

Sheet no. 26

Lecture title: Lower Limb Nerves – Clinical anatomy

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Written by: Safa Al-Husseini & Saeed Al-Laham

Edited by: Joud Khraisat

If you come by any mistake (whether it be spelling, grammatical or scientific) while browsing this sheet, kindly report it to the Academic team Facebook account.

اللَّهُمَّ، اغْفِرْ لِرَشِيدٍ وَارْحَمَهُ، وَاعْفُ عَنْهُ وَعَافِهِ، وَأَكْرِمْ نُزُلَهُ،
وَوَسِّعْ مُدْخَلَهُ، وَاغْسِلْهُ بِمَاءٍ وَتَلْجٍ وَبَرْدٍ، وَنَقِّهِ مِنَ الْخَطَايَا كَمَا
يُنَقَّى الثَّوْبُ الْأَبْيَضُ مِنَ الدَّنَسِ، وَأَبْدِلْهُ دَارًا خَيْرًا مِنْ دَارِهِ،
وَأَهْلًا خَيْرًا مِنْ أَهْلِهِ، وَزَوْجًا خَيْرًا مِنْ زَوْجِهِ، وَقِهِ فِتْنَةَ الْقَبْرِ
وَعَذَابَ النَّارِ

Lumbar Plexus

- Composed from the ventral rami L1-L4.

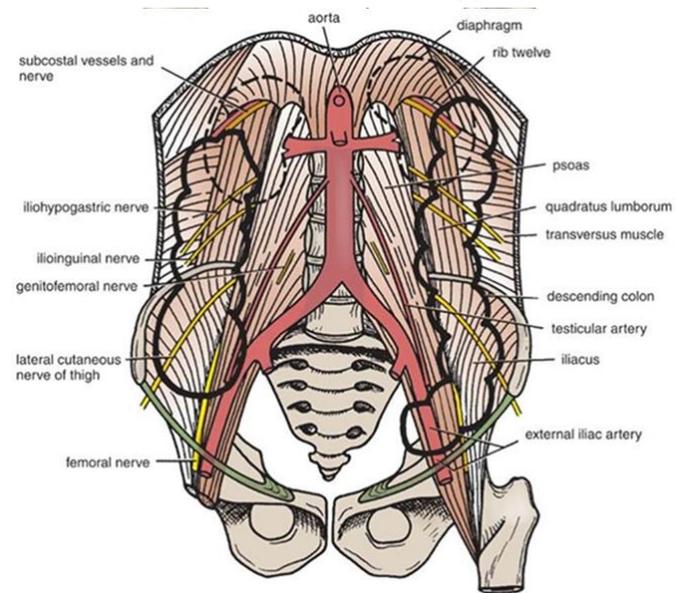
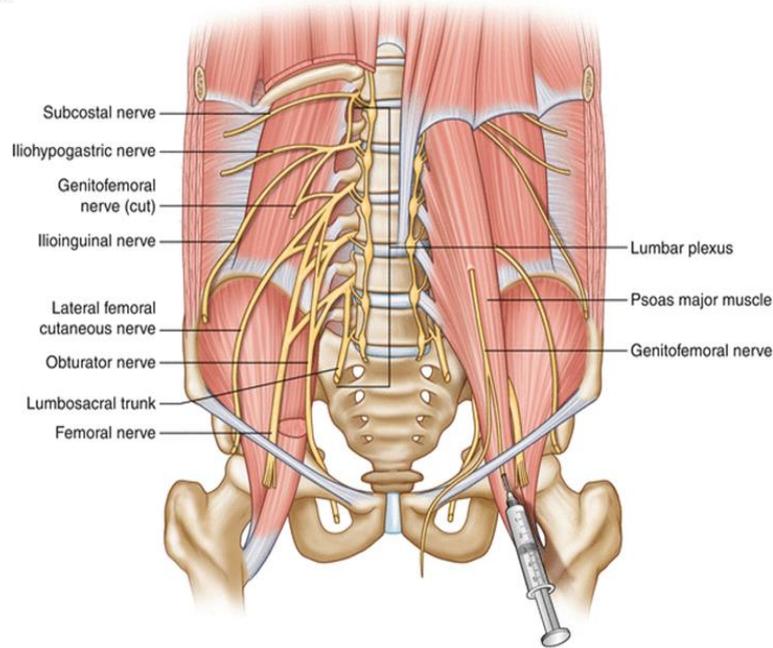
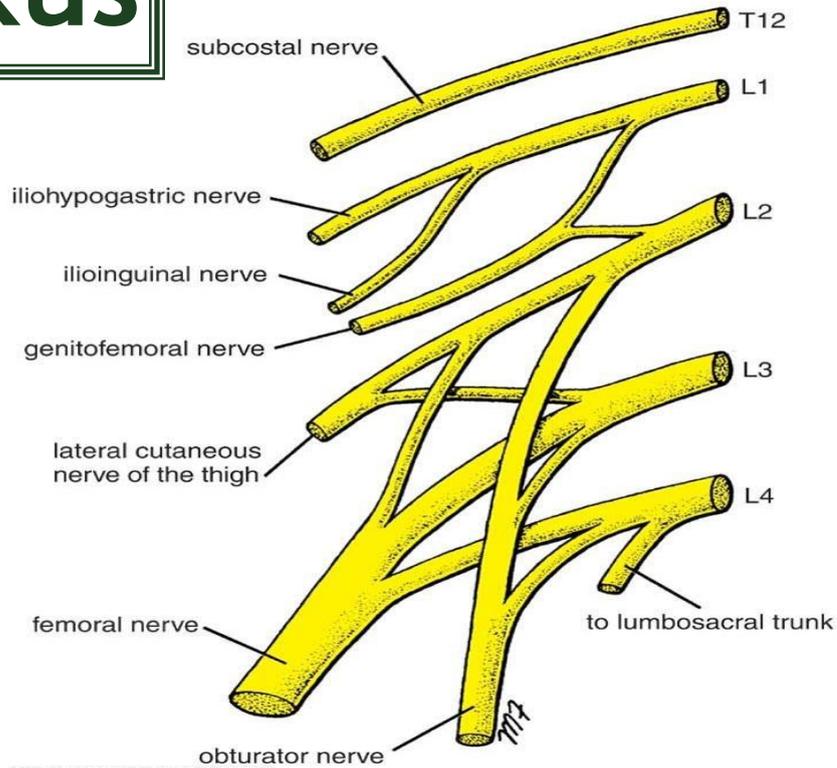
- Supplies:

- Abdominal wall.
- External genitalia.
- Anteromedial thigh.

- Nerves relation to psoas major muscle while exiting the posterior abdominal wall:

- Medially to the medial border:
Lumbosacral trunk & Obturator nerve.

- Piercing the muscle to exit from the anterior surface:
Genitofemoral nerve.
- Laterally to the lateral border:
Remaining nerves (Iliohypogastric nerve, Ilioinguinal nerve & Lateral femoral cutaneous nerve)



Distribution of some nerves:

1) Iliohypogastric nerve:

Innervates the anterior abdominal wall inferiorly.

2) Ilioinguinal nerve:

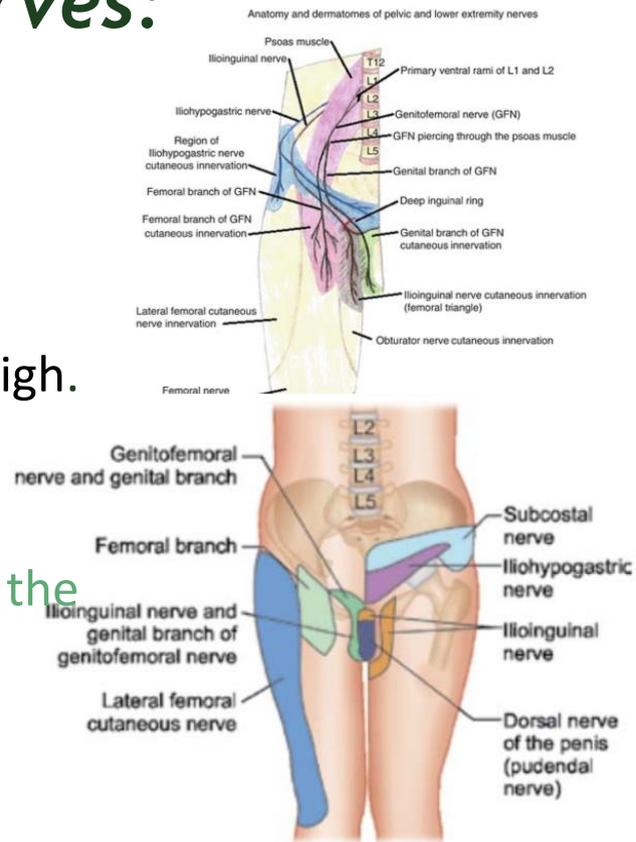
Innervates upper medial part of the thigh.

3) Genitofemoral nerve:

this nerve has two branches:

A) **Femoral branch** which innervates the anterior part of the femoral triangle.

B) **Genital branch** which innervates the anterior part of scrotum.



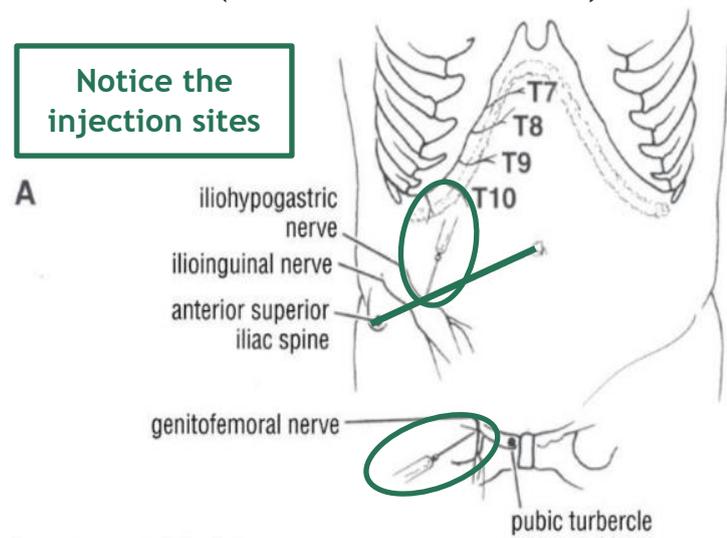
Lumbar Spinal Nerve Block (anesthesia):

-Affected area: anterior superior medial part of the thigh, anterior part of the genital and lower part of the anterior abdomen.

-For iliohypogastric and ilioinguinal nerves block: we draw a line from Anterior Superior Iliac Spine (ASIS) to the umbilicus (spinoumbilical line), the area above this line is used for blocking these two nerves.

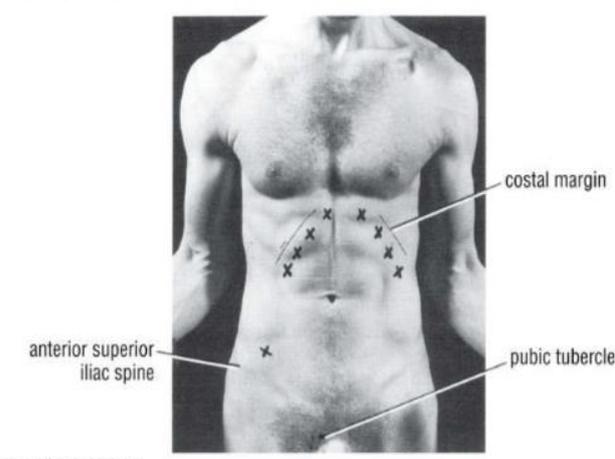
-For Genitofemoral nerve block: Lateral to the pubic tubercle.

Notice the injection sites



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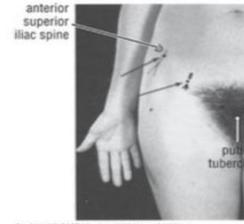
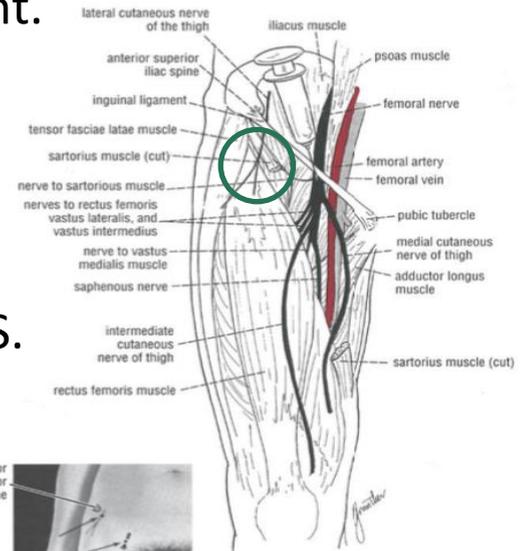
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4) Lateral Cutaneous Nerve of the Thigh:

- It is located deep to the inguinal ligament.
- Innervates the lateral side of the thigh.
- So, area of sensation: anterolateral side of the thigh.
- Where to deposit for anesthesia? (nerve block) Just inferomedial to the ASIS.



5) Femoral Nerve:

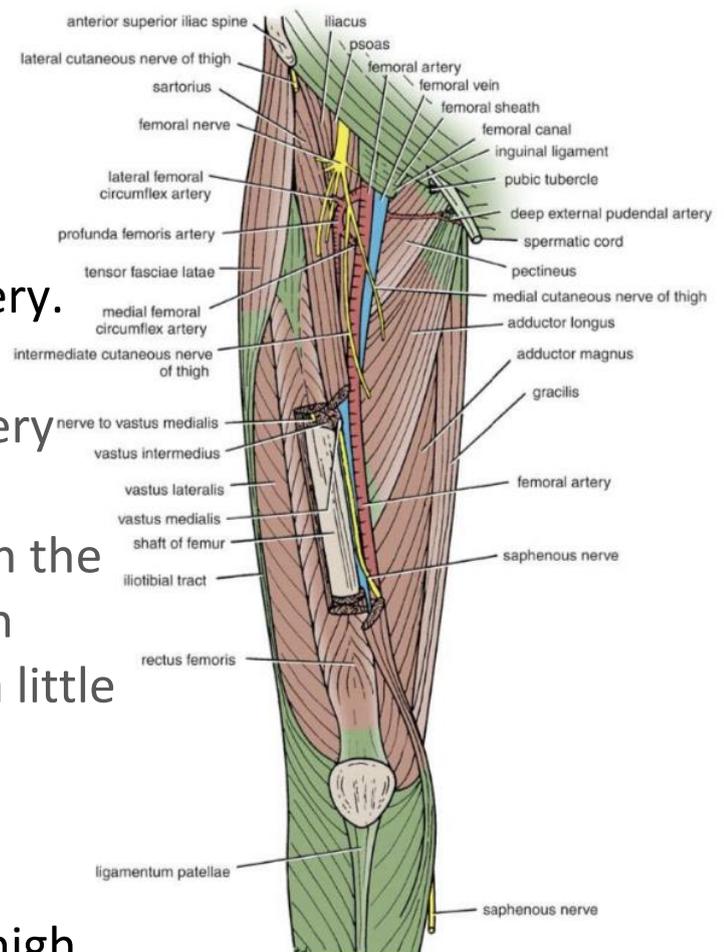
- It is the largest branch of the lumbar plexus.
- **Relations:** Femoral nerve enters the femoral triangle just lateral to femoral sheath and its contents especially the most lateral one, the femoral artery.

So, we can locate the femoral nerve by locating the femoral artery which is inferior to the inguinal ligament in in the middle between the ASIS and the pubic tubercle, when You fell the pulse move laterally a little bit to reach the femoral nerve.

- **Femoral nerve branches:**

A) Muscular branches:

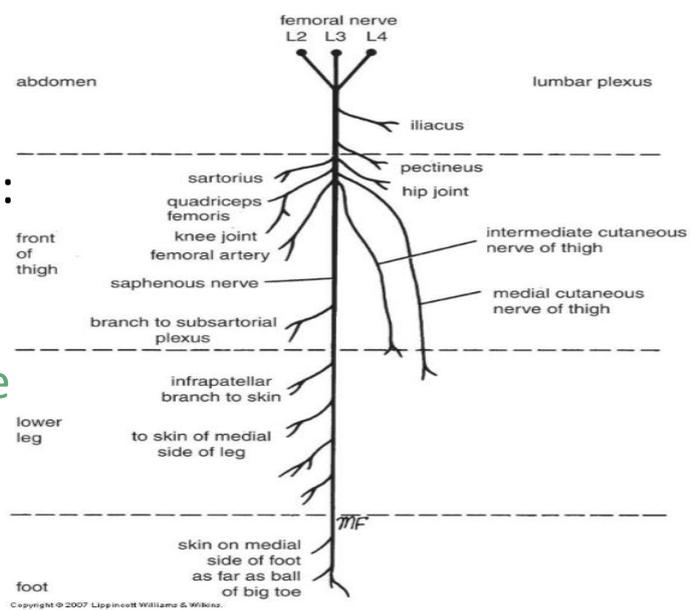
Anterior compartment of the thigh (hip flexors and knee extensors).



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B) Cutaneous (lateral) branches:

- Medial cutaneous n. of the thigh: which supplies the medial side of the skin of the thigh.
- Intermediate cutaneous n. of the thigh: which supplies the anterior part of the skin of the thigh.
- Saphenous nerve:



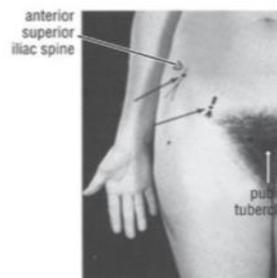
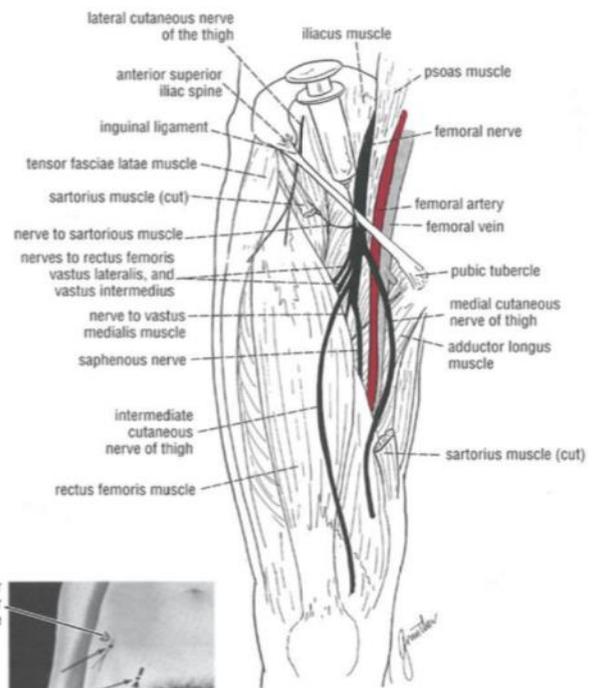
Femoral nerve ends as saphenous nerve.

■ Femoral Nerve Block:

Affected area: medial side of the lower limb and anterior side of thigh.

Where to deposit for anesthesia?

Below the midpoint of inguinal ligament (between ASIS and pubic tubercle) we feel the pulsation of femoral artery then move lateral to the palpated area we block.



■ Femoral Nerve Injury:

-Results from:

Stab or gunshot wound (Complete division is rare).

-Paralysis of quadriceps femoris muscles So:

- 1) Knee cannot be extended against resistance.
- 2) Patient usually press against the distal thigh during walking.

-Loss of sensation along the medial part of the lower limb and the anterior part of the thigh.

6) Saphenous nerve:

■ **Relations:** descends through femoral triangle toward adductor canal which crosses the femoral artery anteriorly then passes between tendons of gracilis and sartorius muscles accompanied with the great saphenous vein to the medial side of knee and leg then it passes anterior to the medial malleolus toward the medial side of the foot, so it supplies the medial side of knee, leg and foot.

■ **Saphenous Nerve Block:**

I. **Block at knee:**

- **Affected area:** medial side of leg & foot.

- **Where to deposit for anesthesia?**

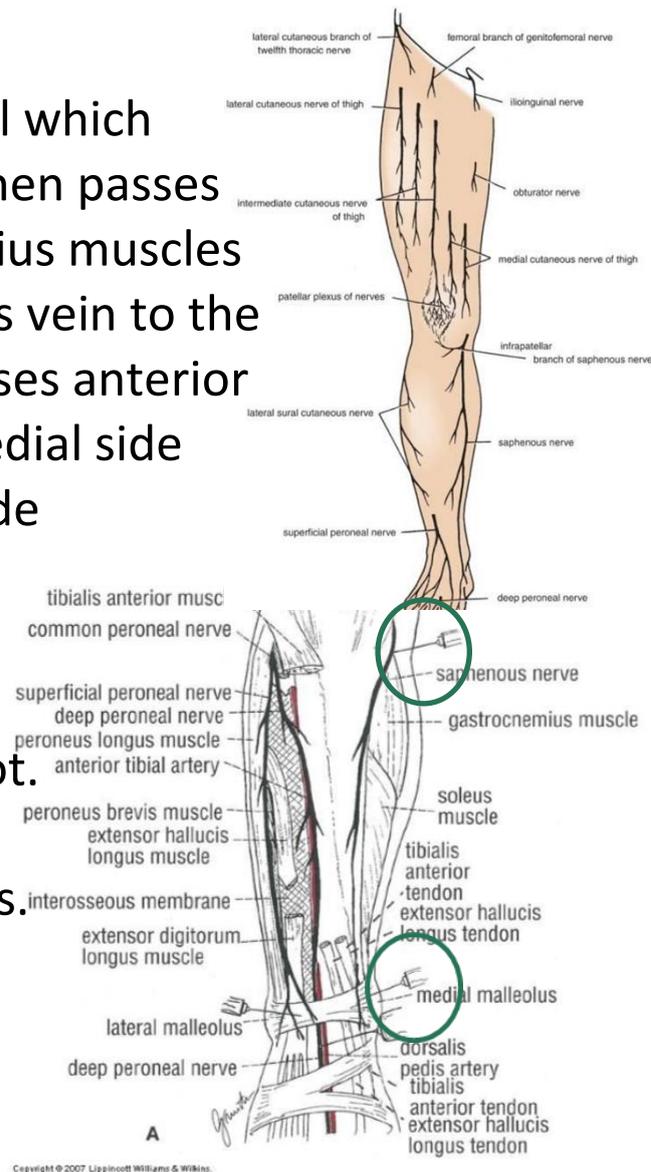
At the medial femoral or tibial condyles.

II. **Block at ankle:**

- **Affected area:** medial side of Foot.

- **Where to deposit for anesthesia?**

Anterior to medial malleolus.

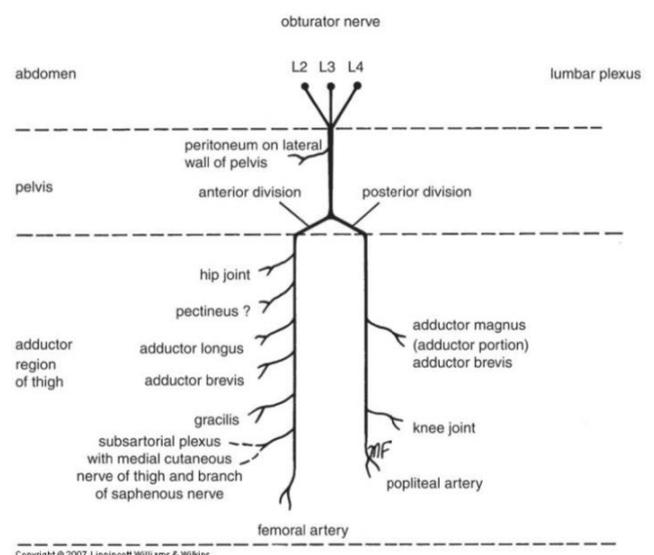


7) Obturator Nerve (deep nerve)

■ **Branches:**

Sensory nerve to parietal peritoneum in pelvis.

It is divided into anterior and posterior divisions which have muscular branch (for adductor muscles) and cutaneous branch (for medial side of the thigh).



- **Obturator Nerve Injury:**

- Rare.

- Paralysis of the adductor muscles.

- Loss of sensation of small area of the medial part of thigh.

Sacral Plexus

- Composed of ventral rami L4-S4.

- Supplies:

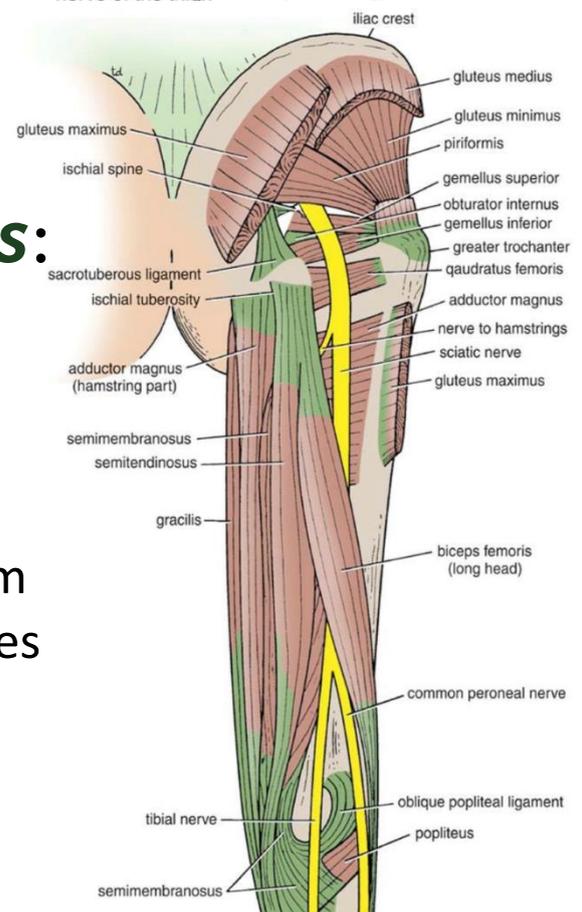
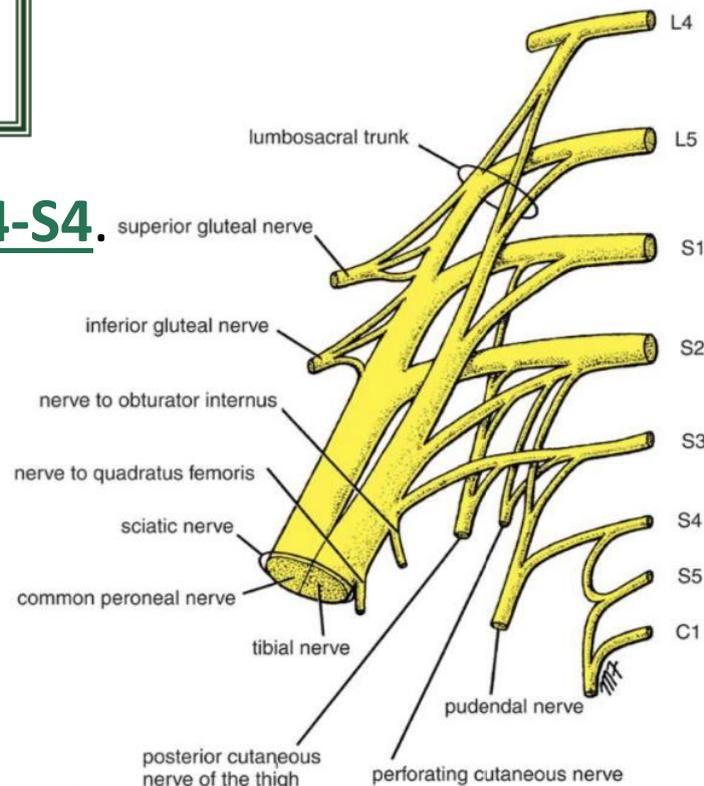
- Buttocks.
- Perineum.
- part of lower limb.

- Sciatic nerve= L4 to S3 supplies posterior thigh & all below knee.

Branches of sacral plexus:

- All branches, except superior gluteal nerve, of sacral plexus leave the pelvis through greater sciatic foramen just below piriformis muscle.

- Note: piriformis muscle originates from sacrum and inserts in femur, it also passes through greater sciatic foramen.



■ Now the branches of sacral plexus:

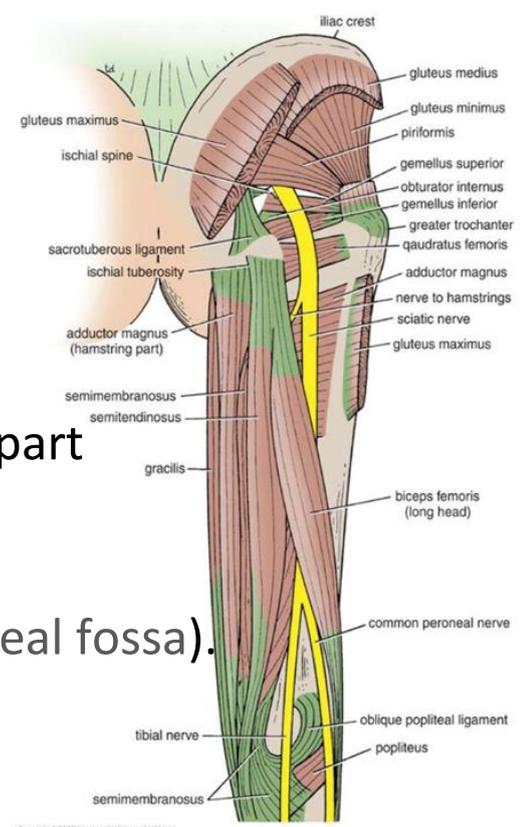
- 1) **Sciatic nerve:** Largest nerve in the body.
- 2) **Superior gluteal nerve:** Innervates Gluteus Medius and minimus and tensor fascia latae mm.
- 3) **Inferior gluteal nerve:** Innervates Gluteus maximus m.
- 4) **Nerve to quadratus femoris muscle:** Supplies inferior gemellus muscle and quadratus femoris muscle.
- 5) **Nerve to the obturator internus muscle:** Innervates Superior gemellus muscle and obturator internus muscle. (This nerve exits from greater sciatic notch and return from the lesser sciatic notch).
- 6) **Nerve to the piriformis muscle.**
- 7) **Pudendal nerve:** Exits from the greater sciatic foramen and enters from the lesser sciatic foramen to supply the perineum.
- 8) **Posterior cutaneous nerve of the thigh:** Supplies buttock & back of the thigh.
- 9) **Perforating cutaneous nerve:** Supplies medial side of buttock.

Distribution of some nerves:

1. Sciatic nerve:

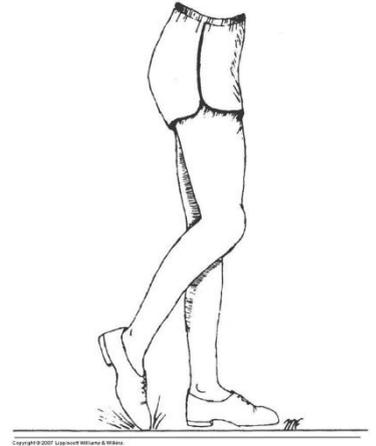
■ **Relations:** Sciatic nerve exits the pelvis through greater sciatic foramen inferior to piriformis muscle and deep to gluteus maximus muscle then enters the posterior side of thigh just deep to biceps femoris muscle long head and then at the superior part of popliteal fossa, it divides into two terminal branches:

- 1) **Tibial nerve** (crosses the middle of popliteal fossa).
- 2) **common peroneal nerve** (passes to the



lateral edge or border of the popliteal fossa).

- Sciatic nerve supplies **hamstring muscles** especially (semimembranosus, semitendinosus and biceps femoris long head).



- **Sciatic Nerve Injury:**

- **Results from:**

- 1) Penetrating wounds, fractures of the pelvis, or dislocation of the hip bone.

- 2) Faulty IM injections in the gluteal region.

- **Complete injury is rare** (90% of the cases affect the common peroneal part because it is more superficial).

- **Paralysis of the hamstring muscles and all muscles below knee causes foot droop** (plantar flexed position).

- **Loss of sensation below knee except for the medial part (femoral nerve) causes trophic ulcers of the sole.**

- **Sciatica:**

- Is a Pain along the sensory distribution of the sciatic nerve, starts from Lateral part of foot then radiates to Posterior & lateral sides of leg then to Posterior of thigh.

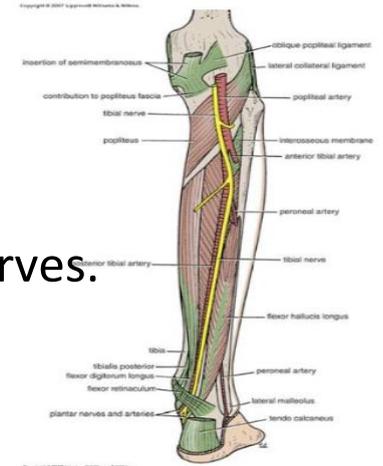
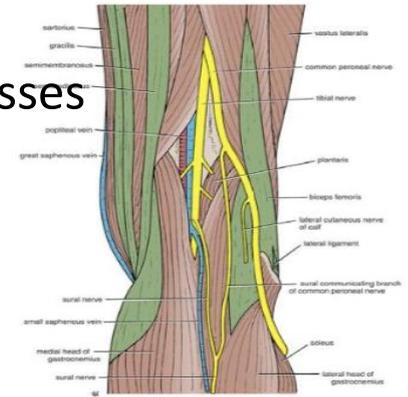
- **Results from:**

- 1) Prolapse of an Intervertebral disc (IVD) (pressing on the roots of the spinal nerves).

- 2) Pressure on the sacral plexus or sciatic n. by tumor

2. Tibial nerve:

■ **Relations:** As we said earlier, tibial nerve passes medially in the popliteal fossa (most superficially) then, along with posterior tibial artery, it passes to the posterior compartment of the leg just deep to gastrocnemius and soleus muscles and continues inferiorly to the sole of foot by passing deep to flexor retinaculum then it passes posteriorly to medial malleolus and divides into medial and lateral planter nerves.



■ **Branches of tibial nerve:**

-**Muscular branches:** Muscles of the posterior compartment of the leg and sole of the foot.

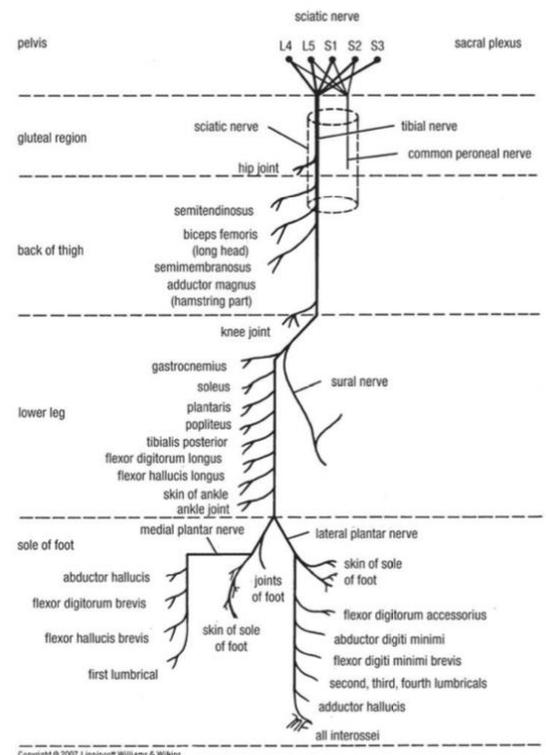
-**Cutaneous branches:**

A) **Sural nerve:** Innervates back of the Leg & lateral side of the foot.

Note: sural nerve has two limbs, one from tibial nerve and one from common peroneal nerve.

B) **Medial calcaneal nerve:** Innervates skin over medial side of heel.

C) **Planter nerves:** Innervates sole of the foot (medial and lateral nerves).



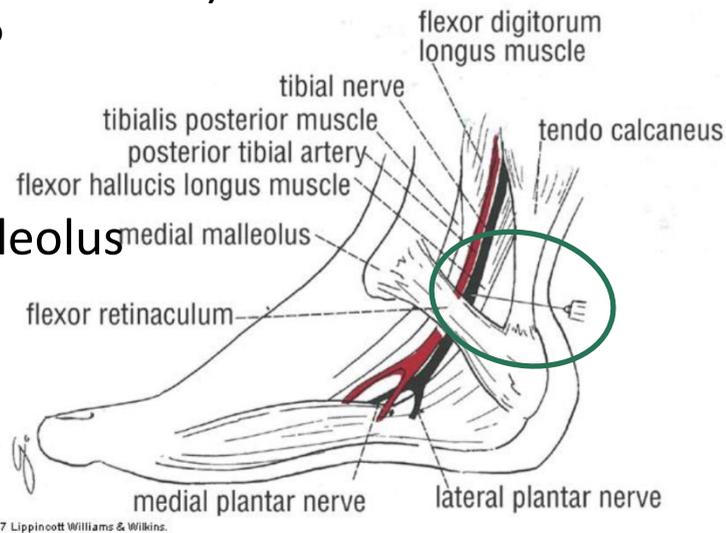
■ Tibial Nerve Block:

-Block at ankle.

-Affected area: sole of the foot (plantar side).

- Where to deposit for anesthesia?

In the midway between the Heel (calcaneus) and the medial malleolus, posterior to medial malleolus feel the pulsation of posterior tibial artery and then posterior to this pulsation is the tibial nerve.



■ Tibial Nerve Injury:

- Rare.

- Paralysis of the muscles in the posterior compartment of the leg and the muscles of the sole <<neither knee flexion nor plantarflexion can happen>> causes Calcaneovalgus (Dorsiflexion & eversion of foot).

- Loss of sensation on the sole of the foot causes trophic ulcers.

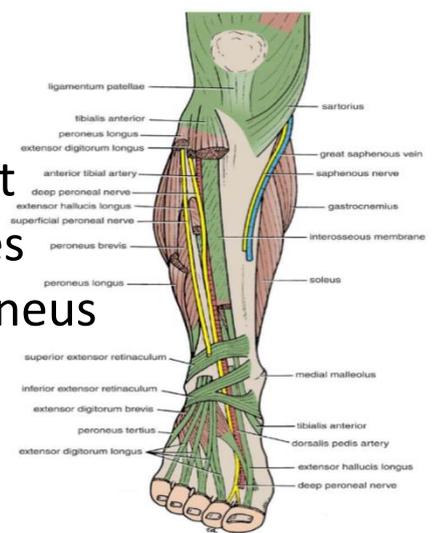
3. Common peroneal nerve:

■ Relations: Common peroneal nerve

runs at lateral border of popliteal fossa then it wraps around the head of fibula and becomes on the anterior lateral side and traverse peroneus longus muscle and divides into two branches:

1) Deep peroneal nerve, this nerve along with anterior tibial vessels pass deep to extensor digitorum longus and in front of interosseus membrane then it passes deep to superior and inferior retinacula and supplies anterior compartments and extensor digitorum brevis muscle

(**muscular branch**), while its (**cutaneous branch**) supplies the area between the big and second toes.



2) **Superficial peroneal nerve**, this nerve goes to the lateral compartment of the leg between peroneus longus & brevis muscles, supplies the lateral compartments (**muscular branch**) also it passes anterior to superior extensor retinaculum and supply the skin on the dorsum of foot (**cutaneous branch**).

■ **Branches of common peroneal nerve:**

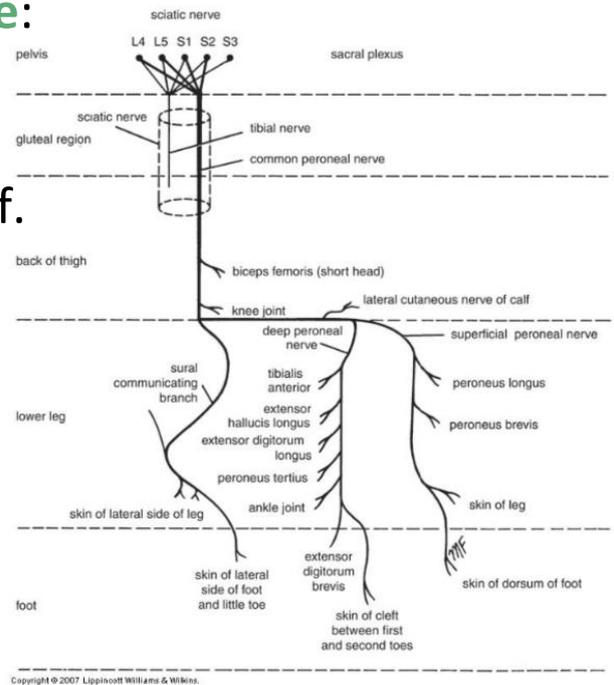
1) **Cutaneous branches:**

- A) Sural communicating branch.
- B) Lateral cutaneous nerve of the calf.

2) **Muscular branch:** innervates short head of biceps femoris muscle.

3) **Superficial peroneal nerve.**

4) **Deep peroneal nerve.**



■ **Superficial Peroneal Nerve Block:**

- **Affected area:** dorsum of foot and toes (except between the 1st and 2nd toes and lateral side of little toe).

- **Where to deposit for anesthesia?**
Infiltrating the area at a line between the medial and lateral malleoli.

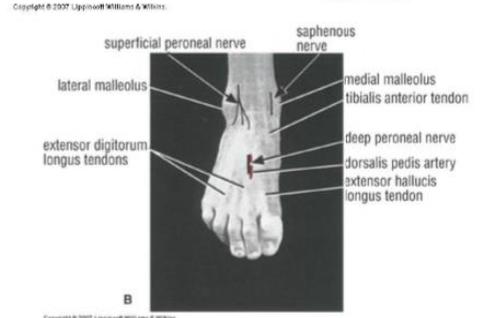
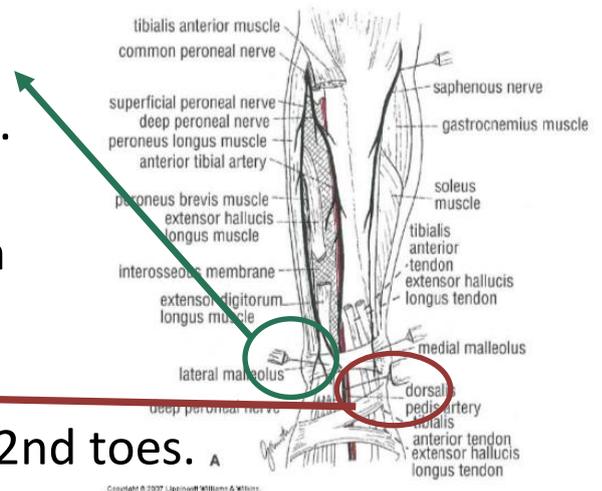
■ **Deep Peroneal Nerve Block:**

- **Affected area:** between the 1st and 2nd toes.

- **Where to deposit for anesthesia?**

1) Lateral to the felt dorsalis pedis artery midway between the medial and lateral malleoli.

2) Between the tendons of extensor digitorum longus muscle and extensor hallucis longus muscle (both felt by dorsiflexion).

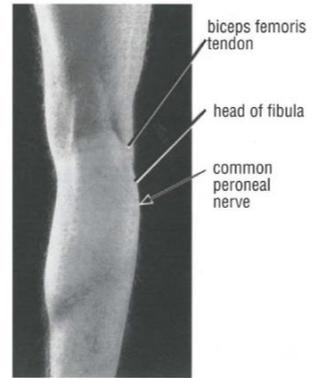
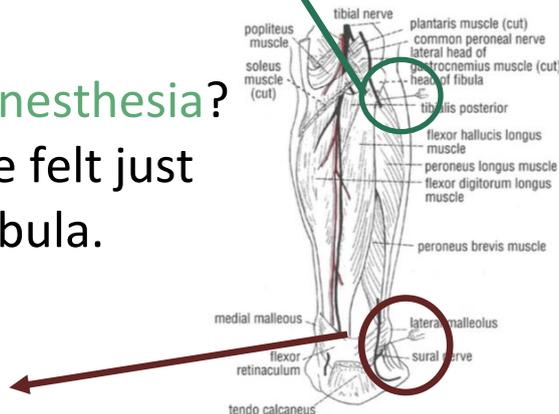


■ **Common Peroneal Nerve Block:**

- **Affected area:** anterior and lateral sides of leg and the dorsum of foot.

- **Where to deposit for anesthesia?**

Common peroneal nerve felt just below the head of the fibula.



■ **Sural Nerve Block:**

- **Affected area:** lateral side of foot and little toe.

- **Where to deposit for anesthesia?**

Between the lateral malleolus and calcaneal tendon.

■ **Common Peroneal Nerve Injury:**

- Results from fractures of the neck of the fibula.

- Paralysis of the muscles of the anterior and lateral compartments of the leg and causes **Equinovarus** (Plantar flexion “foot drop” and inversion).

- Loss of sensation on the anterior and lateral sides of leg & dorsum of foot.

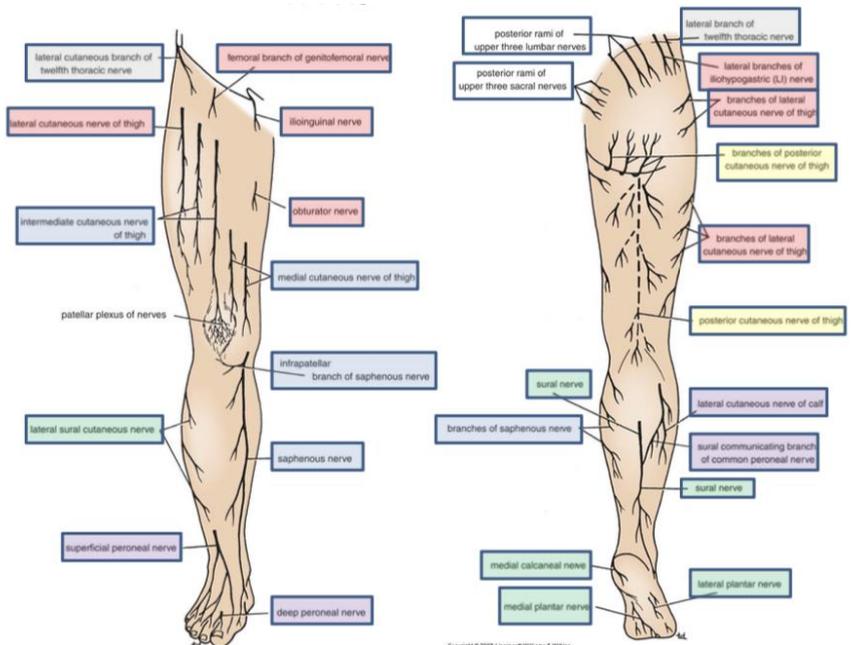


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Cutaneous Innervation of the Lower Limb

Just a summary

- Posterior rami
- 12th thoracic
- Lumber plexus
- Femoral
- Sacral plexus
- Tibial
- Common peroneal

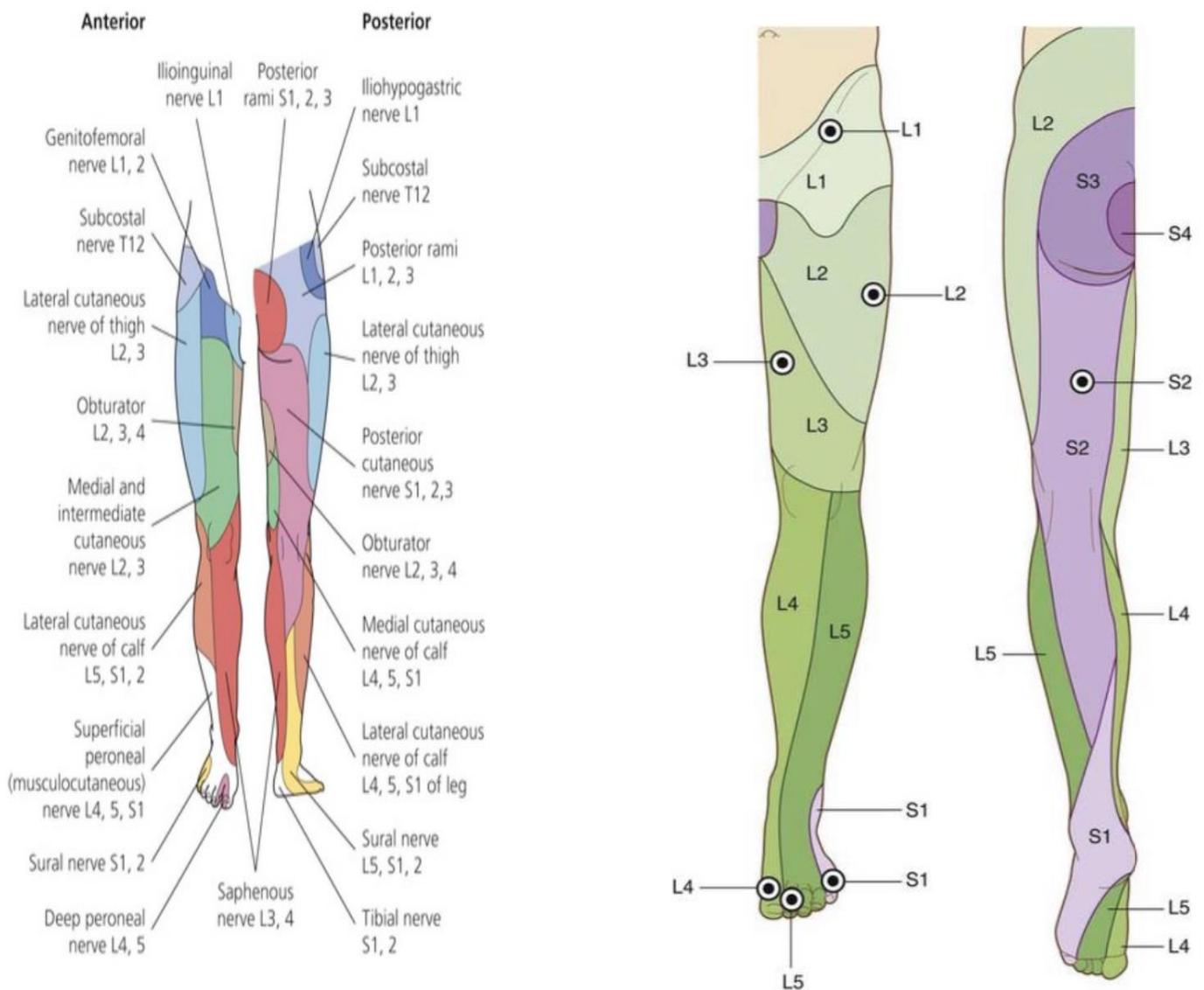


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Dermatomes of the Lower Limb

The doctor read all the regions.



Dermatomes are important since they assess and reflect the spinal segments so, the site of pain reflects the injured segment of the spinal cord.

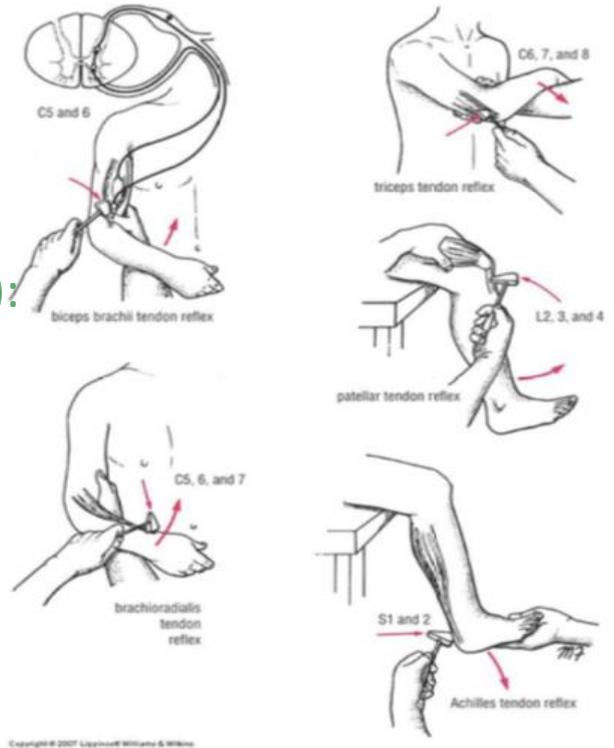
Tendon Reflexes & Segmental Innervation of the Lower Limb Muscles:

■ Patellar tendon reflex (knee jerk):

- L2-L4.
- Extension of knee.
- Tapping on the patellar tendon.

■ Achilles tendon reflex (ankle jerk):

- S1-S2.
- Plantar flexion.
- Tapping on the Achilles tendon.



GOOD LUCK!
YOU'VE GOT
THIS!