

وَقُلْ رَبِّ زِدْنِي عِلْمًا



PERIPHERAL NERVOUS SYSTEM



SUBJECT : Anatomy

LEC NO. : 12

DONE BY : Batool Alzubaidi + Hashem Ata

#كَلِينِيكَال_إِلَا_شَحْطَة



PNS..

Lecture (12)

Lumbosacral Plexus

قبل ما نبليش المحاضرة بس حبيت احكي انه هاد اخر تفريغ مني الكم
بالبيسك للامانة كانت تجربة حلوة و لطيفة جدا حتى لو كانت متعبة 😊
😊 بتمنى اني اكون فدتكم و ساعدتكم و ما قصرت و تذكروني بالخير
و بدعواتكم مع تفريغ رقم #155 🔥🔥 الحمد لله رب العالمين الي
قدرني و الحمد لله على لطف ربنا الي عدينا فيه نص الطريق و صرنا
نص دكاترة .. بتمنالكم كل التوفيق و اعلى العلامات والله ❤️❤️❤️

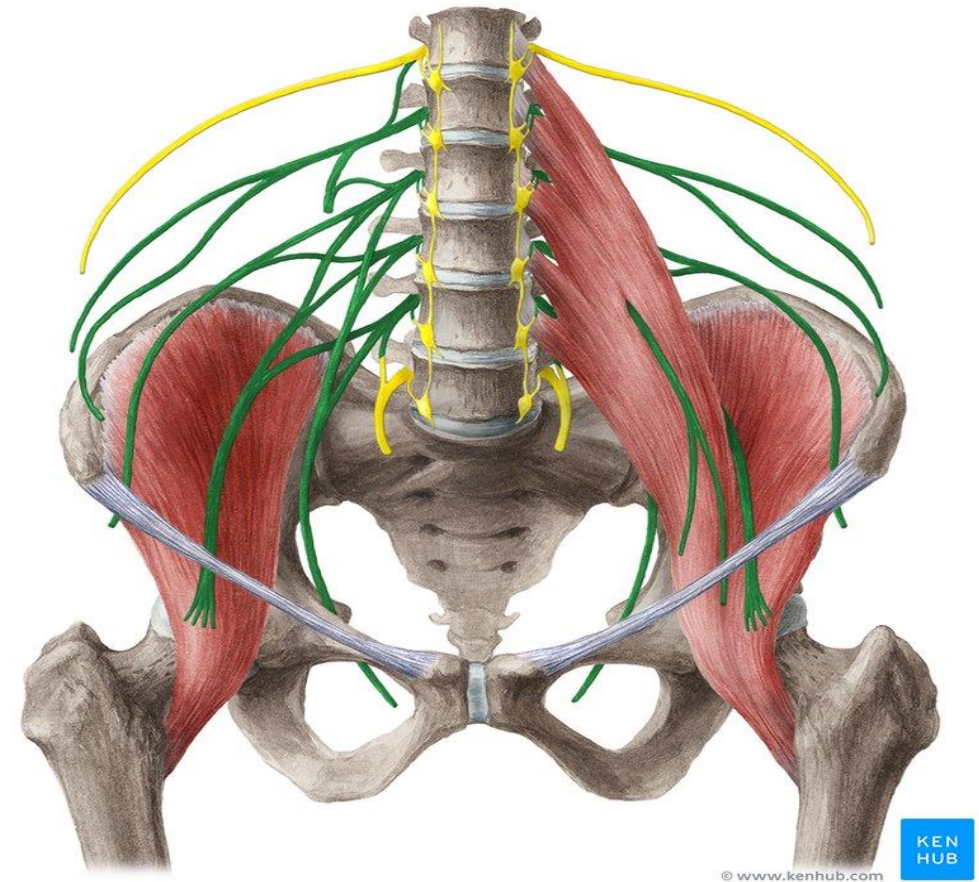
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Lumbar plexus

The lumbar plexus:

- It is a network of nerve fibres that supplies the skin and musculature of the lower limb.
- Location: Each located in the lumbar region, within the substance of the **psoas major** muscle.



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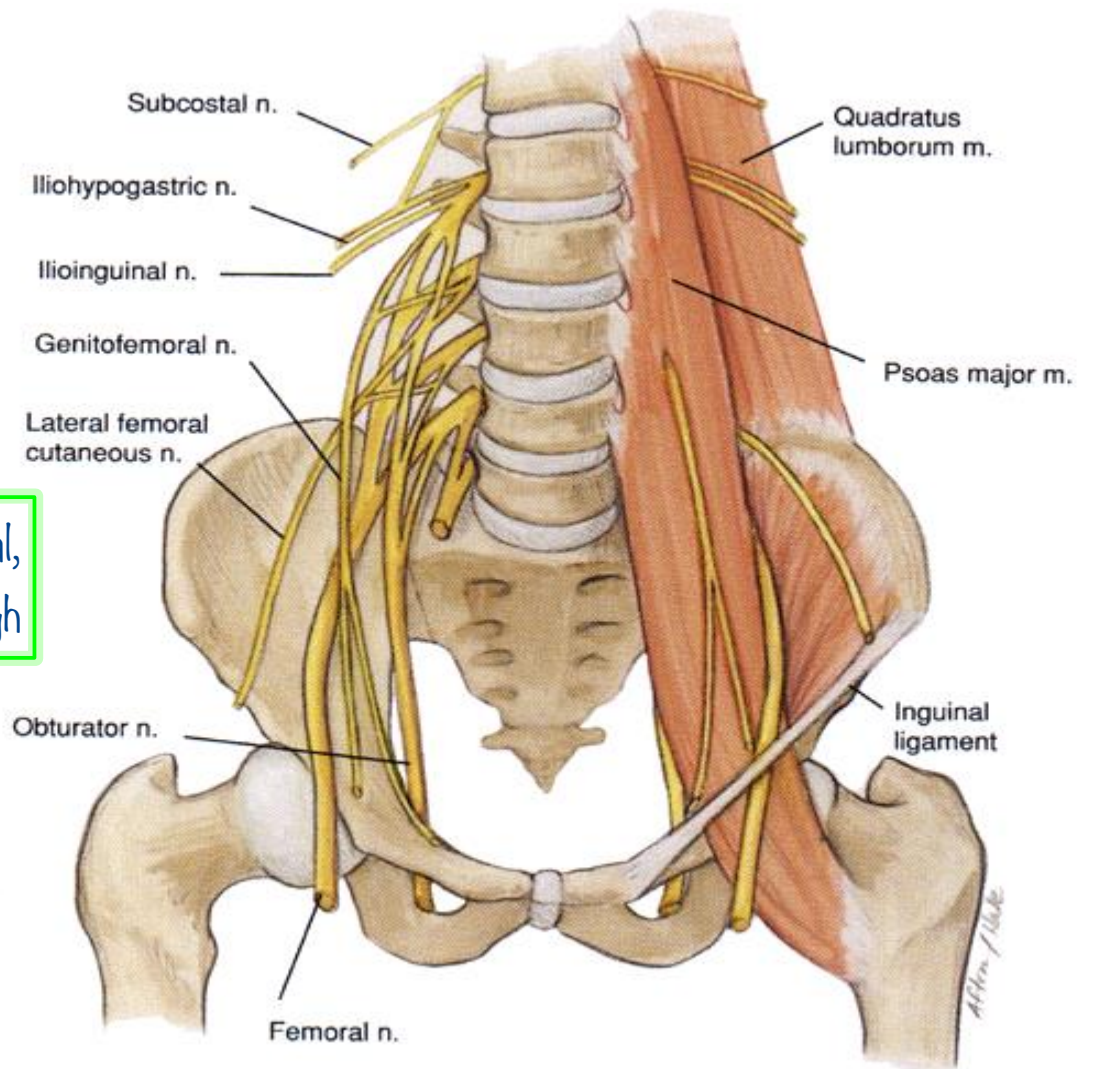
Formation of the lumbar plexus:

- It is formed by the **anterior (ventral) rami** of the lumbar spinal nerves L1, L2, L3 and L4.
- It receives **contributions** from T12.

Relation to the psoas muscle.

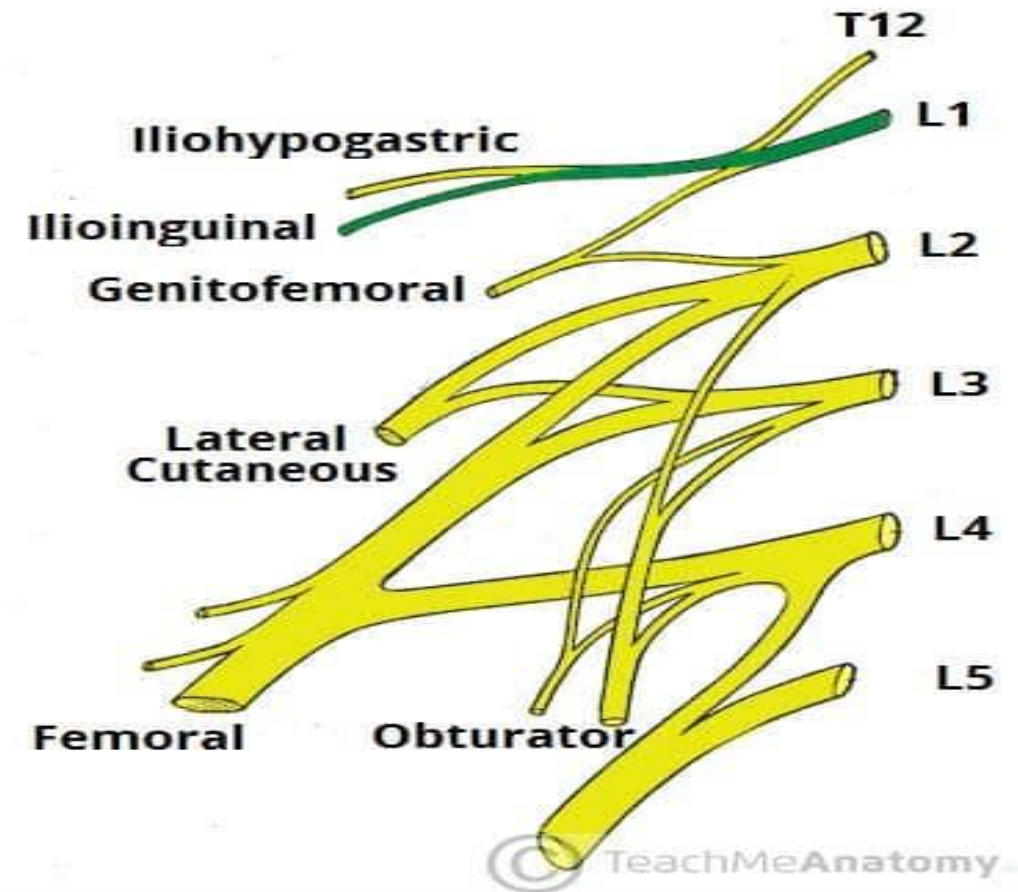
Femoral, iliohypogastric, ilioinguinal, lateral cutaneous nerve of the thigh

- The nerves of the plexus **traverse psoas major** and **emerge from its lateral border**.
- Except: **Obturator nerve** appears at its **medial border**.
- **Genitofemoral nerve** emerges on its **anterior aspect**



Formation of the lumbar plexus

- The first lumbar ventral ramus, joined by a branch from the 12th thoracic ventral ramus, bifurcates, the upper part divides again into the iliohypogastric and ilioinguinal nerves.
- The smaller lower part unites with a branch from the second lumbar ventral ramus to form the genitofemoral nerve.
- The remainder of the second, third, and part of the fourth, lumbar ventral rami divide into ventral and dorsal branches.
- Ventral branches of the second to fourth rami join to form the obturator nerve. $L2+L3+L4$
- Dorsal branches of the second to fourth rami join to form the femoral nerve.
- Small branches from the dorsal branches of the second and third rami join to form the lateral femoral cutaneous nerve.
- The accessory obturator nerve, when it exists, arises from the third and fourth ventral branches.



Iliohypogastric Nerve:

Roots: L1 (with contributions from T12).

- It is the first branch of the lumbar plexus.
- It runs toward the iliac crest.
- It then perforates the transversus abdominis. ↗

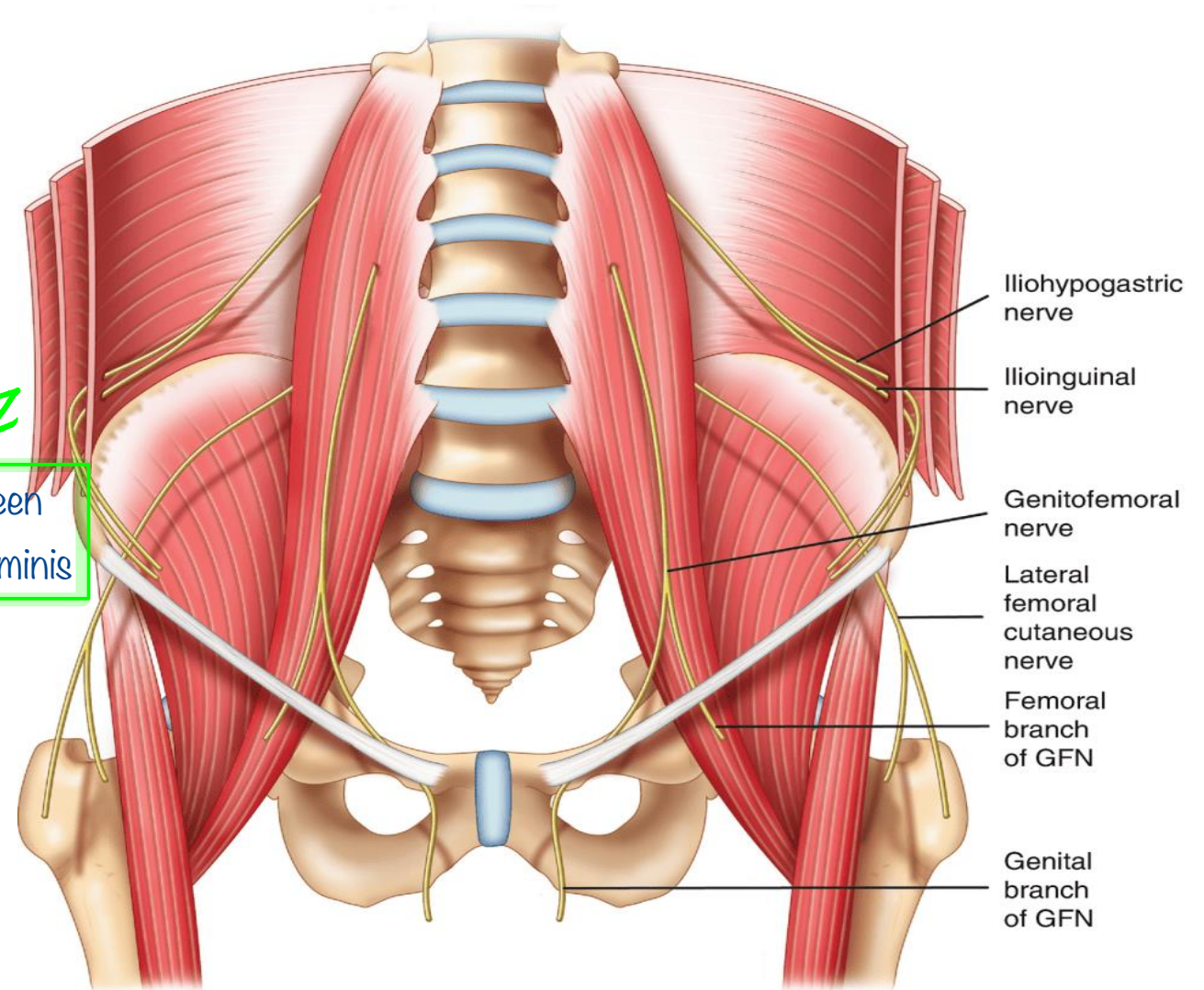
Then runs antrolateral direction between
internal oblique and transversus abdominis

Motor Functions:

- Internal oblique & Transversus abdominis.

Sensory Functions:

- Posterolateral gluteal skin, suprapubic skin.



Emerges lateral to psoas major, runs toward iliac crest, perforates transversus abdominis, runs between internal oblique and transversus abdominis, then it traverses the inguinal ligament then emerges from superficial inguinal ring

Ilioinguinal Nerve:

Roots: L1

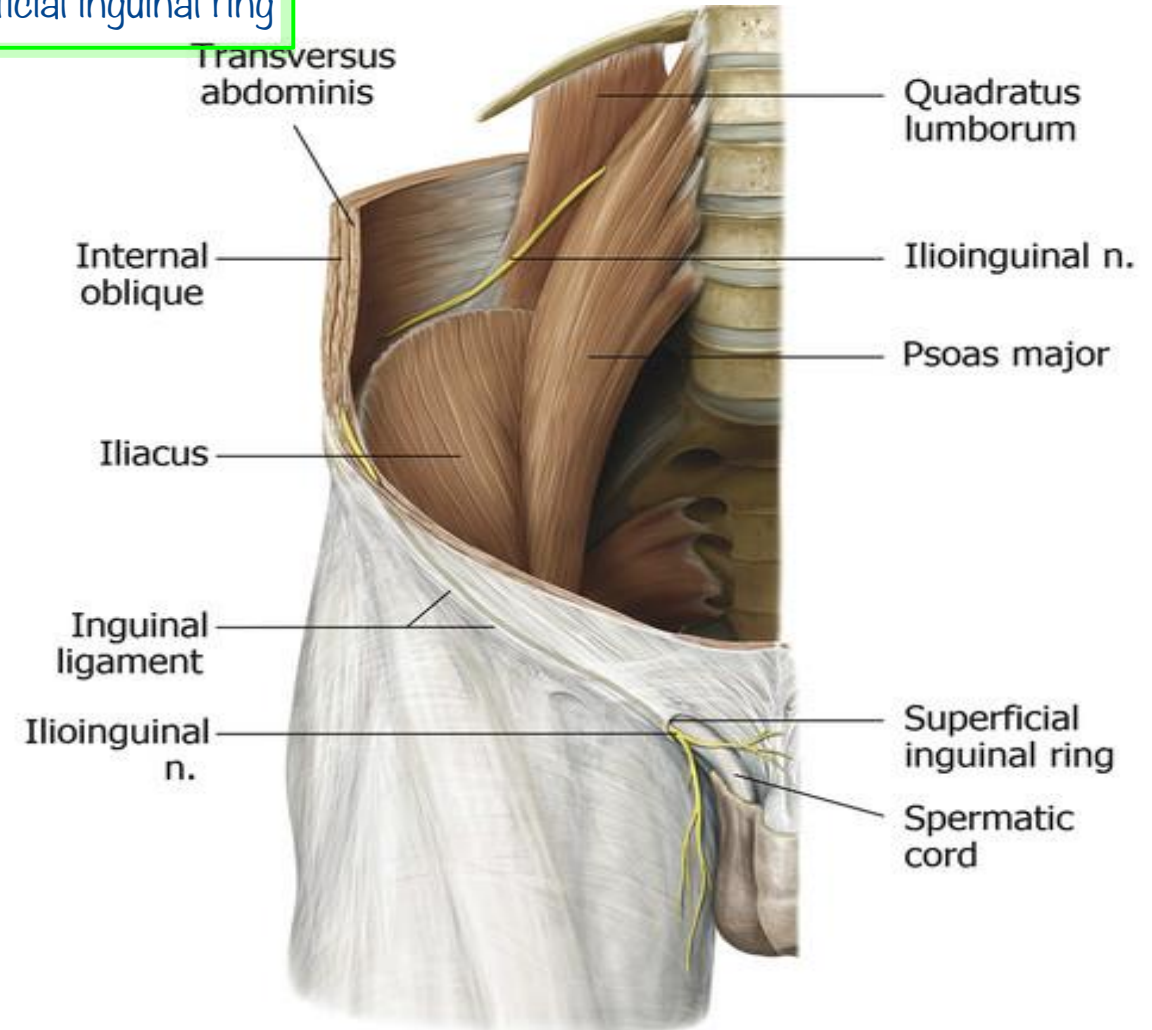
Course: as the iliohypogastric nerve, then it **traverses the inguinal canal.** (may be injured or Entrapment during inguinal surgery).

Motor Functions:

- Internal oblique & Transversus abdominis.

Sensory Functions:

- Proximal medial skin of the thigh.
- Skin over the root of the penis and anterior scrotum.
- Skin over mons pubis and labia majora.



Genitofemoral Nerve:

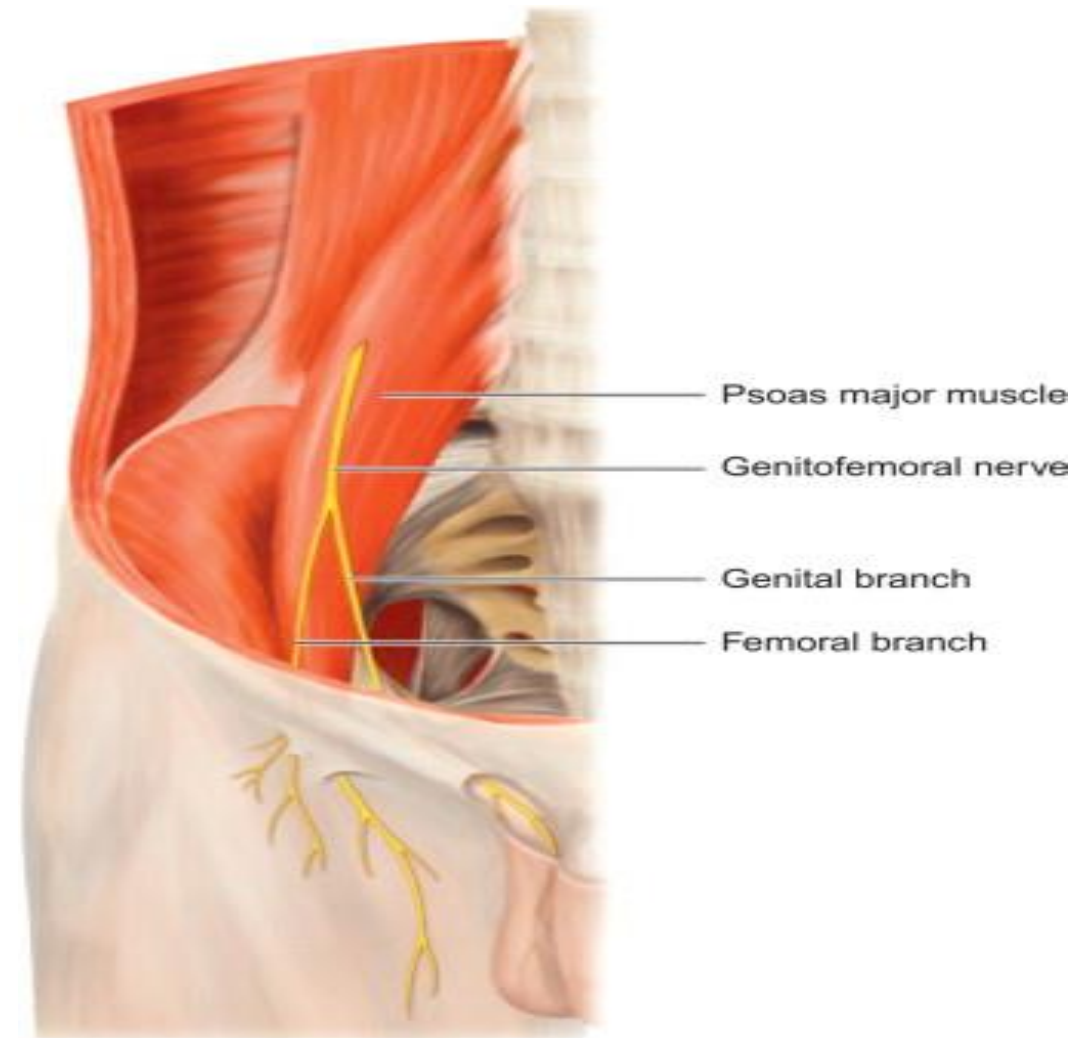
- **Roots:** L1, L2.
- It divides into a genital branch, and a femoral branch.

Genital branch:

- Cremasteric muscle.
- Skin of the scrotum (in males).
- Skin over mons pubis and labia majora (in females).

Femoral branch:

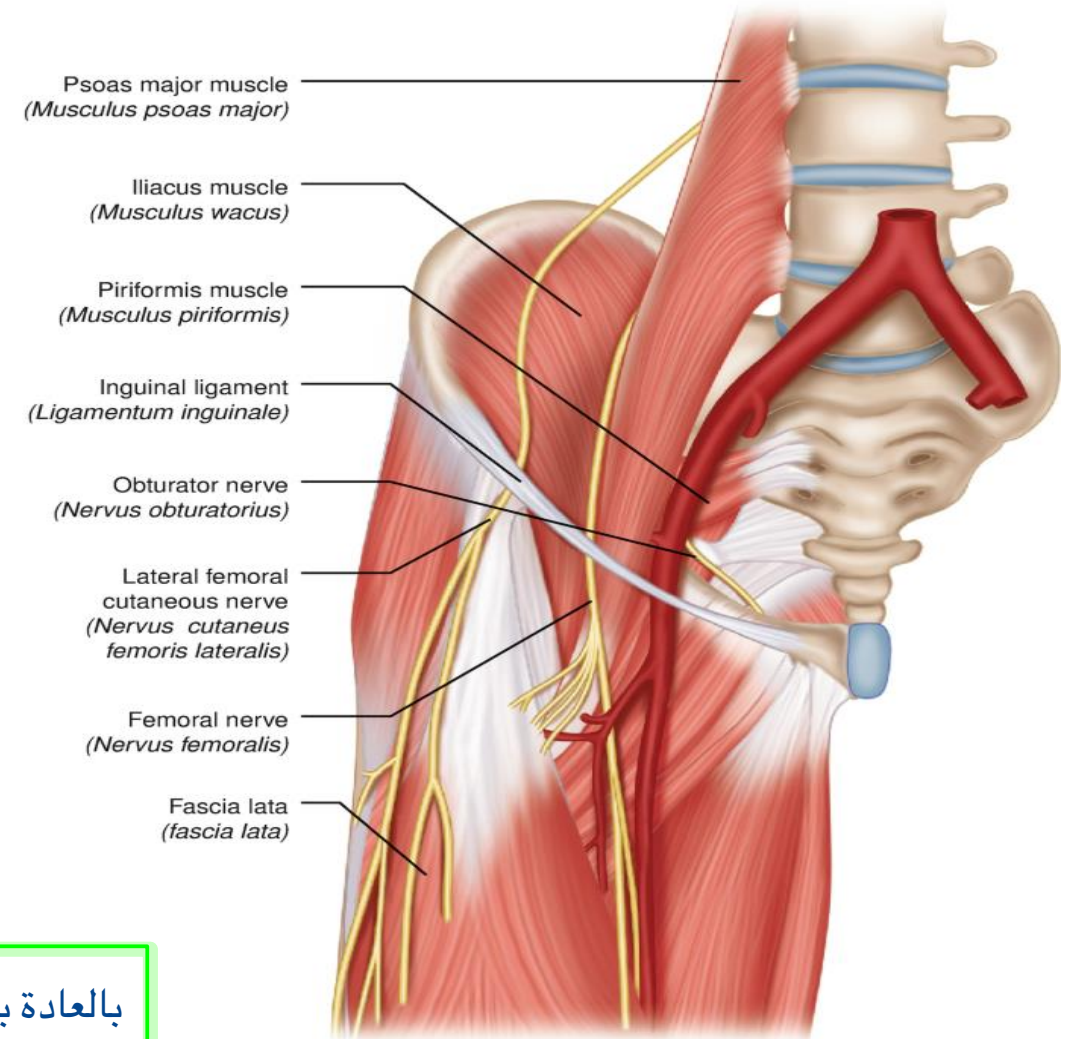
- Anteromedial skin of the thigh.



Lateral cutaneous nerve of the thigh:

- It enters the thigh by passing deep to the inguinal ligament.
- Roots: L2, L3
- Sensory Functions:
 - Innervates the skin of the anterior and lateral aspects of the thigh down to the knee.
- Entrapment of this nerve as it enters the thigh can produce tingling, or burning hypersensitivity over the lateral thigh known as **meralgia paresthetica**. ↘

بالعادة بتصير للناس ال obese او لل pregnant women



Obturator Nerve:

Roots: L2, L3, L4.

Course:

It traverses the obturator foramen to enter the thigh.

Motor Functions:

- Muscles of the medial aspect of the thigh.

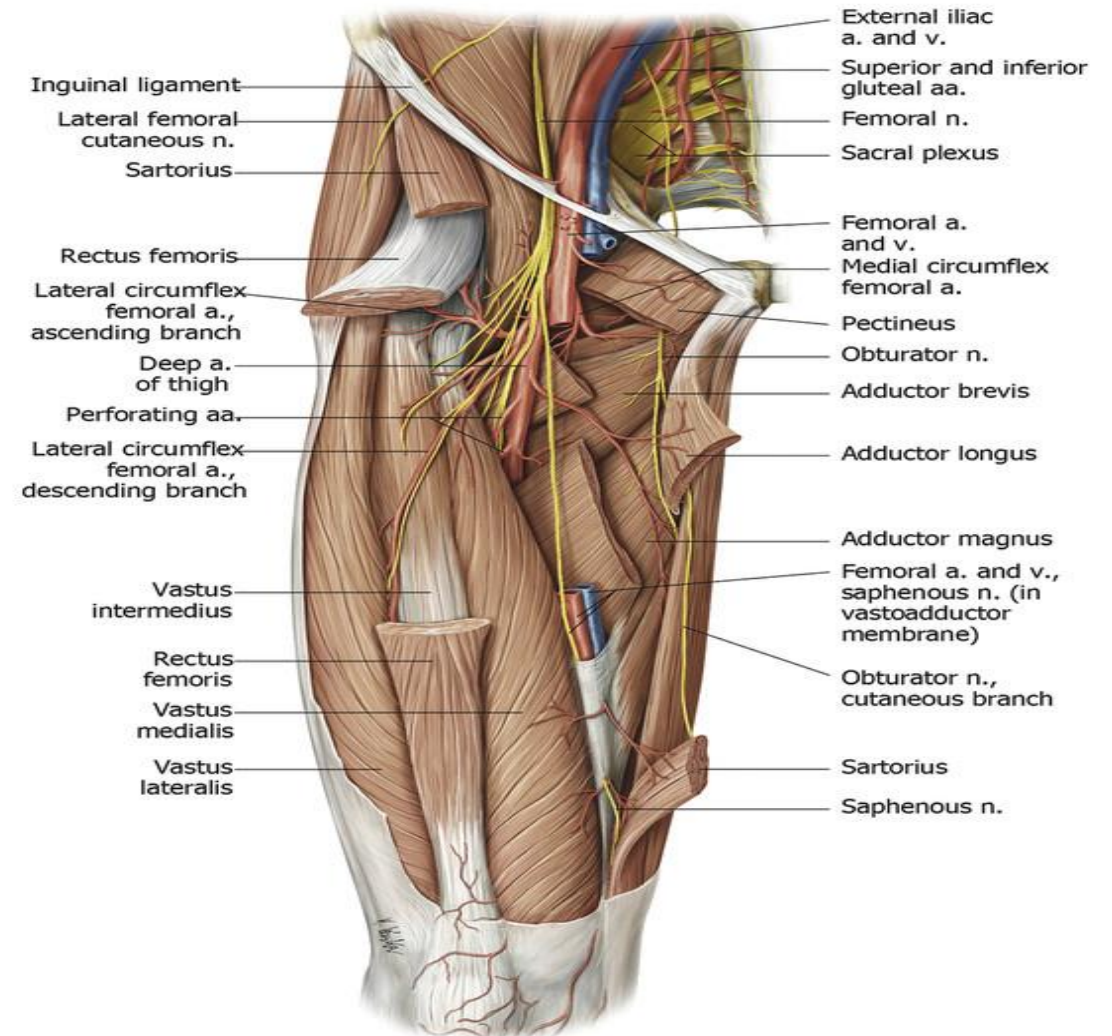
Sensory Functions:

- Skin over the medial aspect of the thigh.

Articular:

- Hip and knee joints.

- Spasm of the adductor muscles of the thigh can be relieved by division of the obturator nerve (obturator neurectomy).



Femoral Nerve:

▪ Roots: L2, L3& L4.

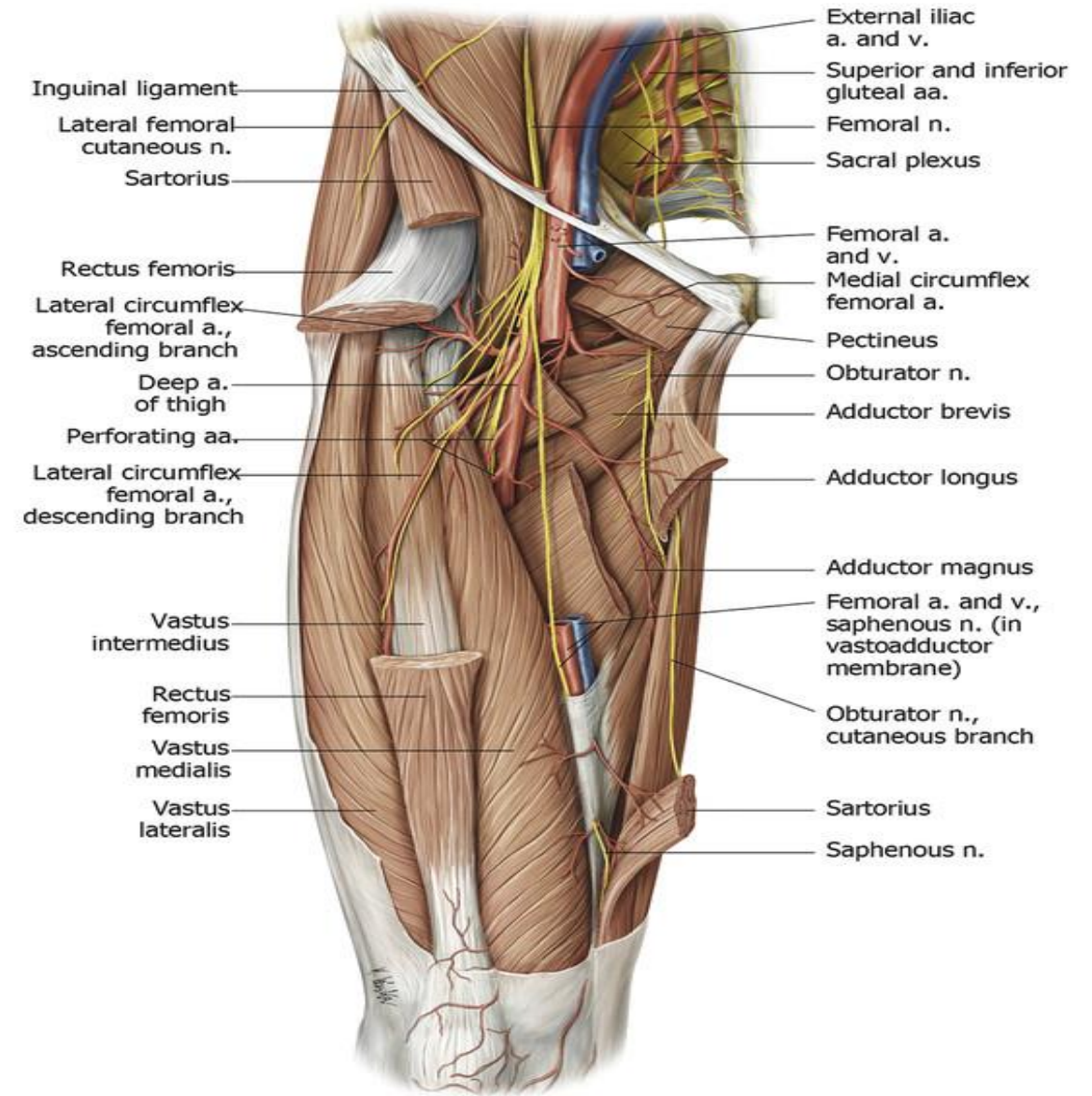
▪ Course:

▪ It is the largest branch of the lumbar plexus.

Within the femoral triangle

▪ It enters the thigh lateral to the femoral artery behind the inguinal ligament.

▪ It terminates by dividing into anterior and posterior divisions.



Branches are:

Muscular:

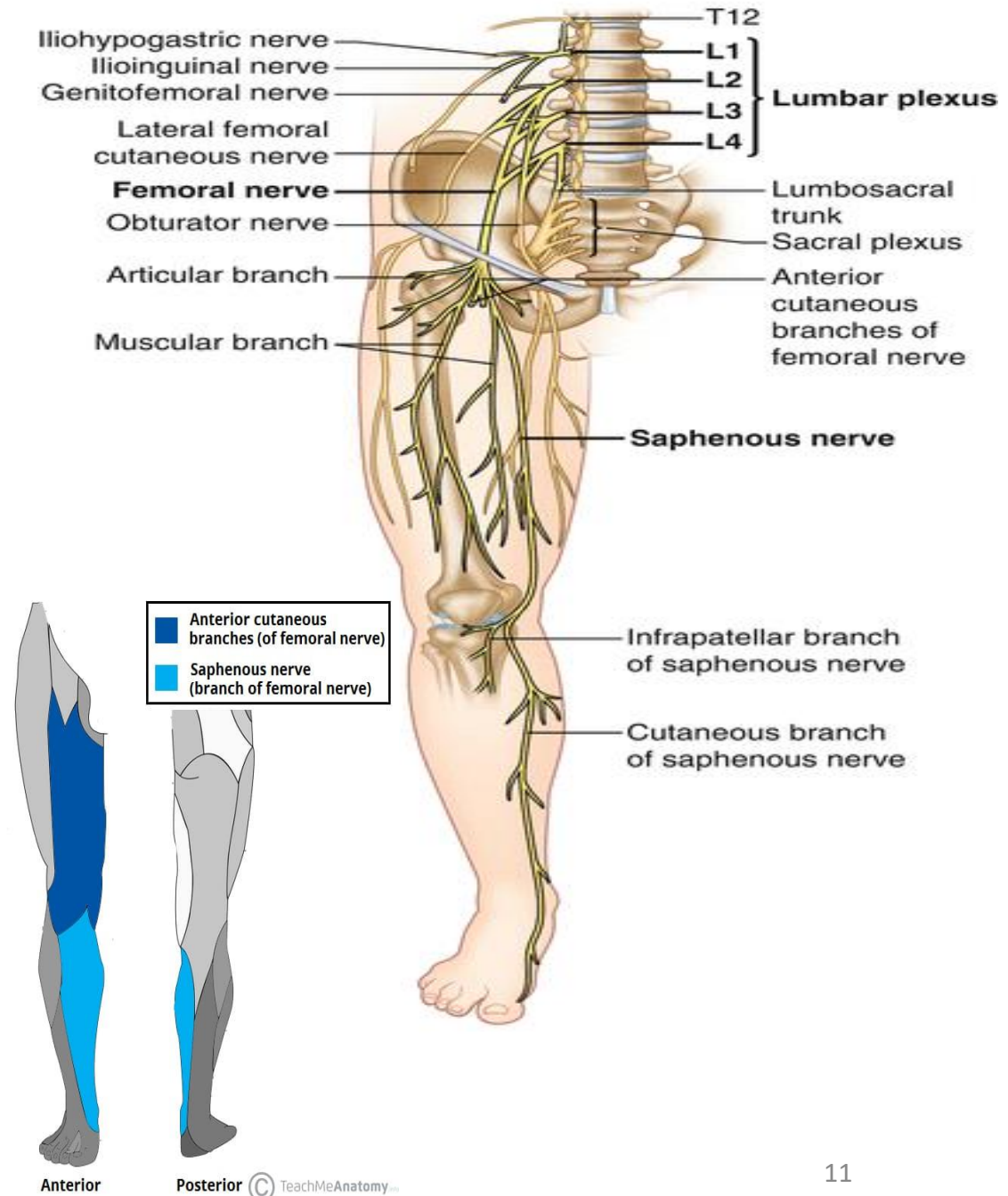
- Muscles of the anterior compartment of the thigh

Cutaneous:

- **Medial and intermediate cutaneous nerves of the thigh**- Skin of the medial & anterior aspects of the thigh
- **Saphenous nerve**, traverses the adductor canal to supply the skin of the medial side of the leg, ankle and foot.

Articular:

- Hip & knee joints.



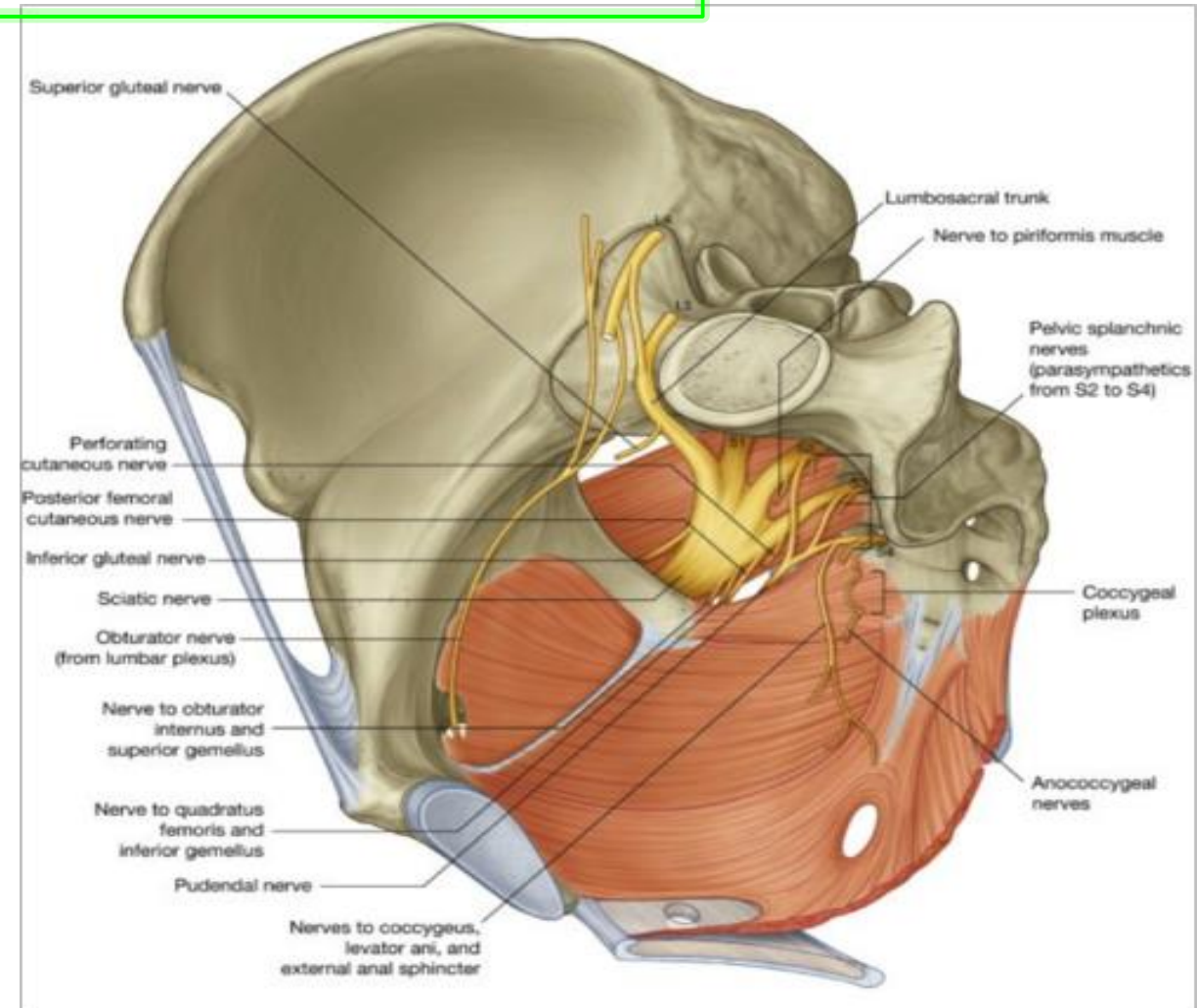
Sacral Plexus

Branches of sacral plexus leave the pelvis through greater sciatic foramen either above or below the piriformis muscle

Formation:

- **Ventral primary rami of sacral nerves S1, S2, S3, and S4**, emerge from the **anterior sacral foramina**
- Joined by the **lumbosacral trunk (L4& L5)** which **descends into the pelvis.**
- These roots divide into dorsal and ventral branches that combine together to form the peripheral nerves of the sacral plexus.

Site: In front of piriformis.



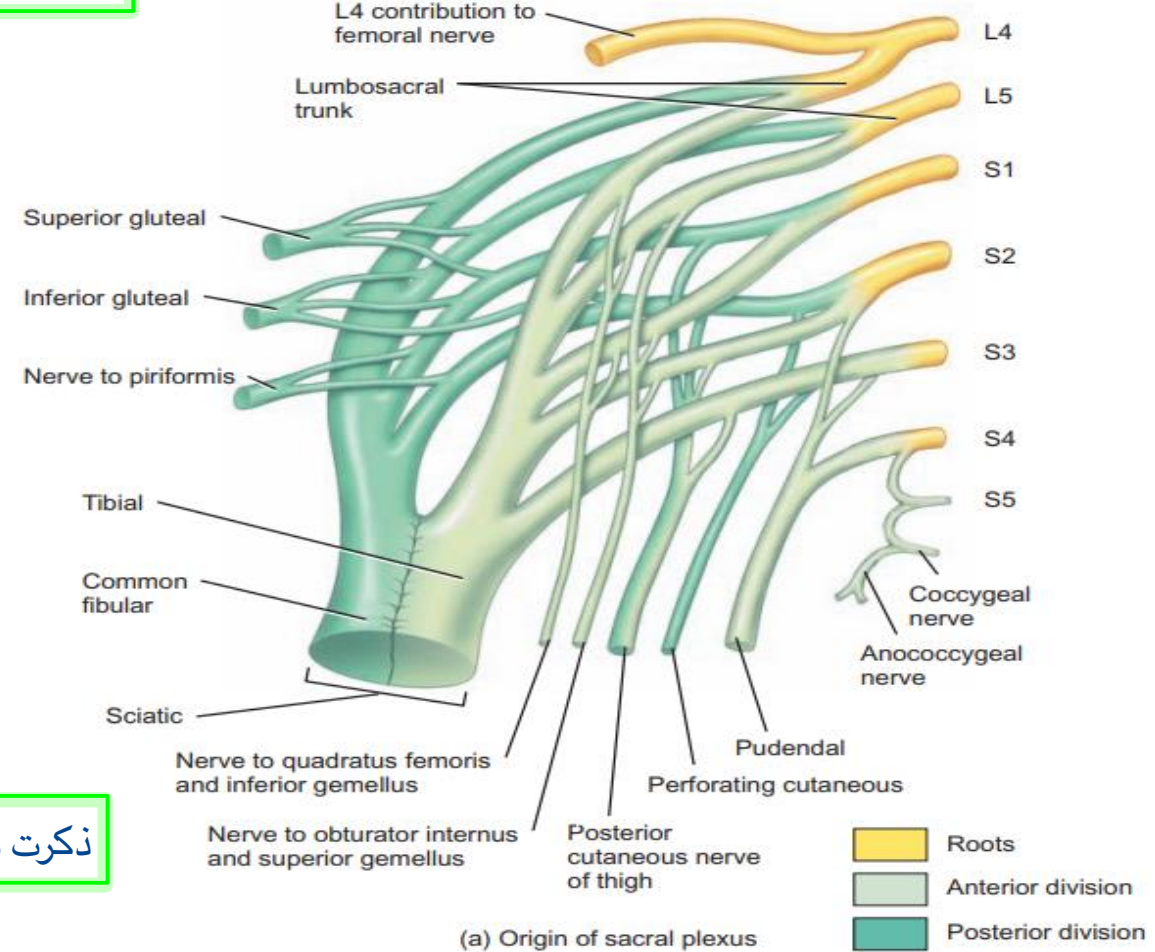
بس اعرفوا انه ال sciatic nerve ال fibers تاعته من L4,5 + S1,2,3 و اعرفوا ال terminal branches تاعته ال tibial and common fibular و اعرفوا انه حتى قبل ما ينقسم و يعطي هدول الفرعين ال fibers تاع كل واحد بكونوا لحال و منفصلين عن بعض

Branches of Sacral Plexus

حكت مش مهم تحفظ كل branch شو ال root تاعه

	Ventral divisions	Dorsal divisions
To quadratus femoris and gemellus inferior	L4, 5, S1	
To obturator internus and gemellus superior	L5, S1, 2	
To piriformis		S(1), 2
Superior gluteal		L4, 5, S1
Inferior gluteal		L5, S1, 2
Posterior femoral cutaneous	S2, 3	S1, 2
Tibial (sciatic)	L4, 5, S1, 2, 3	
Common fibular (sciatic)		L4, 5, S1, 2
Perforating cutaneous		S2, 3
Pudendal	S2, 3, 4	
To levator ani, coccygeus and sphincter ani externus	S4	

ذكرت بس هدول لما حكت عن ال sciatic nerve

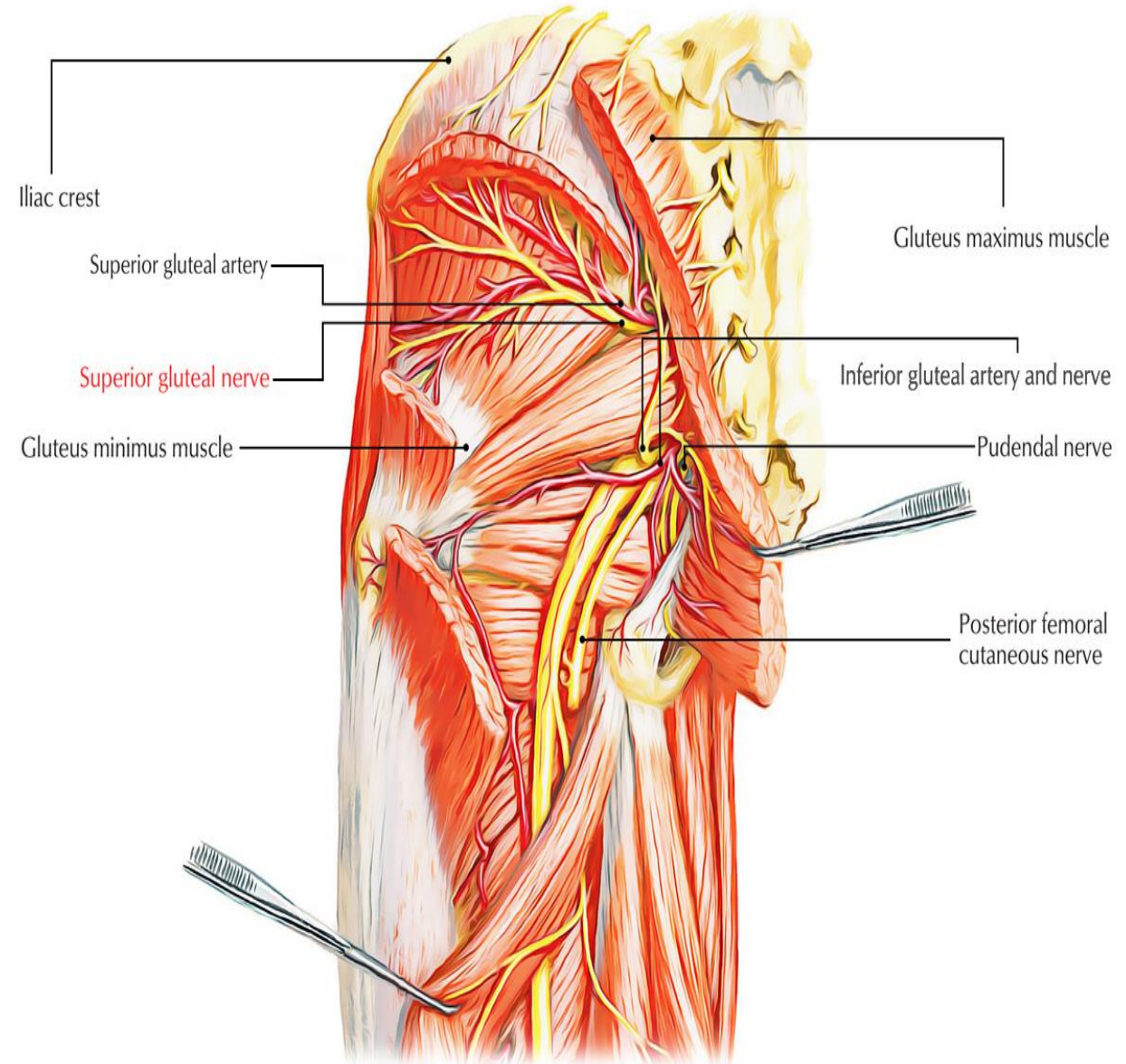


Superior gluteal nerve:

- Leaves the pelvis through **greater sciatic foramen** **above** the piriformis.
- Runs **between the gluteus medius & minimus**, **supplies both**, and ends by **supplying the tensor fasciae latae**

Inferior gluteal nerve:

- Leaves the pelvis through the **greater sciatic foramen** **below** the piriformis.
- Enters the **deep surface of gluteus maximus** and **supplies it**.



Superior gluteal nerve damage:

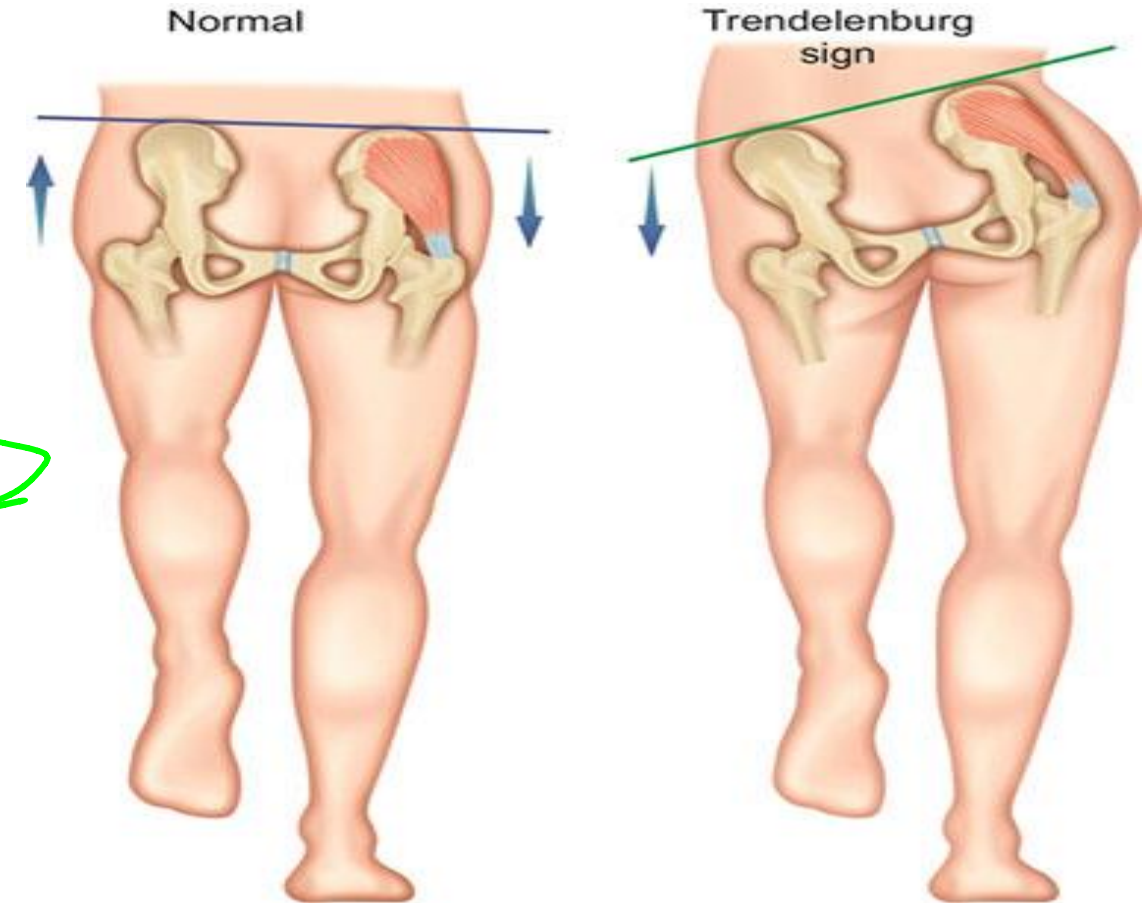
Result in:

- Weakness or paralysis of **gluteus medius & minimus** muscles, result in;
- Weak abduction in the affected hip joint.
- Gait disturbance is known as **Trendelenburg gait**.
- **Positive Trendelenburg's sign**...the **pelvis sags** toward the normal unsupported side (the swing leg).

When unilateral

The trunk itself sags toward paralyzed side

- **Bilateral paralysis of these muscles** results in **a waddling gait**.
- In normal gait, the gluteus medius and minimus muscles on the stance side can stabilize the pelvis in the coronal plane.

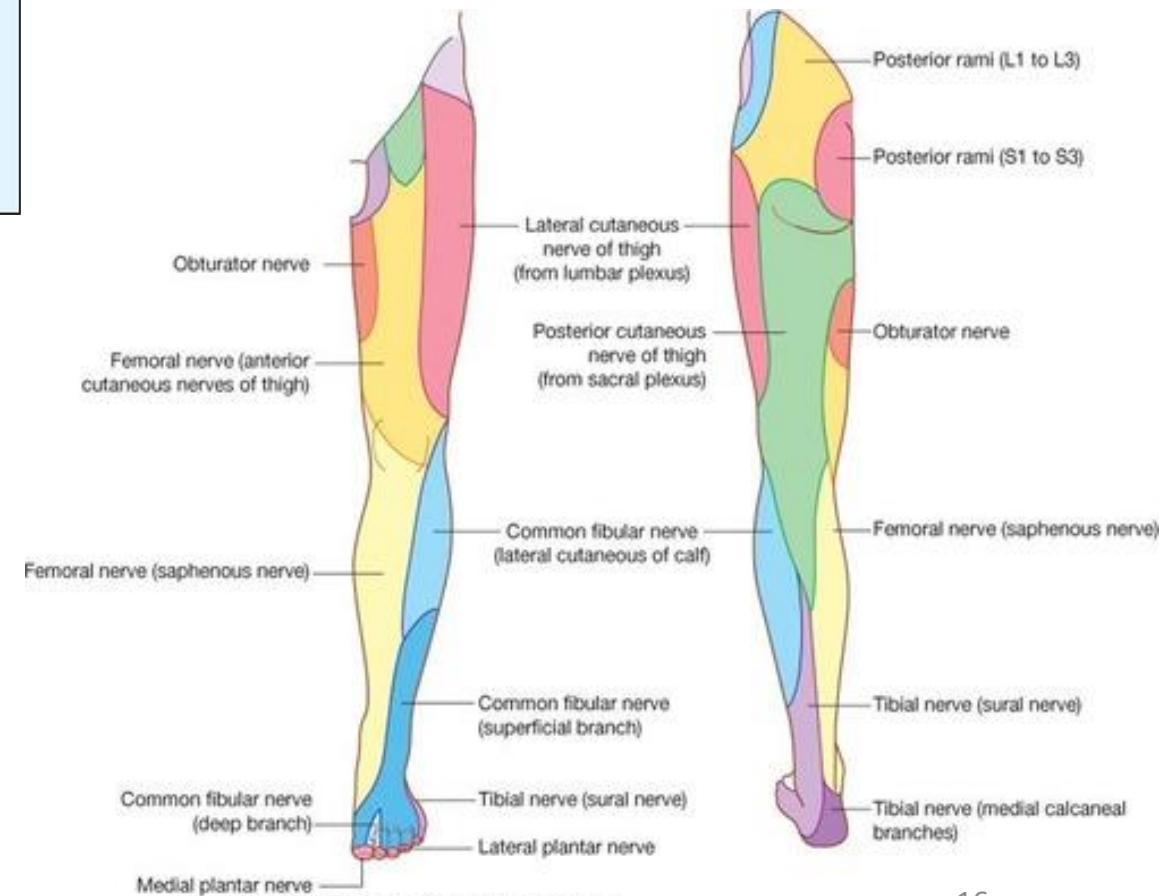
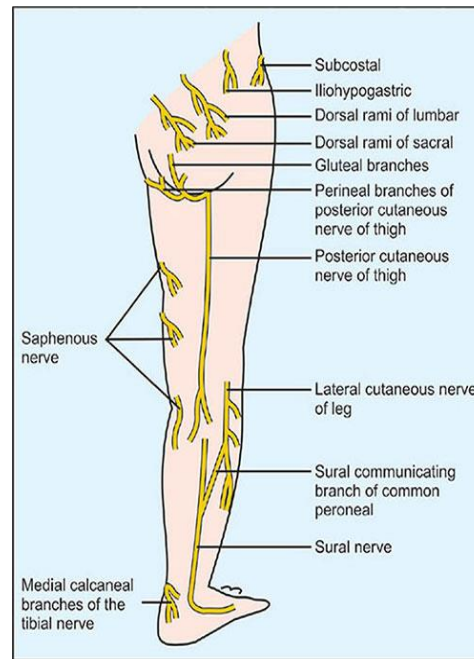


Posterior Cutaneous nerve of the thigh:

Roots: S1, S2 & S3

Course:

- Enters the gluteal region via the greater sciatic foramen.
- Descends in the back of the thigh.
- Innervates the skin on the posterior surface of the thigh and leg.



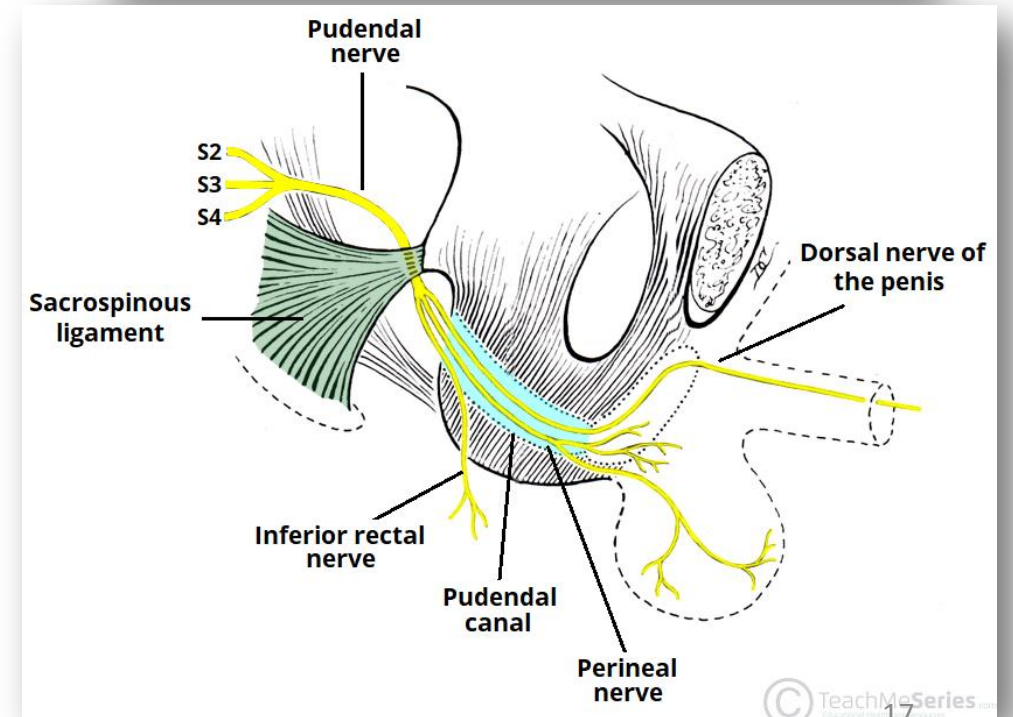
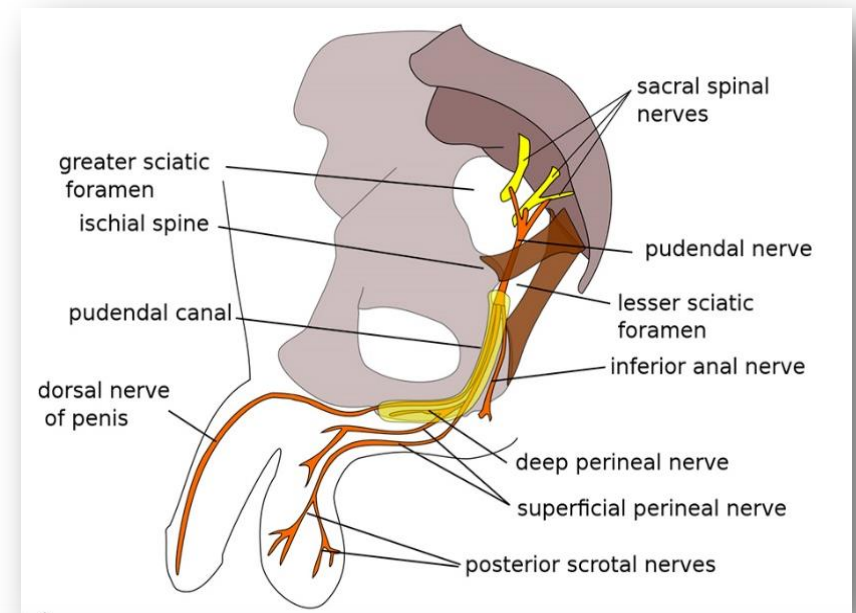
Pudendal nerve

Course:

- It leaves the pelvis through the **greater sciatic foramen**.
- It **crosses the dorsum of the ischial spine** and enter the **perineum**.
- It **lies within pudendal canal**.

Branches:

- **Inferior rectal nerve**.
- **Perineal nerve**.
- **Dorsal nerve of the penis (or clitoris)**.



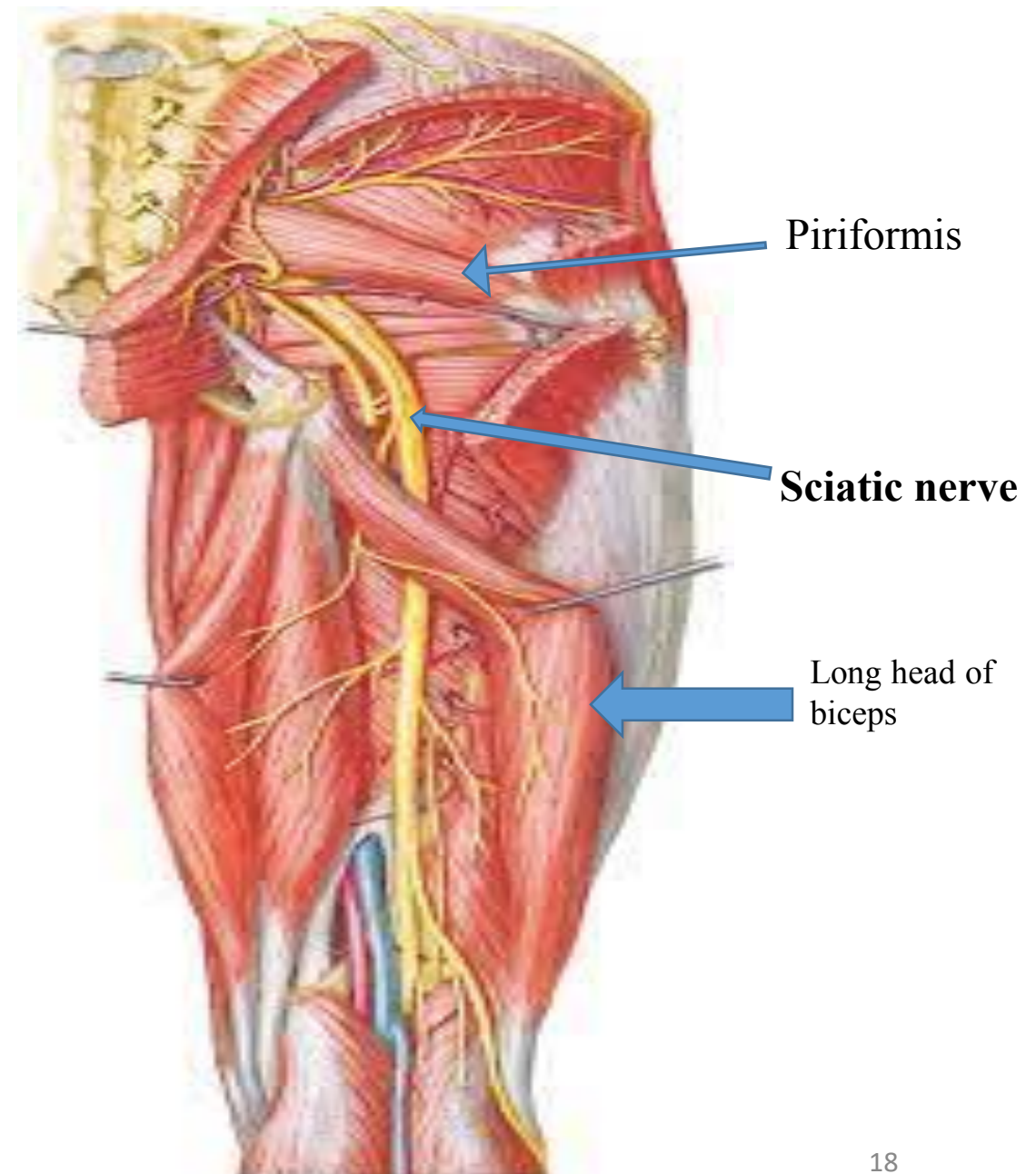
Sciatic nerve

Root: L4, 5, S1–3.

- It is the largest nerve in the body.

Course & Relations:

- Leaves the pelvis through the greater sciatic foramen below the piriformis and under cover of gluteus maximus.
- It descends on the adductor magnus.

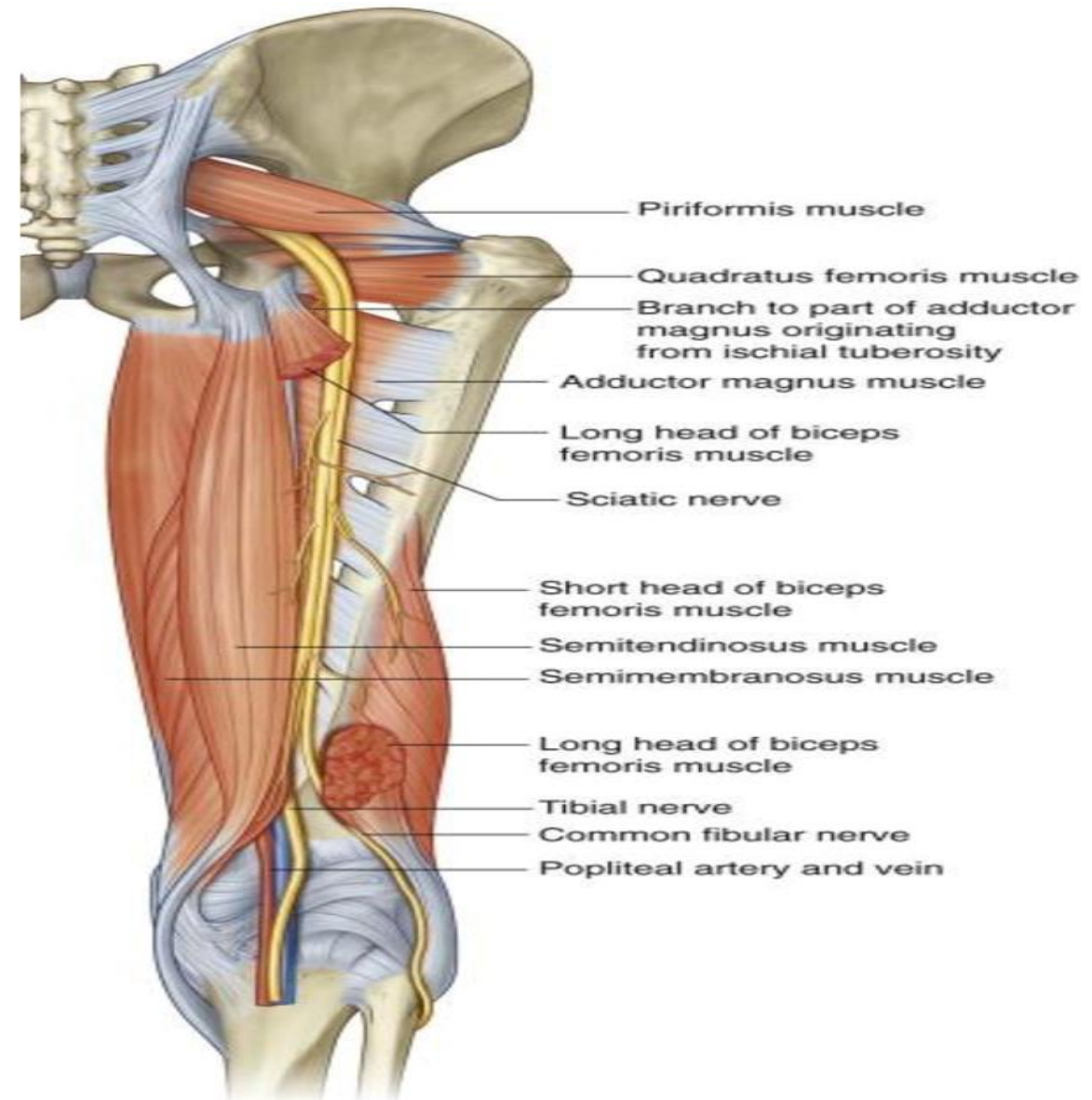


Termination:

- The sciatic nerve terminates by **dividing into the tibial and common peroneal nerves.**

Branches:

- The **trunk of the sciatic nerve** supplies the **hamstring muscles** (biceps, semimembranosus, semitendinosus) and also the **adductor magnus.**



Safe site » upper lateral quadrant of gluteal region

Sciatic nerve injury:

Causes: In penetrating injuries (wrong I.M injection) →
Herniated disc. Posterior dislocation of the hip- Fracture
pelvis

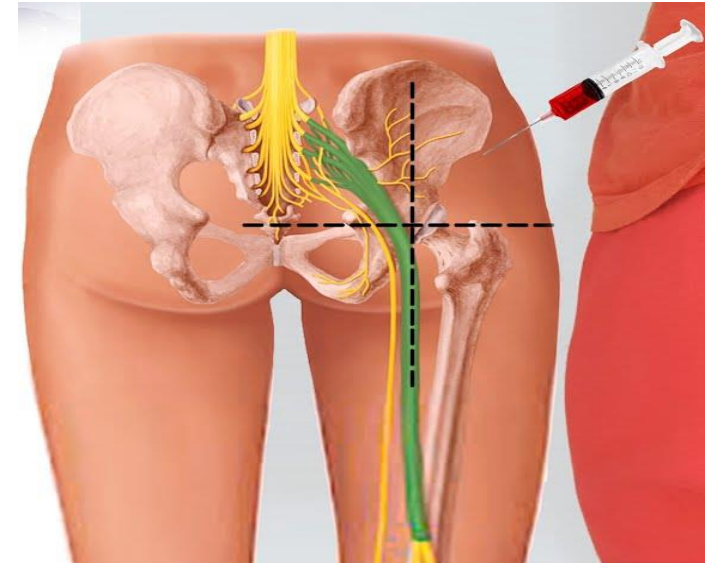
Result in:

▪ Motor effect:

- 1- Weakness/Paralysis of hamstrings & ischial part of adductor magnus
- 2- Weakness/Paralysis of muscles of leg & foot leading to foot drop.

▪ Sensory loss:

Sensory loss in the leg & foot except medial side (saphenous)



Safe site for intramuscular injection

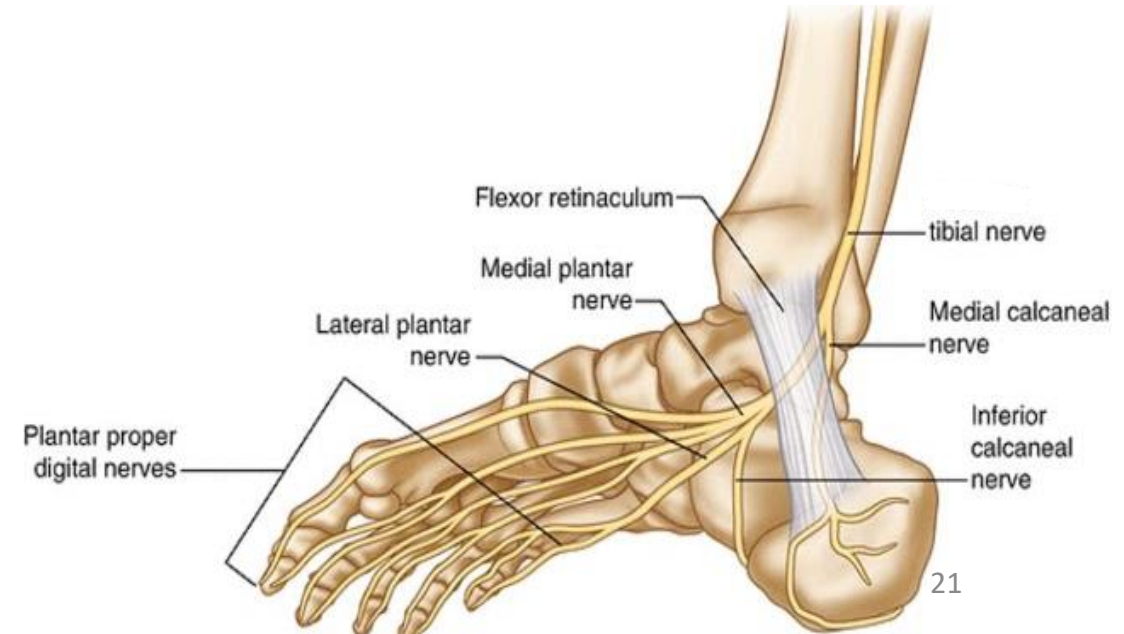
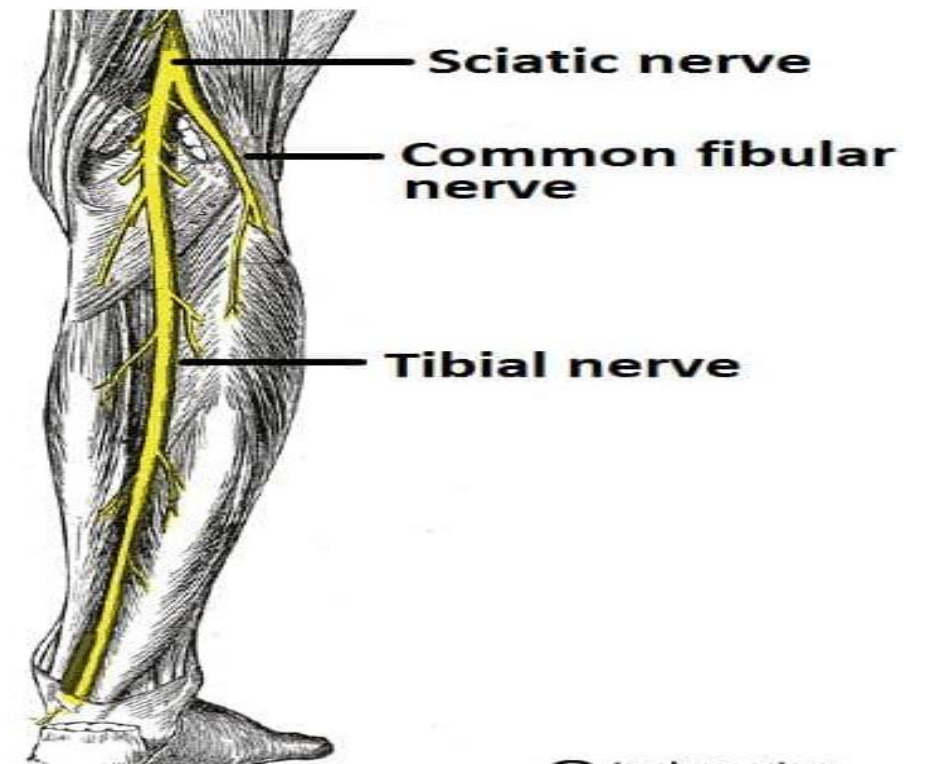
Tibial nerve

- It is the larger of the two terminal branches of the sciatic nerve.

التي تكون فاهمه انه ال tibial nerve هو ال terminal branch ال related الي of the sciatic nerve ال posterior لل compartment of the leg و هو الي ال branches تابعته ال sole of the foot و ال planter aspect of the foot بتدخل ال

Course:

- Traverses the popliteal fossa superficial to the popliteal vessels.
- Descends deep to soleus.
- Passes behind the medial malleolus.
- End by dividing into the medial and lateral plantar nerves.



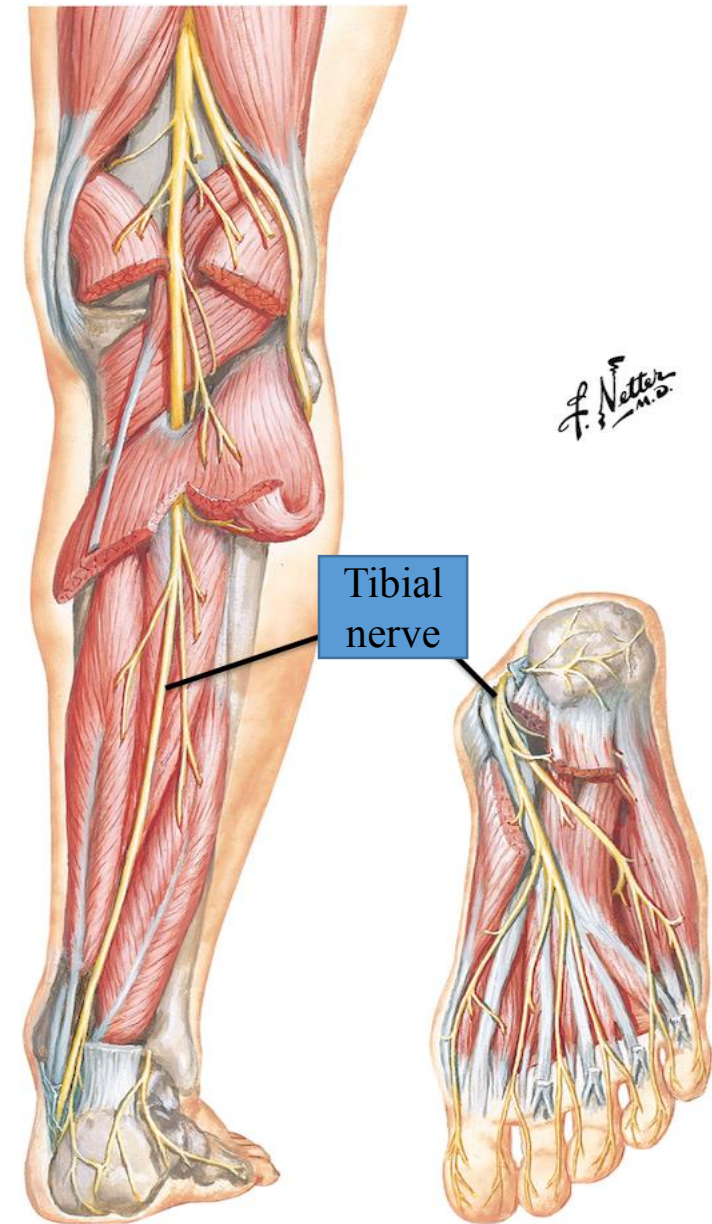
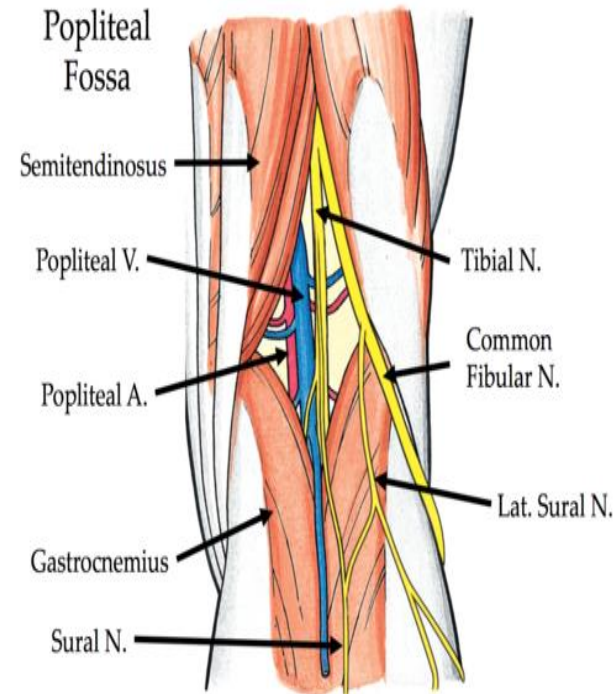
Branches of tibial nerve:

a) In popliteal fossa

- **Muscular**—to gastrocnemius, soleus and popliteus.
- **Cutaneous** — **Sural nerve** -- supplies the lateral side of the leg, foot and 5th toe.
- **Articular**—Knee joint.

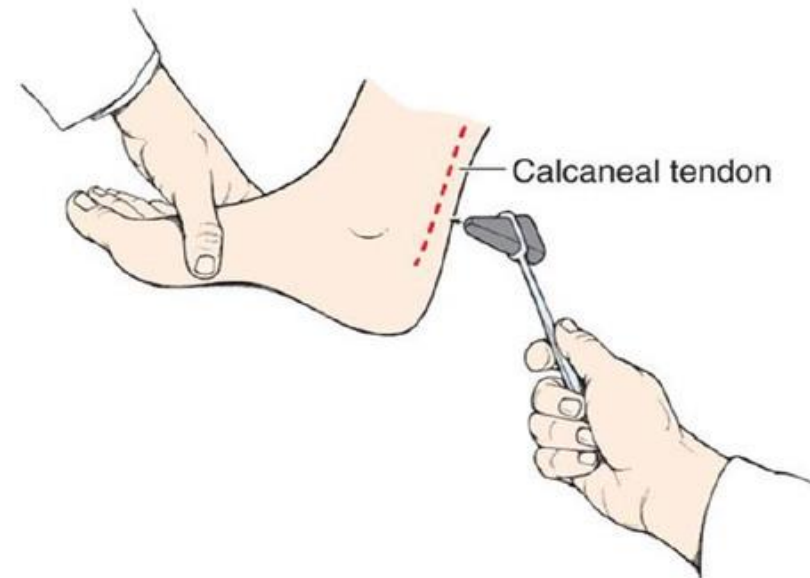
b) In the leg

- **Supplies** muscles of the posterior compartment of the leg.
- **Its terminal plantar branches** supply the intrinsic muscles and skin of the sole of the foot.



A positive response to the **calcaneal (Achilles) tendon reflex** causes **plantar flexion of the ankle joint** via the **contractions of the gastrocnemius and soleus muscles**. The plantar flexion of the ankle joint **confirms the integrity of the tibial nerve and the S1-2 spinal segments**.

Calcaneal tendon reflex (S1-S2)



Common peroneal (fibular) nerve

- It is the smaller of the terminal branches of the sciatic nerve.

Course:

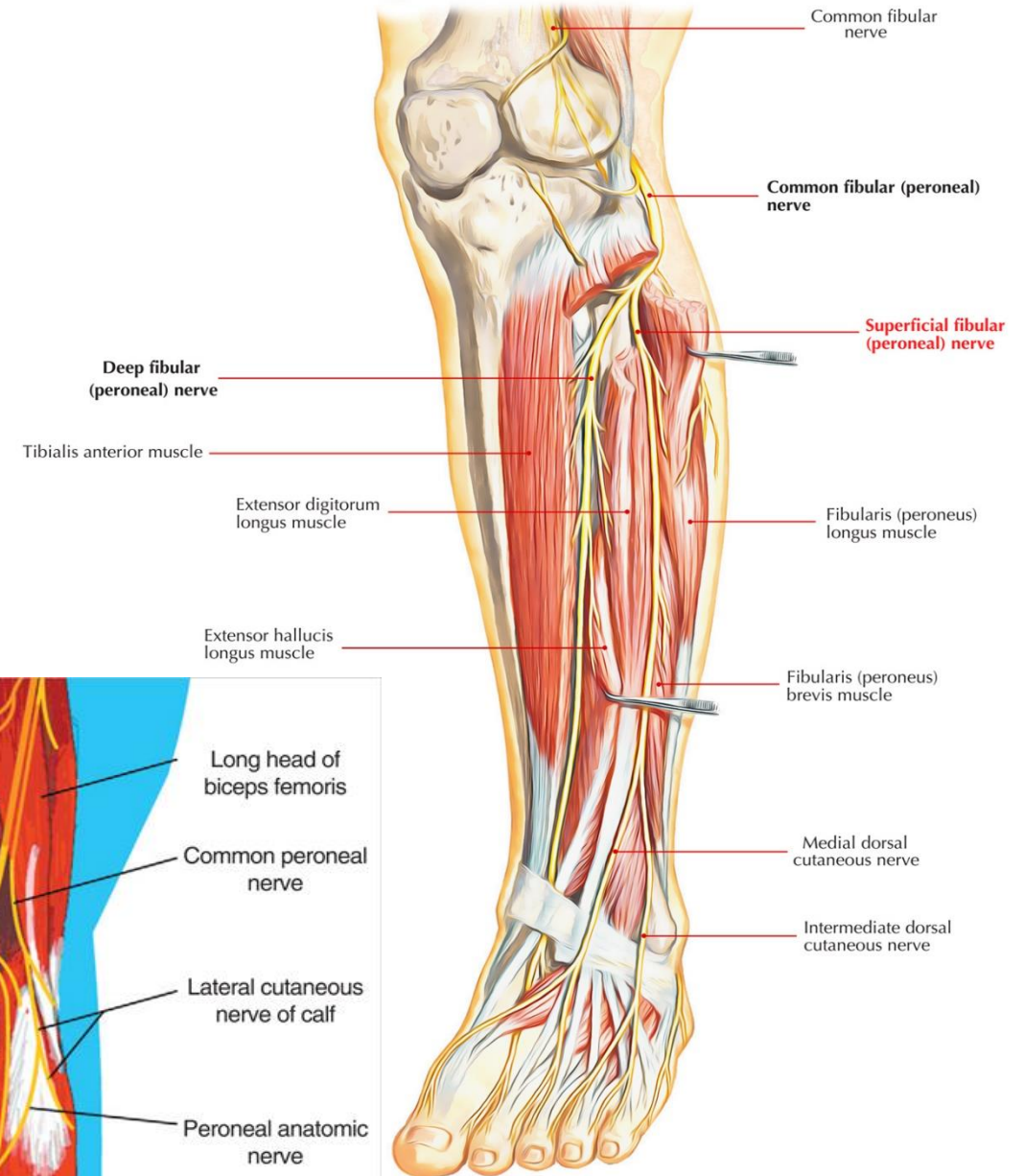
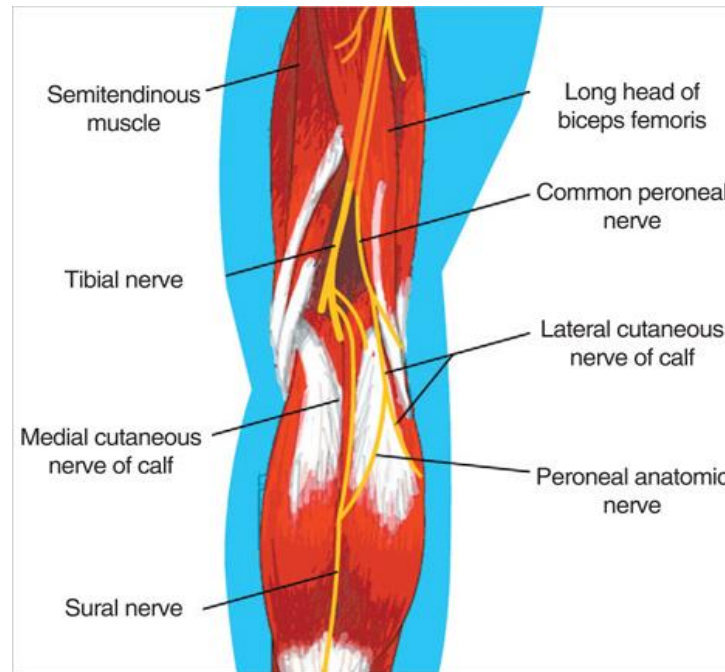
- Passes along the medial border of the biceps tendon,
- Curves around** the neck of the fibula and **divides into its terminal branches**, the **deep peroneal** and **superficial peroneal nerves**.

Branches:

In the popliteal fossa:

- Lateral cutaneous nerve of the calf. ✓↑
- Peroneal (sural) communicating branch.

Supplies skin of the upper part of the lateral aspect of the leg



Deep peroneal nerve:

- Descends over the interosseous membrane.

Its branches are:

Muscular -- Muscles of the anterior compartment of the leg

Cutaneous -- a small area of skin in the web between the 1st & 2nd toes.

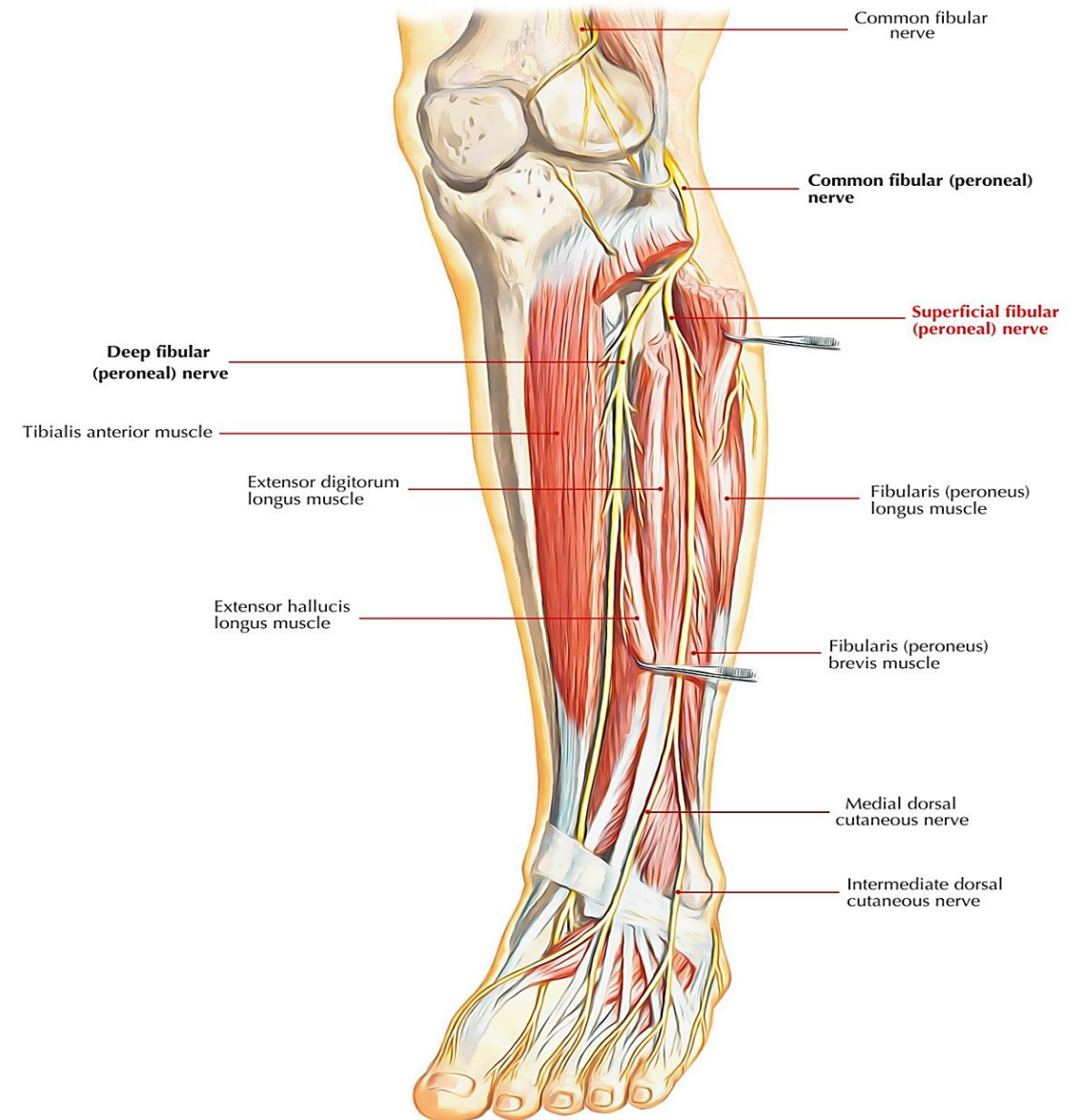
Superficial peroneal nerve:

- It runs in the lateral compartment of the leg.

Its branches are:

Muscular — Lateral compartment muscles.

Cutaneous — Skin of the lateral aspect of the leg (distal two-thirds) & dorsum of the foot



Injury of tibial nerve:

Causes:

- Commonest is the cut wound in popliteal fossa.

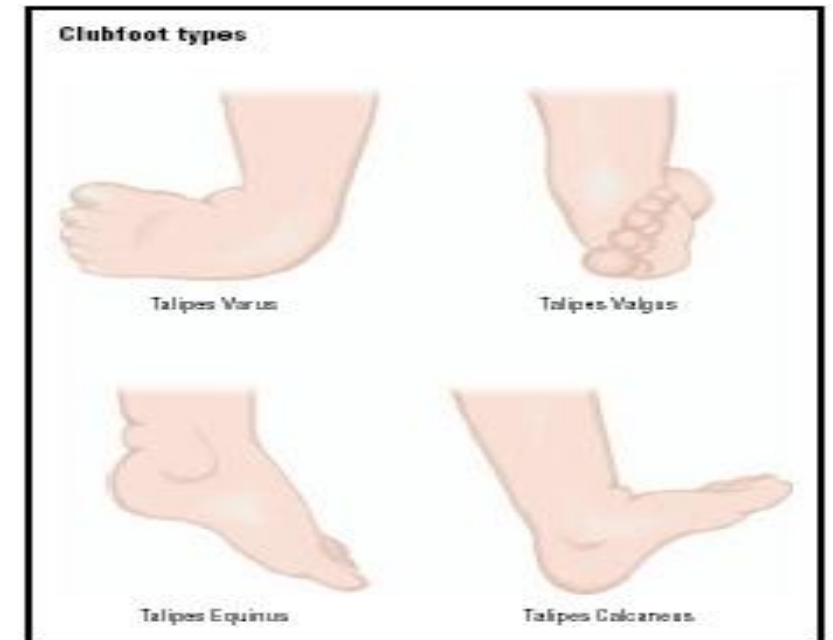
Motor effect:

- Paralysis of muscles of post. compartment of leg leads to loss of plantar flexion.
- Paralysis of short muscles of sole.
- Deformity-- Talipes calcaneovalgus (foot is dorsiflexed & everted).

Sensory effect:

On skin area supplied by the nerve.

Valgus » everted
Varus » inverted
Equinus » planter flexed
Calcaneos » dorsi flexed



Common peroneal nerve injury:

Causes:

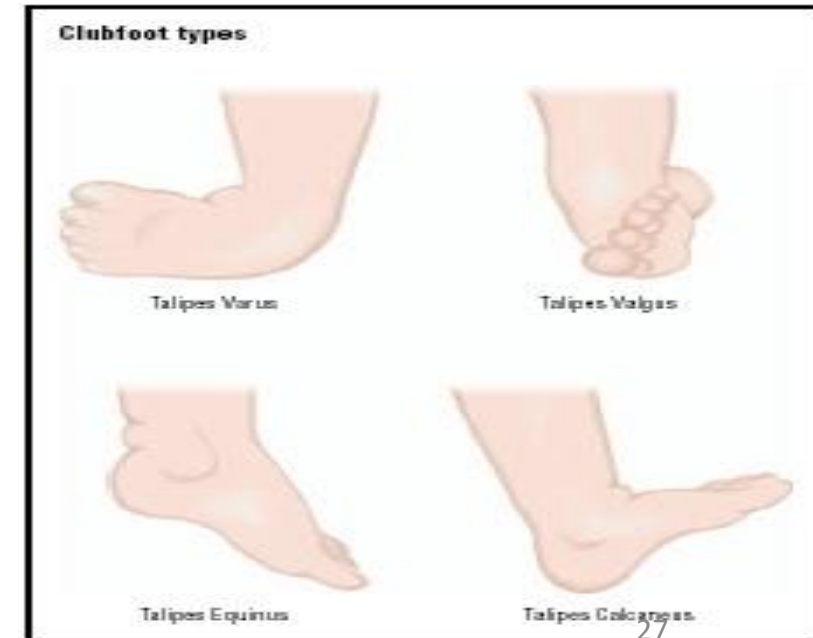
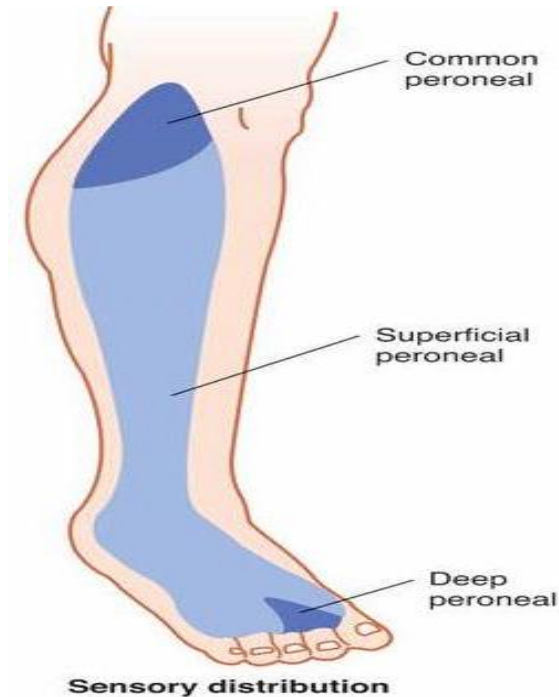
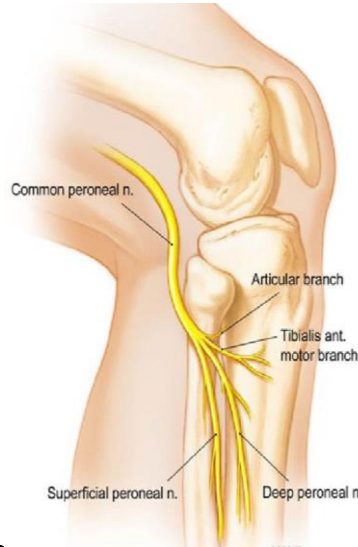
Fracture of neck of fibula

Result in:

Motor effect

- Paralysis of foot extensors leads to foot drop
- Paralysis of foot evertors leads to inversion of foot.
- Deformity_ **Talipes equinovarus**

Sensory effect: on skin area supplied by the nerve.



Dermatomes & Myotomes

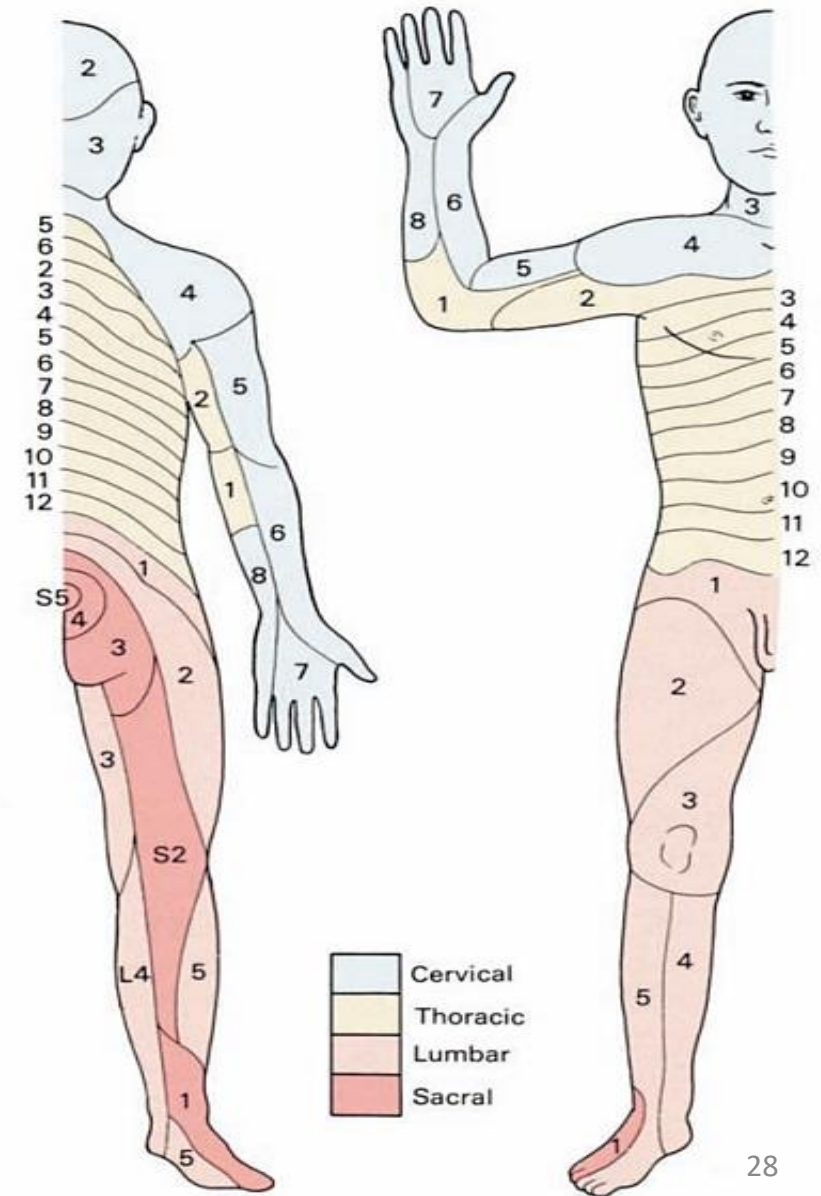
A dermatome: is an **area of skin** that is innervated by the **afferent nerve fibres** from the **dorsal root** of a **specific single spinal nerve root**.

The arrangement of root segments supplying the lower limb is as follows: for example

- L1, 2 and 3—supply the anterior aspect of the thigh from above down.
- L4—supplies the frontomedial aspect of the leg;
- L5—supplies the frontolateral aspect of the leg & medial side of the foot.

A myotome is a **group of muscles** innervated by the **ventral root** of a **single spinal nerve**, For example;

- **L2:** hip flexion
- **L3:** knee extension
- **L4:** ankle dorsiflexion
- **S1:** ankle plantarflexion.





Quiz

A 27-year-old patient exhibits a loss of skin sensation and paralysis of muscles on the plantar aspect of the medial side of the foot. Which of the following nerves is most likely damaged?

- (A) Common peroneal
- (B) Tibial
- (C) Superficial peroneal
- (D) Deep peroneal
- (E) Sural

A physician tests the calcaneal tendon (ankle jerk) reflex. A normal response of plantar flexion of the ankle joint is noted. This myotatic (deep tendon) reflex confirms the integrity of what nerve?

- A- Tibial nerve
- B. Deep peroneal nerve
- C. Superficial peroneal nerve
- D. Medial plantar nerve
- E. Lateral plantar nerve

A 20-year-old college student receives a severe blow on the inferolateral side of the left knee joint while playing football. Radiographic examination reveals a fracture of the head and neck of the fibula.

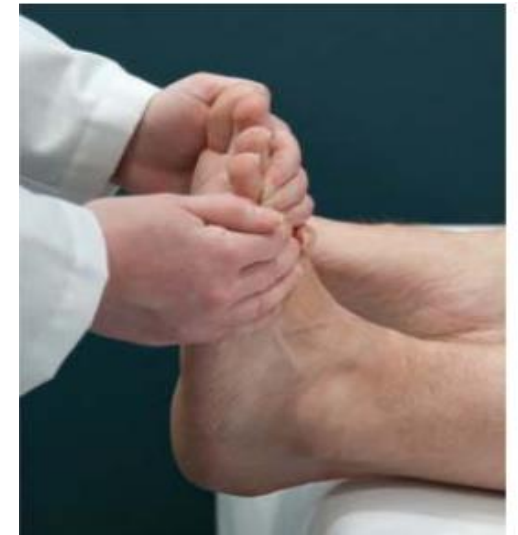
Which of the following nerves is damaged?

- (A) Sciatic
- (B) Tibial
- (C) Common peroneal
- (D) Deep peroneal
- (E) Superficial peroneal

Which of the following conditions would occur from this fracture?

- (a) Loss of plantar flexion
- (b) Trendelenburg's sign
- (c) Talipes equinovarus
- (d) Flat foot

As part of a physical examination to evaluate lower limb function, a physician places her hands on the dorsum of the patient's foot and asks the patient to dorsiflex the ankle joint against resistance, as shown. What nerve is the doctor testing?



- A. Tibial nerve
- B. Deep peroneal nerve
- C. Superficial peroneal nerve
- D. Medial plantar nerve
- E. Lateral plantar nerve