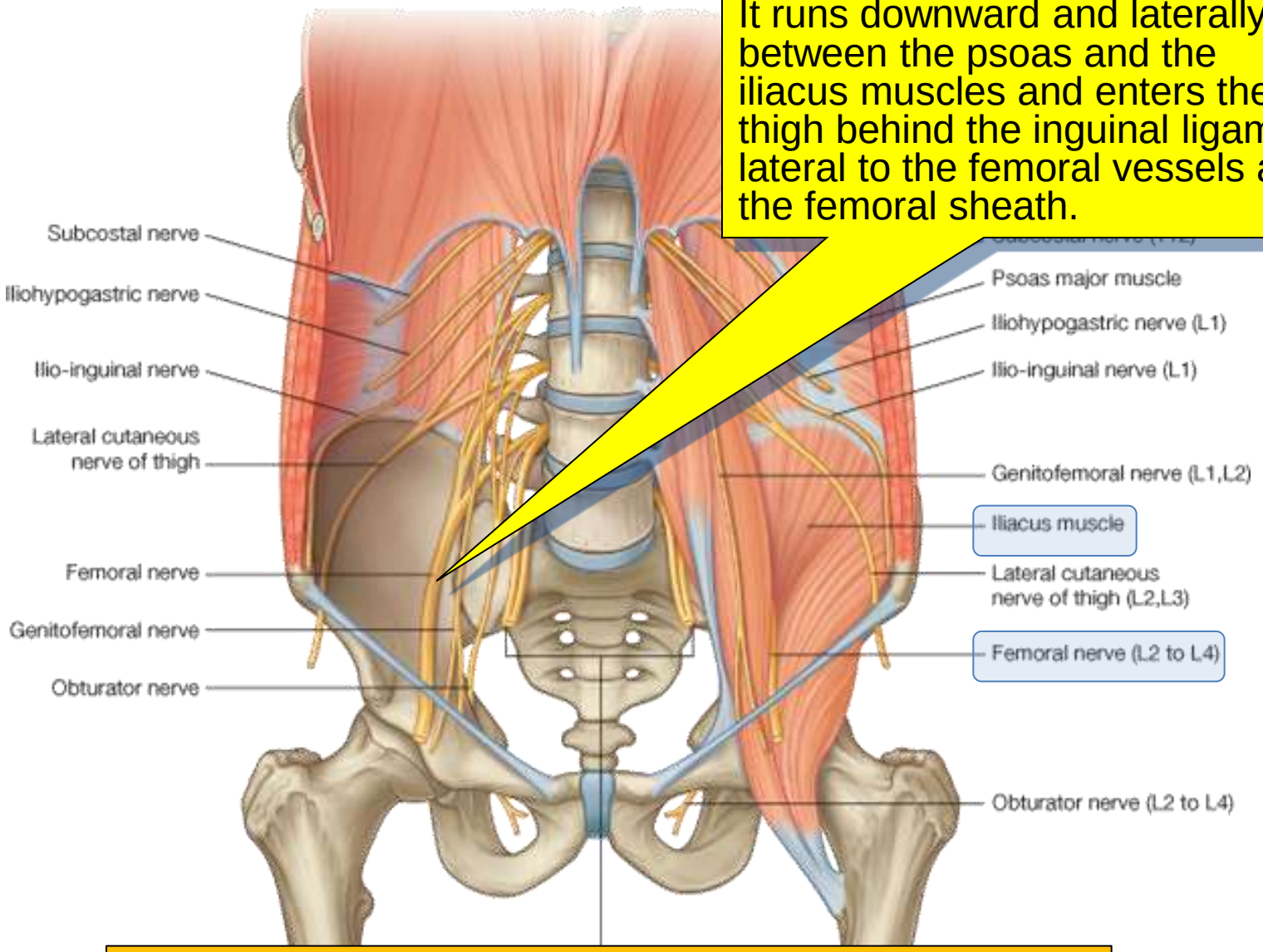
The **lateral cutaneous nerve of the thigh** crosses the iliac fossa in front of the iliacus muscle and enters the thigh behind the lateral end of the inguinal ligament close to the anterior superior iliac spine.



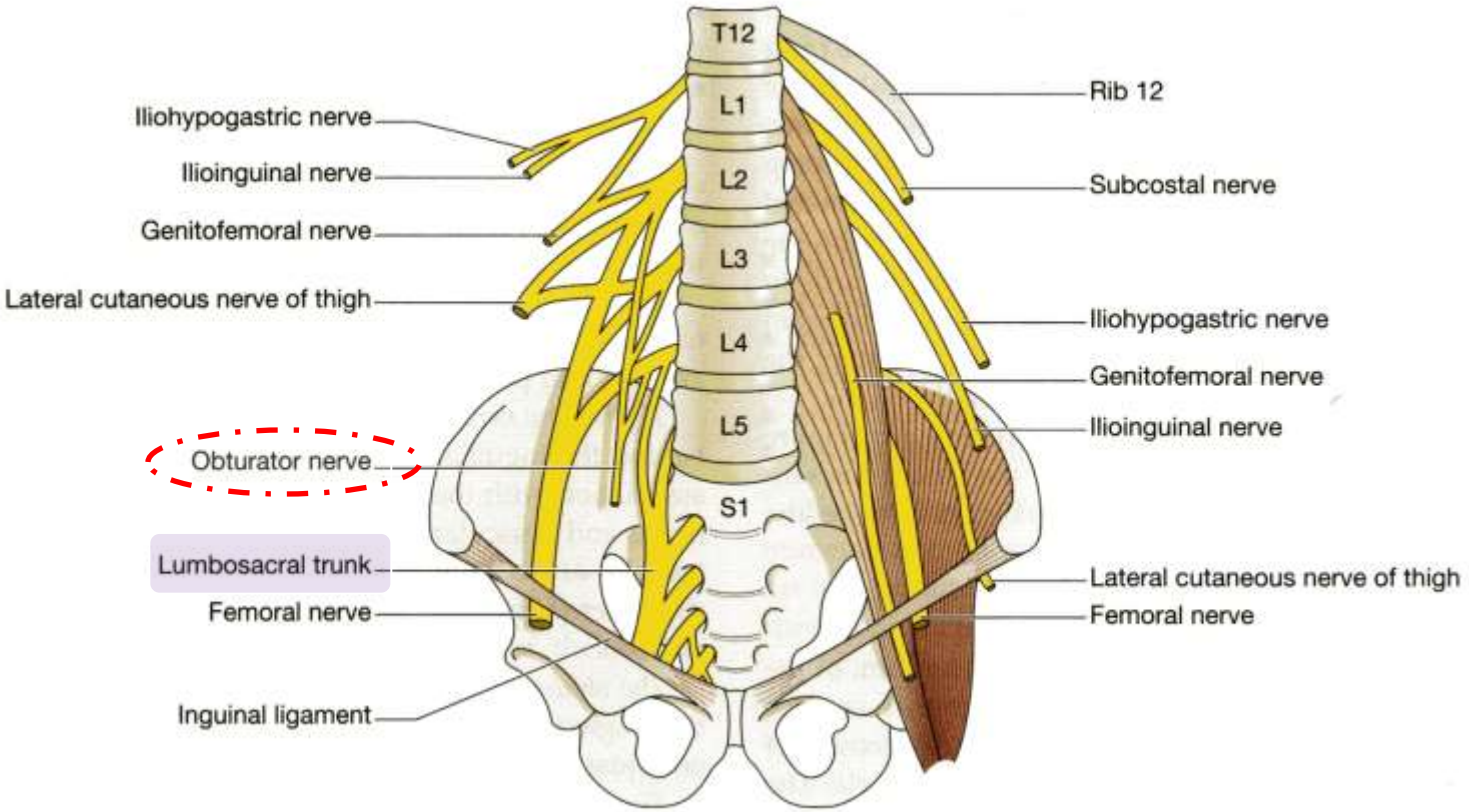


The **lateral cutaneous nerve of the thigh** supplies the skin over the lateral surface of the thigh.

It runs downward and laterally between the psoas and the iliacus muscles and enters the thigh behind the inguinal ligament lateral to the femoral vessels and the femoral sheath.

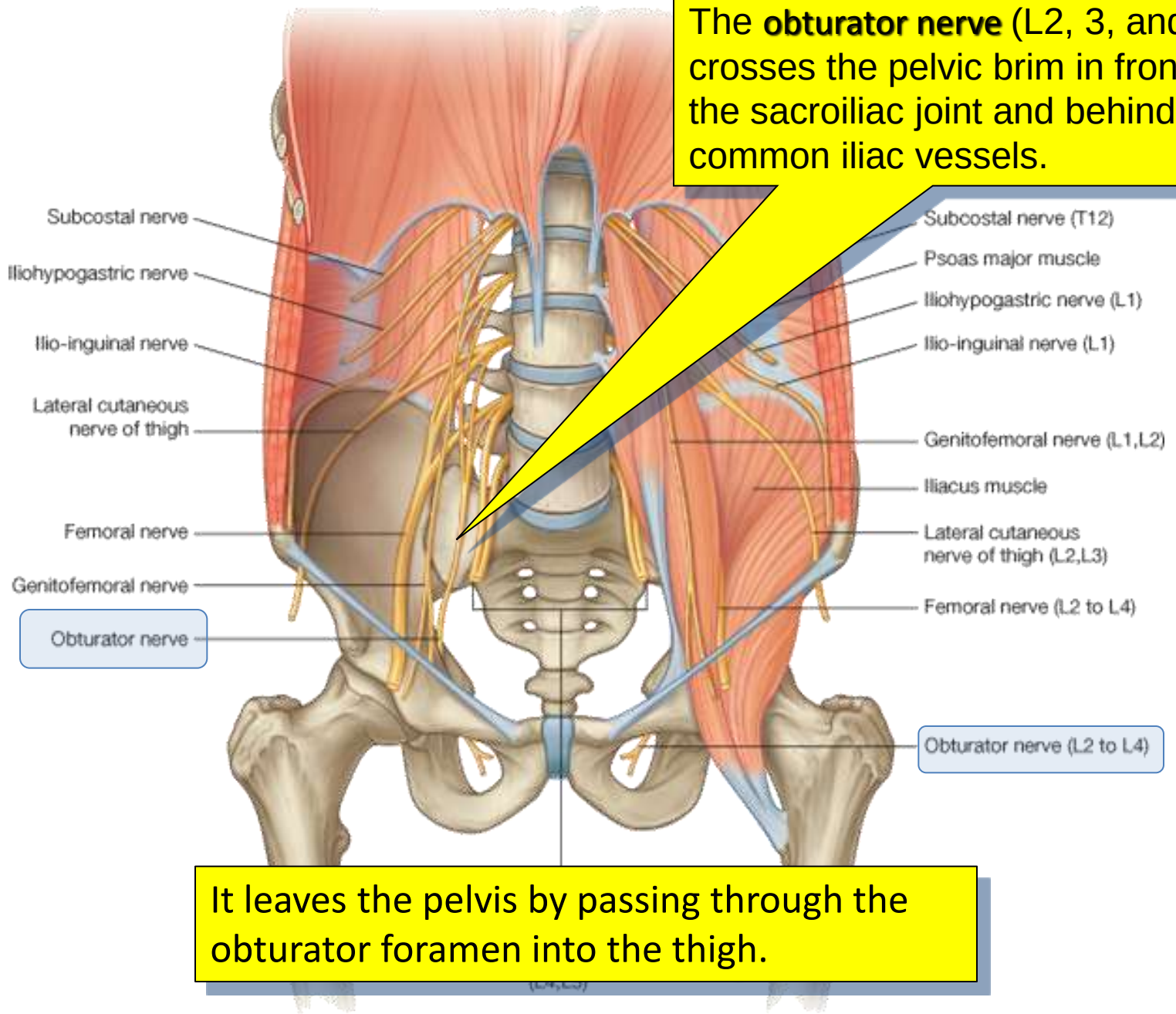


- The **femoral nerve** (L2, 3, and 4) is the largest branch of the lumbar plexus.
- It supplies the iliacus muscle in the abdomen

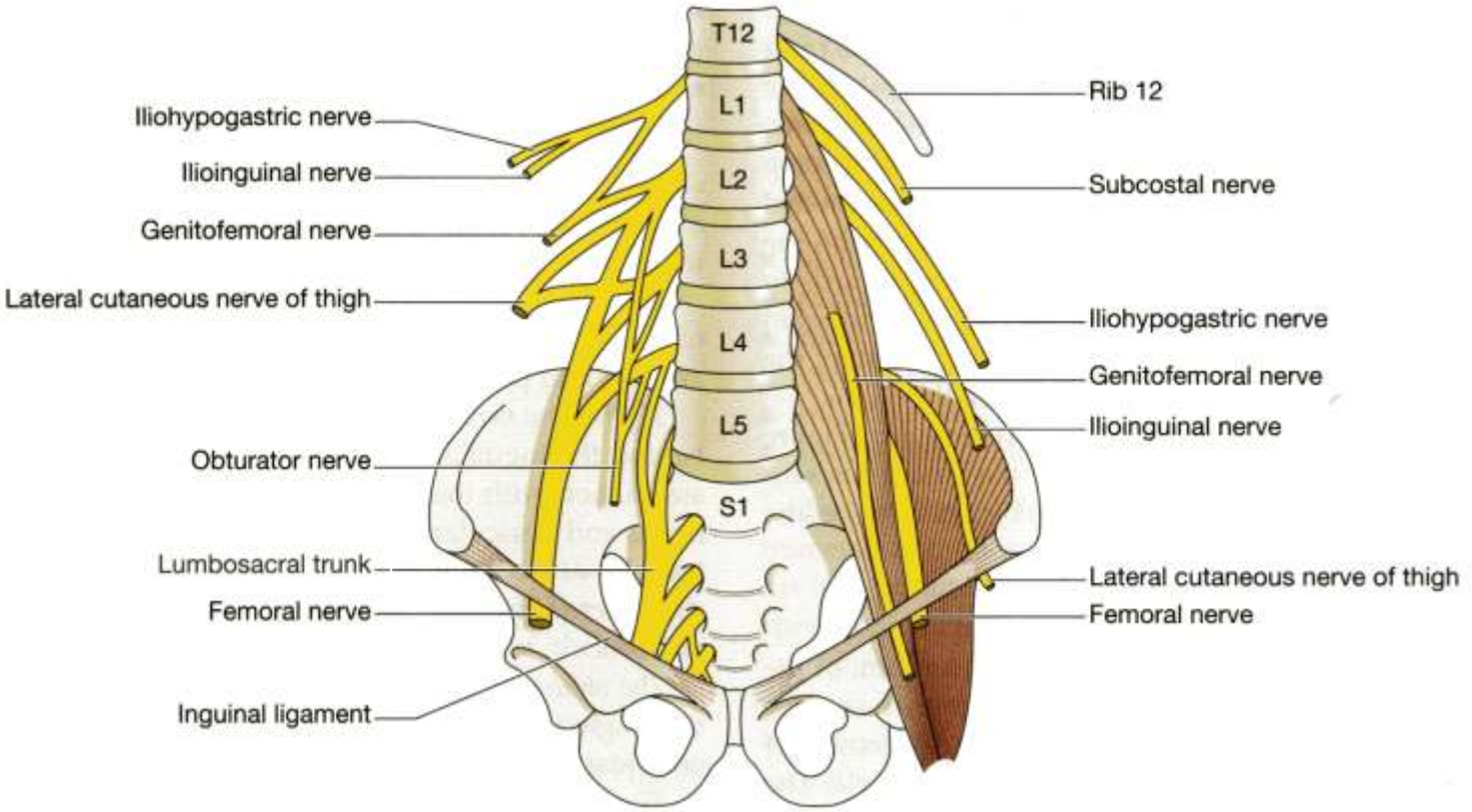


The **obturator nerve** and the **fourth lumbar root** of the lumbosacral trunk emerge from the medial border of the psoas at the brim of the pelvis.

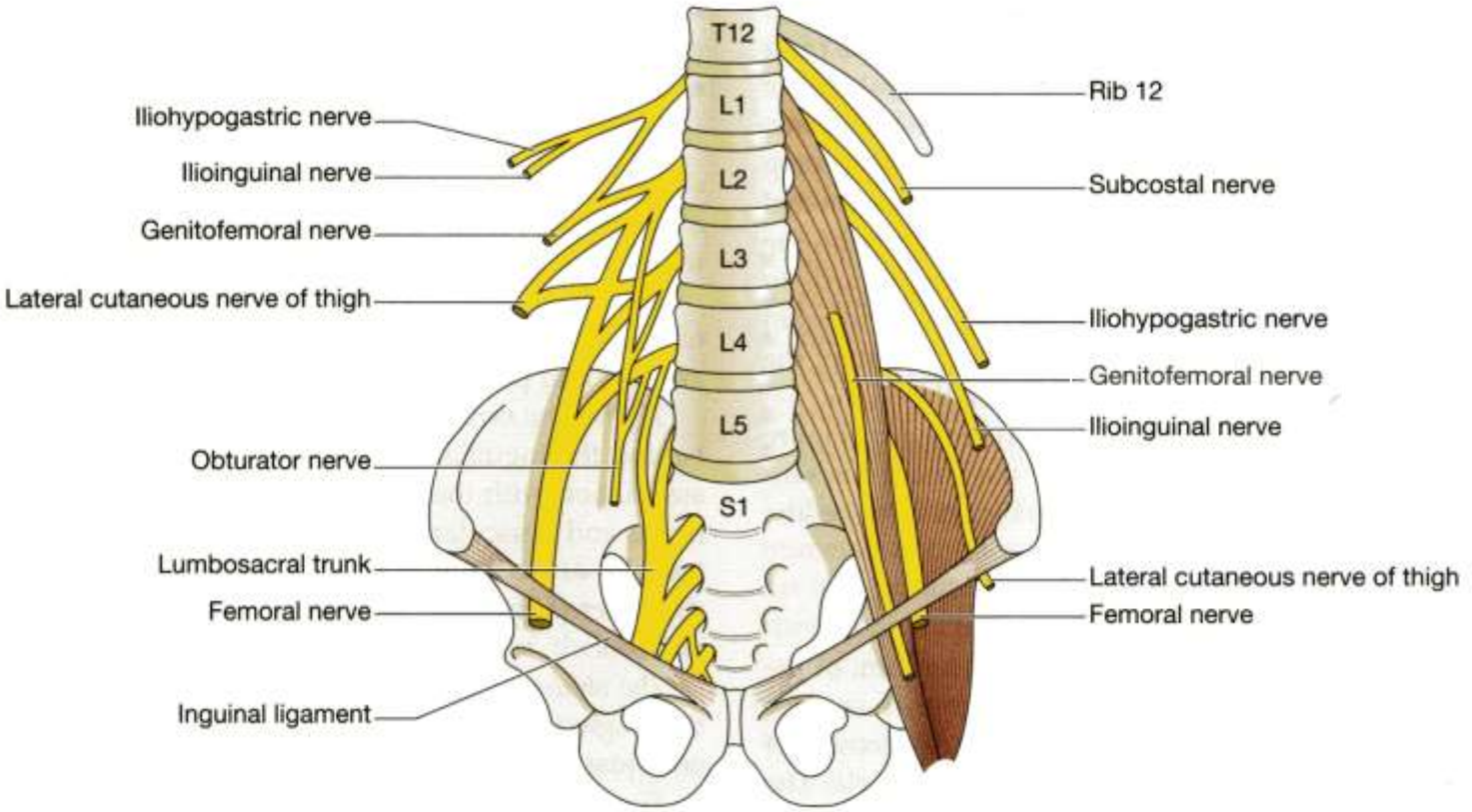
The **obturator nerve** (L2, 3, and 4) crosses the pelvic brim in front of the sacroiliac joint and behind the common iliac vessels.



It leaves the pelvis by passing through the obturator foramen into the thigh.



- The **fourth lumbar root of the lumbosacral trunk unites with L 5 &** takes part in the formation of the sacral plexus.
- It descends anterior to the ala of the sacrum and joins the first sacral nerve.

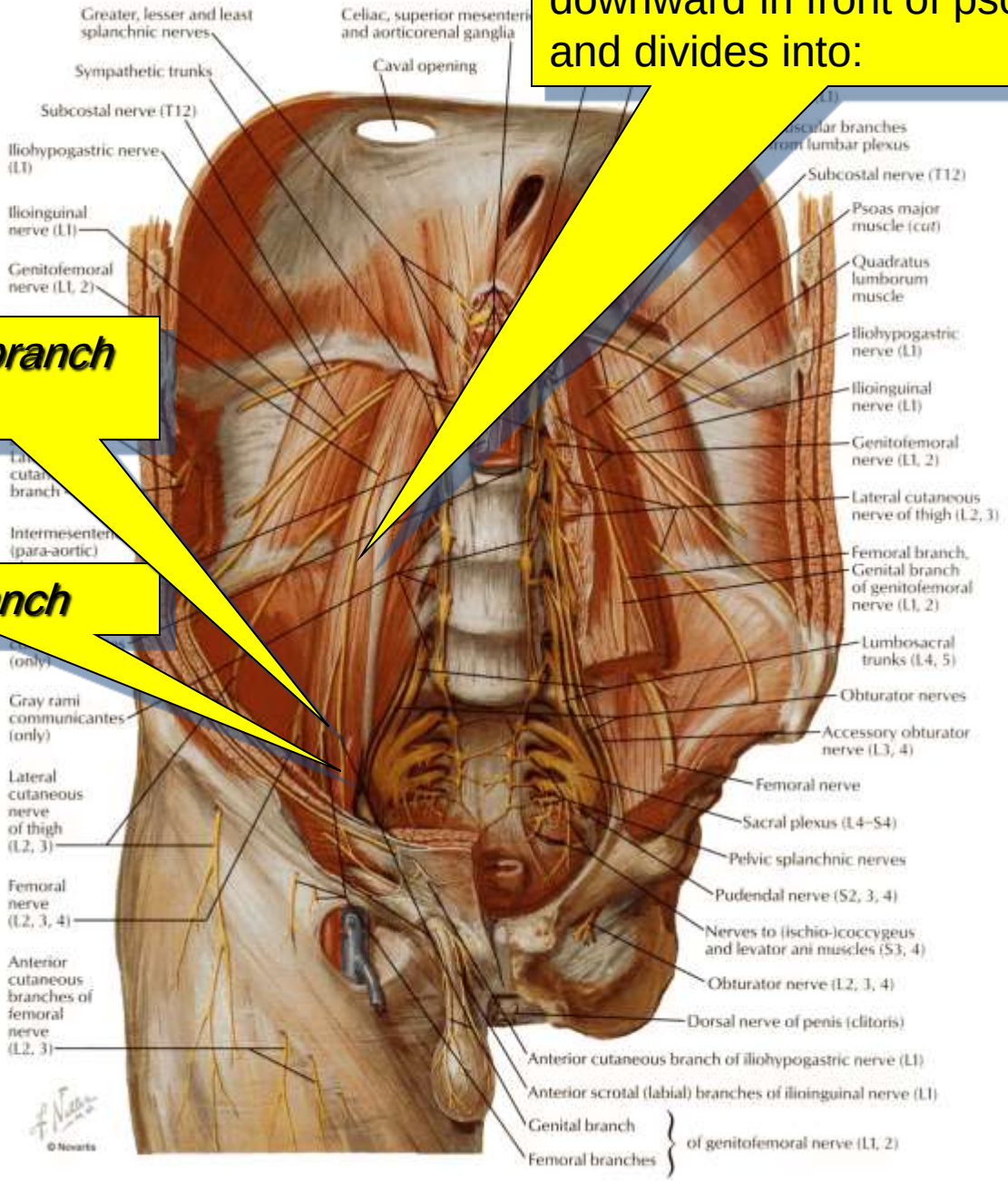


The genitofemoral nerve (L1 and 2) emerges on the anterior surface of the psoas major muscle.

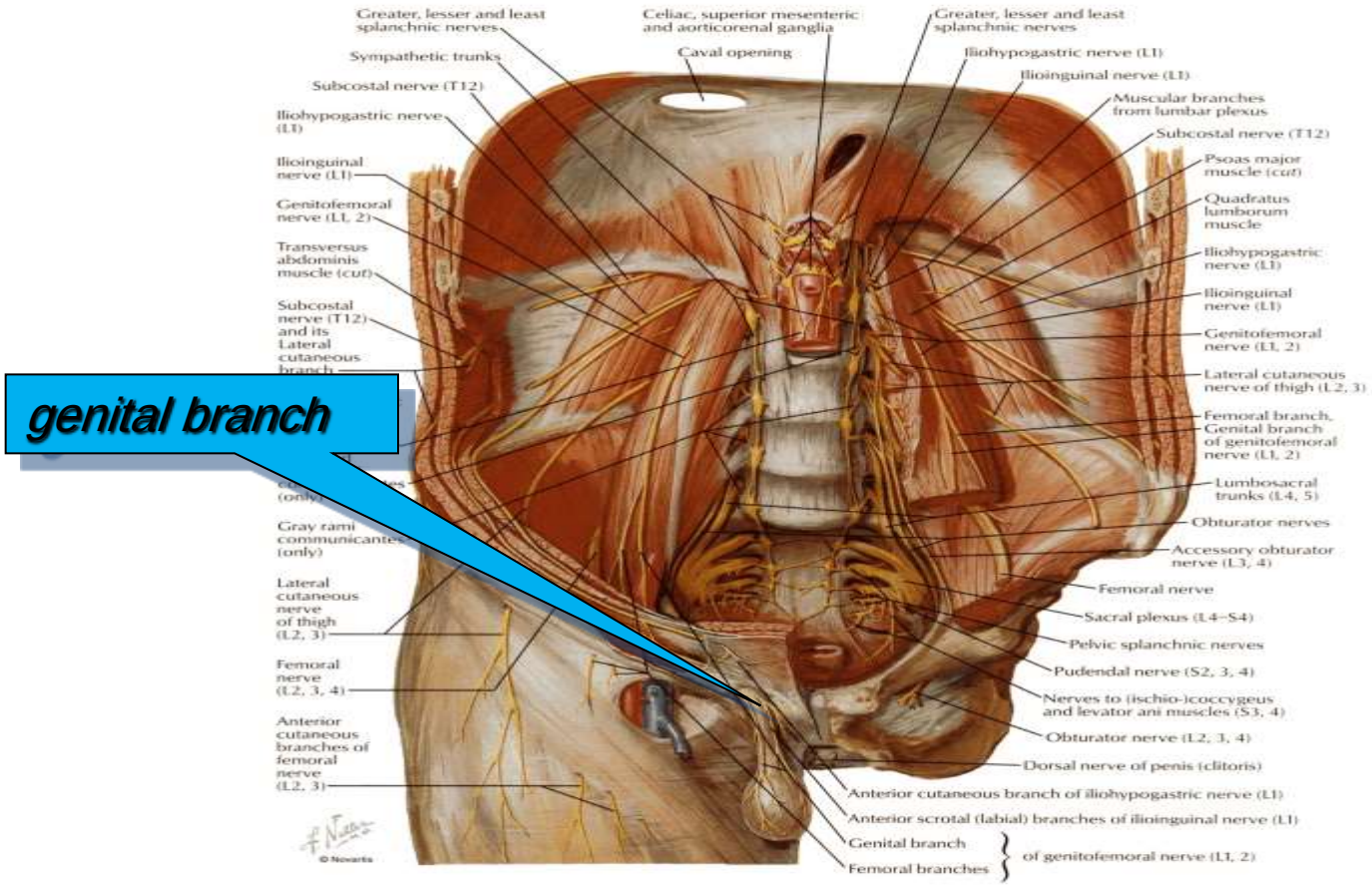
The genitofemoral nerve runs downward in front of psoas major and divides into:

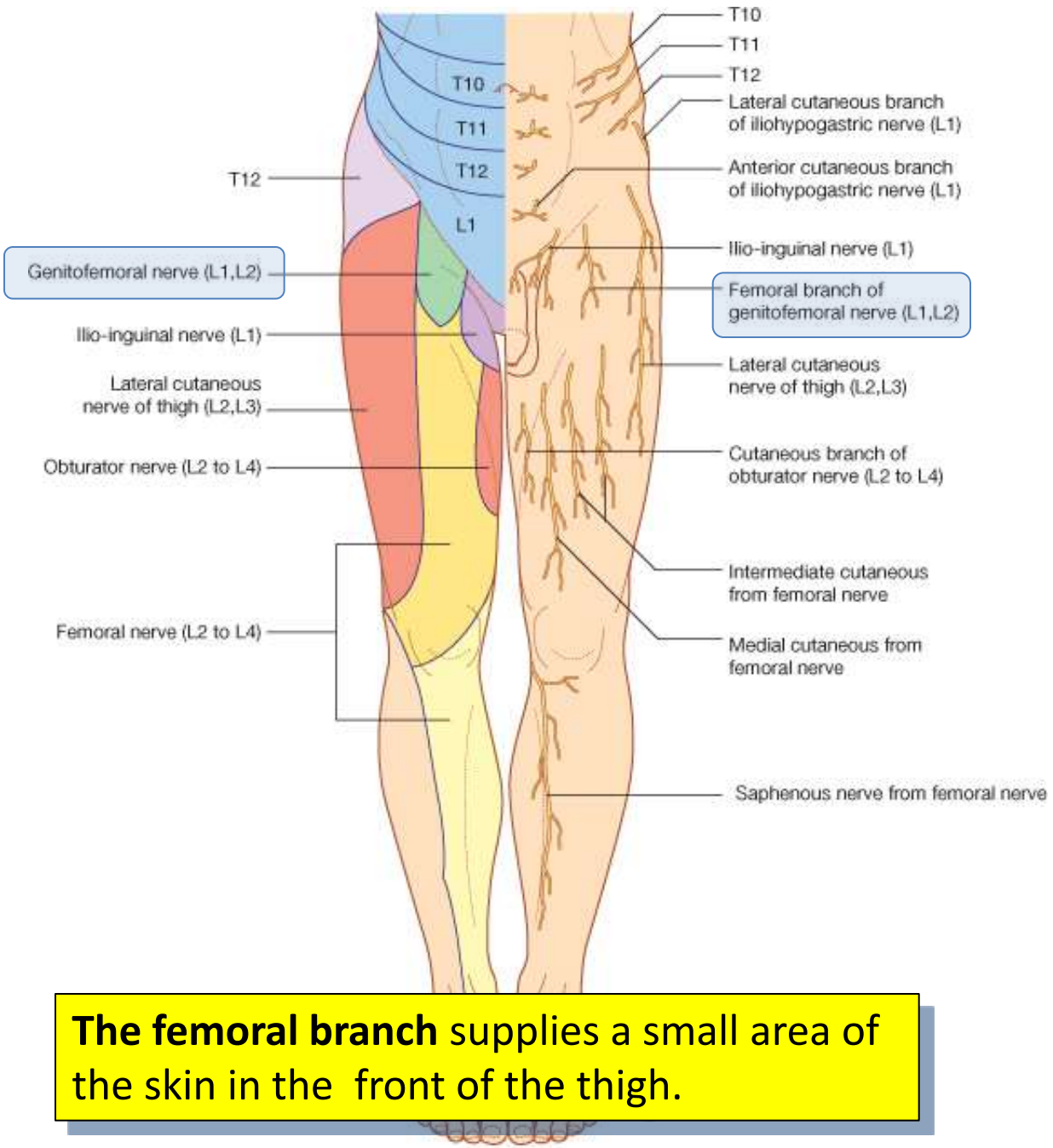
femoral branch

genital branch



- **The genital branch** enters the spermatic cord and supplies the cremaster muscle.
- It is the nervous pathway involved in the **cremasteric reflex,** in which stimulation of the skin of the thigh in the male results in reflex contraction of the cremaster muscle and the drawing upward of the testis within the scrotum.

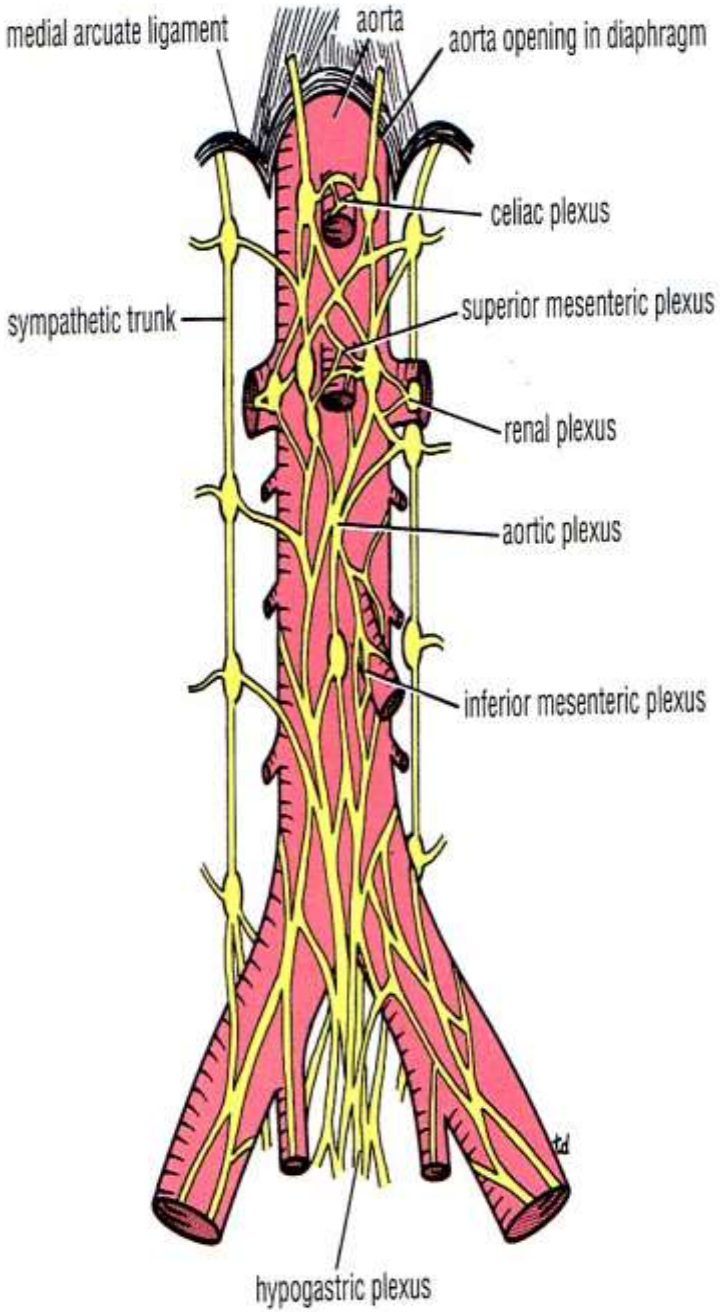




The femoral branch supplies a small area of the skin in the front of the thigh.

Table 5-1 Branches of the Lumbar Plexus and Their Distribution

Branches	Distribution
Iliohypogastric nerve	External oblique, internal oblique, transversus abdominis muscles of anterior abdominal wall; skin over lower anterior abdominal wall and buttock
Ilioinguinal nerve	External oblique, internal oblique, transversus abdominis muscles of anterior abdominal wall; skin of upper medial aspect of thigh, root of penis and scrotum in the male, mons pubis and labia majora in the female
Lateral cutaneous nerve of the thigh	Skin of anterior and lateral surfaces of the thigh
Genitofemoral nerve (L1, 2)	Cremaster muscle in scrotum in male; skin over anterior surface of thigh; nervous pathway for cremasteric reflex
Femoral nerve (L2, 3, 4)	Iliacus, pectineus, sartorius, quadriceps femoris muscles, and intermediate cutaneous branches to the skin of the anterior surface of the thigh and by saphenous branch to the skin of the medial side of the leg and foot; articular, branches to hip and knee joints
Obturator nerve (L2, 3, 4)	Gracilis, adductor brevis, adductor longus, obturator externus, pectineus, adductor magnus (adductor portion), and skin on medial surface of thigh; articular branches to hip and knee joints
Segmental branches	Quadratus lumborum and psoas muscles



SYMPATHETIC TRUNK
(ABDOMINAL PART)

Lumbar Sympathetic Trunk

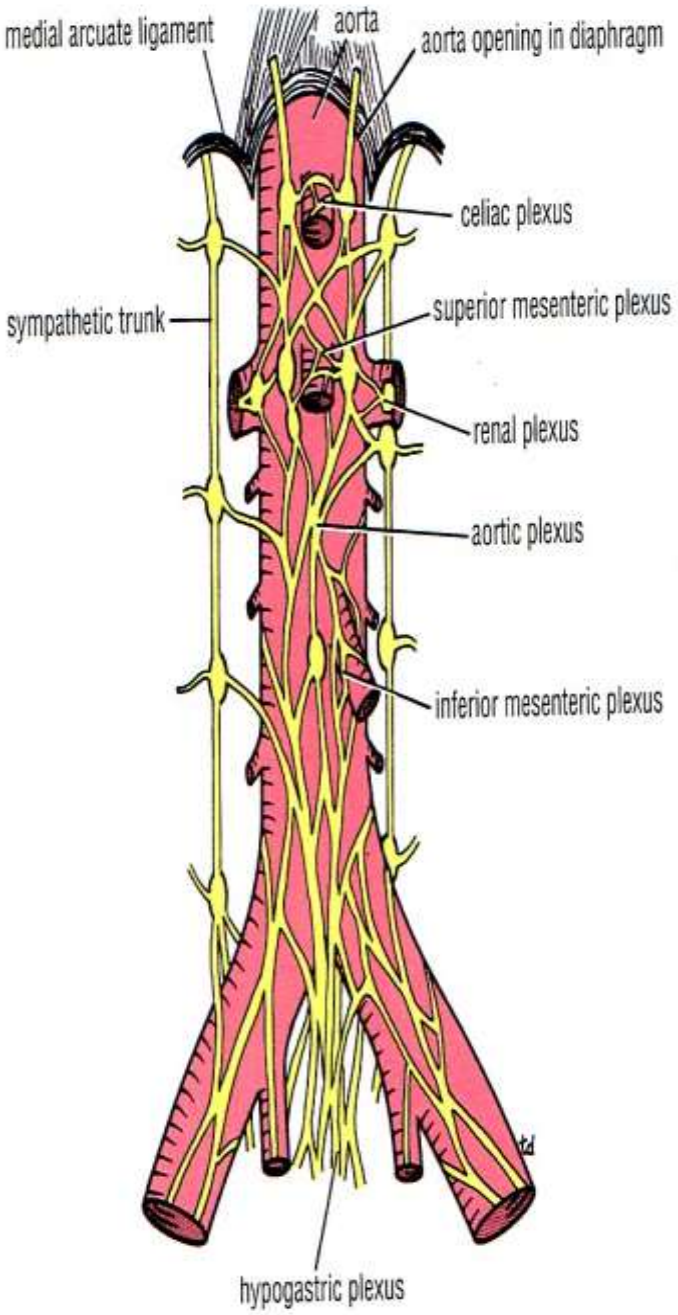
- It is downward continuation of *thoracic* part of the sympathetic trunk
- It enter the abdomen behind the ***medial arcuate ligament***.
- It descend along the medial border of ***psoas major muscle***.
- The **left trunk** descends on the left side of ***abdominal aorta***.
- The **right trunk** descends behind the right margin of the ***IVC.***
- Each trunk poses **4** or **5** ganglia.
- The first 2 ganglia are often fused together

➢It enters the pelvis behind the ***common iliac arteries***.

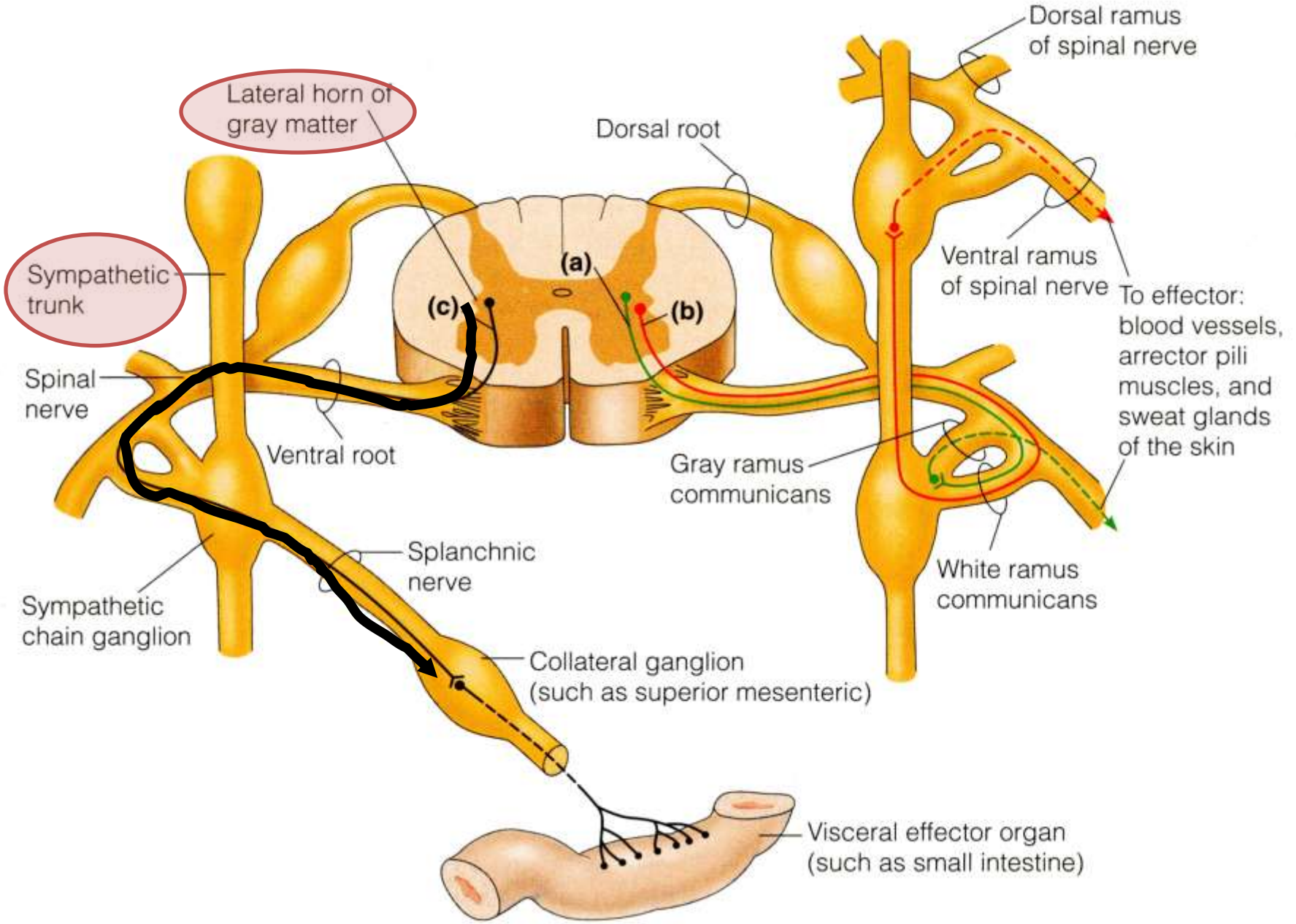
Branches:

1-The upper 2 or 3 ganglia ***receive*** white rami communicantes from upper 2 or 3 lumbar spinal nerves.

2- Each of the **4** ganglia **give off** grey rami communicantes to the corresponding lumbar spinal nerves.

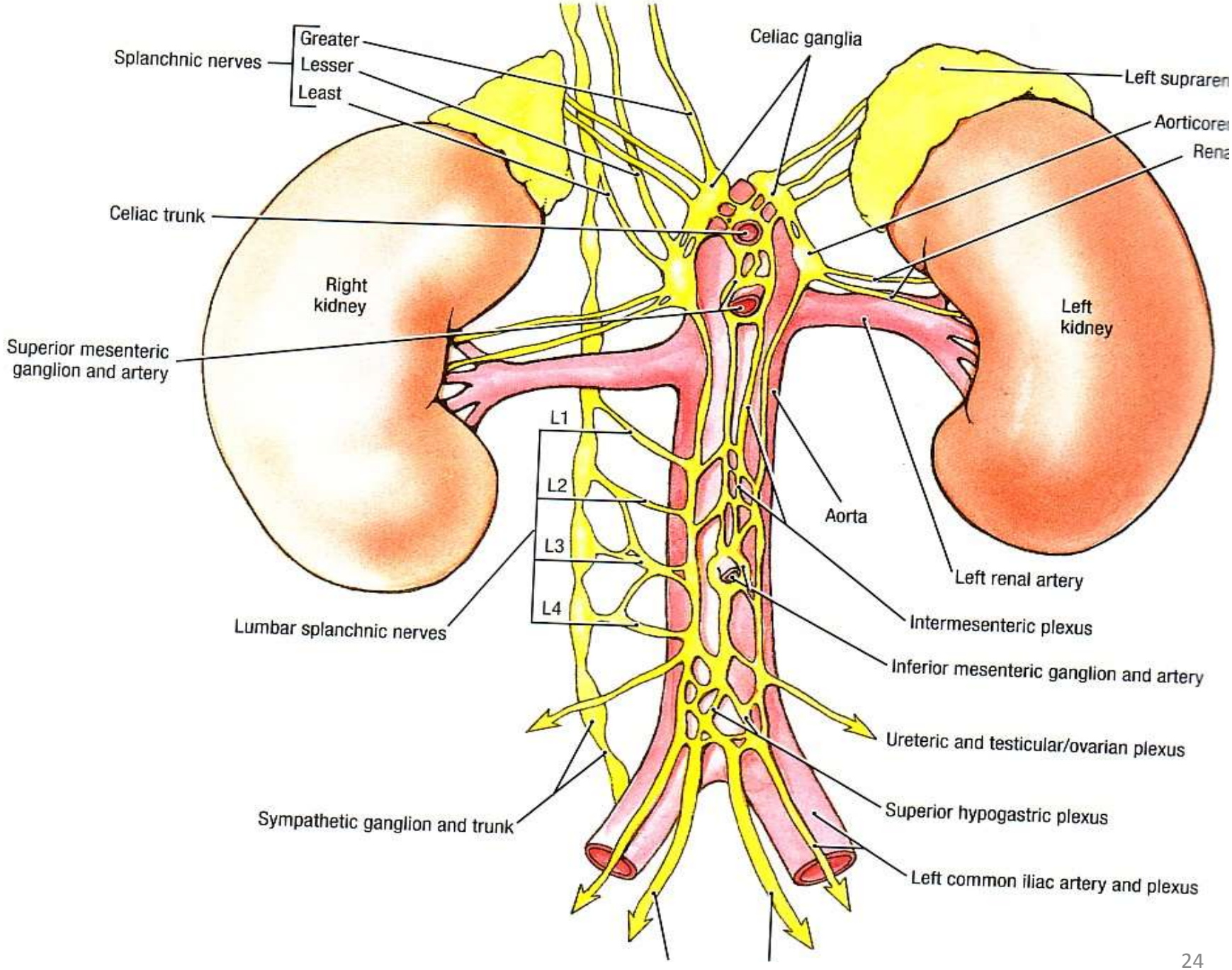


- 3- Fibers pass medially to the sympathetic plexuses on the abdominal aorta and its branches.
- 4- Other fibers pass downward and medially in front of the common iliac vessels and aorta to form the hypogastric plexus.


Dorsal ramus of spinal nerve
Lateral horn of gray matter
Dorsal root
Sympathetic trunk
(a)
(c)
(b)
Ventral ramus of spinal nerve
To effector: blood vessels, arrector pili muscles, and sweat glands of the skin
Spinal nerve
Ventral root
Gray ramus communicans
Splanchnic nerve
White ramus communicans
Sympathetic chain ganglion
Collateral ganglion (such as superior mesenteric)
Visceral effector organ (such as small intestine)

- **Celiac plexus:**

- It is a plexus of nerves around the celiac trunk.
- It ends laterally in a number of nodules which collectively form the celiac ganglion.
- The right celiac ganglion is covered by the **I V C.**
- The left celiac ganglion lies behind the **lesser sac.**
- Each ganglion receives the **greater &the lesser and the least splanchnic** nerves, which arises from the sympathetic trunk in the **thorax.**
- The nerves which arise from the ganglion form the celiac plexus.
- The celiac plexus receives a branch from posterior gastric nerve (from both vagi).


Splanchnic nerves
Greater
Lesser
Least
Celiac ganglia
Left suprarer
Aorticore
Rena
Celiac trunk
Right kidney
Left kidney
Superior mesenteric ganglion and artery
L1
L2
L3
L4
Aorta
Left renal artery
Intermesenteric plexus
Lumbar splanchnic nerves
Inferior mesenteric ganglion and artery
Ureteric and testicular/ovarian plexus
Sympathetic ganglion and trunk
Superior hypogastric plexus
Left common iliac artery and plexus

Abdominal pain

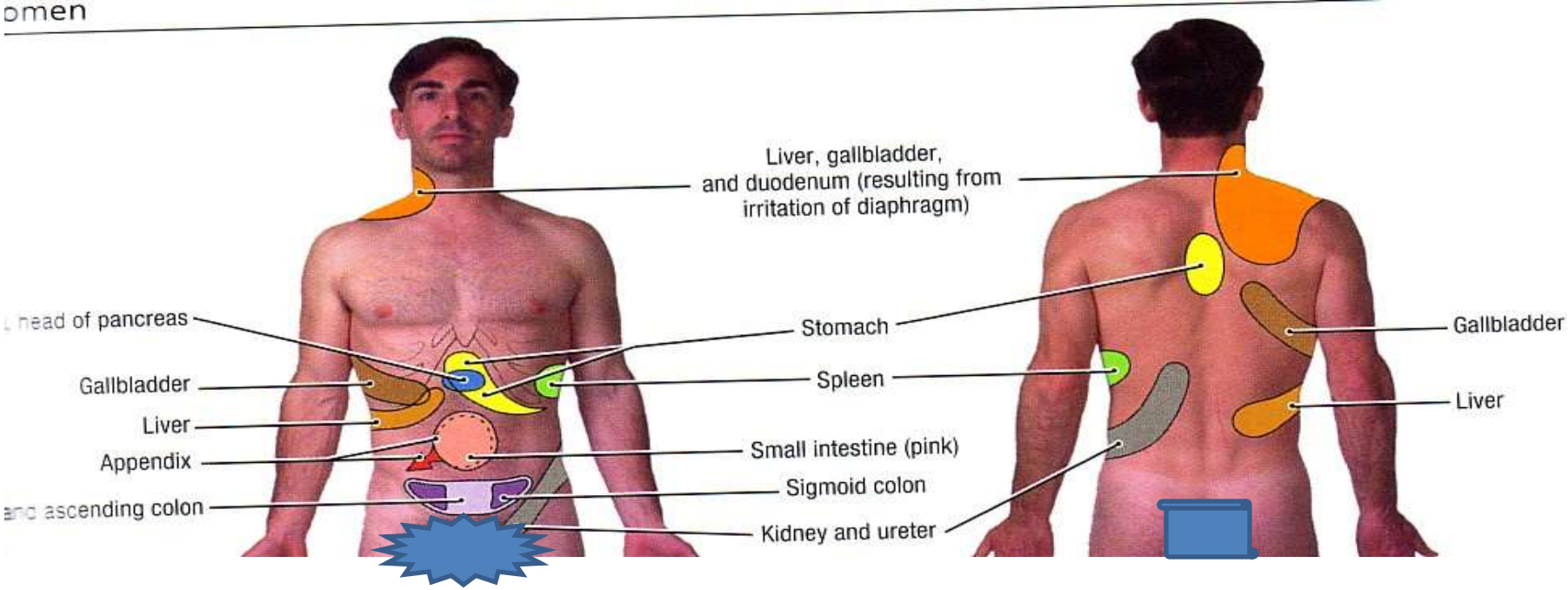
- There are 3 types of pain: ***Somatic, Visceral, and Referred***
- **I- Somatic:** It arises from abdominal wall (skin, fascia, muscles, and parietal peritoneum).
- It can be sever and precisely localized.
- It could be lateralized according to its origin.
- It reaches the spinal cord through the following nerves:
- 1- Central part of diaphragm: Phrenic nerve **C 3,4 & 5**.
- 2- Peripheral part of diaphragm: Intercostal nerves**T7 toT11**
- 3- Anterior abdominal wall: Intercostal nerves **T7 to T12 & L 1**
- 4- Pelvic wall: Obturator nerve(**L 2,3,&4**).

- Inflamed parietal peritoneum is very sensitive and transmitted to the skin by the same nerves.
- So it causes hyperesthesia and tenderness .
- Increasing abdominal tones or rigidity is often.
- It is called **guarding** as an attempt to rest and localized the inflammatory process.
- **Rebound tenderness**: any movement of the inflamed parietal peritoneum leads to pain.

- **II- Visceral pain:**
- It arises from abdominal organs and visceral peritoneum.
- It is caused by **stretch** of a viscus or mesentery, or **ischemia** or **distension** of a hollow organ or **chemical damage** (acidic gastric juice).
- Pain is **dull or poorly localized**.
- Pain is referred to **middle line, Why?**
- **Colic** is a form of visceral pain, (violent contraction of smooth muscles, e.g. biliary or renal colic).
- Many visceral pain are accompanied by **reflex activity** e.g., sweating ,salivation, vomiting, tachycardia.

Referred Abdominal pain

- It is the feeling of pain at a different sit of the original pain.
- ***Both somatic & visceral structures can produce referred pain.***
- Both the origin of the stimulus and the area of feeling the pain are supplied by the same segment of spinal cord.
- E.g., in acute cholecystitis pain is refereed to the right shoulder.



Pain arising from the organs, called visceral pain.

It varies from sever to dull pain.

It is poorly localized pain.

It radiates to the part of the body supplied by somatic sensory fibers associated with the same ganglion and spinal cord segment.

Pain is interpreted by the brain as thought the irritation occurred from the area of skin supplied by the same segment

Lumbar Sympathectomy

- In case of vasospastic disorder of the arteries of the lower limb, we perform lumbar sympathectomy.
- It produces vasodilatation of the arteries.
- The preganglionic sympathetic fibers to the vessels of the lower limb arise from T11,T12 and L1.
- They synapse in the lumbar and sacral ganglia.
- Postganglionic fibers join the sacral and lumbar nerves.
- Bilateral sympathectomy in male may be followed by loss of ***ejaculation,*** while **erection is not impaired**.