

Lower Extremity: Innervation

I was torn about the best way to present this, originally planning on something heavy with images but I think key ideas can get missed, so please review whatever your preferred images are. I recommend Netter Atlas of Human Anatomy: Classic Regional Anatomy Approach, Eighth Edition, chapter 8, plates 550-554 which is available on clinical key.

As far as sensation innervation goes:

- The **lateral thigh** from the hip to the knee is innervated by the **lateral femoral cutaneous nerve**.
- The **anterior thigh** is innervated by the **anterior cutaneous nerve**, which is a **branch off the femoral nerve**.
- The **medial, distal thigh to the knee** is innervated by the **obturator nerve**.
- The **posterior thigh down to the popliteal fossa** and the upper medial thigh is innervated by the **posterior femoral cutaneous nerve**, which runs near the sciatic nerve and is typically blocked if a transgluteal sciatic is performed.

Thus knee surgery would require four separate nerves to be blocked: The femoral, lateral femoral cutaneous, obturator, and sciatic/posterior femoral.

- The **medial lower leg** is innervated by the **saphenous nerve**, a branch of the femoral nerve that provides only sensation and has no motor function.
- **Lateral leg** innervation is tough due to multiple naming conventions but it is broadly innervated by the **fibular or peroneal nerve**, a branch of the sciatic nerve.
- The **posterior lower leg** is innervated by the **medial sural cutaneous nerve**, a **branch of the tibial nerve**, which is a branch of the sciatic nerve.

This allows surgery below the knee to be performed with two nerve blocks: a saphenous and a sciatic.

- The innervation of the foot was designed to give us all headaches during the day and nightmares at night:
- Most of the **dorsum of the foot** is innervated by the **superficial peroneal/fibular nerve**.
- The **interspace between the first and second digits** is innervated by the **deep peroneal/fibular nerve**.
- The very **lateral foot** is innervated by the **sural nerve**.
- The **medial foot** is innervated by the **saphenous nerve**.
- The **plantar portion of the foot** is innervated by the **tibial nerve** via three branches: the medial calcaneal, lateral plantar and medial plantar branches.

Briefly for motor innervation (primarily used for nerve stimulation when blocking):

- **Obturator nerve: leg adduction** via adductor muscle group stimulation
- **Femoral nerve: knee extension** via quadriceps stimulation
- **Sciatic nerve: dorsiflexion/eversion or plantarflexion/inversion** depending on if the peroneal (lateral) or tibial (medial) portion of the nerve is stimulated respectively.
- **Tibial nerve: plantarflexion and inversion** via posterior muscle group of the leg.
- **Fibular/peroneal nerve: dorsiflexion and eversion** via the anterior and lateral compartment muscle.