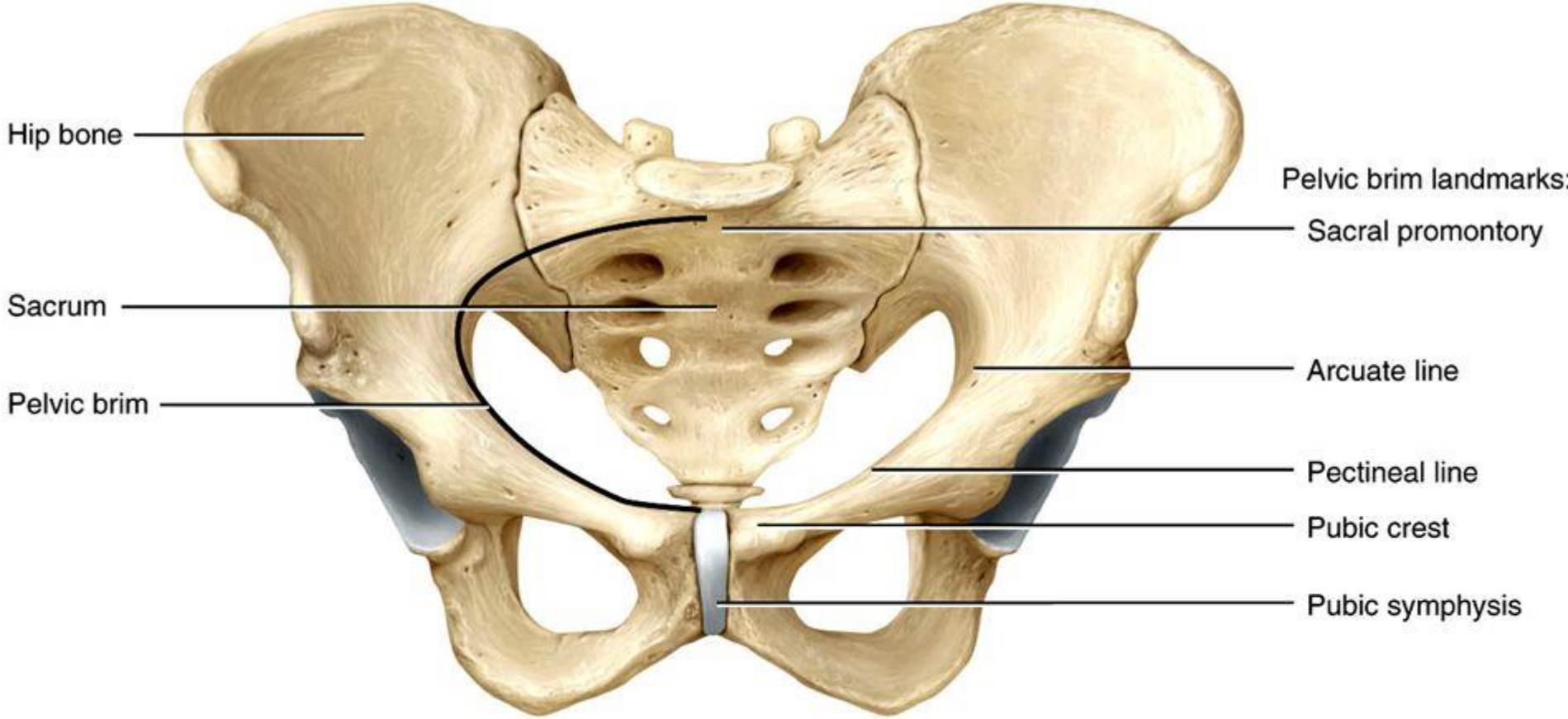
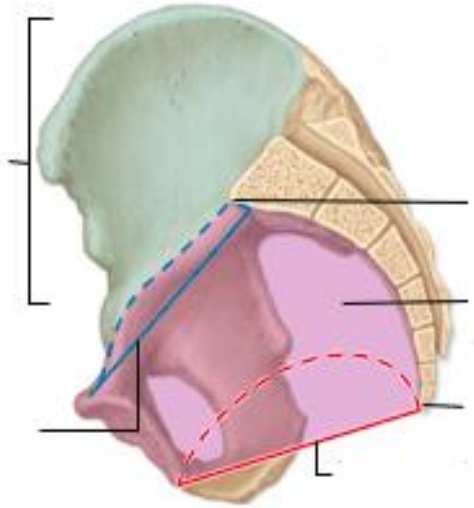
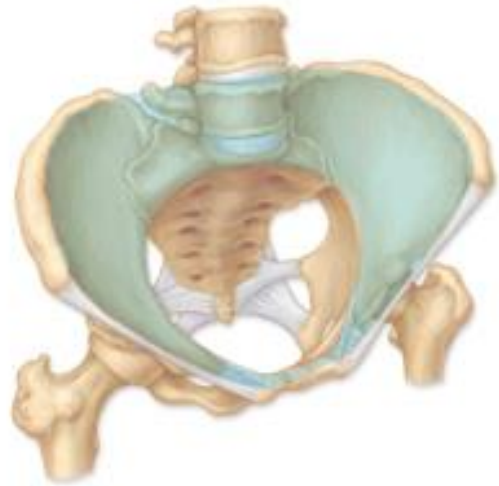
Lumbosacral Plexus

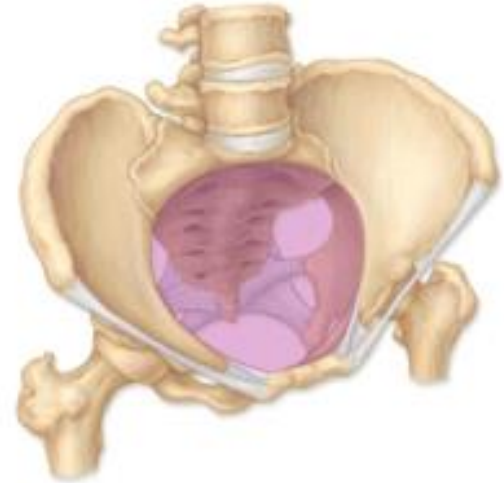


(a) Anterosuperior view of pelvic girdle

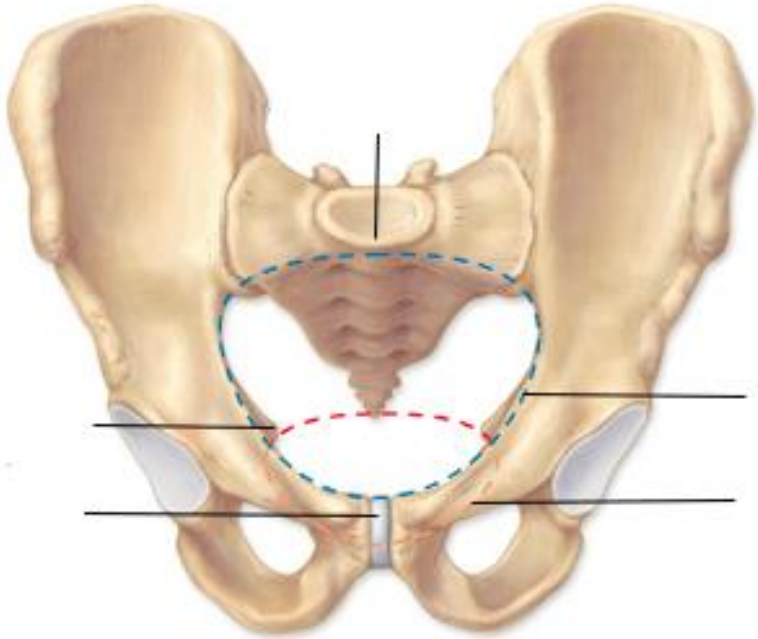
True and False Pelvis Figure 8.11

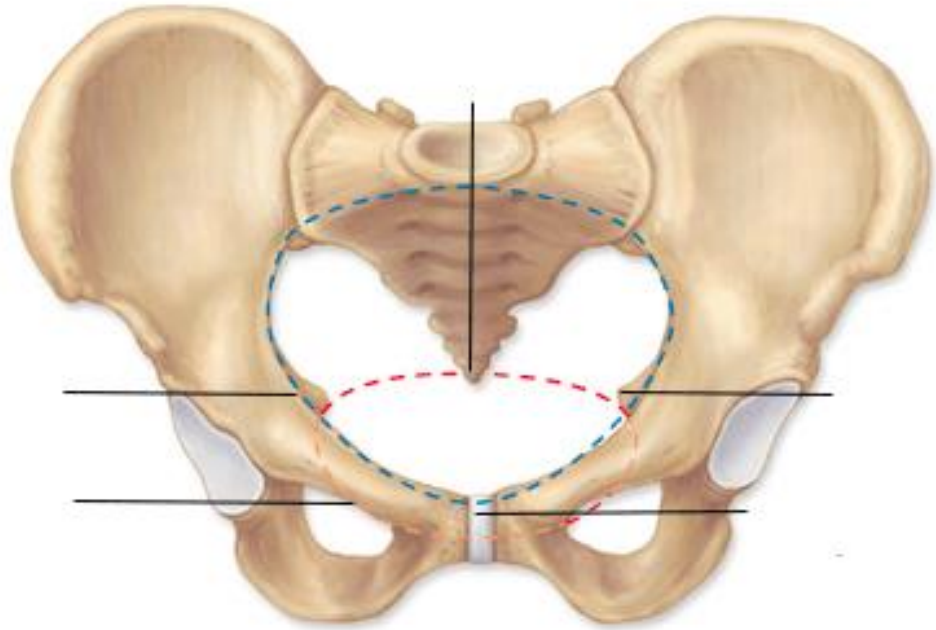




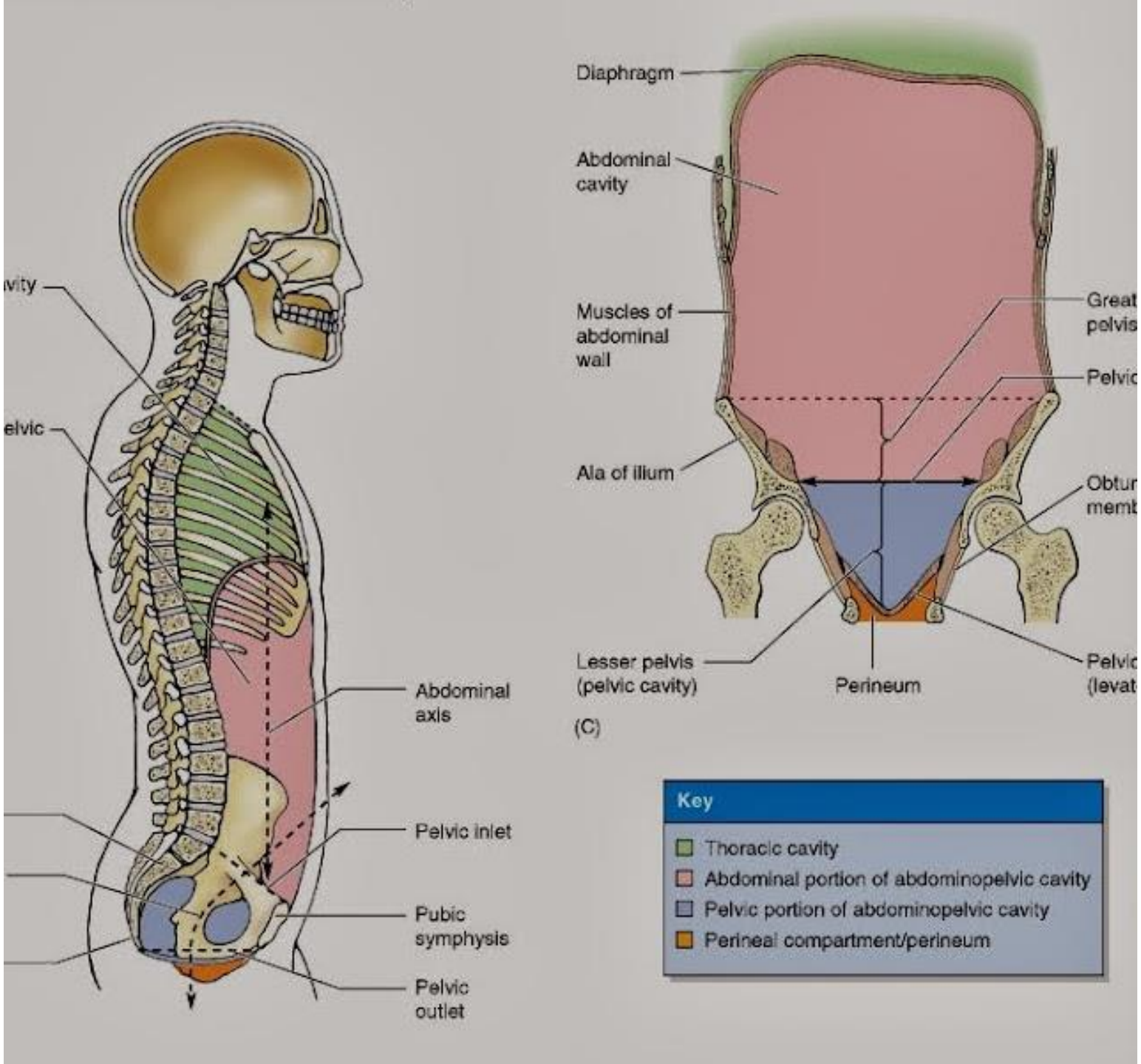


(Anterolateral views



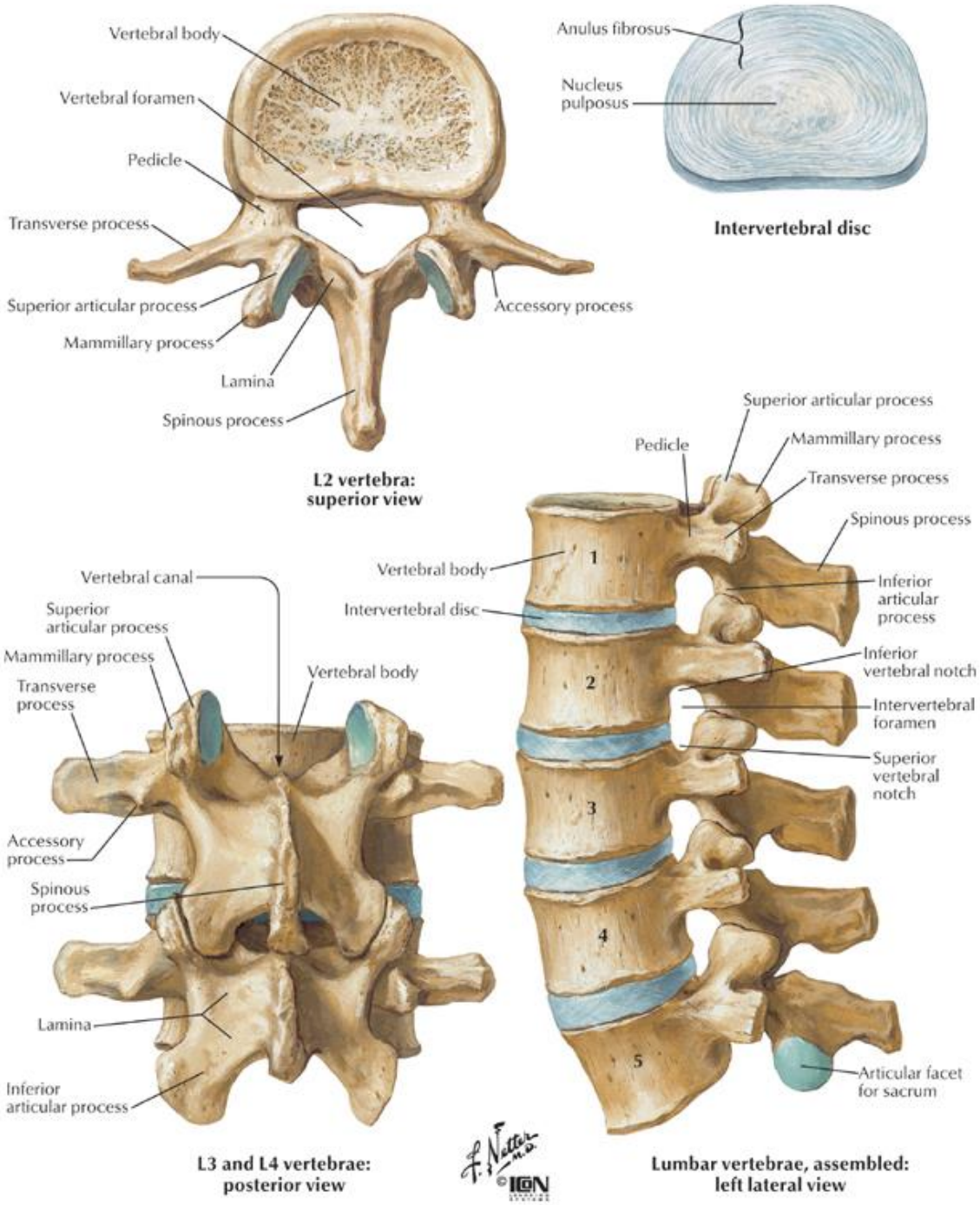


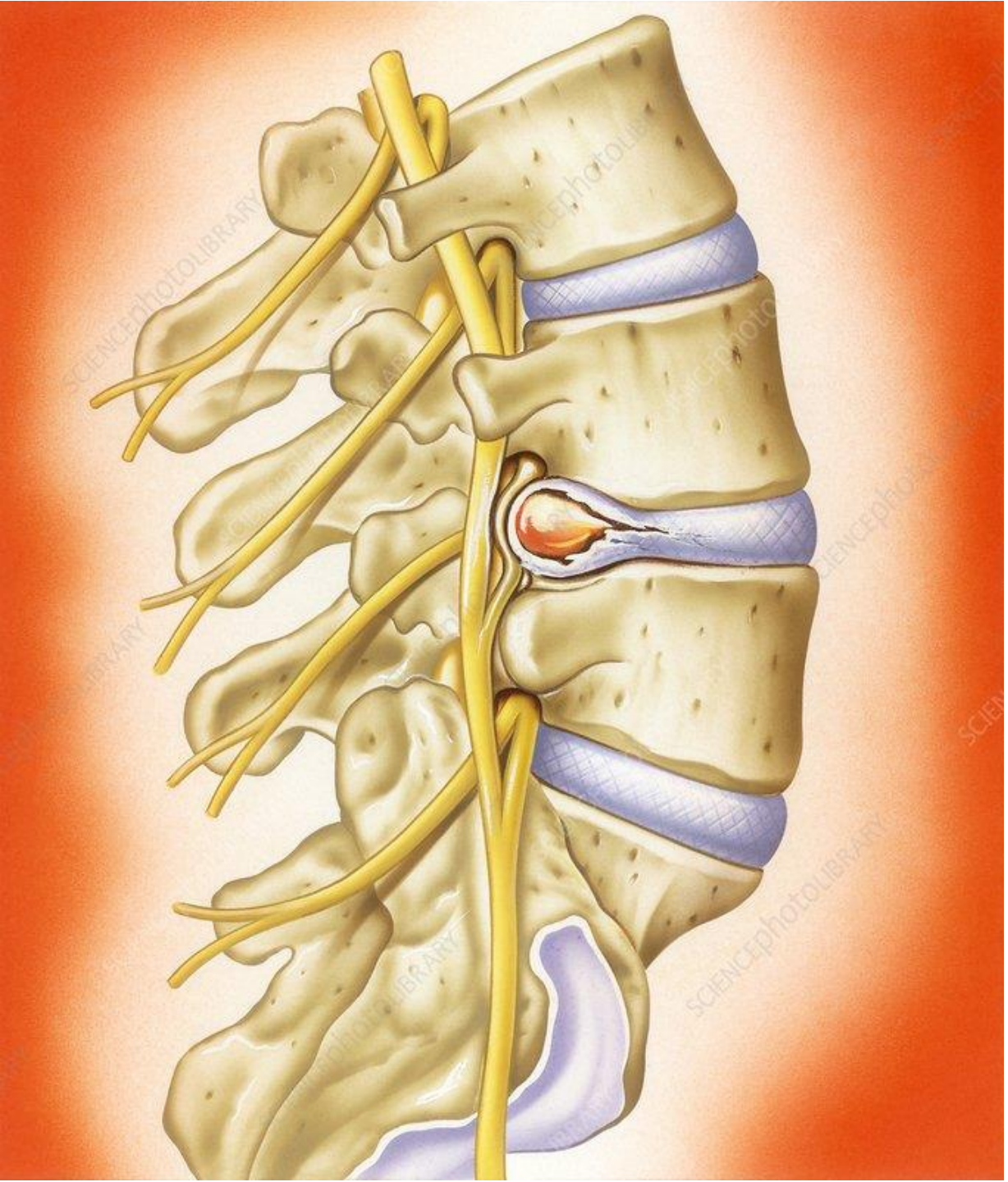
(Pelvis, Anterosuperior views

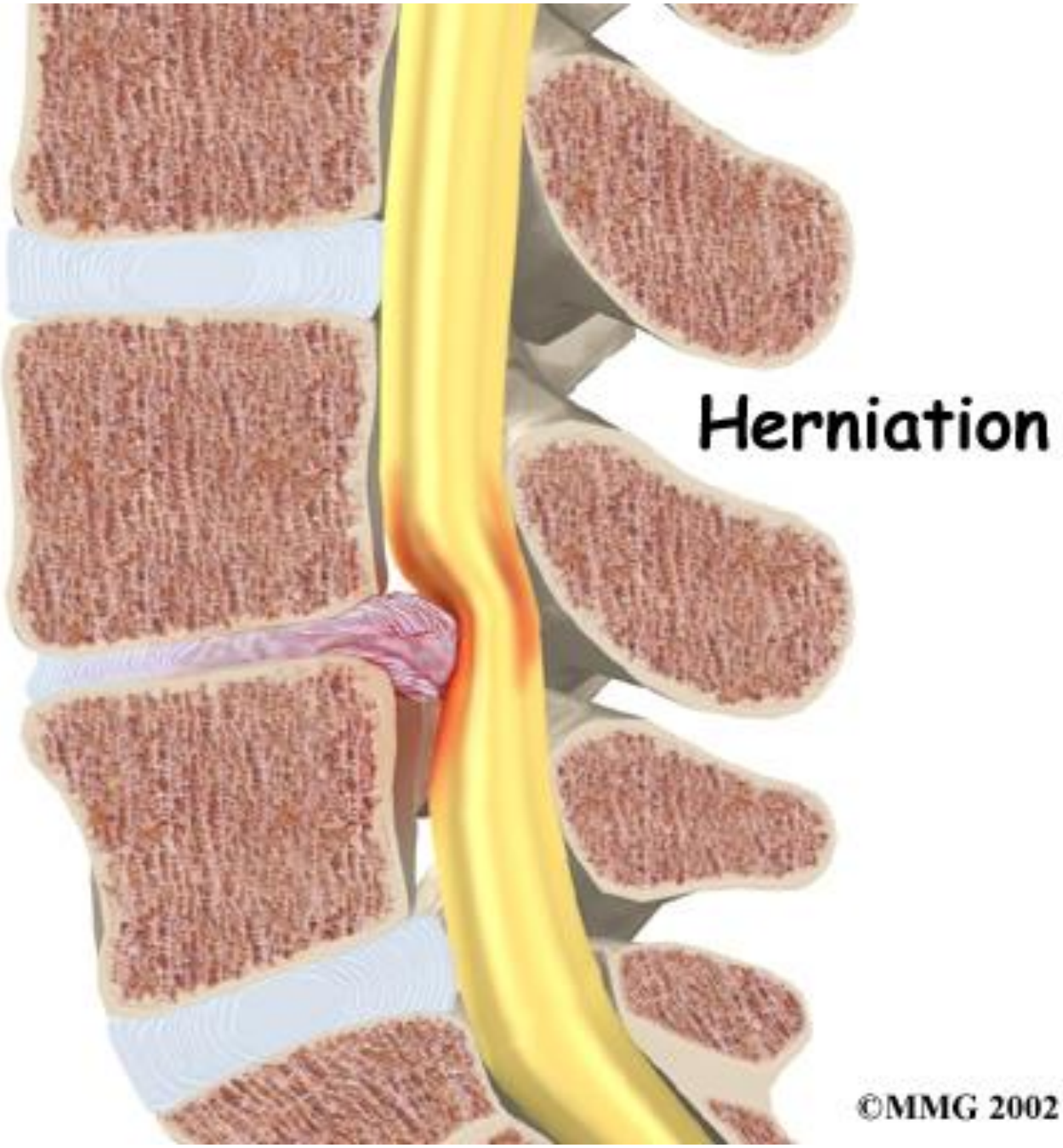

vity
elvic
Abdominal axis
Pelvic inlet
Pubic symphysis
Pelvic outlet
Diaphragm
Abdominal cavity
Muscles of abdominal wall
Great pelvis
Pelvic
Ala of ilium
Obtur membr
Lesser pelvis (pelvic cavity)
Perineum
Pelvic (levat
(C)
Key
Thoracic cavity
Abdominal portion of abdominopelvic cavity
Pelvic portion of abdominopelvic cavity
Perineal compartment/perineum

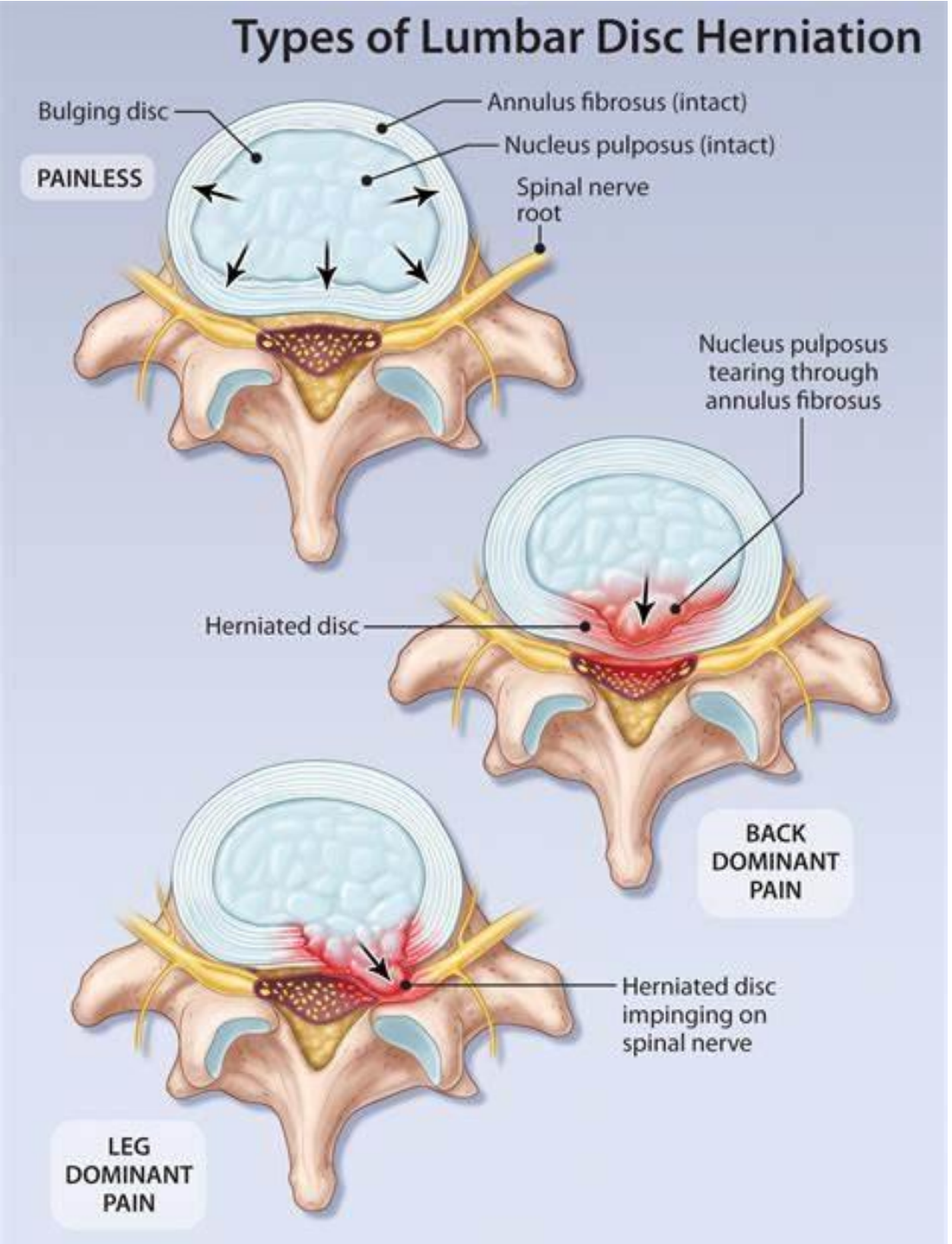
Intervertebral disc

- Nucleus pulposus
- Anulus fibrosus



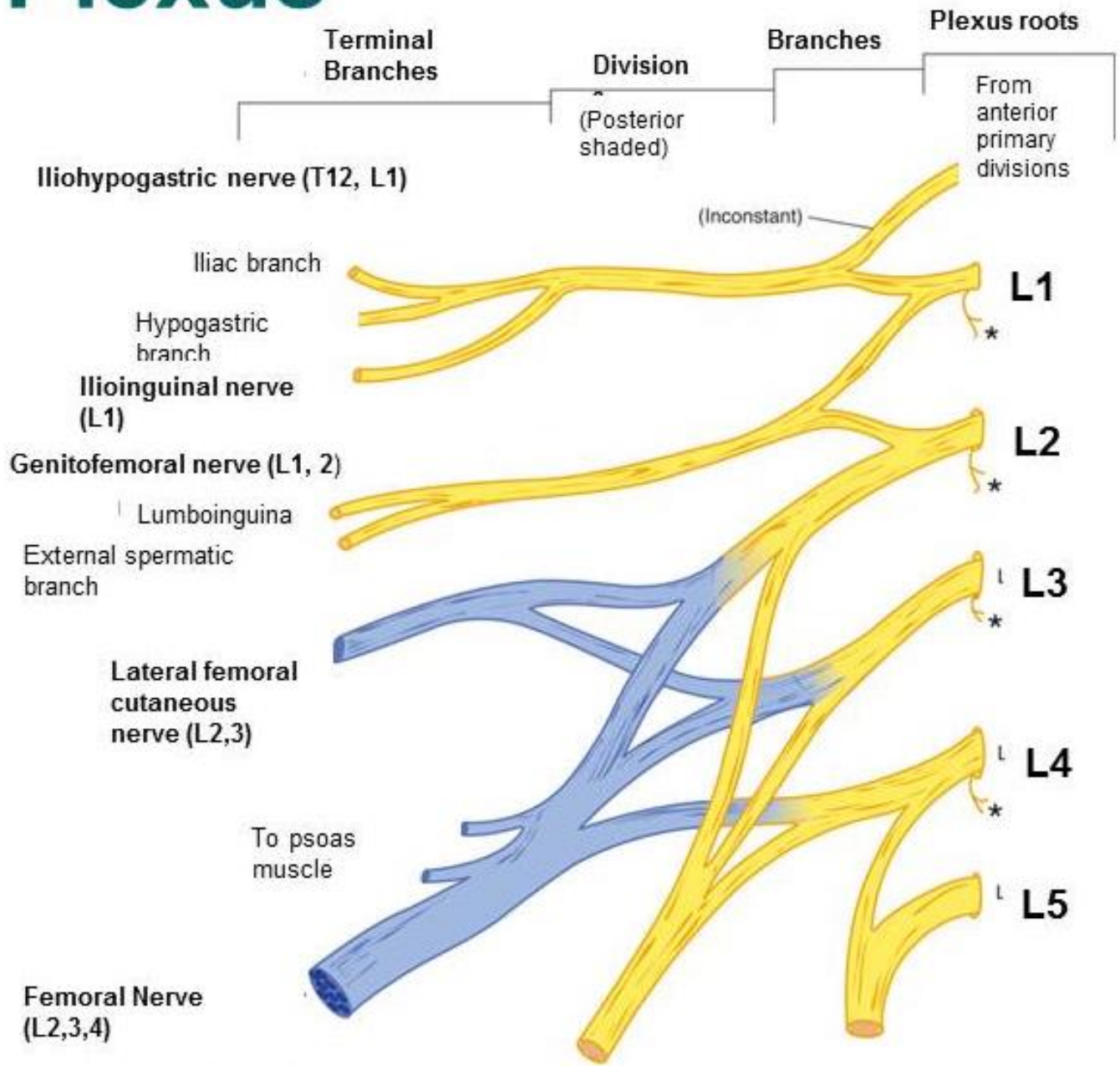


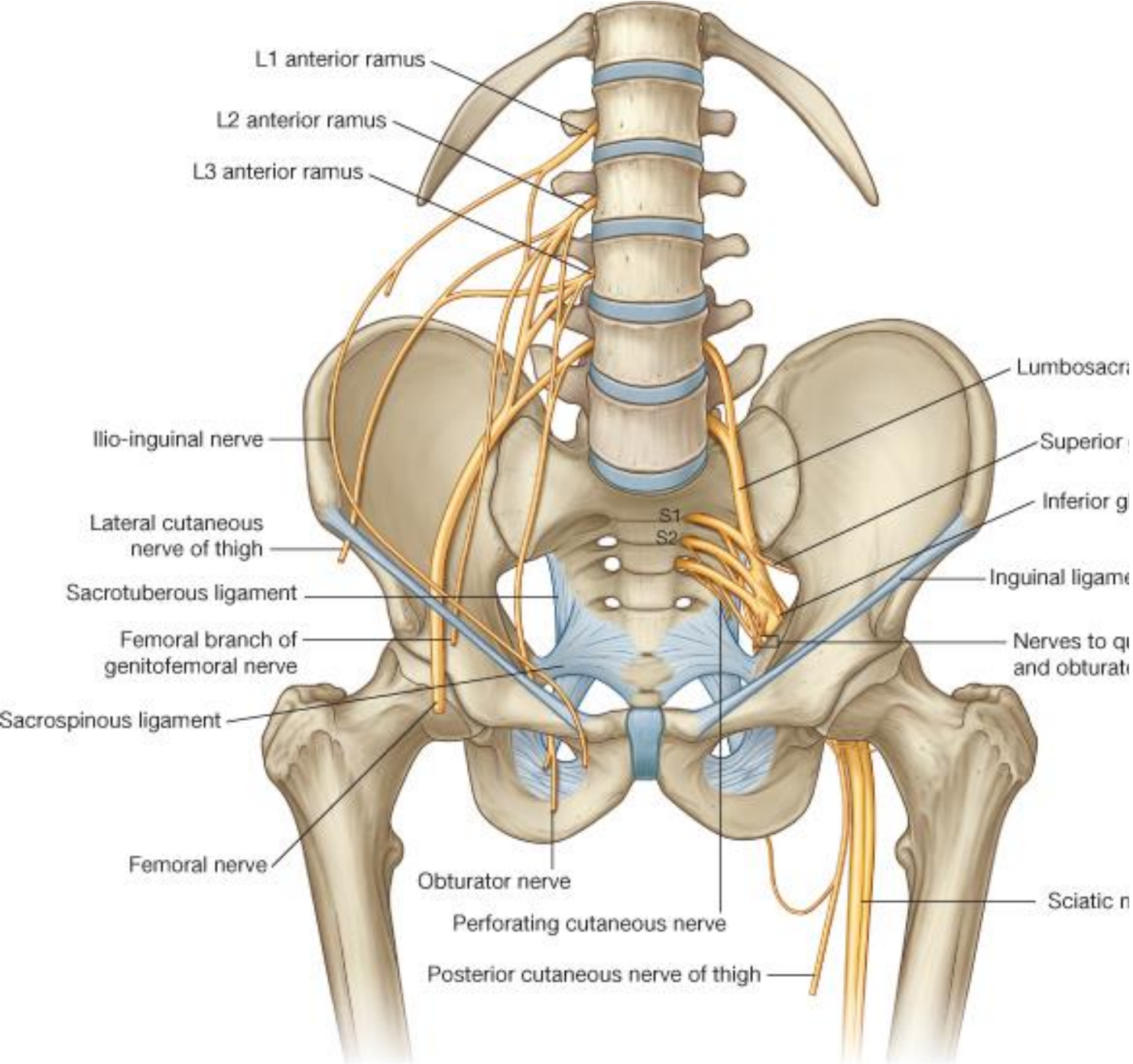

Herniation
©MMG 2002

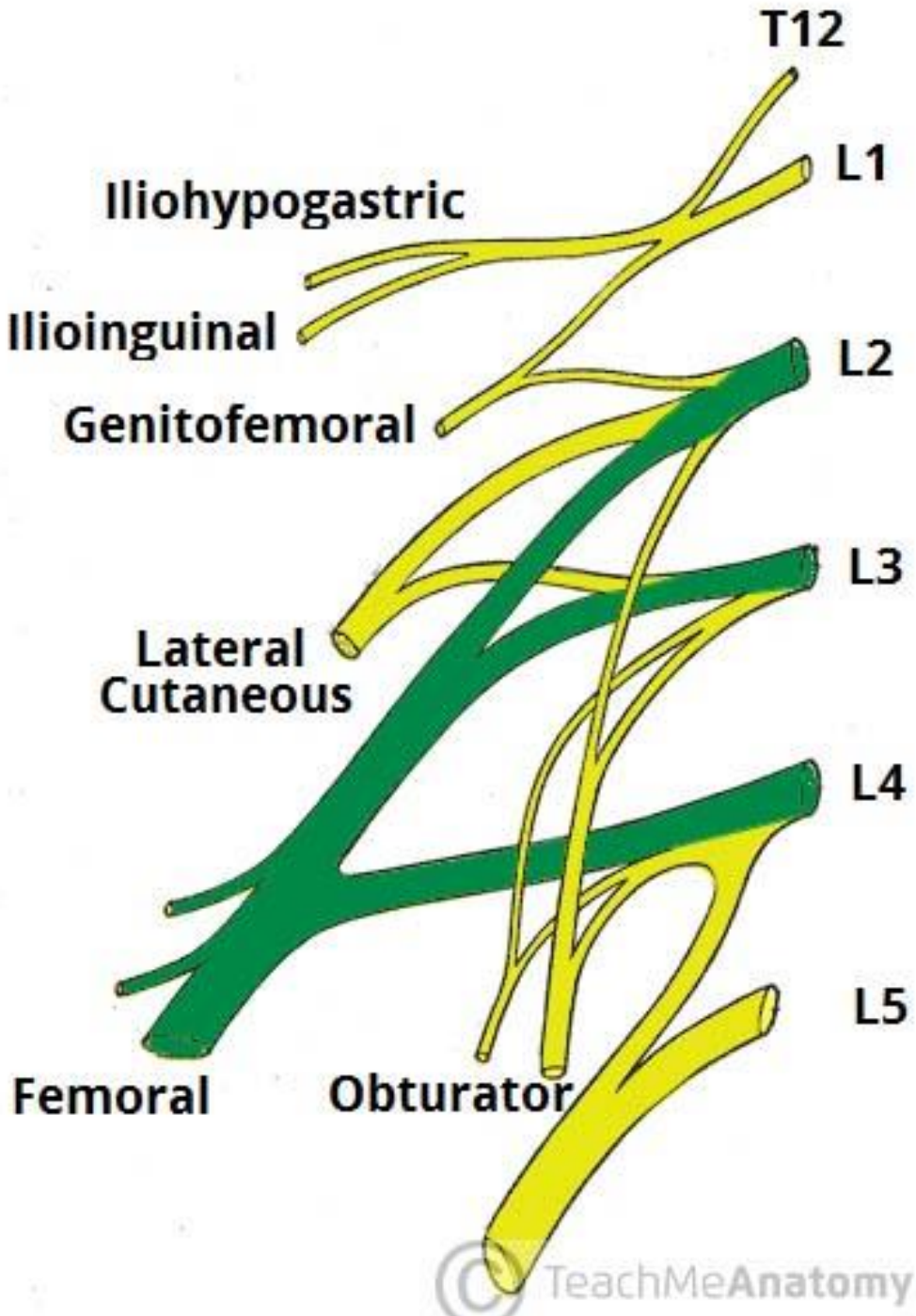


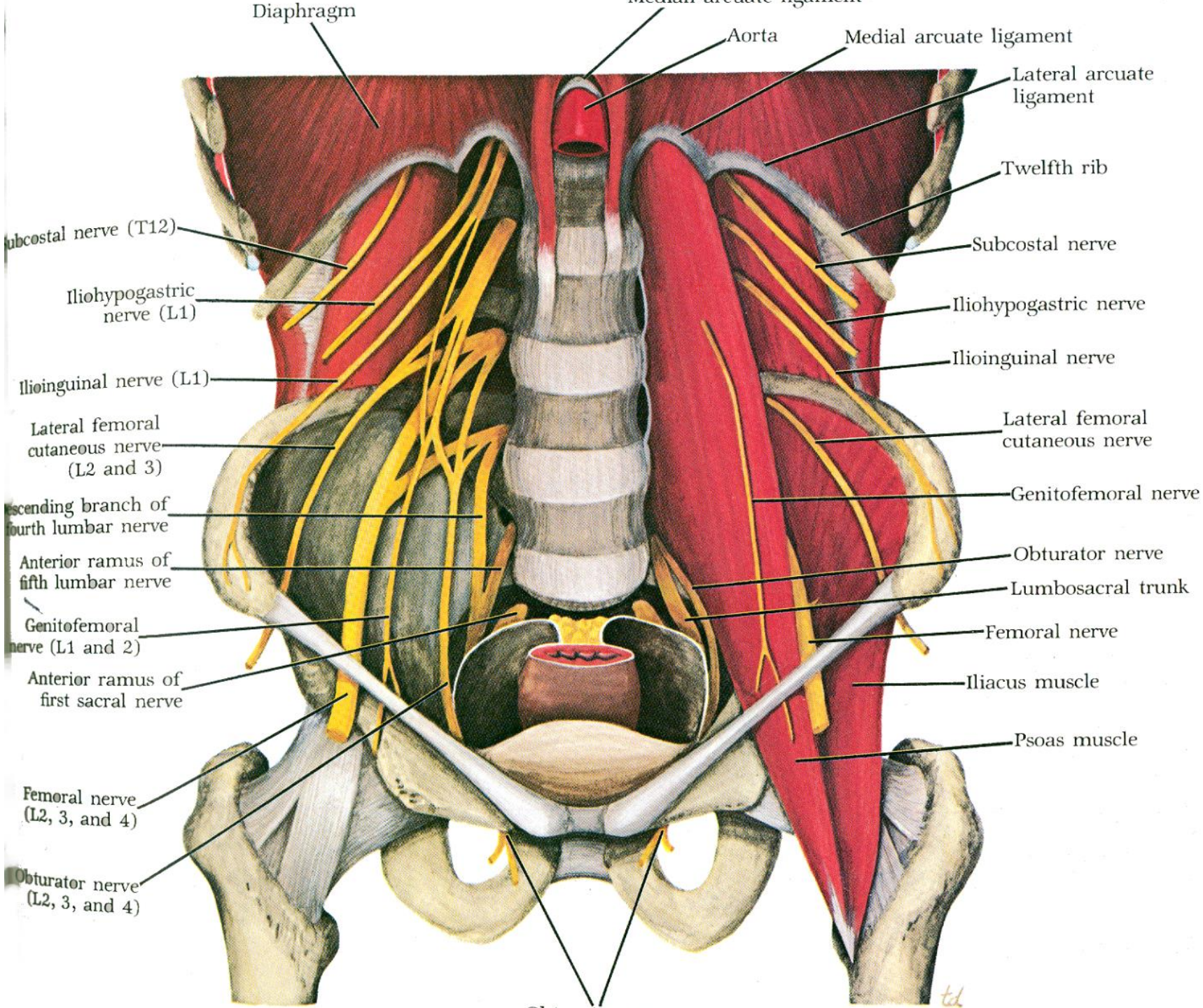
Lumbar Plexus

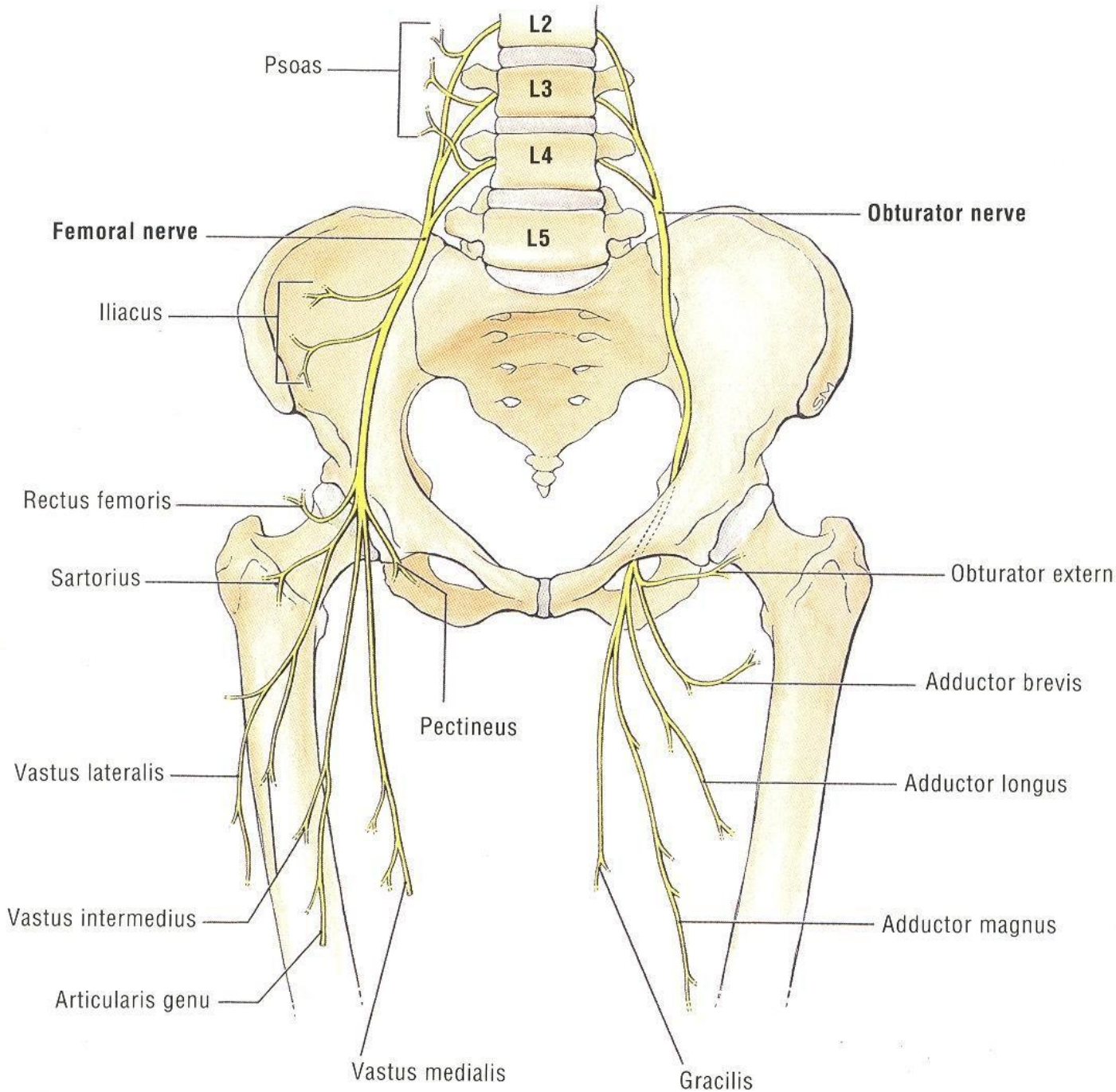
- Ventral rami of L1-L4

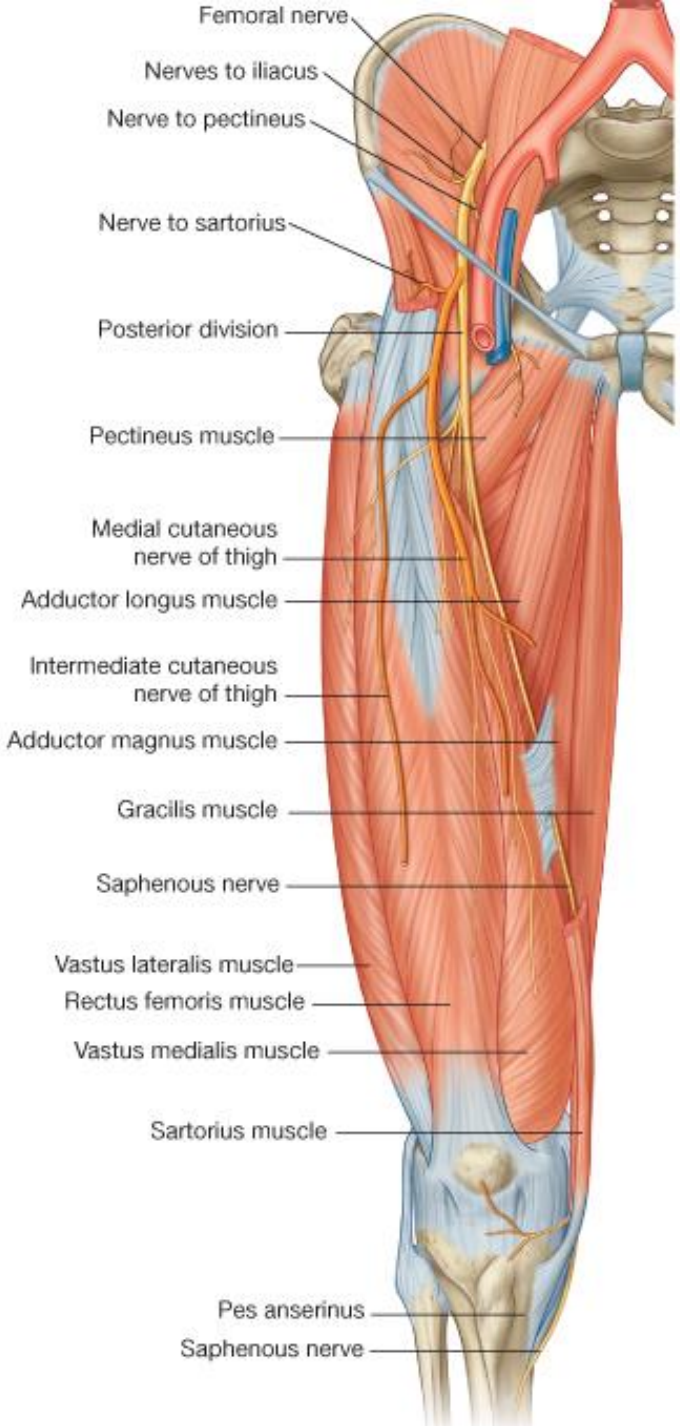







Diaphragm
Aorta
Medial arcuate ligament
Lateral arcuate ligament
Twelfth rib
ubcostal nerve (T12)
Subcostal nerve
Iliohypogastric nerve (L1)
Iliohypogastric nerve
Ilioinguinal nerve (L1)
Ilioinguinal nerve
Lateral femoral cutaneous nerve (L2 and 3)
Lateral femoral cutaneous nerve
scending branch of ourth lumbar nerve
Genitofemoral nerve
Anterior ramus of fifth lumbar nerve
Obturator nerve
Lumbosacral trunk
Genitofemoral nerve (L1 and 2)
Femoral nerve
Anterior ramus of first sacral nerve
Iliacus muscle
Psoas muscle
Femoral nerve (L2, 3, and 4)
Obturator nerve (L2, 3, and 4)


L2
L3
L4
L5
Psoas
Femoral nerve
Obturator nerve
Iliacus
Rectus femoris
Sartorius
Obturator externu
Adductor brevis
Pectineus
Vastus lateralis
Adductor longus
Vastus intermedius
Adductor magnus
Articularis genu
Vastus medialis
Gracilis

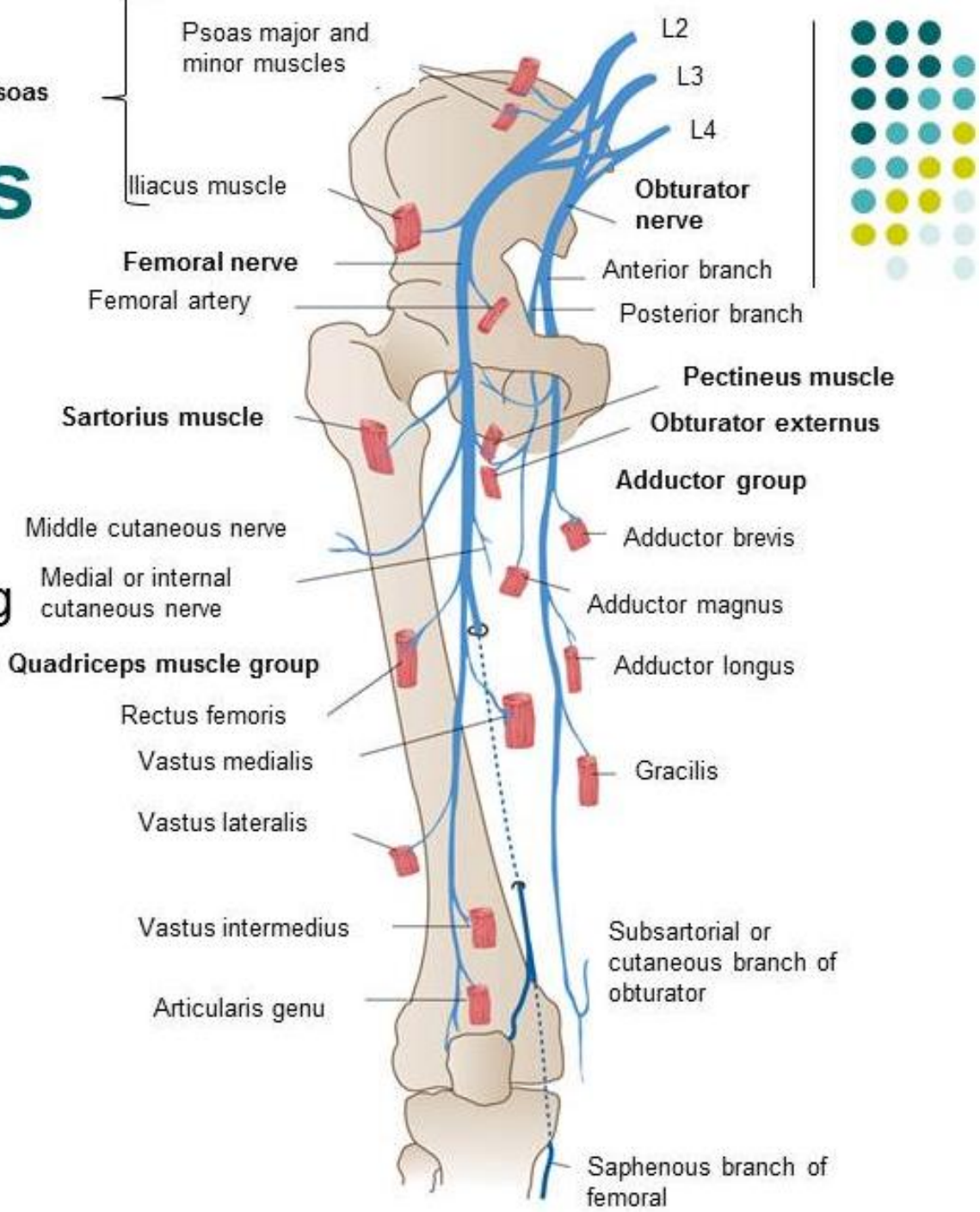


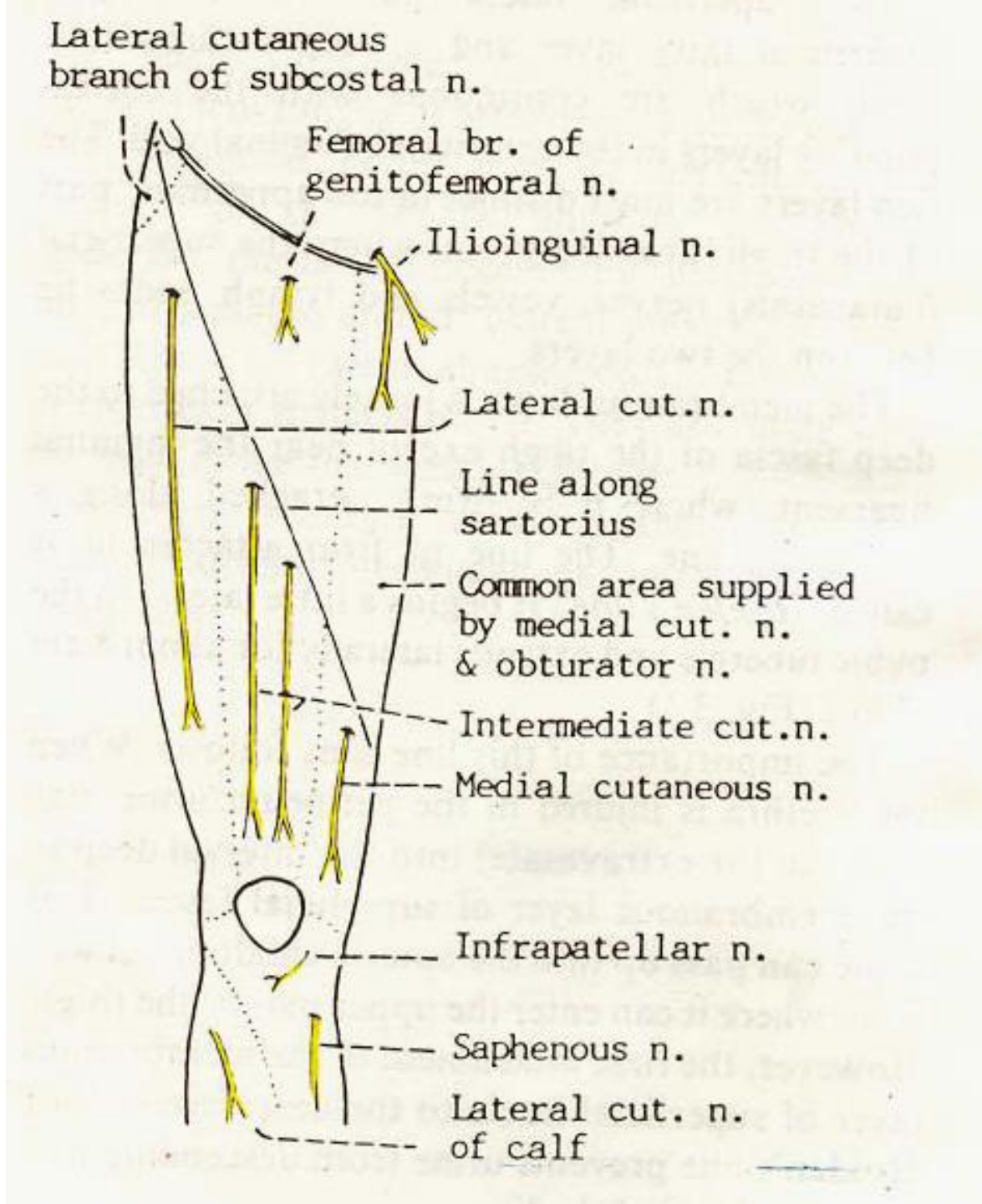
rves

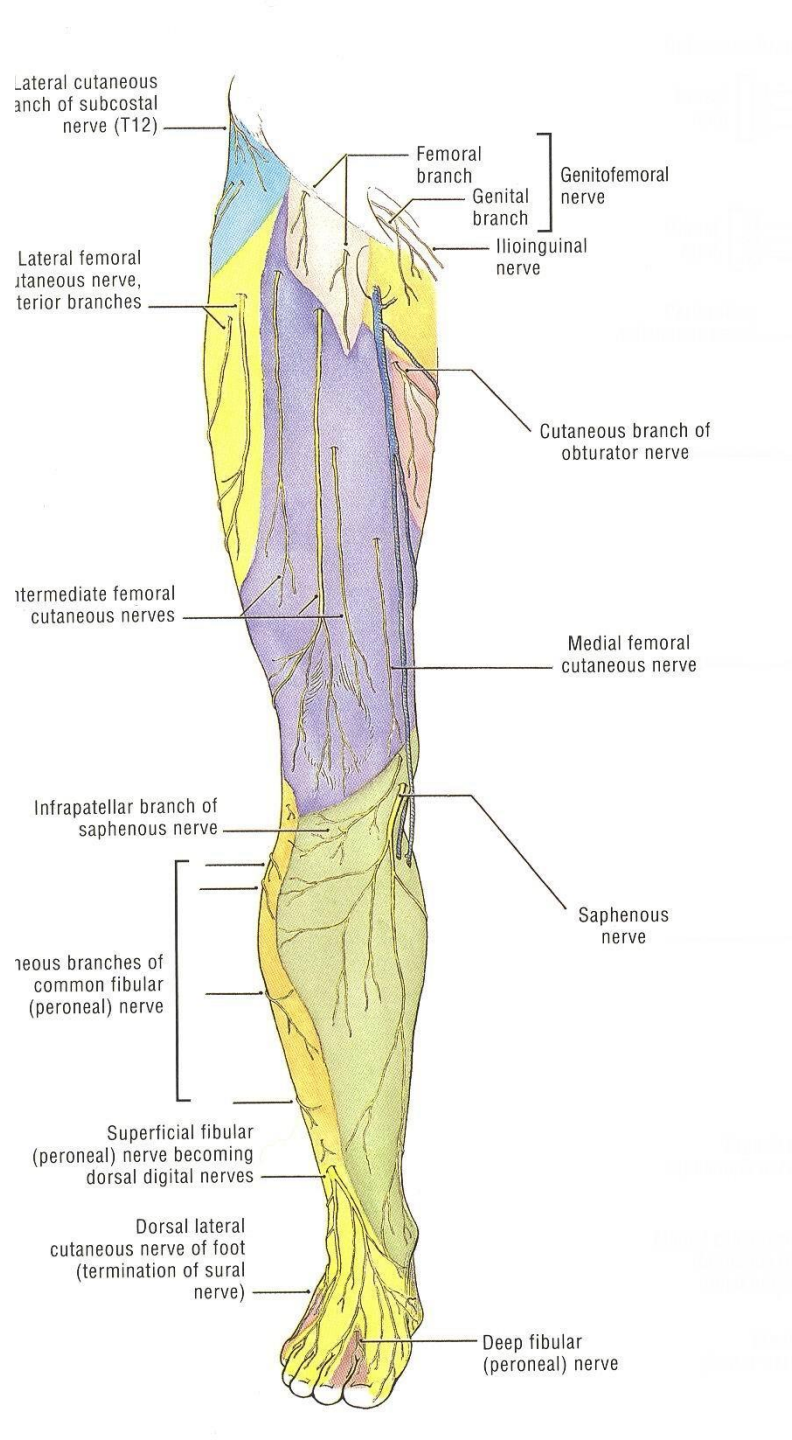
hip, leg

nee

high




Lateral cutaneous branch of subcostal n.
Femoral br. of genitofemoral n.
Ilioinguinal n.
Lateral cut.n.
Line along sartorius
Common area supplied by medial cut. n. & obturator n.
Intermediate cut.n.
Medial cutaneous n.
Infrapatellar n.
Saphenous n.
Lateral cut. n. of calf


Lateral cutaneous nerve (T12)
Femoral branch
Genital branch
Genitofemoral nerve
Ilioinguinal nerve
Cutaneous branch of obturator nerve
Medial femoral cutaneous nerve
Infrapatellar branch of saphenous nerve
Saphenous nerve
Superficial fibular (peroneal) nerve becoming dorsal digital nerves
Dorsal lateral cutaneous nerve of foot (termination of sural nerve)
Deep fibular (peroneal) nerve

Femoral and Obturator Nerves

- Sensory distribution

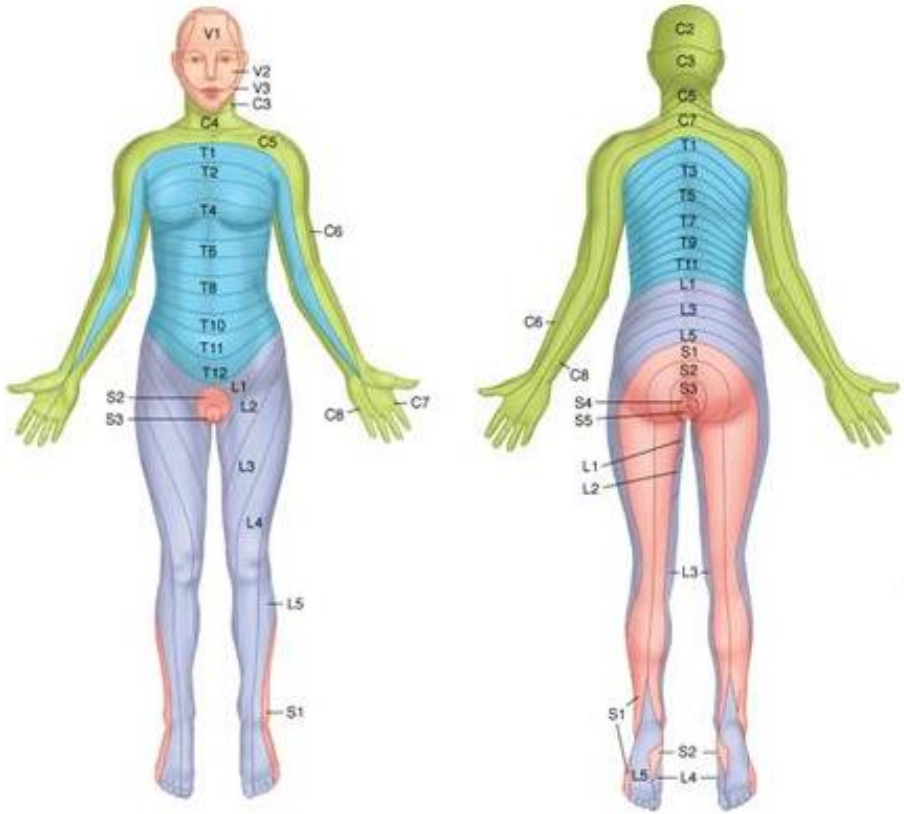


Figure 19-3. Dermatome distribution. In: F. Gary Cunningham. *Williams Obstetrics*. 23rd ed. http://www.accessmedicine.com. Accessed March 22, 2012.

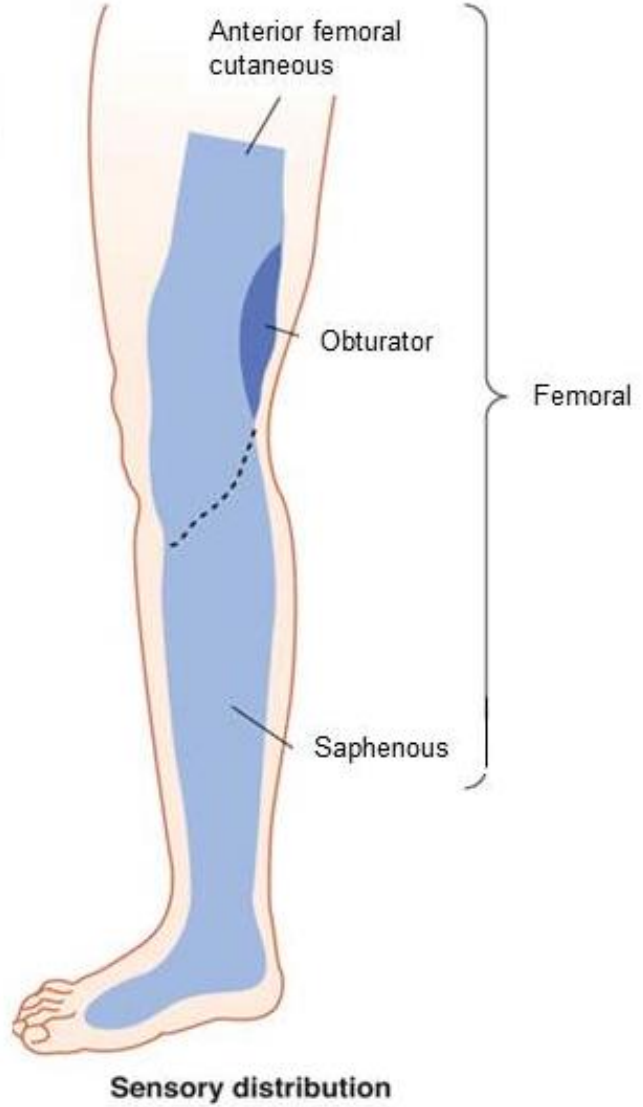
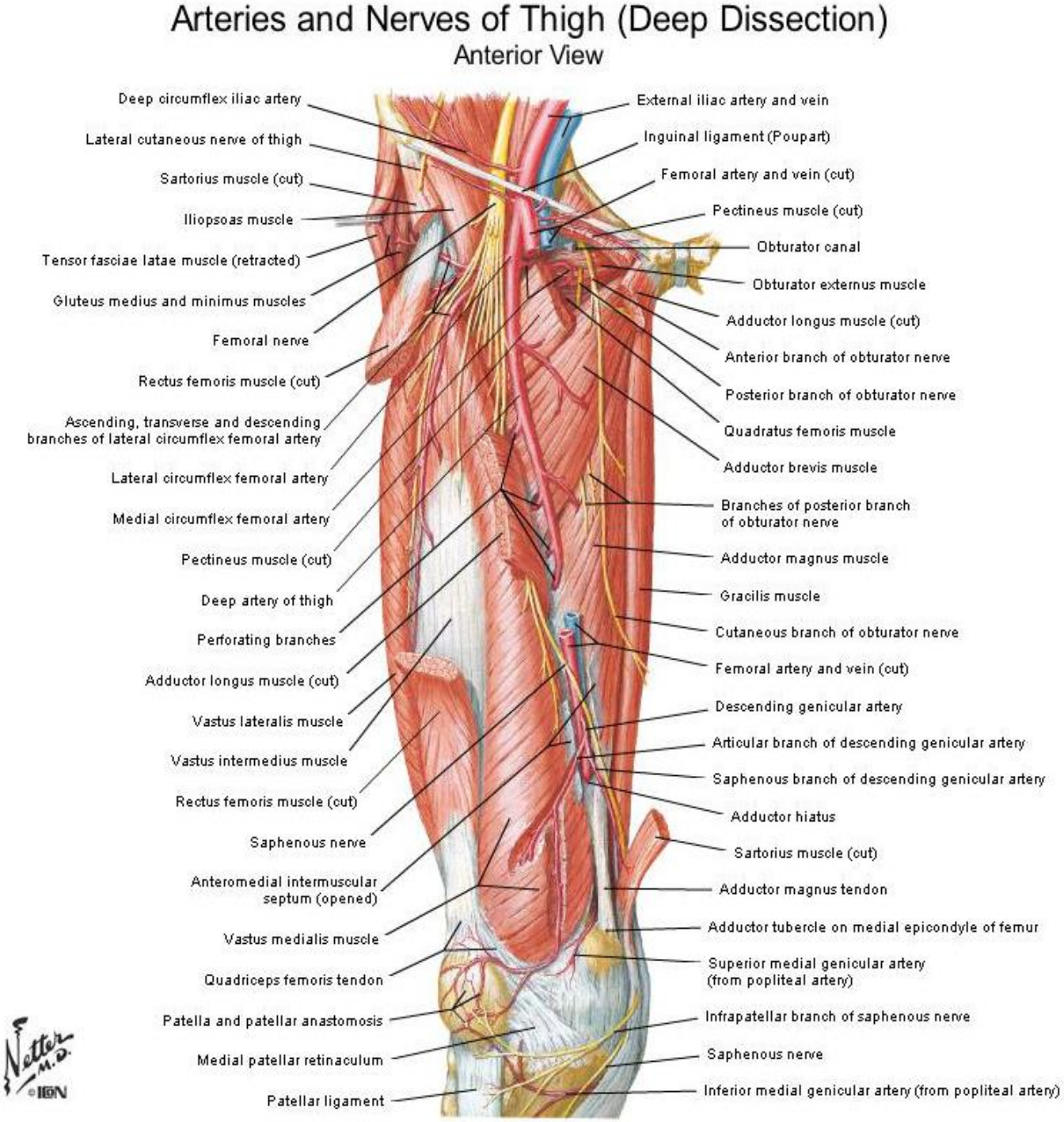


Figure 28-11. The femoral and obturator nerves. In: Waxman SG. *Clinical Neuroanatomy*. 26th ed. New York, NY: McGraw-Hill; 2010. http://www.accessphysiotherapy.com. Accessed March 22, 2012.

Causes

- Injury of the femoral uncommon but may be injured by a stab, gunshot wounds, or a pelvic fracture



Signs of femoral neuropathy

- This nerve condition can lead to difficulties moving around. Your leg or knee might feel weak, and you may be unable to put pressure on the affected leg.
- You might also feel unusual sensations in your legs. They include:
- numbness in any part of the leg (typically the front and inside of the thigh, but potentially all the way down to the feet)
- tingling in any part of the leg
- dull aching pain in the genital region
- lower extremity muscle weakness
- difficulty extending the knee due to quadriceps weakness
- feeling like your leg or knee is going to give out (buckle) on you

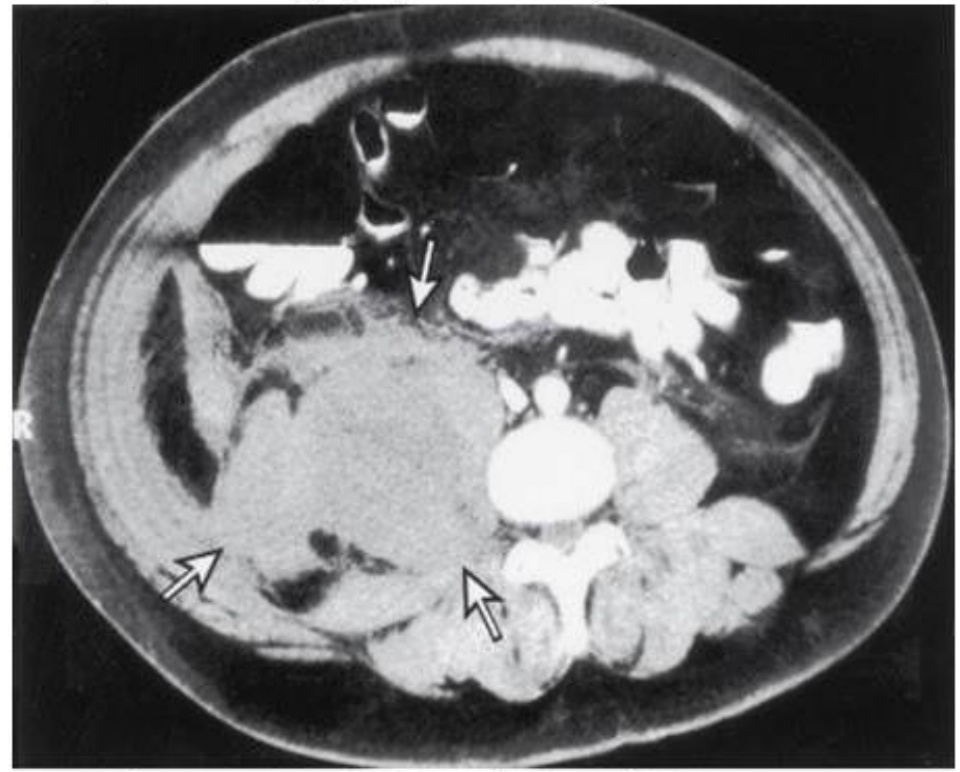
Case 1: Jane has lower extremity weakness

- A 68-year-old female was admitted to the hospital due to an acute chest pain. She underwent cardiac catheterization and angioplasty through the right femoral artery.
- She was referred to physical therapy 1 month later for evaluation of her right lower extremity weakness and numbness in her thigh. She described her pain as moderated in her groin and anterior thigh.

Case 1: Jane's Neurologist Report

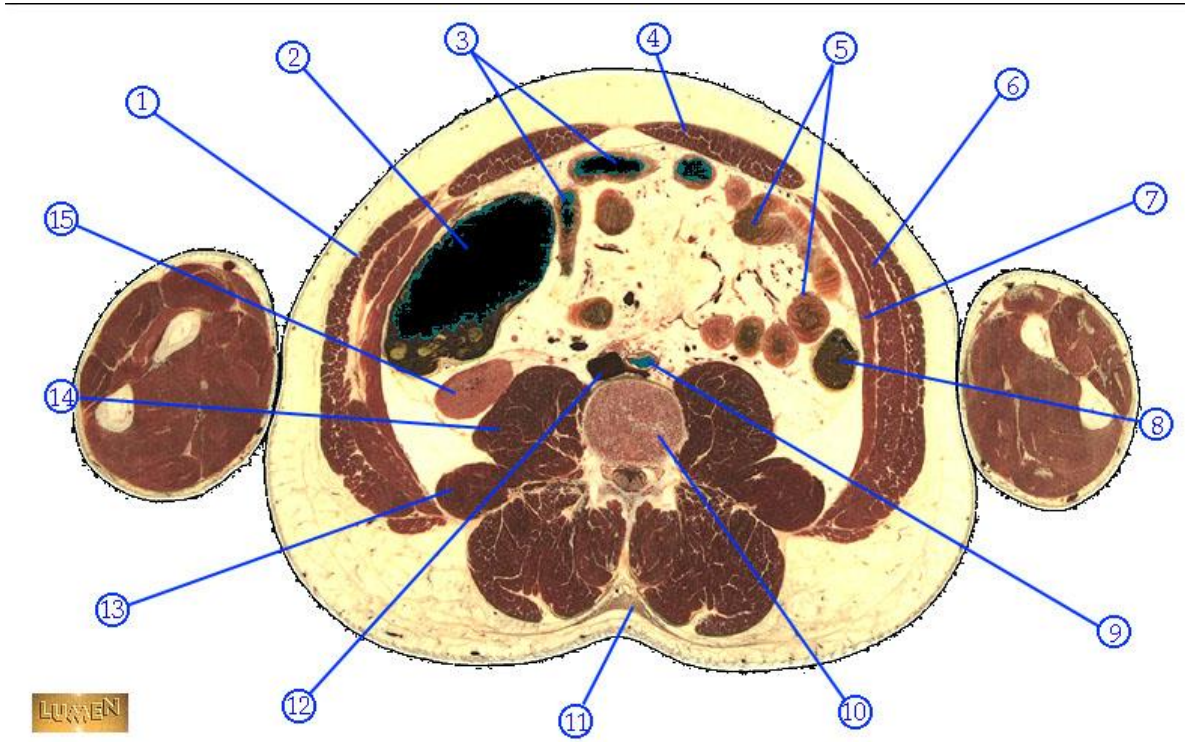
- Complete paralysis of right quadriceps and iliopsoas
- Thigh adductors and ankle dorsiflexion are normal
- Right knee jerk are absent
- Loss of touch and pain sensation over the anterior thigh and medial leg

Computed Tomography of a Retroperitoneal Hematoma



Source: Lichtman MA, Kipps TJ, Seligsohn U, Kaushansky K, Prchal JT: *Williams Hematology, 8th Edition:* http://www.accessmedicine.com

Computed tomography scan of a retroperitoneal hematoma in a patient with severe hemophilia A. Extent of the hematoma is indicated by the arrows.


1
2
3
4
5
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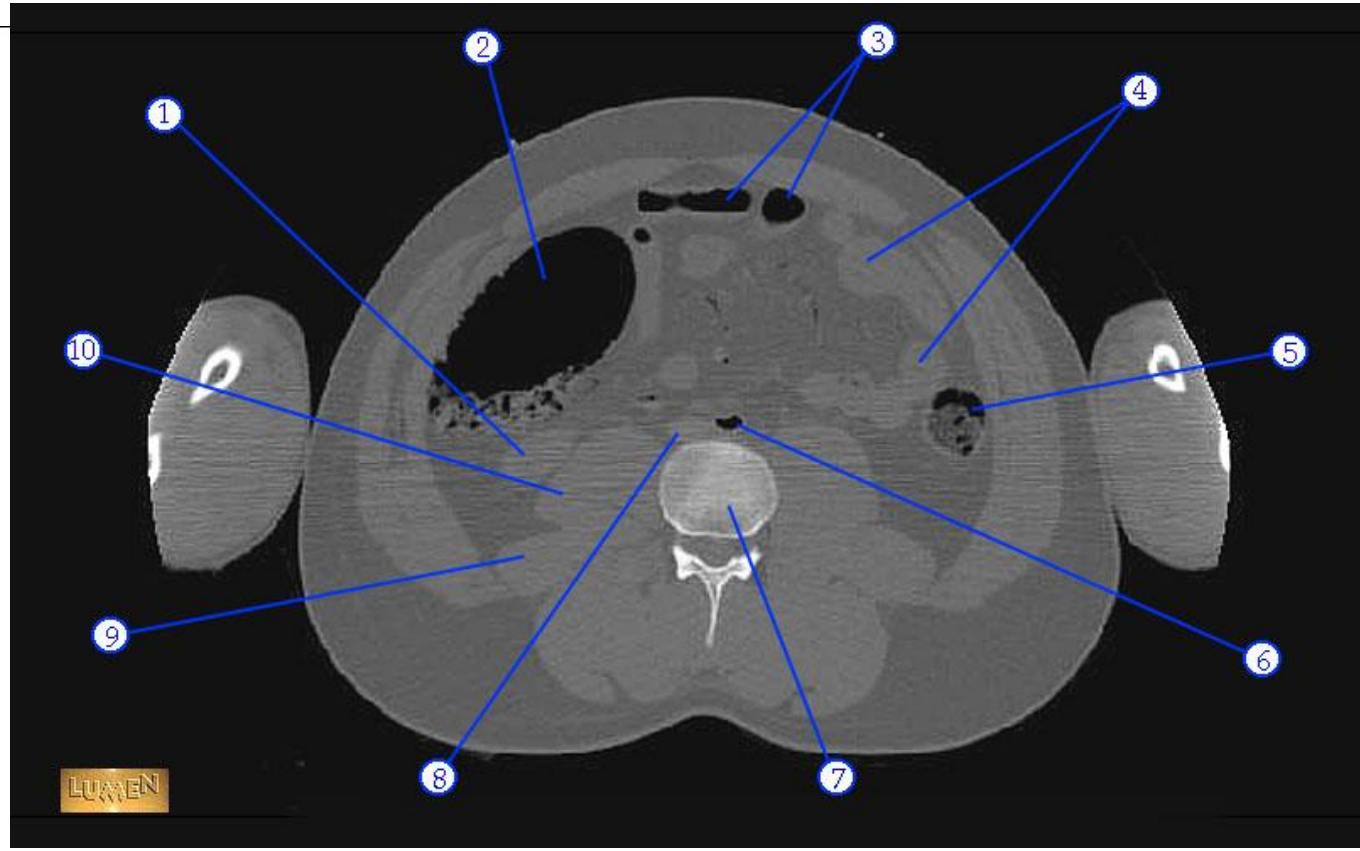
LUMEN


1
2
3
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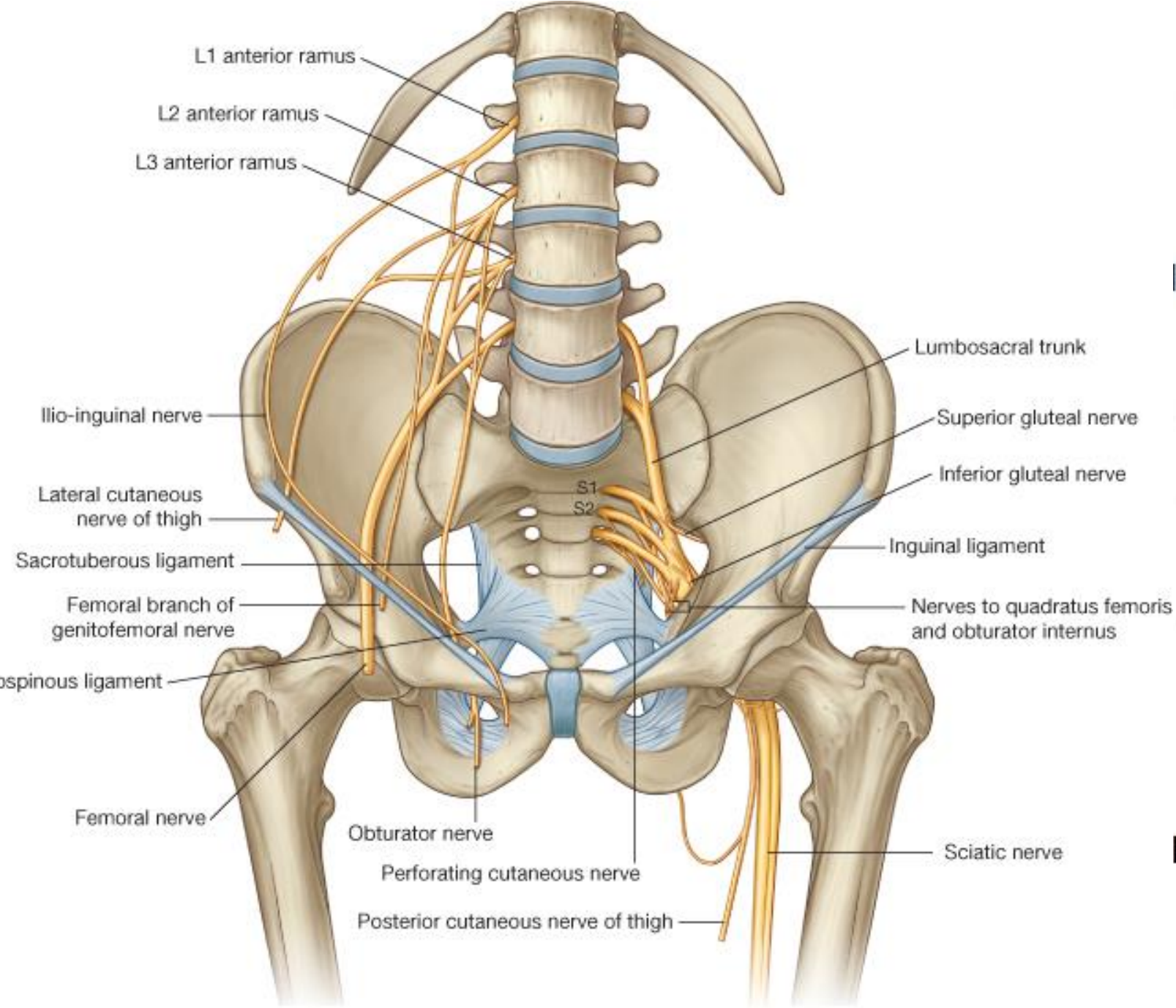
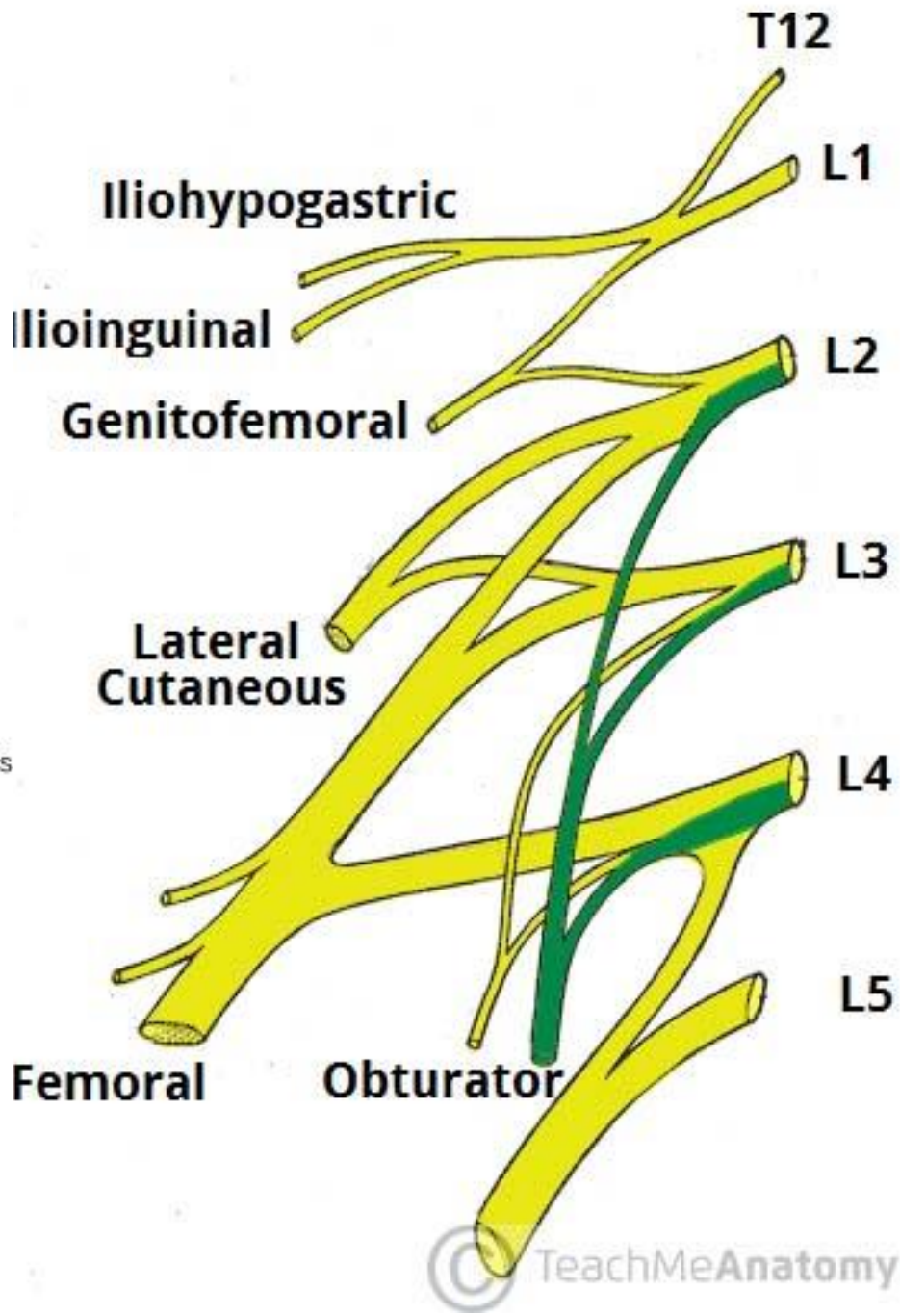
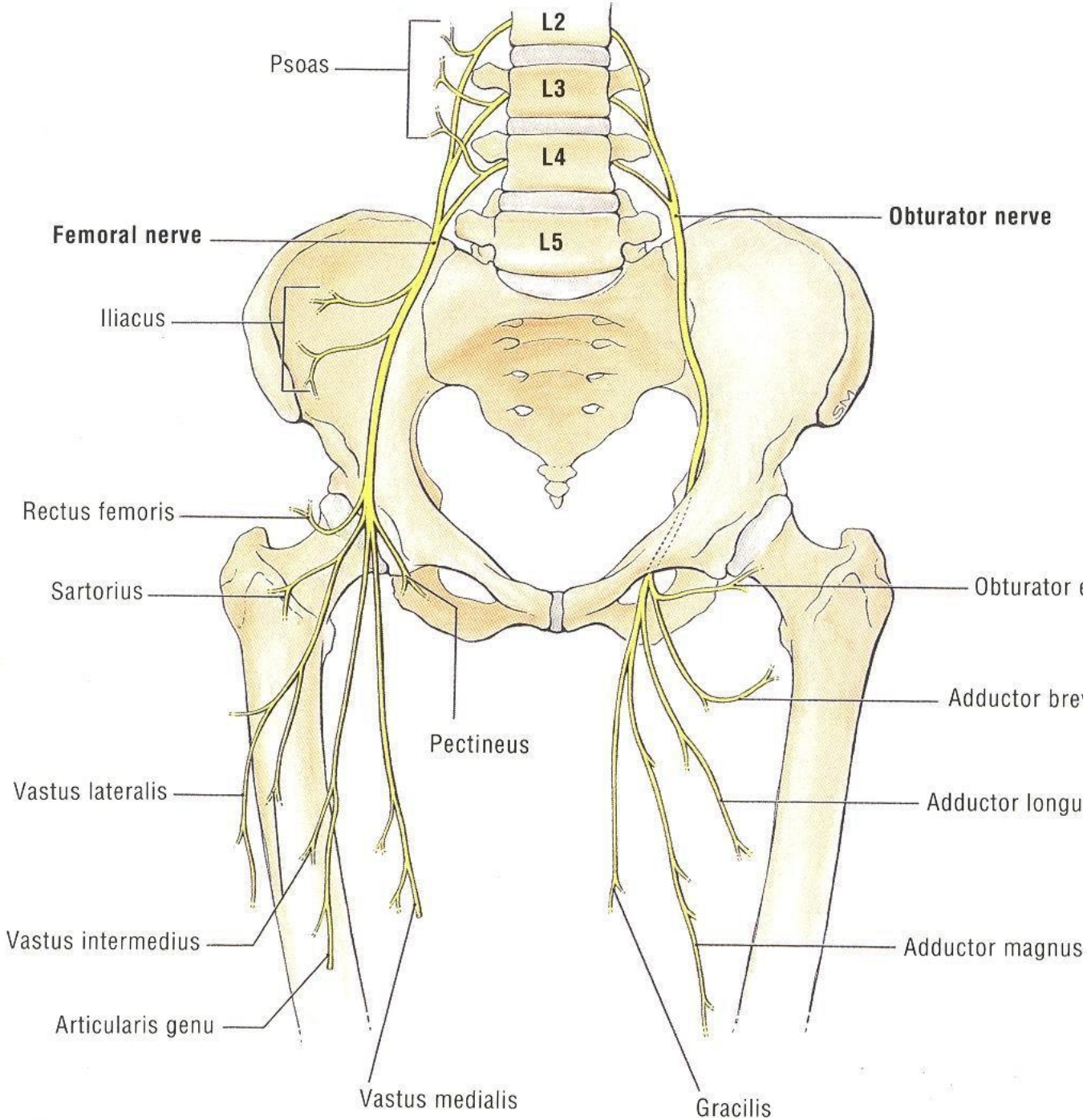
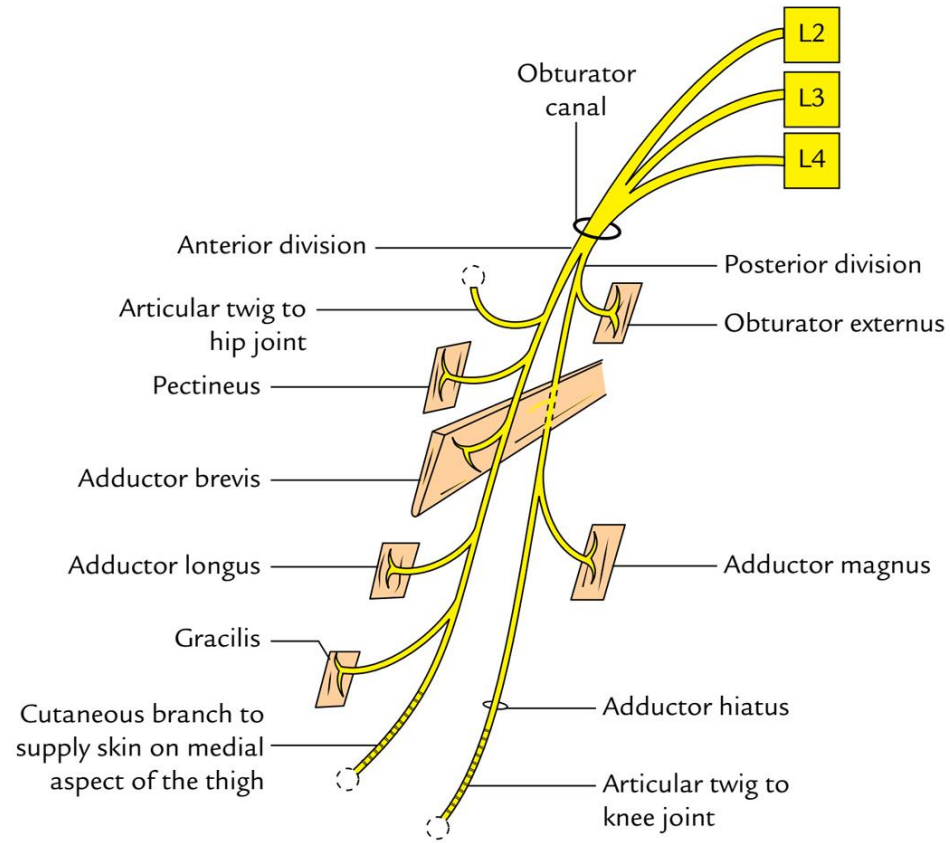
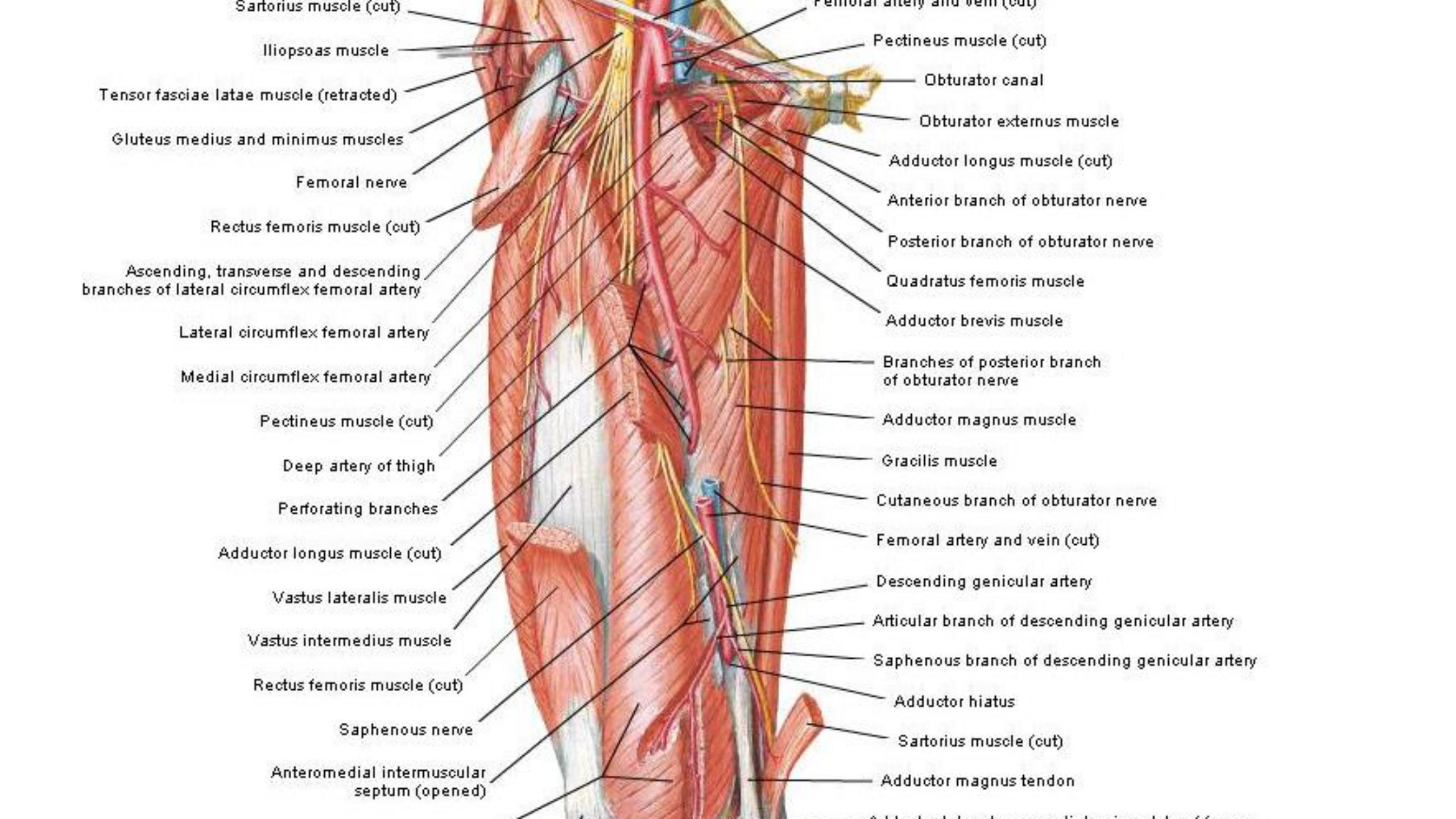
9
10
LUMEN

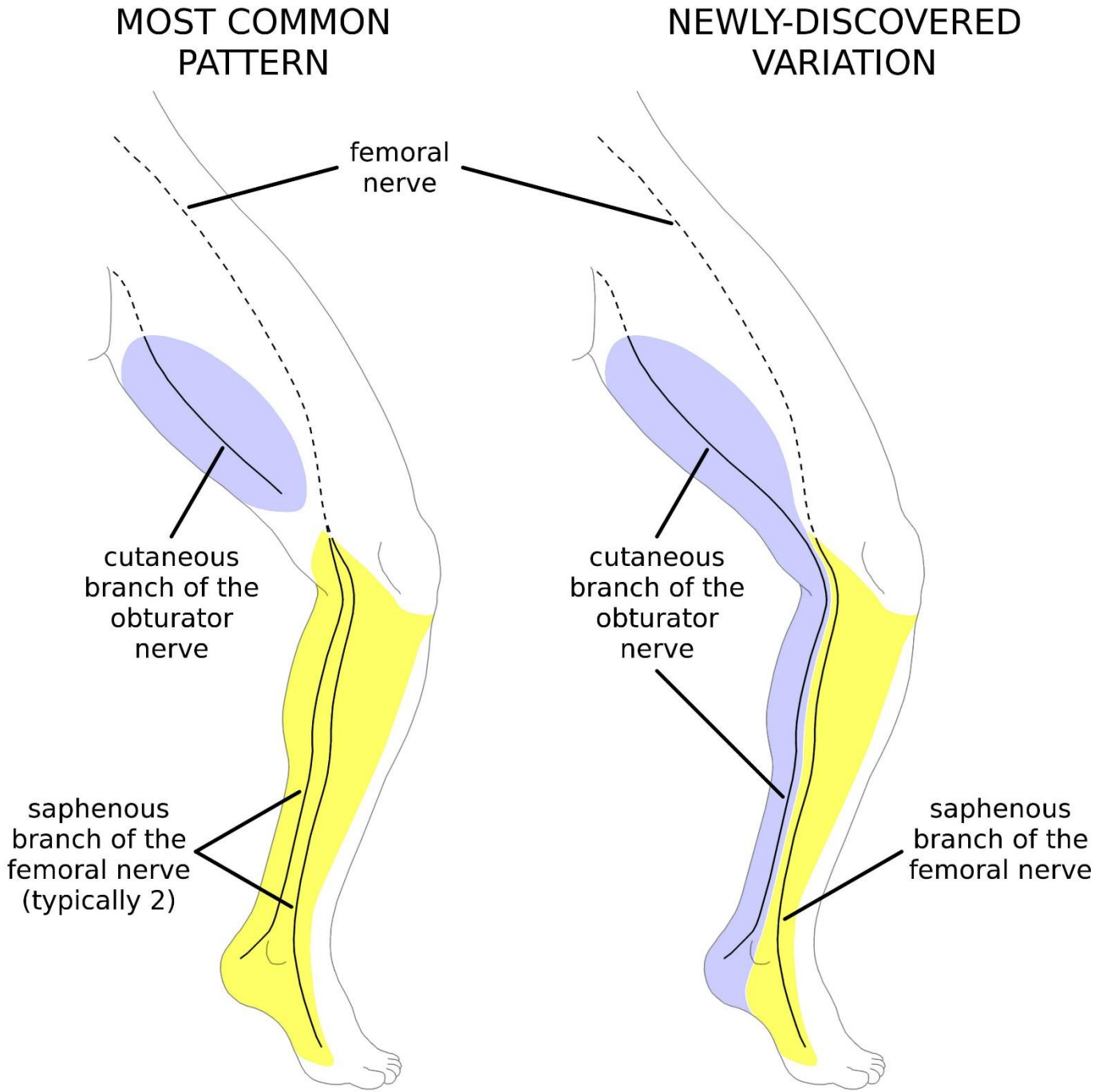





L2
L3
L4
L5
Psoas
Femoral nerve
Obturator nerve
Iliacus
Rectus femoris
Sartorius
Obturator
Adductor bre
Pectineus
Vastus lateralis
Adductor longu
Vastus intermedius
Adductor magnus
Articularis genu
Vastus medialis
Gracilis

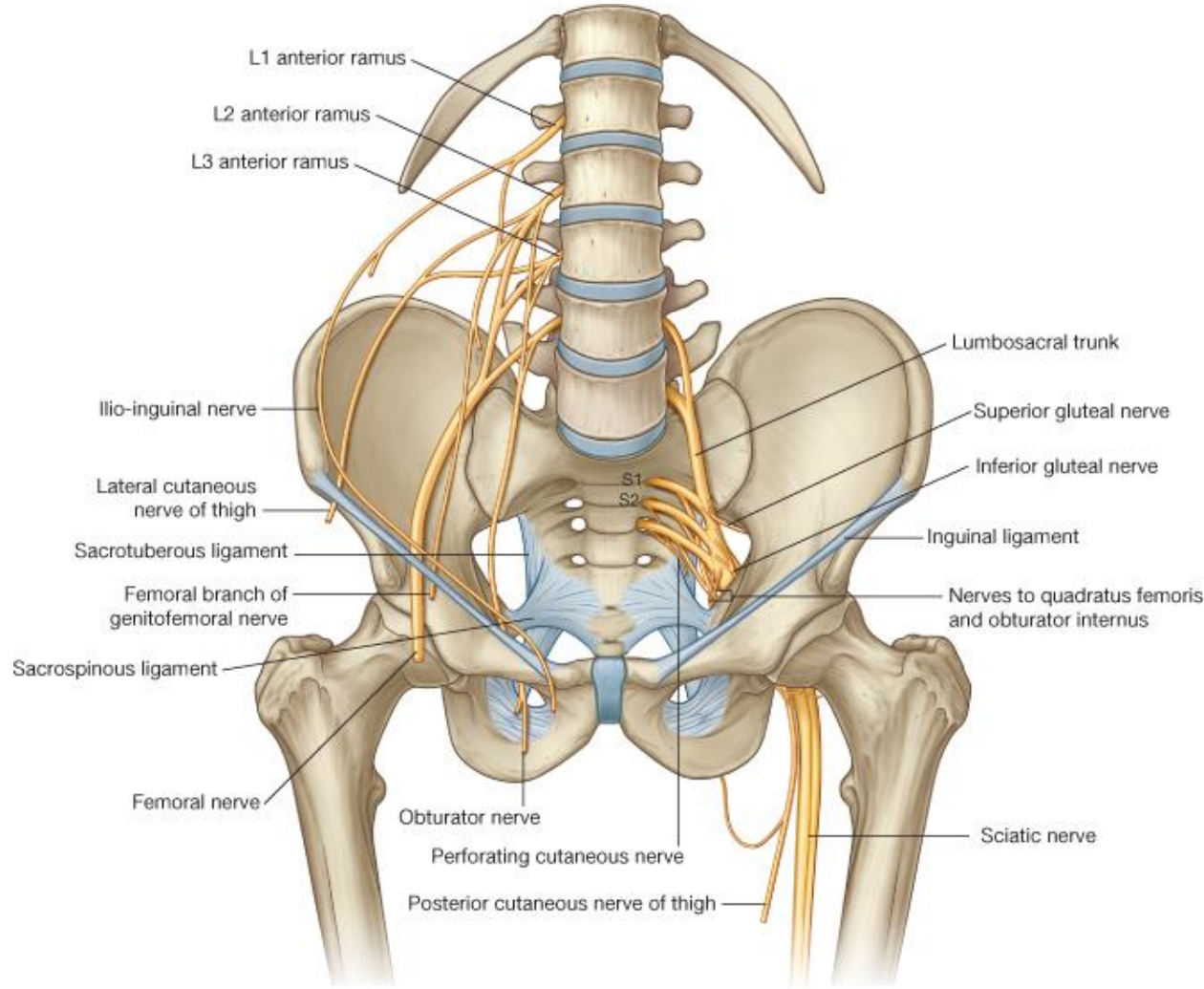

L2
L3
L4
Obturator canal
Anterior division
Posterior division
Articular twig to hip joint
Obturator externus
Pectineus
Adductor brevis
Adductor longus
Adductor magnus
Gracilis
Adductor hiatus
Cutaneous branch to supply skin on medial aspect of the thigh
Articular twig to knee joint


Sartorius muscle (cut)
Iliopsoas muscle
Tensor fasciae latae muscle (retracted)
Gluteus medius and minimus muscles
Femoral nerve
Rectus femoris muscle (cut)
Ascending, transverse and descending branches of lateral circumflex femoral artery
Lateral circumflex femoral artery
Medial circumflex femoral artery
Pectineus muscle (cut)
Deep artery of thigh
Perforating branches
Adductor longus muscle (cut)
Vastus lateralis muscle
Vastus intermedius muscle
Rectus femoris muscle (cut)
Saphenous nerve
Anteromedial intermuscular septum (opened)
Femoral artery and vein (cut)
Pectineus muscle (cut)
Obturator canal
Obturator externus muscle
Adductor longus muscle (cut)
Anterior branch of obturator nerve
Posterior branch of obturator nerve
Quadratus femoris muscle
Adductor brevis muscle
Branches of posterior branch of obturator nerve
Adductor magnus muscle
Gracilis muscle
Cutaneous branch of obturator nerve
Femoral artery and vein (cut)
Descending genicular artery
Articular branch of descending genicular artery
Saphenous branch of descending genicular artery
Adductor hiatus
Sartorius muscle (cut)
Adductor magnus tendon


MOST COMMON PATTERN
NEWLY-DISCOVERED VARIATION
femoral nerve
cutaneous branch of the obturator nerve
saphenous branch of the femoral nerve (typically 2)
cutaneous branch of the obturator nerve
saphenous branch of the femoral nerve

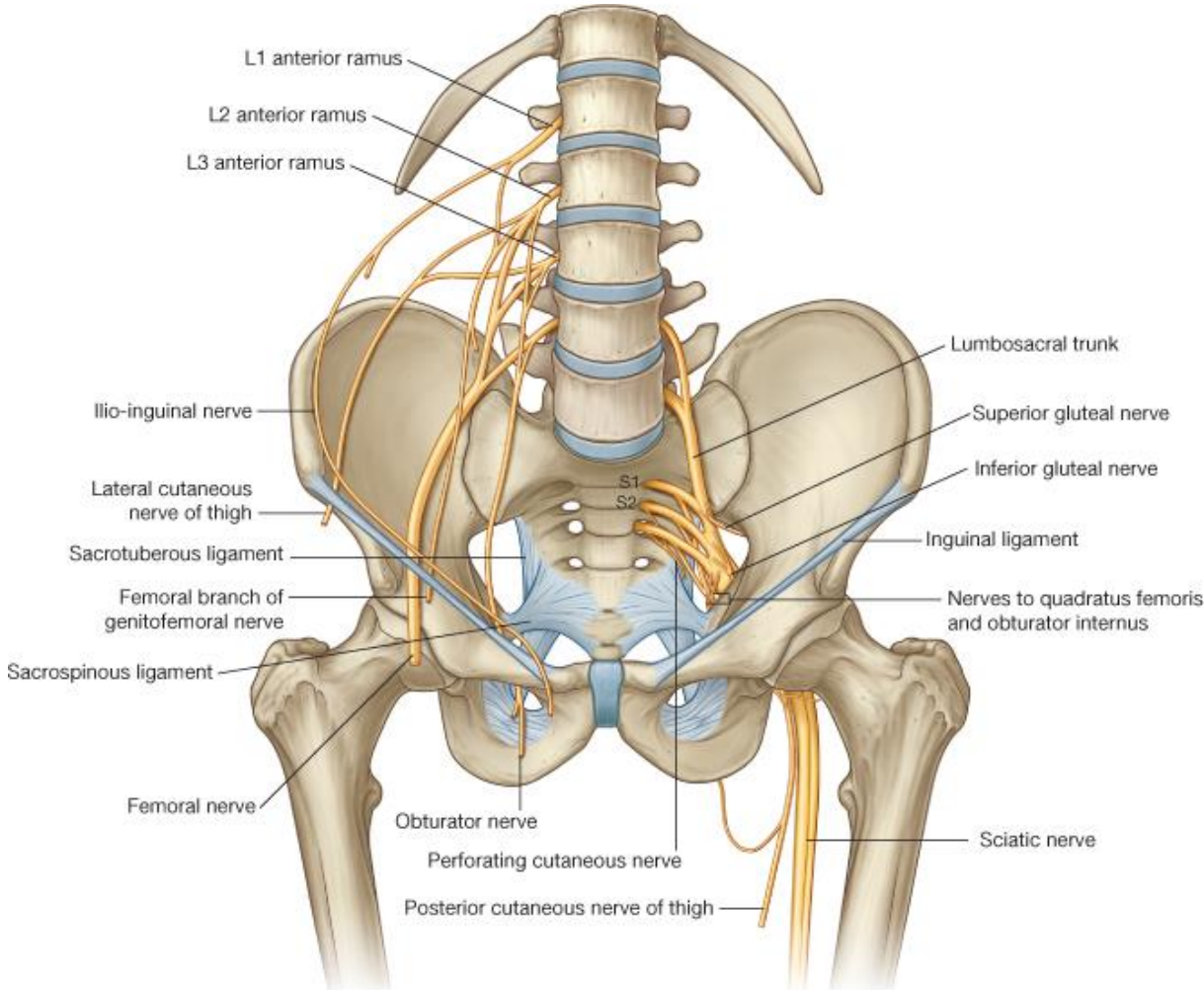
Case report

- A 28-year-old woman with stage IB cervical cancer underwent fertility–sparing surgery, including bilateral pelvic lymphadenectomy. The left obturator nerve was damaged intraoperatively during pelvic dissection.



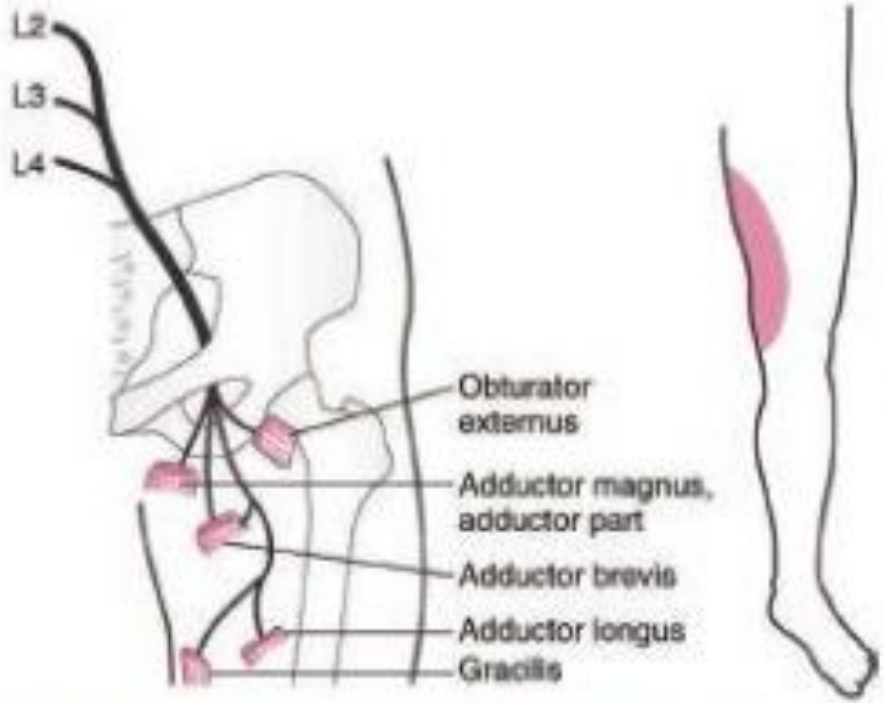
OBTURATOR NERVE INJURY

- Causes
- Penetrating wounds
- Anterior dislocation of hip joint
- Obturator hernia or tumors
- Muscles paralyzed
- All the adductor muscles except for hamstring part of adductor magnus
  Motor loss adduction of thigh
- Sensory loss
- Medial side of thigh



Injury of obturator nerve

Waddleing Gait (lateral leg swing/drag)

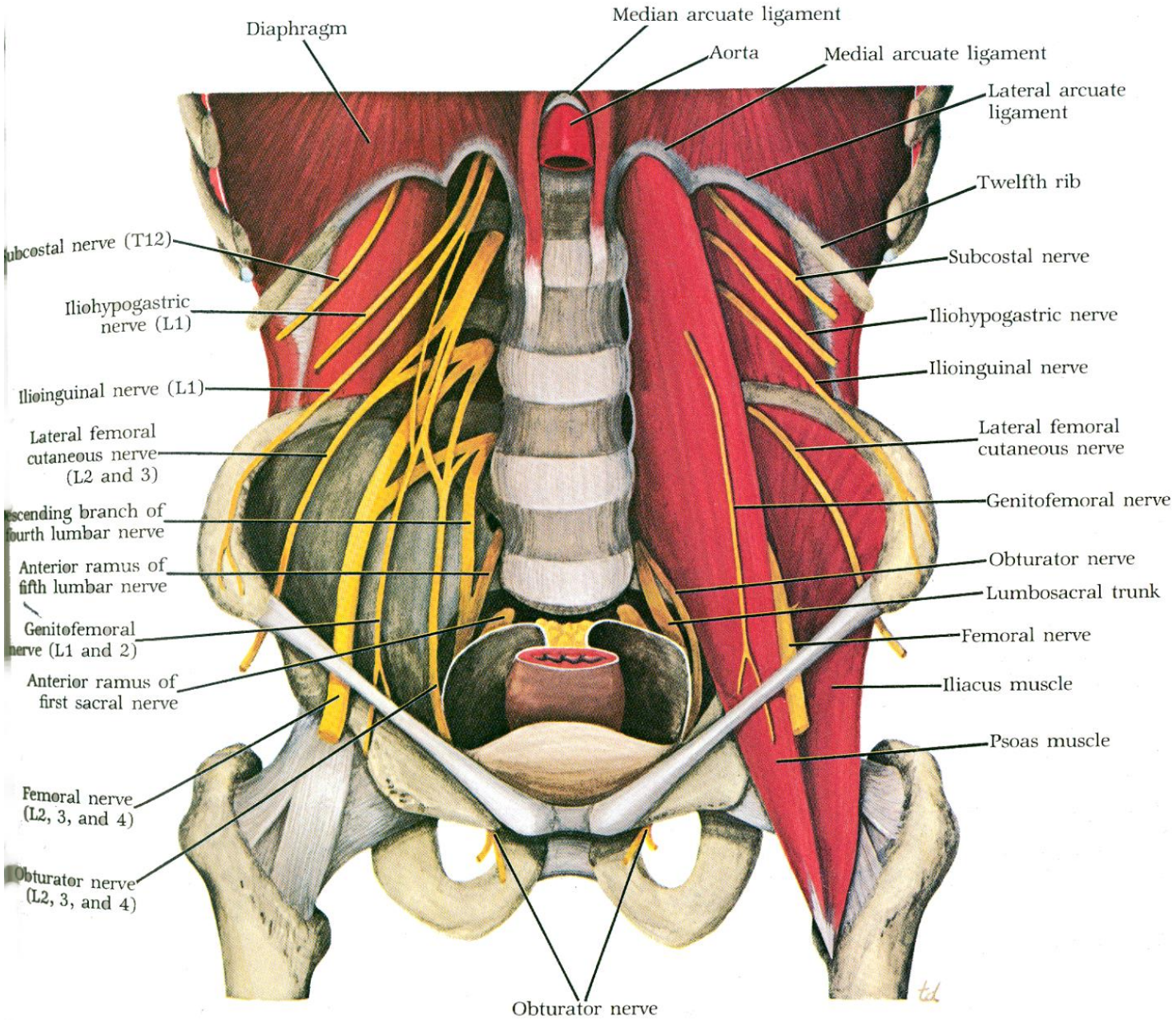


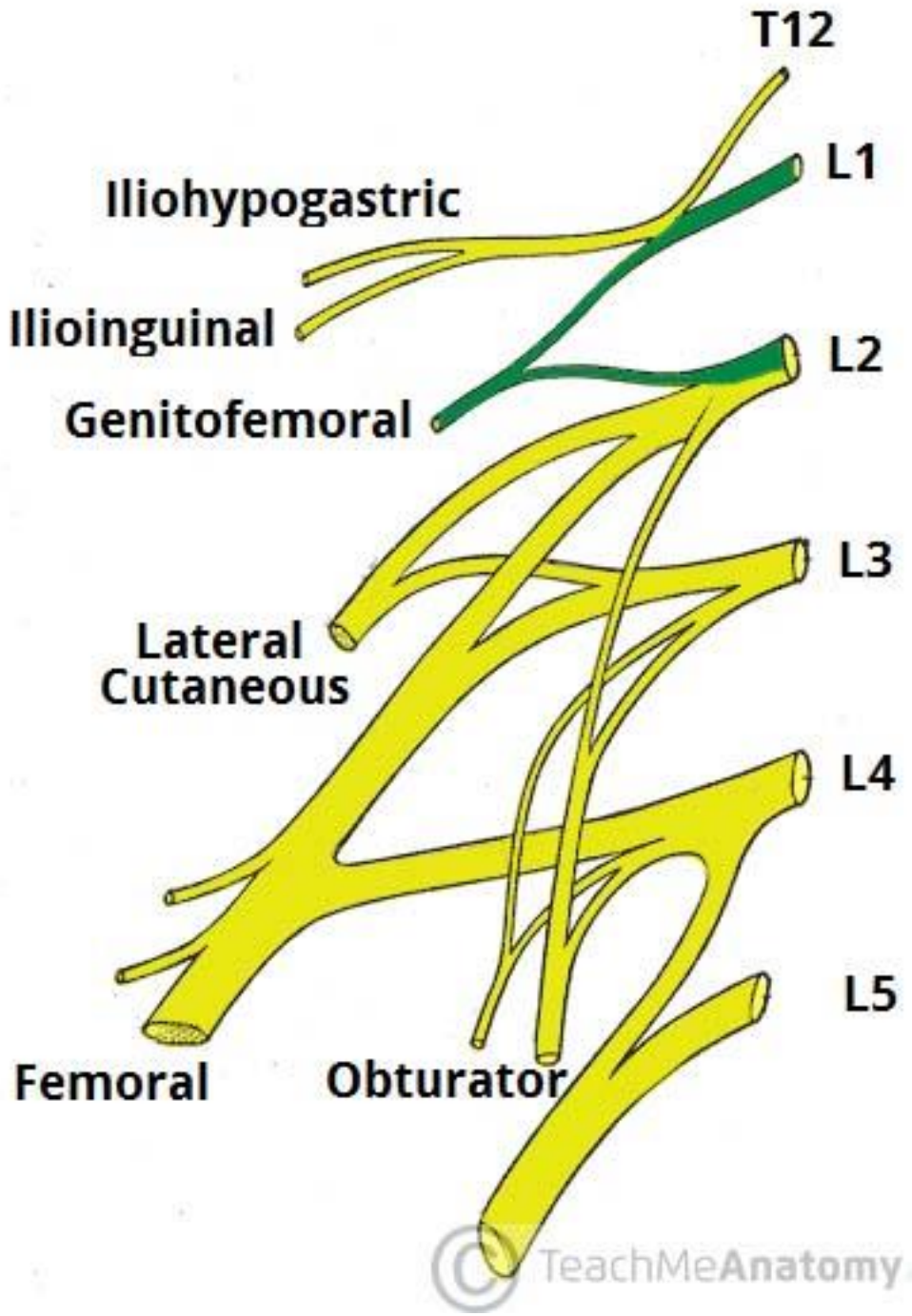
- Difficulty adducting thigh (e.g., crossing legs while sitting)
- Decreased sensation over upper medial thigh
- Cause of injury: **anterior hip dislocation**, radical retropubic prostatectomia

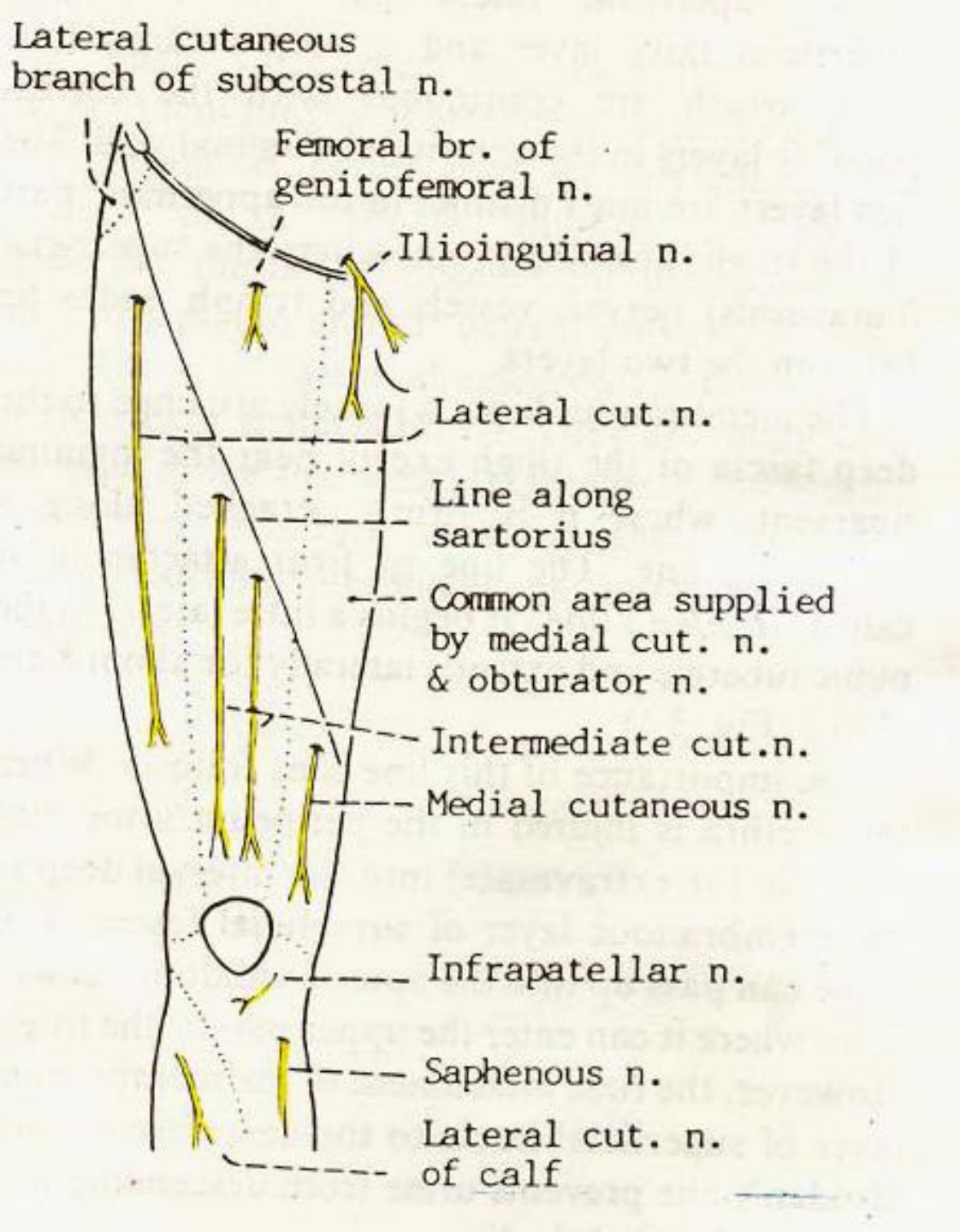
passes through obturator canal that is covered by obturator membrane in obturator foramen

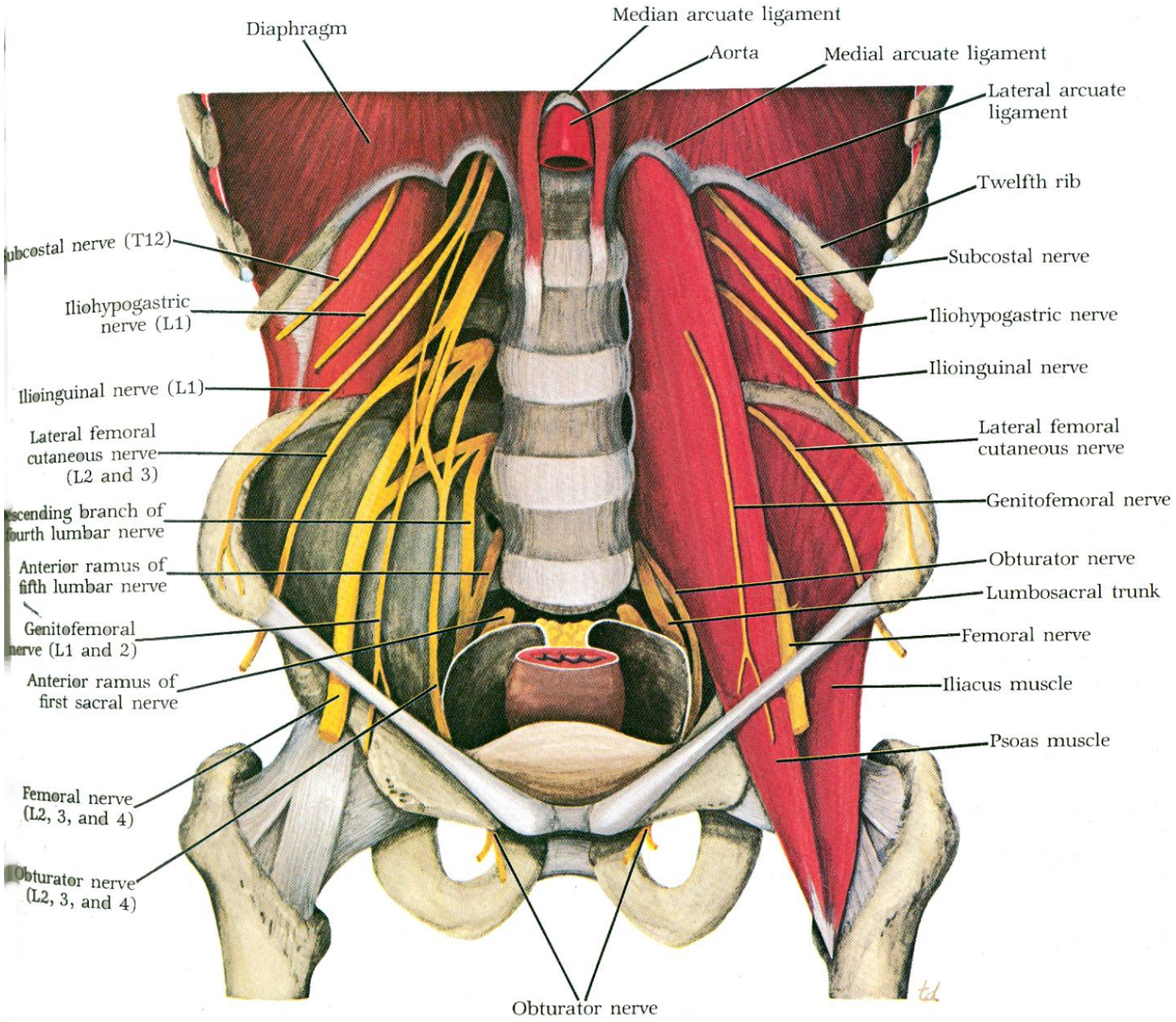
Affects Obturator externus, Adductor longus, brevis, magnus (paritally), pectineus, gracilis
lateral rotation weakness and poor adduction

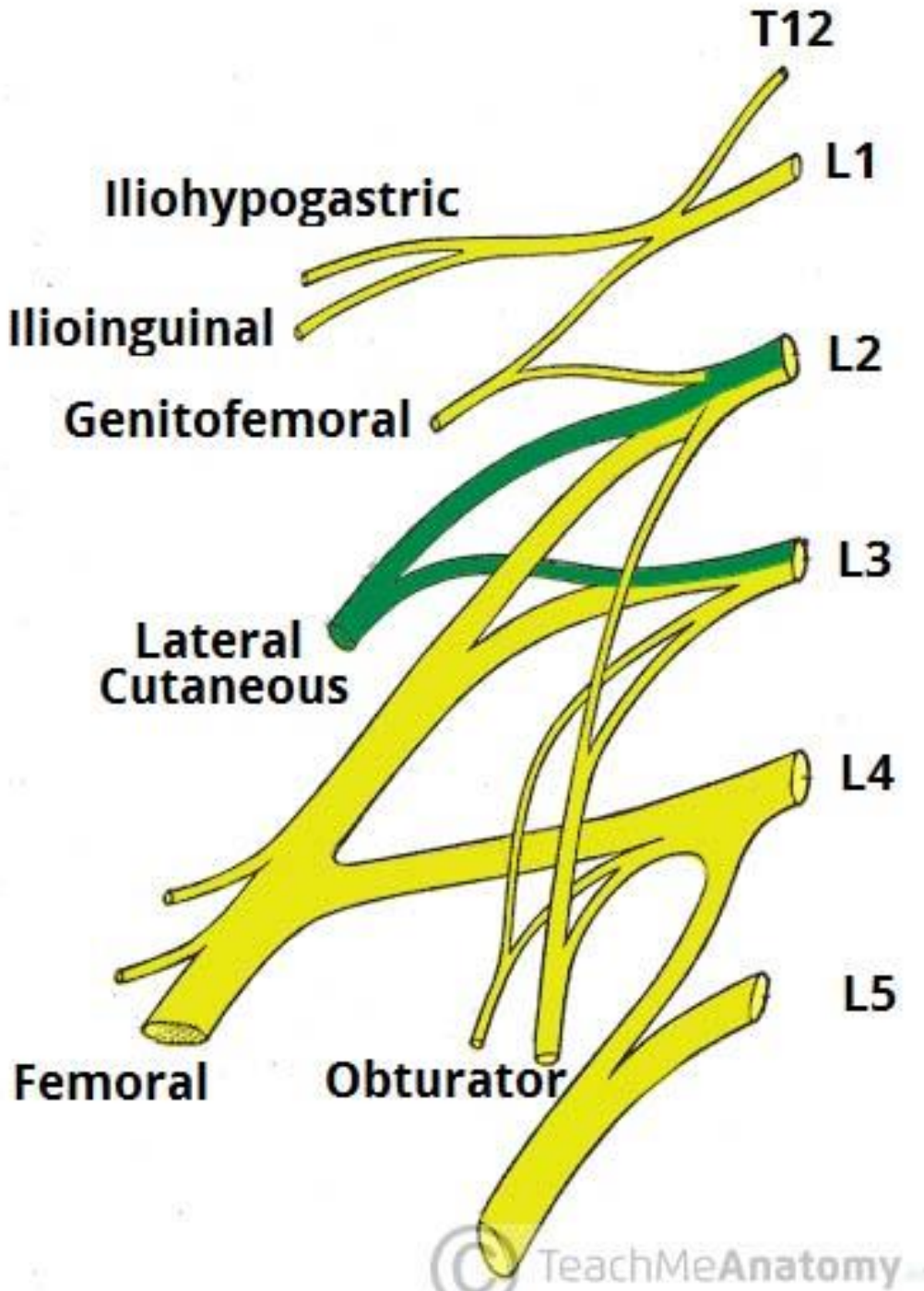
Obturator Neuralgia





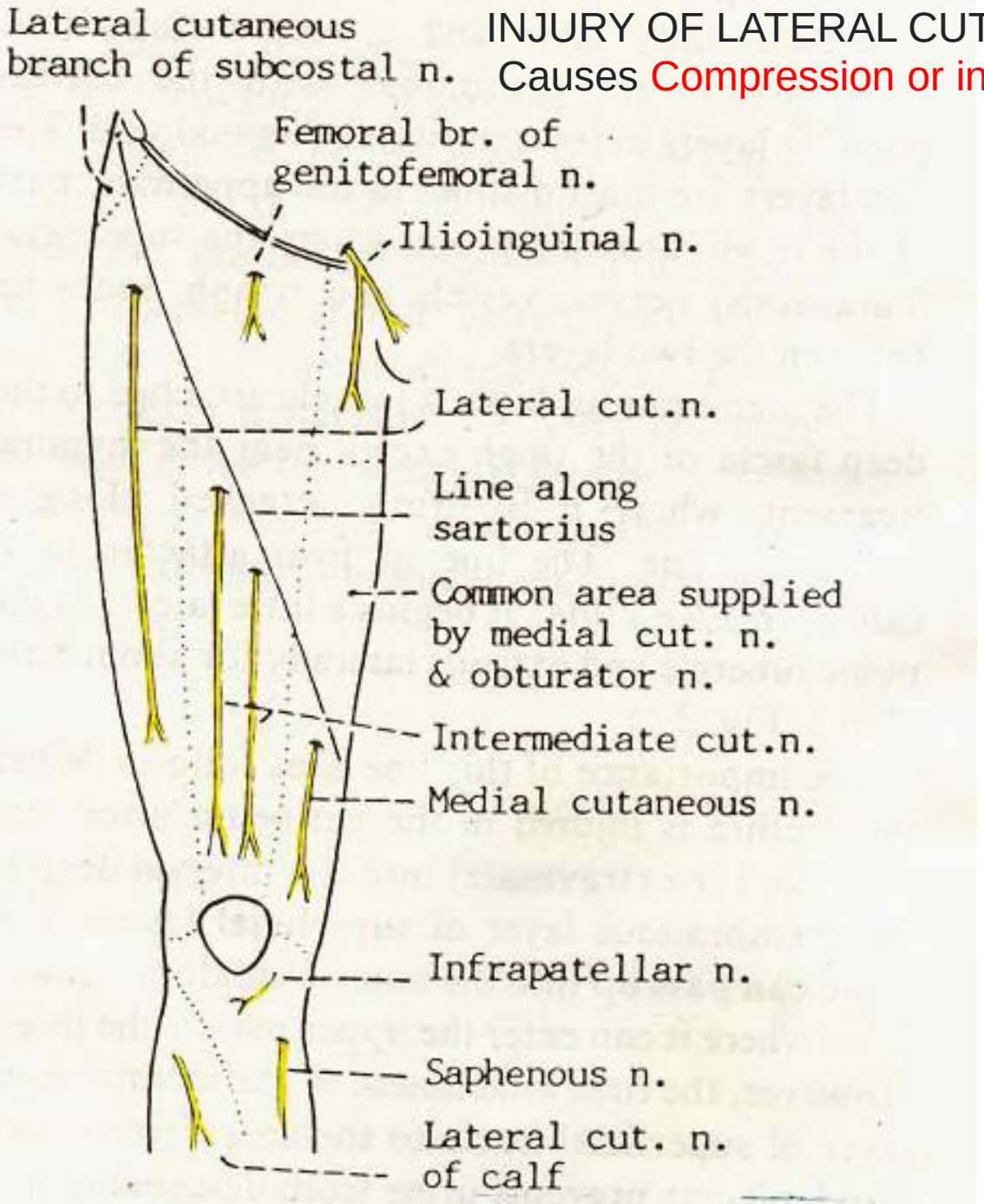

Lateral cutaneous
branch of subcostal n.
Femoral br. of
genitofemoral n.
Ilioinguinal n.
Lateral cut.n.
Line along
sartorius
Common area supplied
by medial cut. n.
& obturator n.
Intermediate cut.n.
Medial cutaneous n.
Infrapatellar n.
Saphenous n.
Lateral cut. n.
of calf

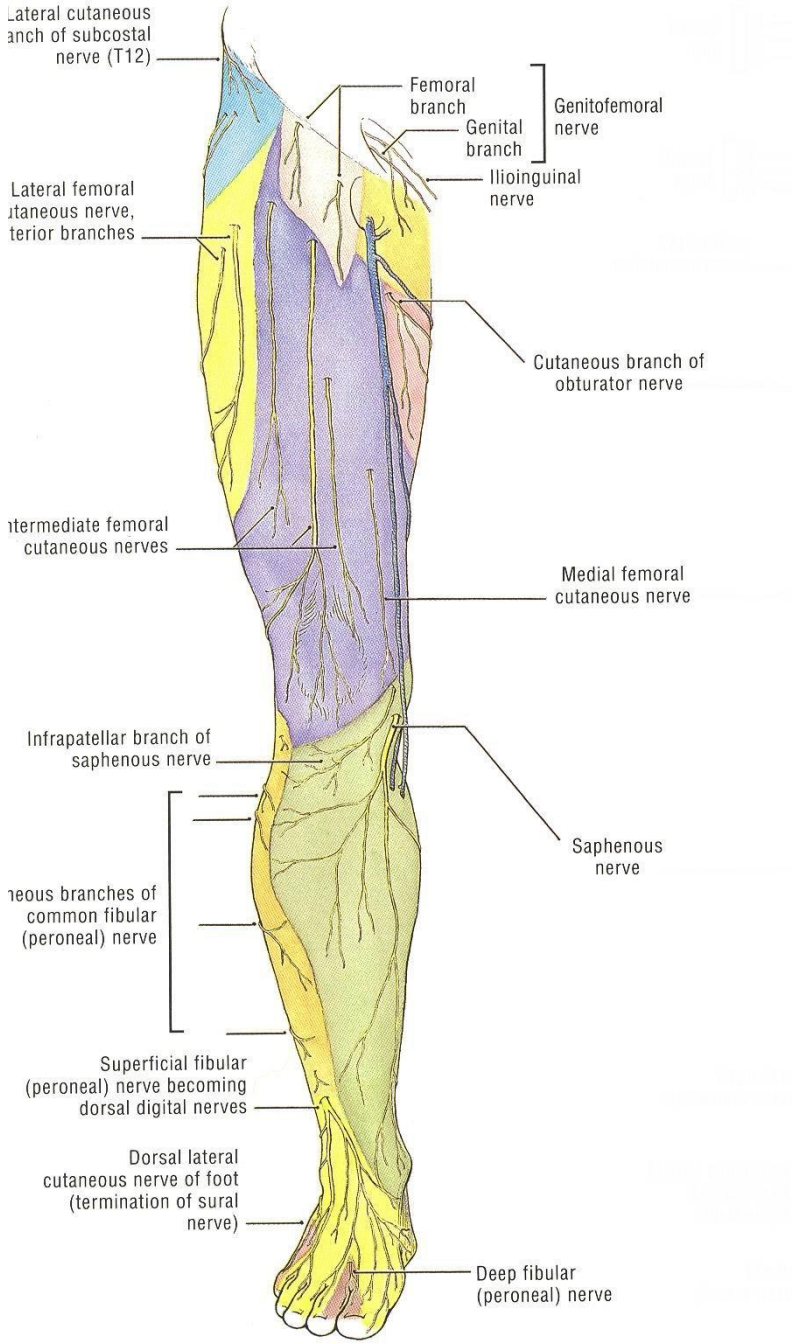




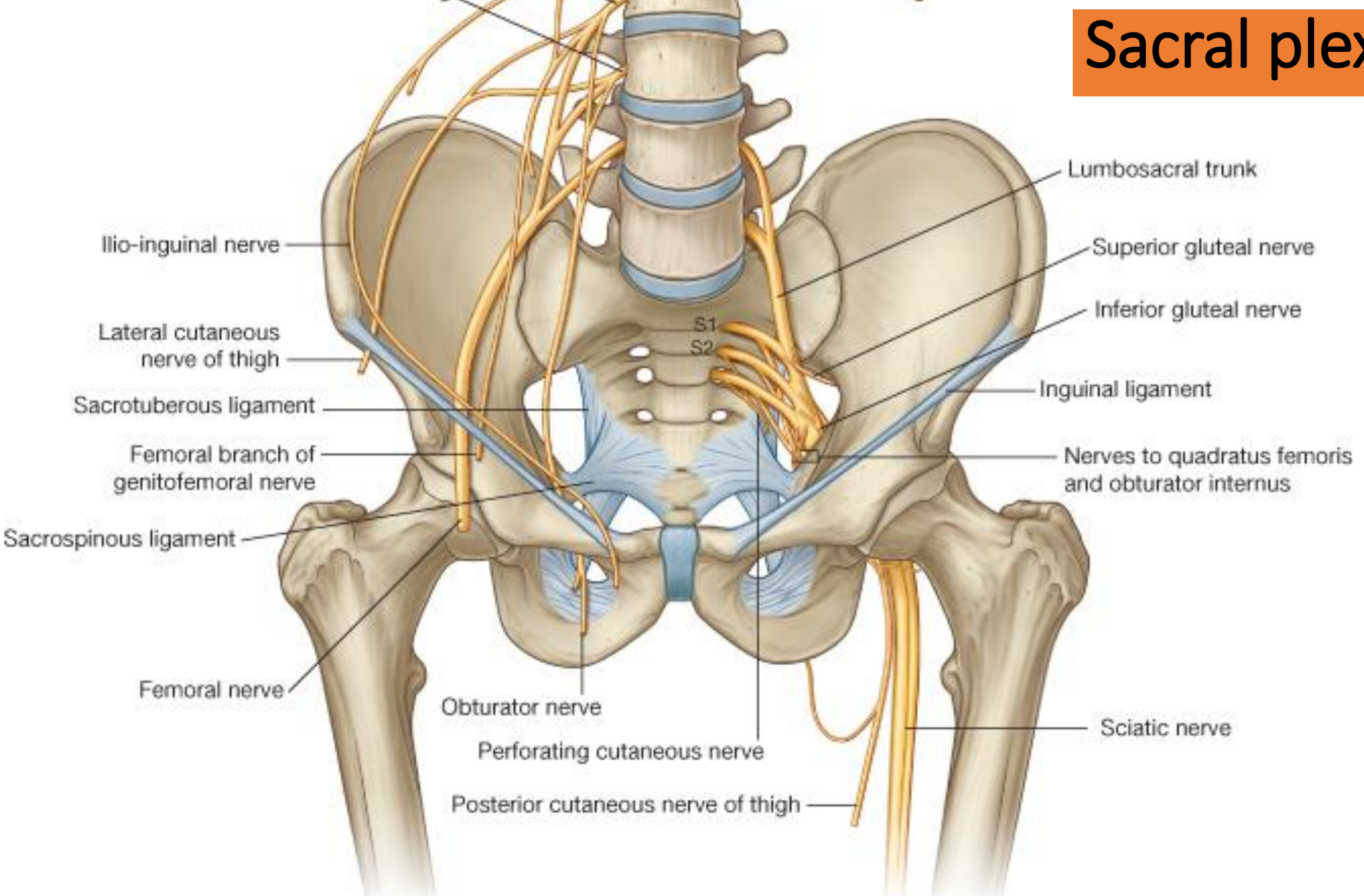
INJURY OF LATERAL CUTANEOUS NERVE OF THIGH

Causes Compression or inflammation

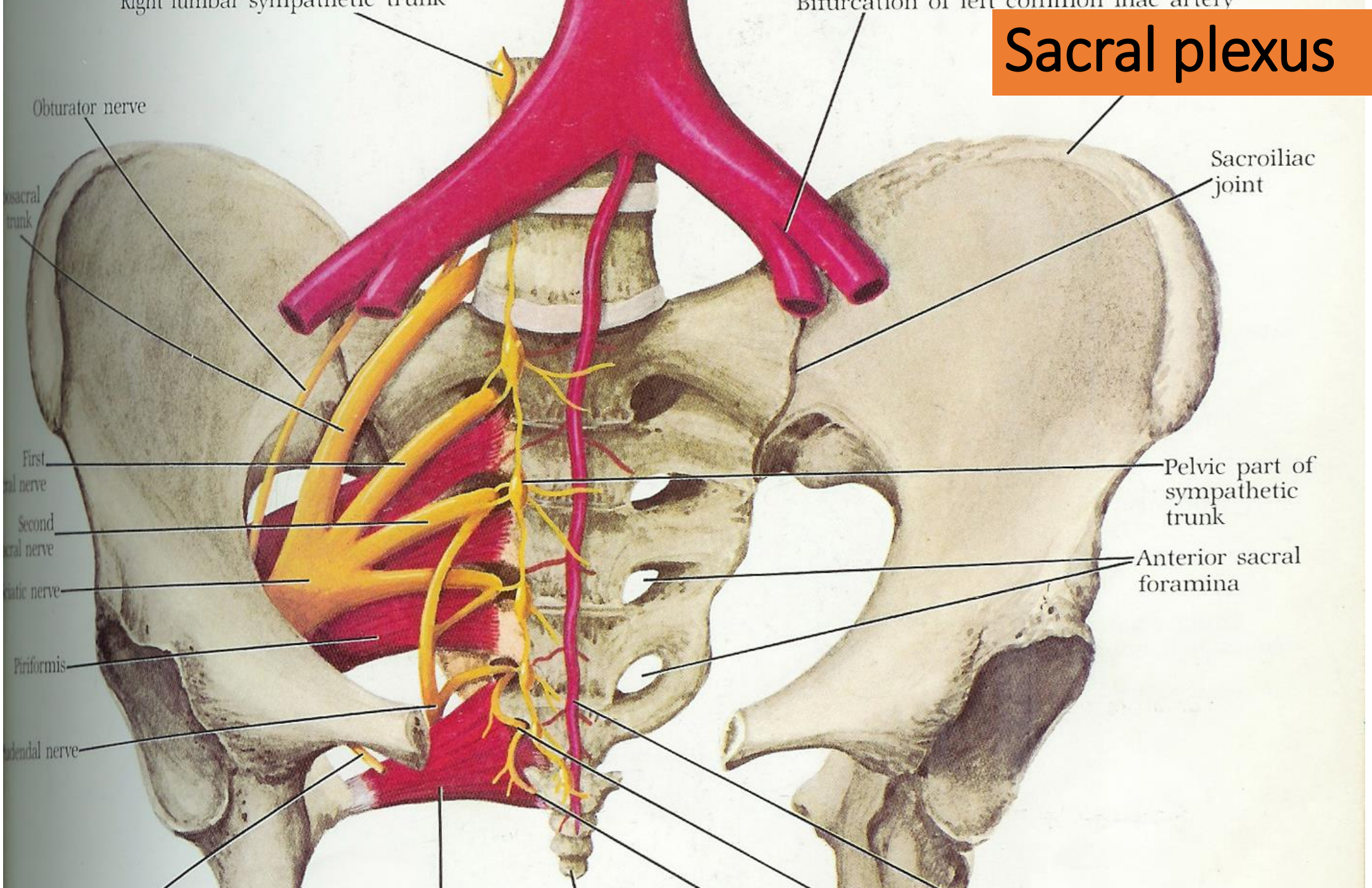


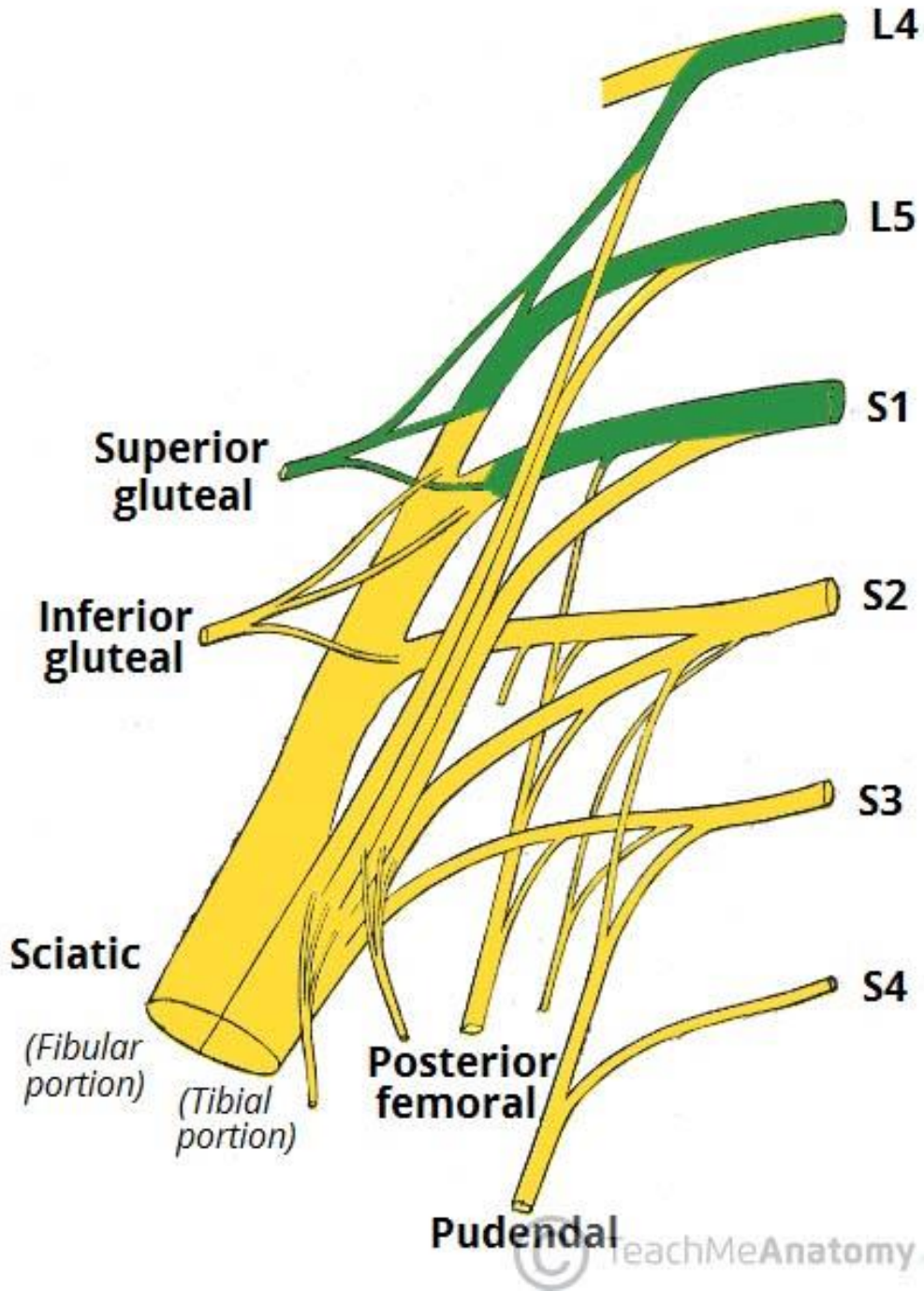


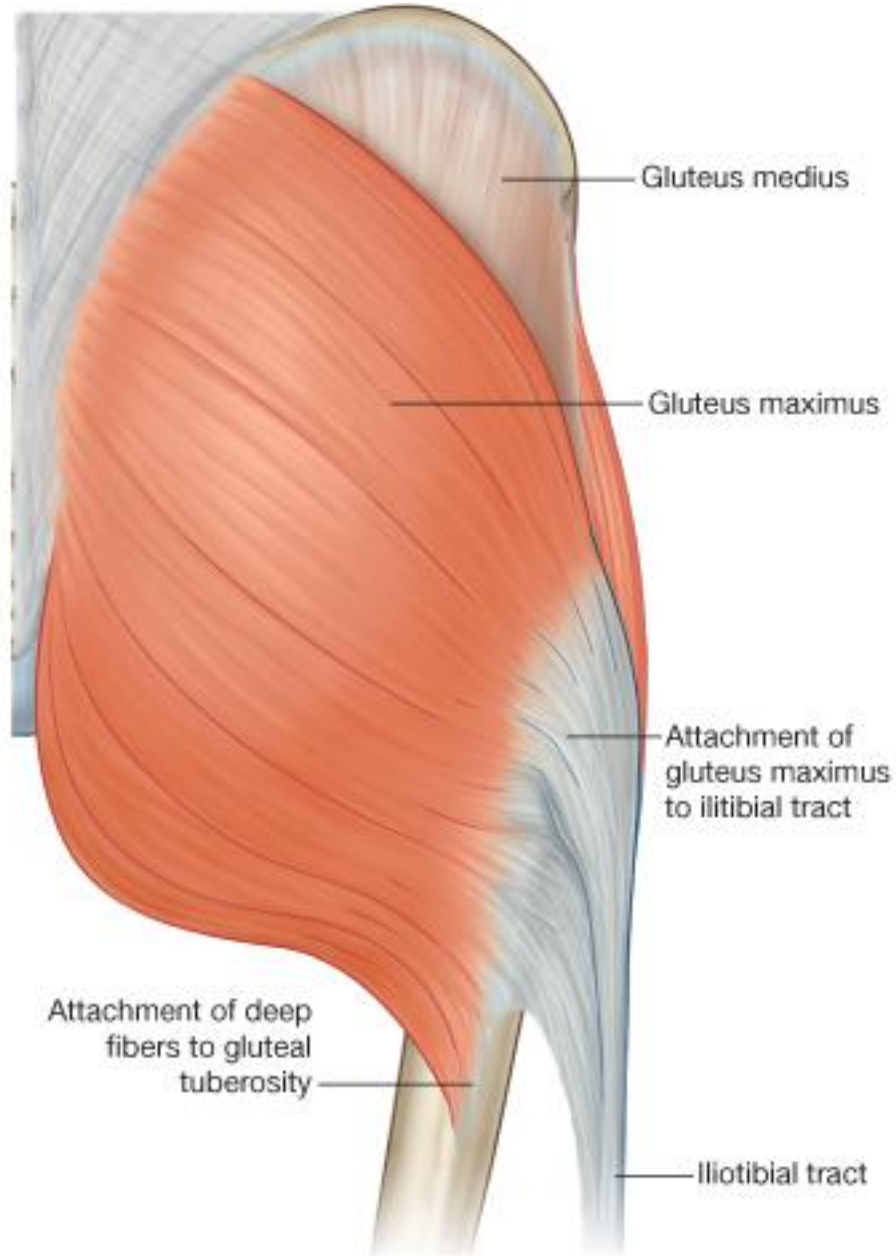
Sacral plexus

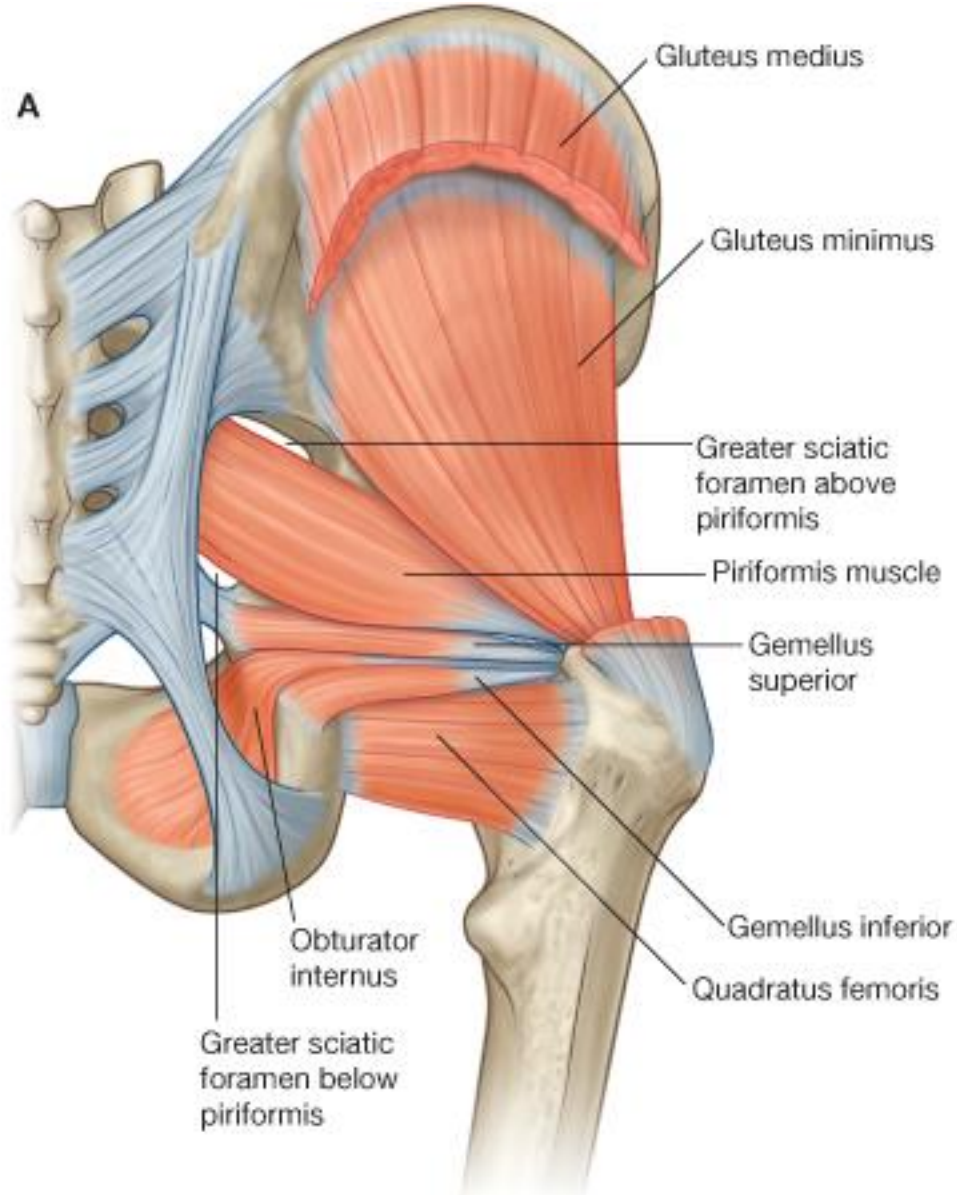


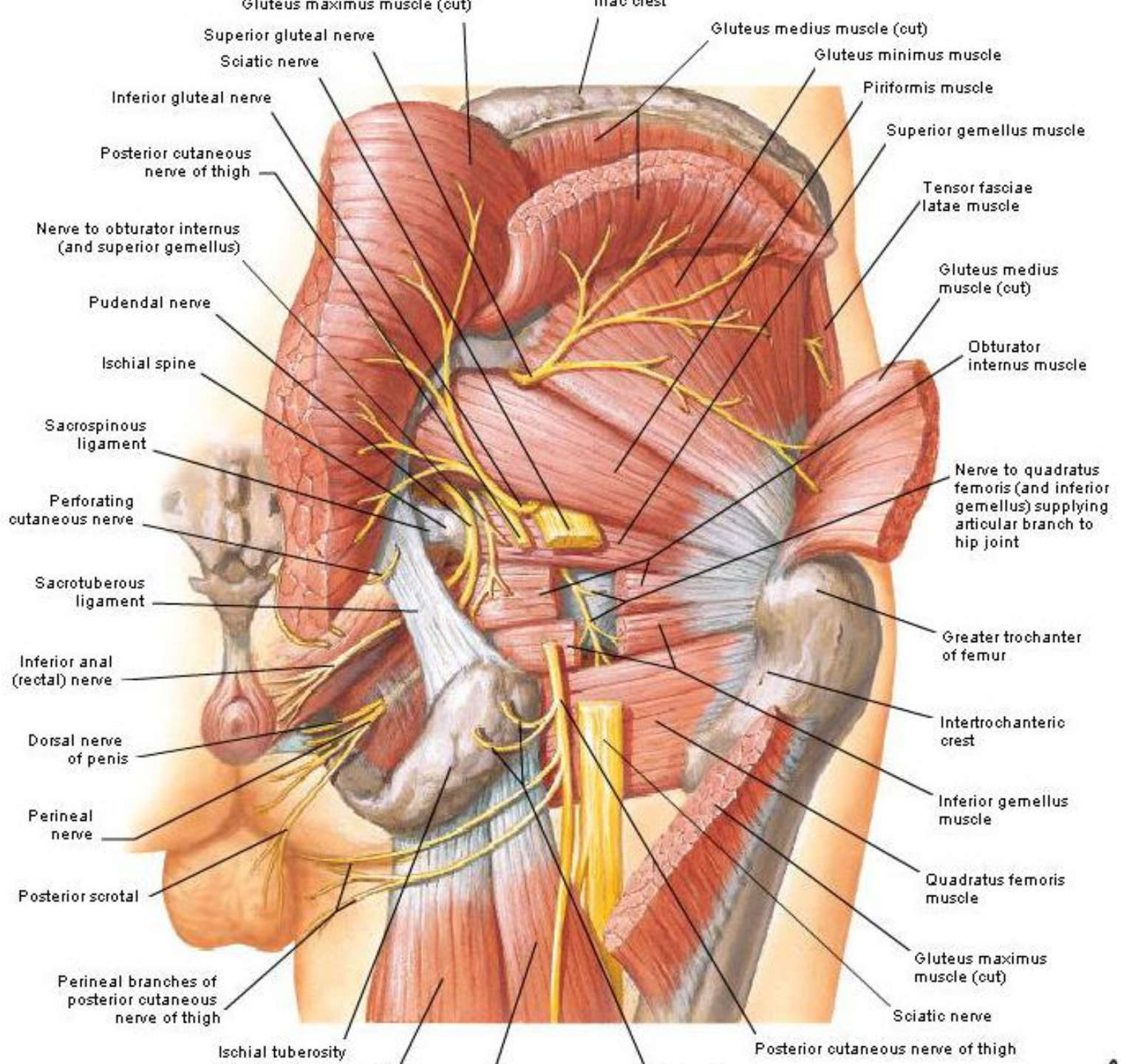
Sacral plexus





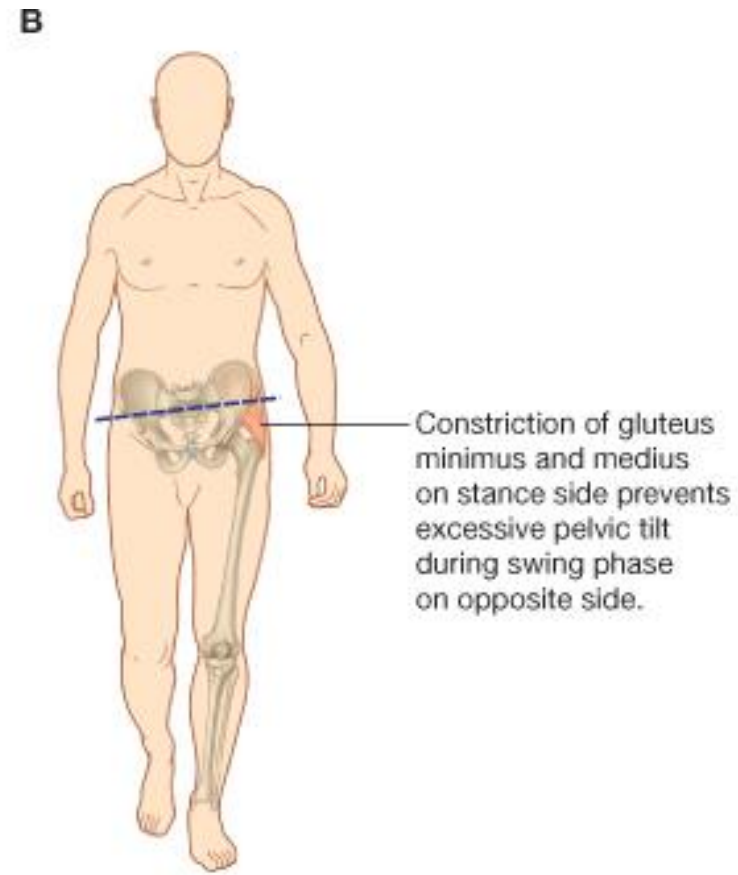


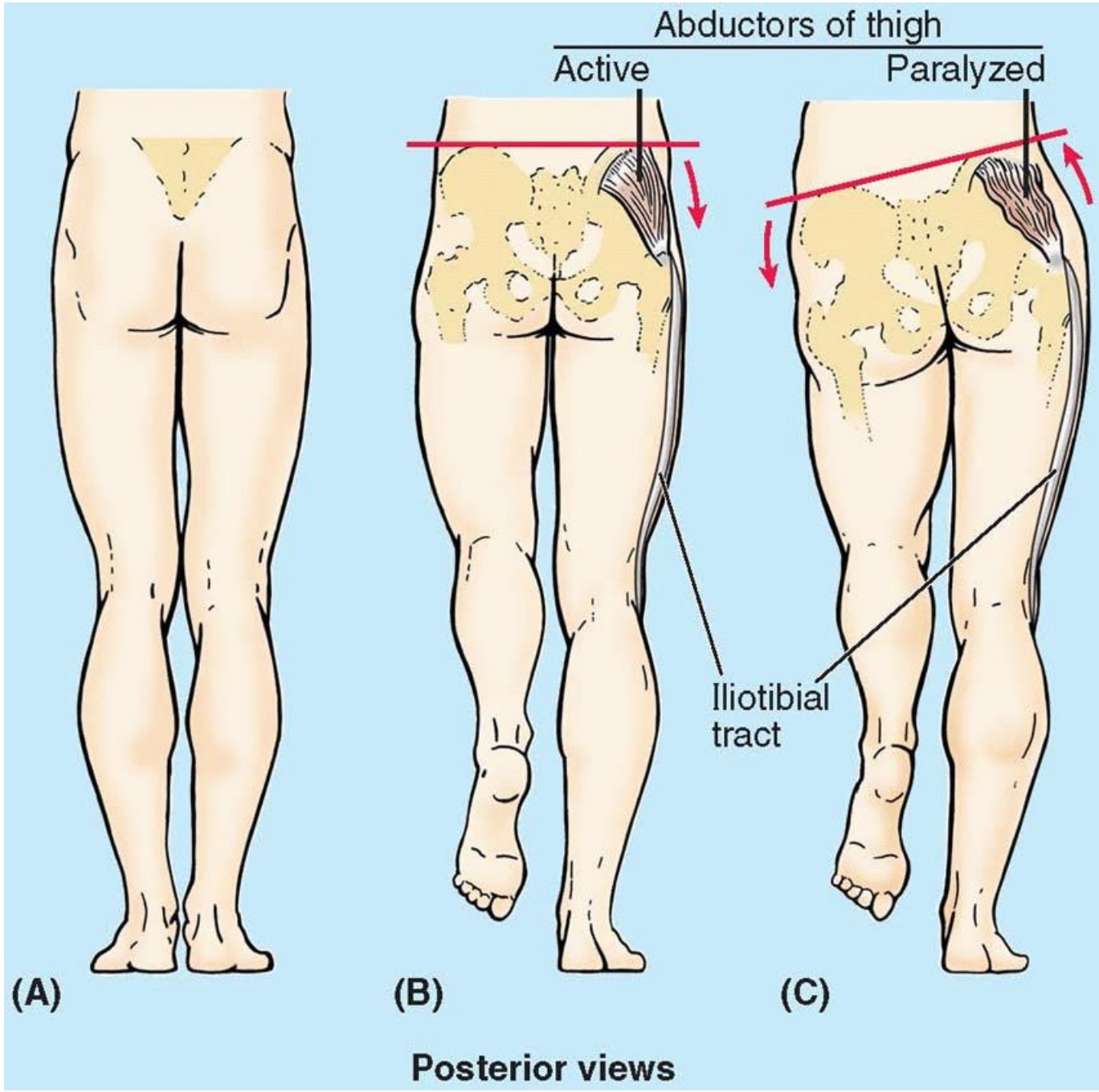



Gluteus maximus muscle (cut)
Iliac crest
Gluteus medius muscle (cut)
Superior gluteal nerve
Gluteus minimus muscle
Sciatic nerve
Piriformis muscle
Inferior gluteal nerve
Superior gemellus muscle
Posterior cutaneous nerve of thigh
Tensor fasciae latae muscle
Nerve to obturator internus (and superior gemellus)
Gluteus medius muscle (cut)
Pudendal nerve
Obturator internus muscle
Ischial spine
Sacrospinous ligament
Nerve to quadratus femoris (and inferior gemellus) supplying articular branch to hip joint
Perforating cutaneous nerve
Sacrotuberous ligament
Greater trochanter of femur
Inferior anal (rectal) nerve
Intertrochanteric crest
Dorsal nerve of penis
Inferior gemellus muscle
Perineal nerve
Quadratus femoris muscle
Posterior scrotal
Gluteus maximus muscle (cut)
Perineal branches of posterior cutaneous nerve of thigh
Sciatic nerve
Ischial tuberosity
Posterior cutaneous nerve of thigh

INJURY TO SUPERIOR GLUTEAL NERVE

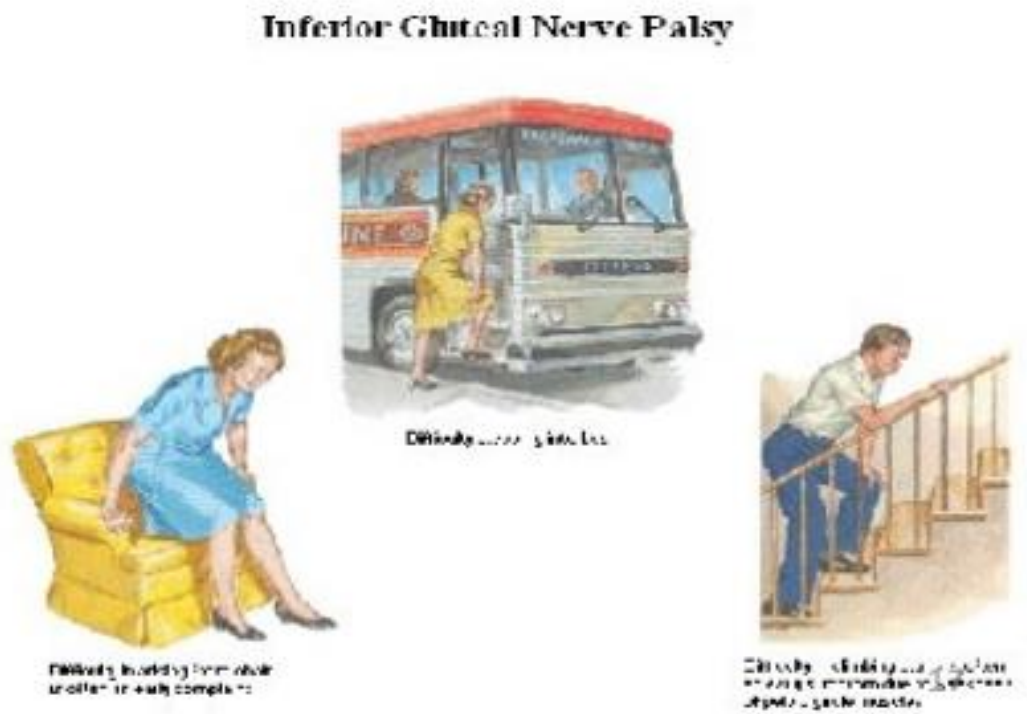
- Loss of abduction of hip
- Unilateral injury: shows positive trendelenberg, s sign
- Bilateral injury: shows waddling gait

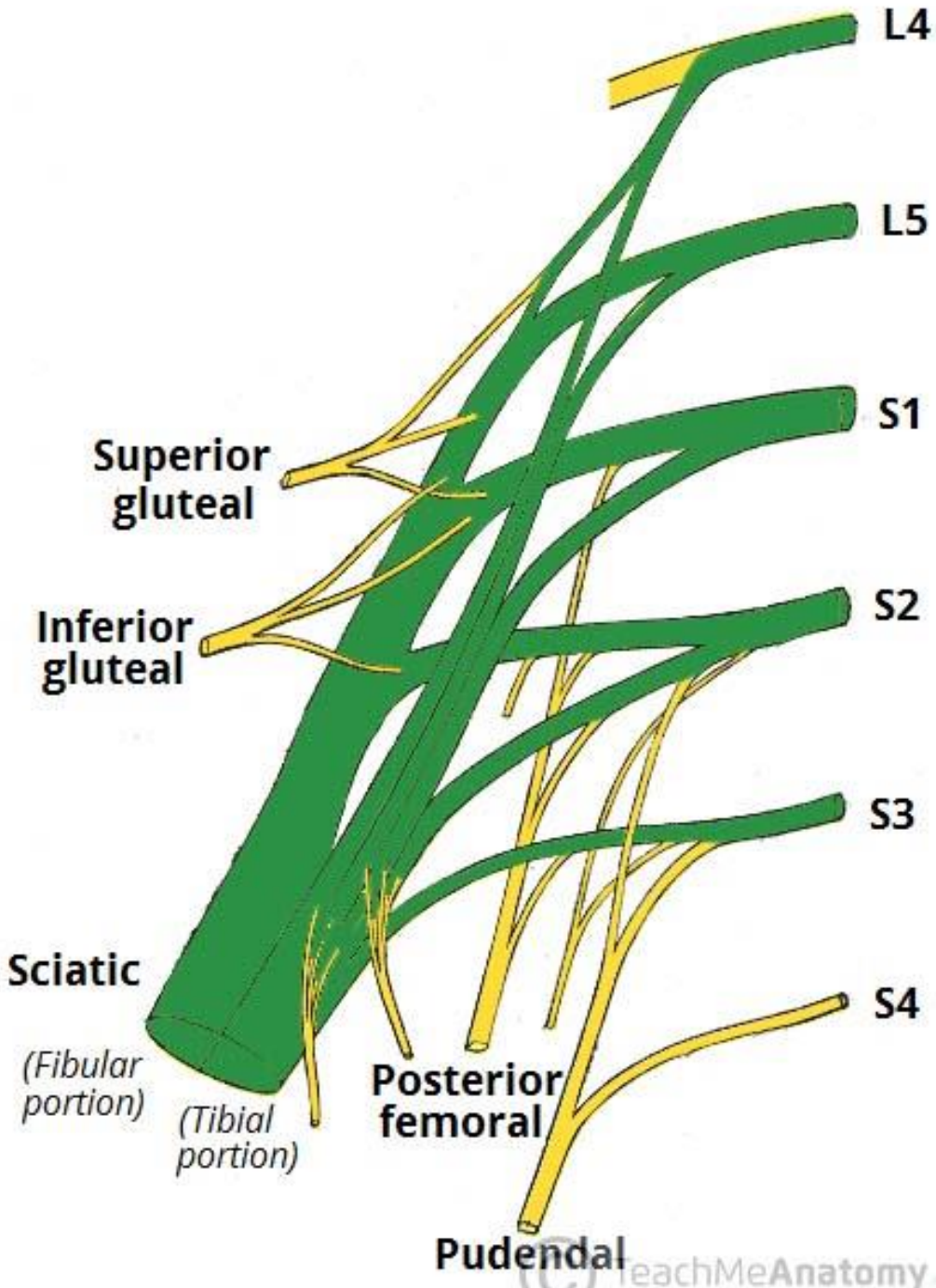


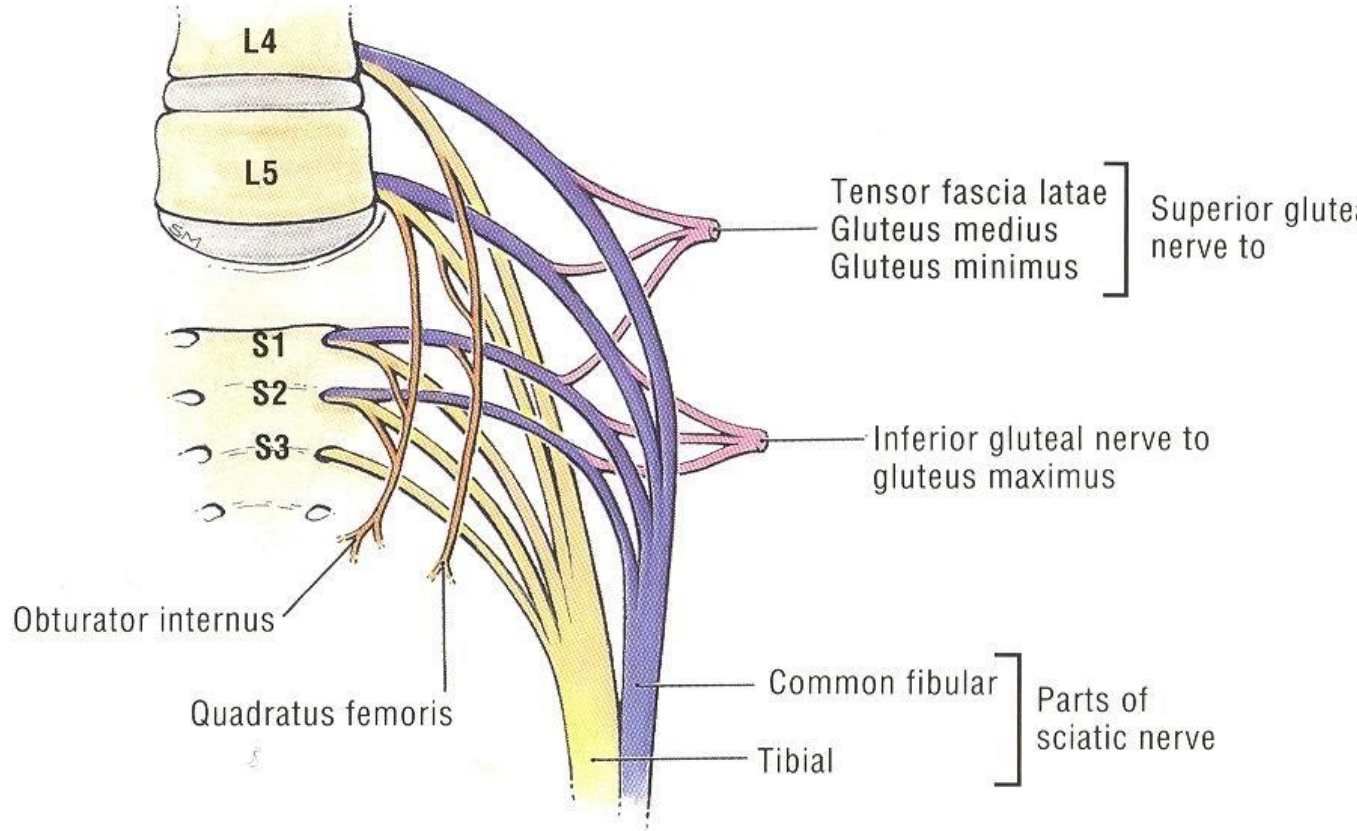


INJURY TO INFERIOR GLUTEAL NERVE

- Impairment of hip extension and lateral rotation
- Difficulty in raising the body from sitting position







The Sacral Plexus

- Provides motor and sensory nerves for the posterior thigh, most of the lower leg, the entire foot, and part of the pelvis

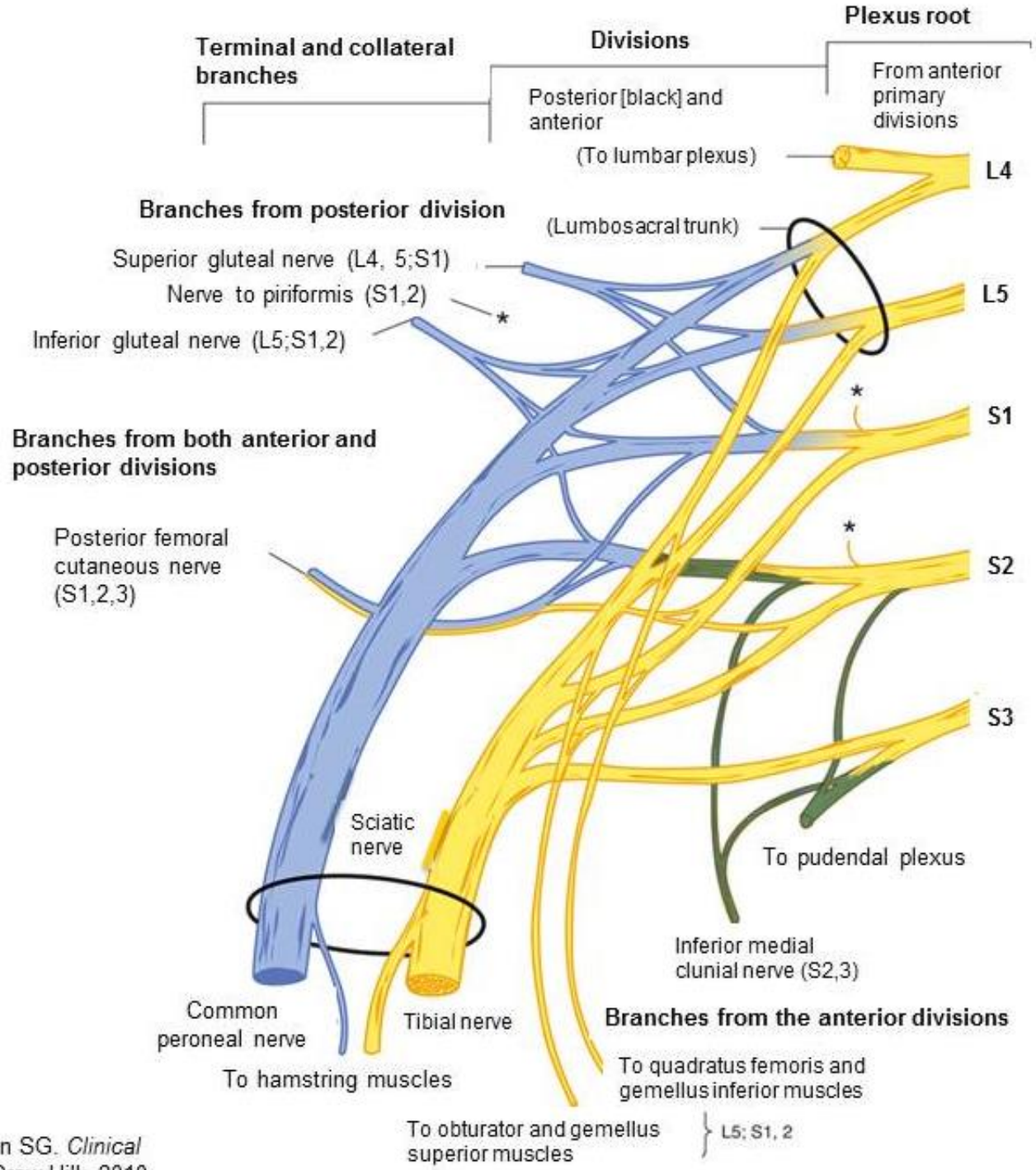
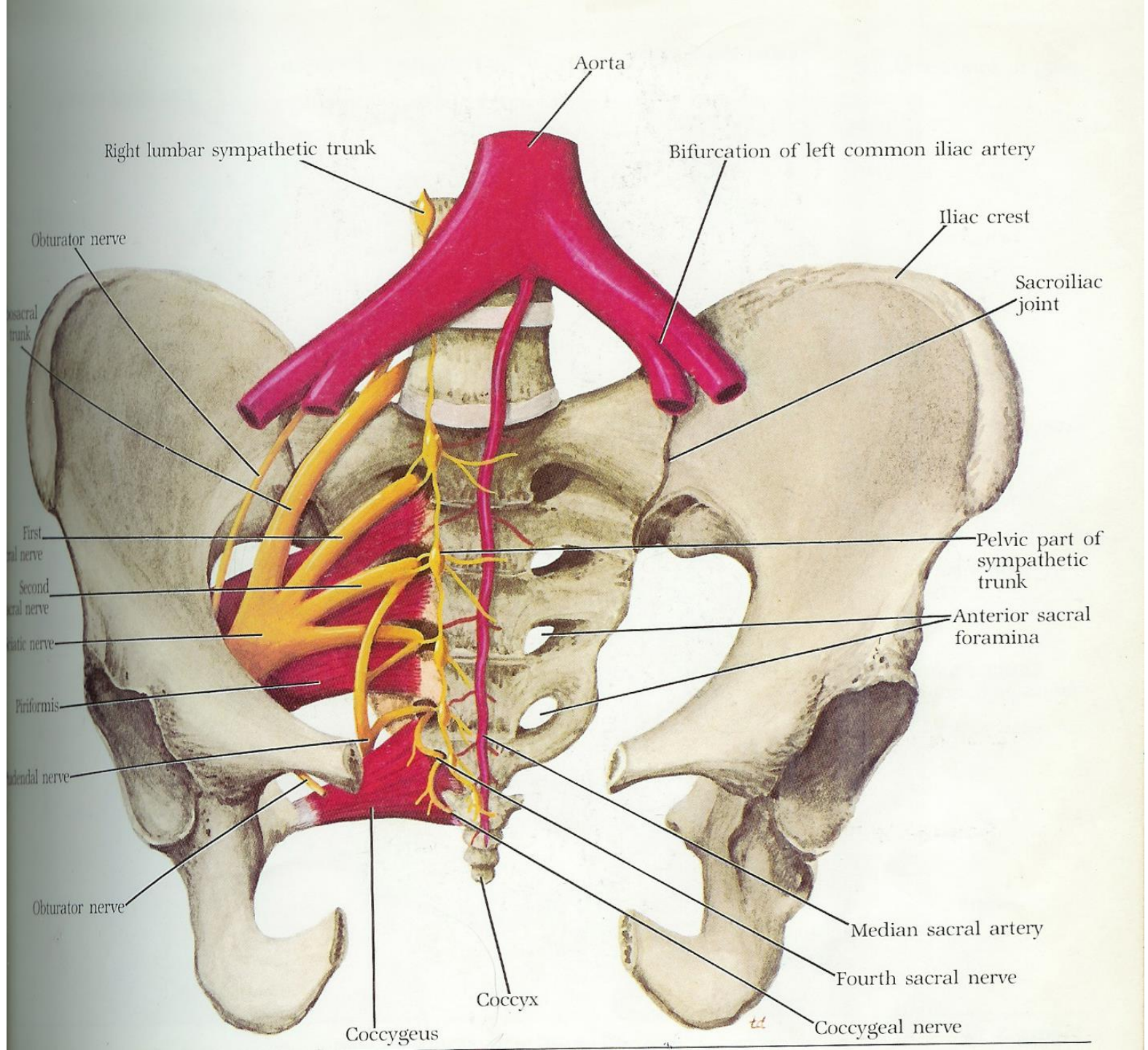
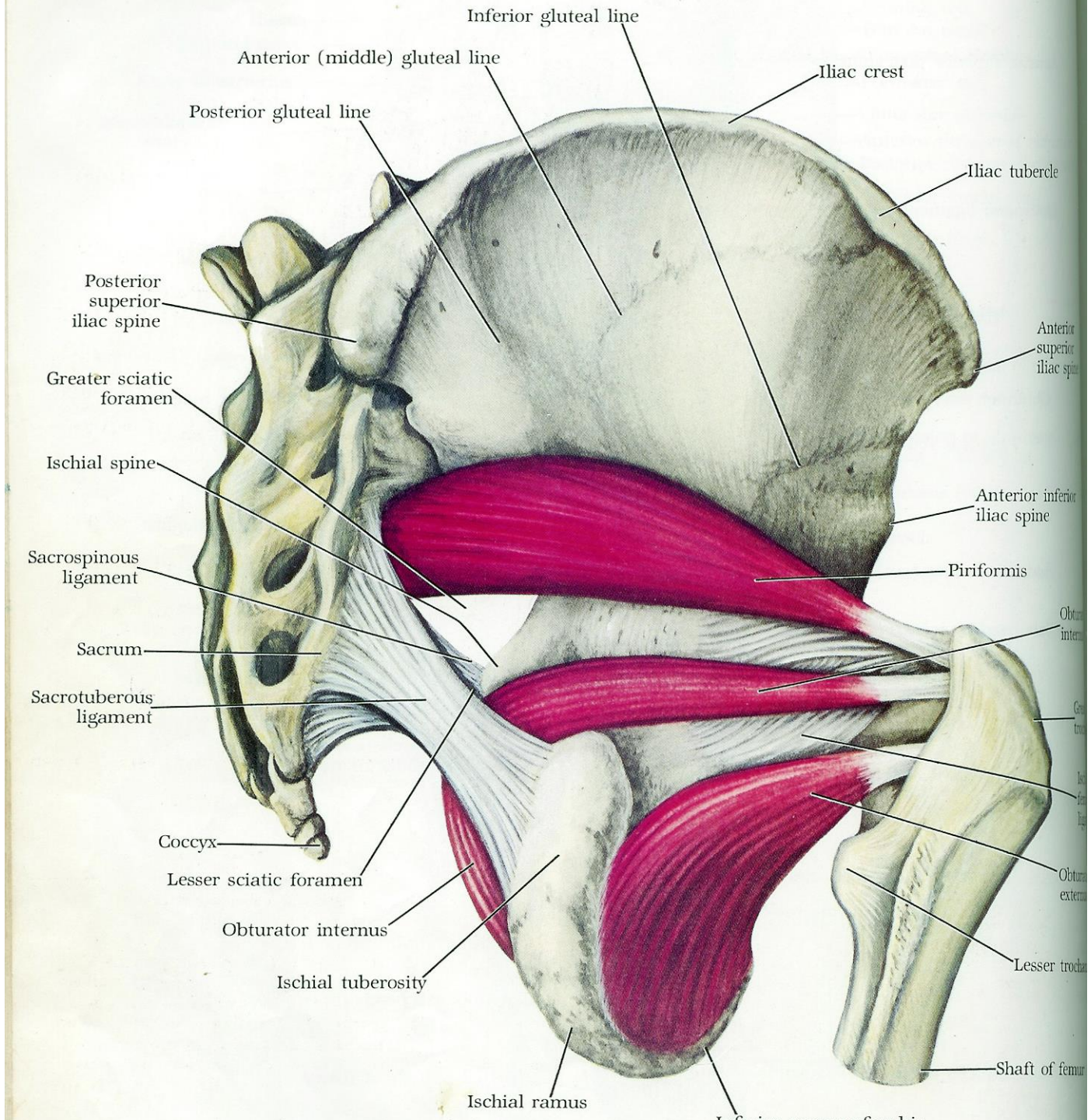
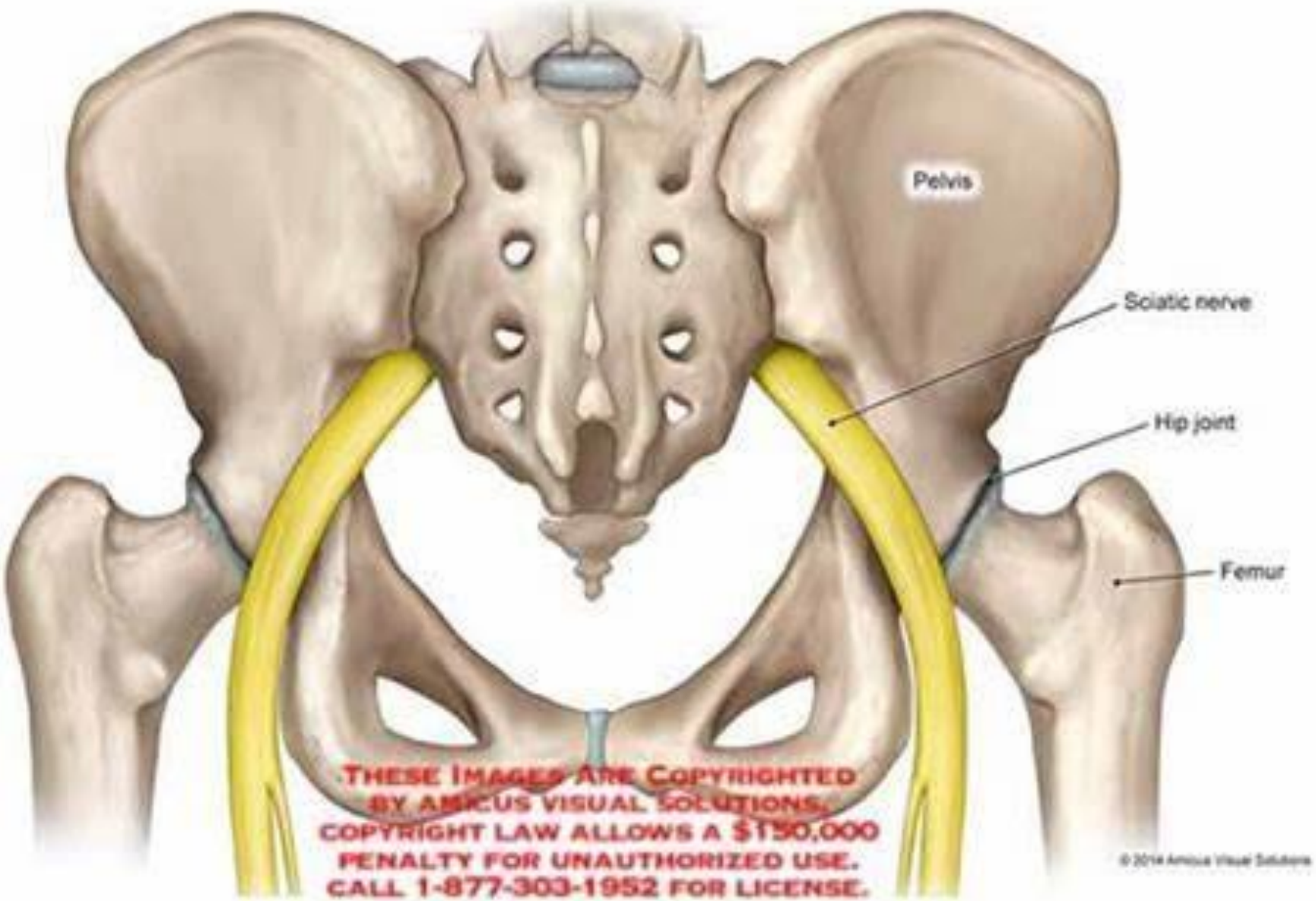


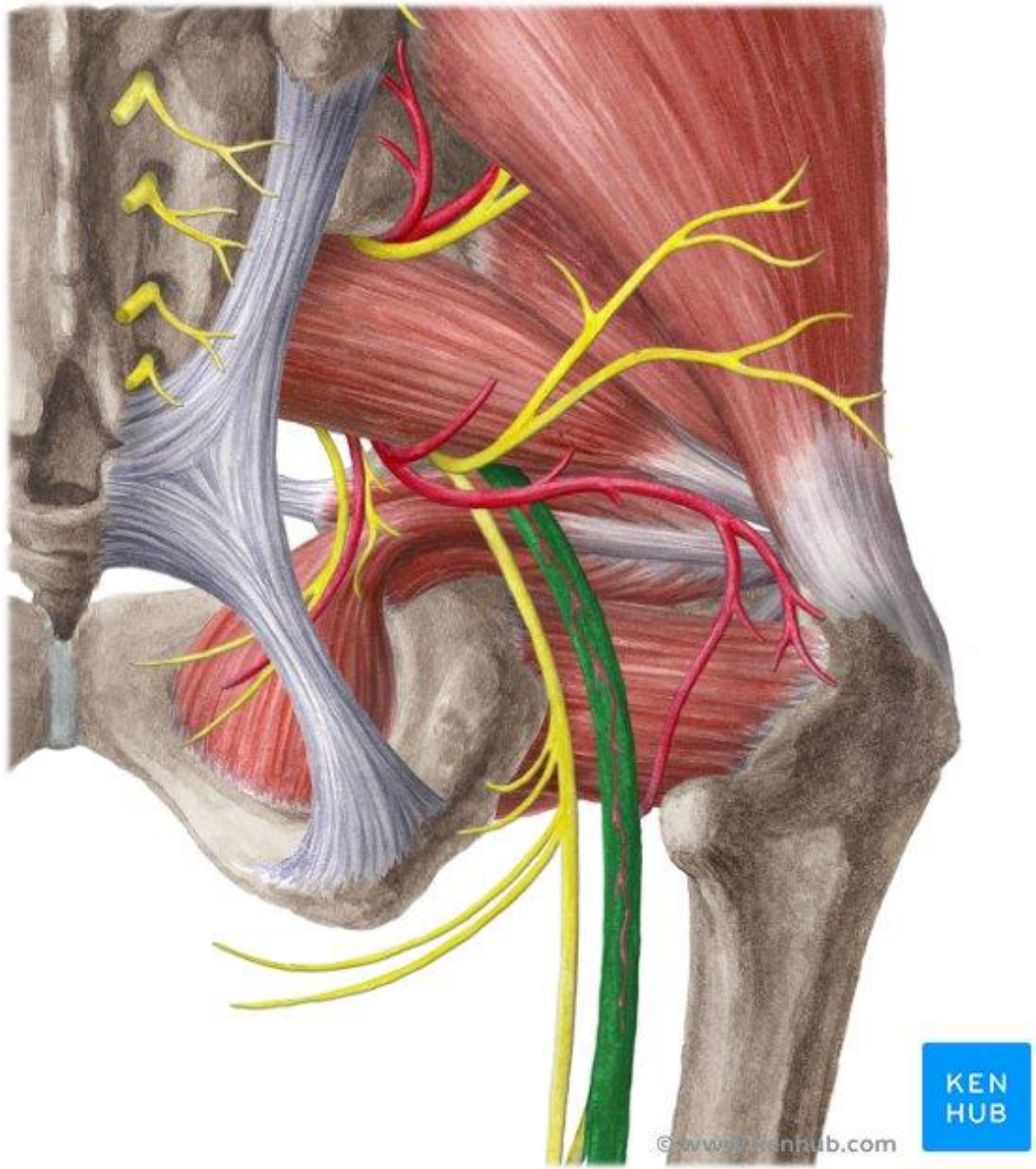
Figure 28-12. The sacral plexus. In: Waxman SG. *Clinical Neuroanatomy*. 26th ed. New York, NY: McGraw-Hill; 2010

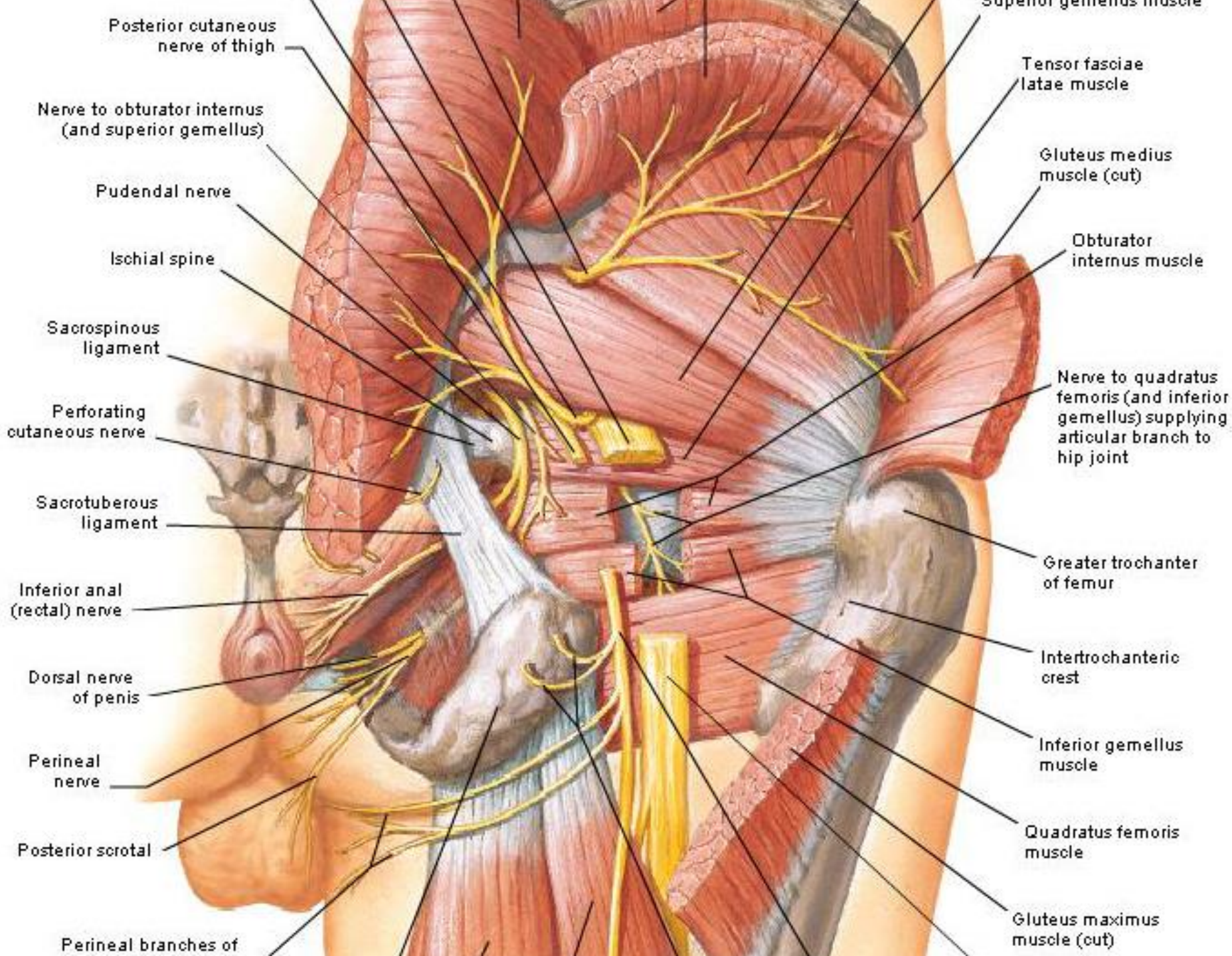

Aorta
Right lumbar sympathetic trunk
Bifurcation of left common iliac artery
Iliac crest
Obturator nerve
Sacroiliac joint
First
Second
Pelvic part of sympathetic trunk
Anterior sacral foramina
Piriformis
Obturator nerve
Median sacral artery
Fourth sacral nerve
Coccyx
Coccygeal nerve
Coccygeus

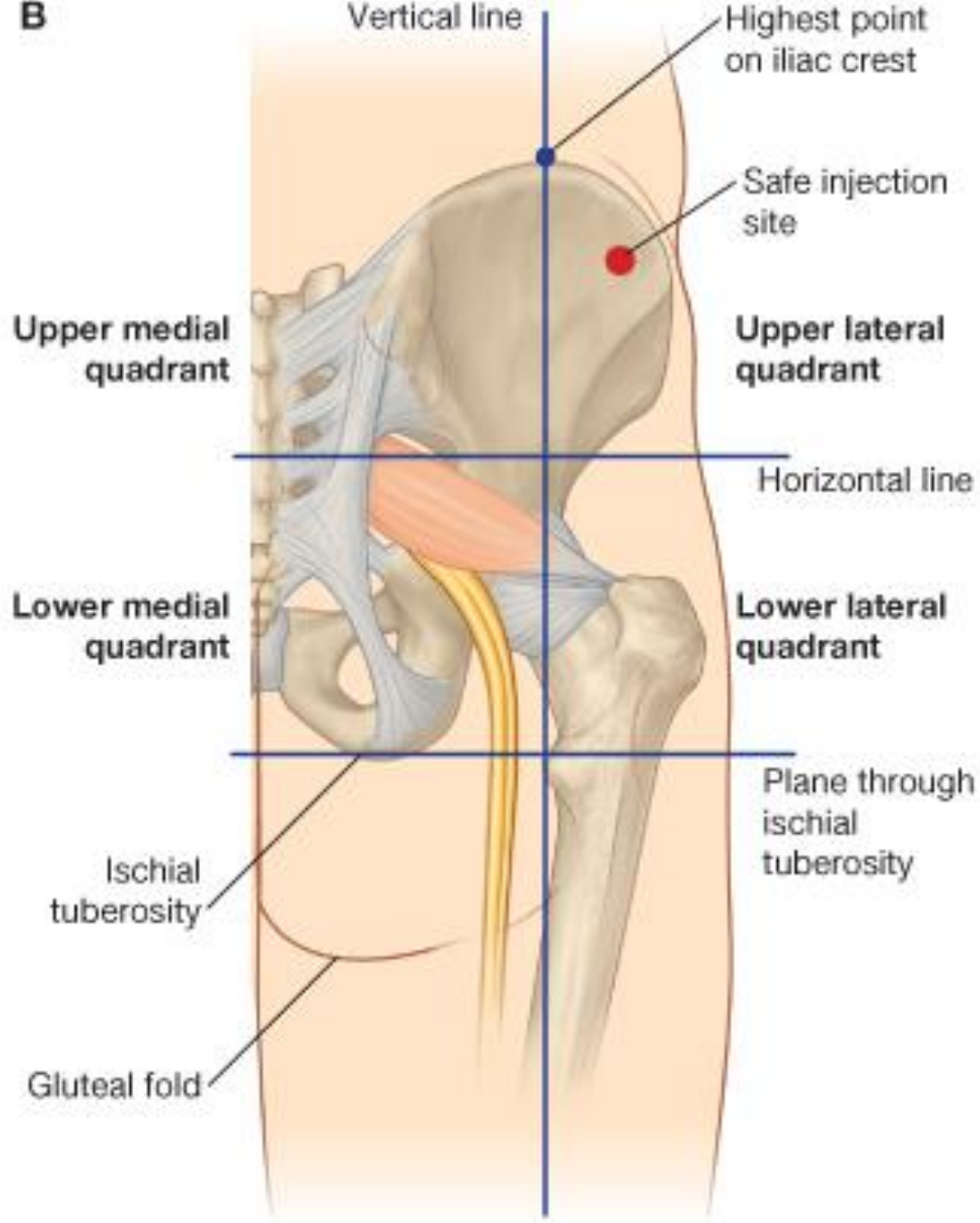

Inferior gluteal line
Anterior (middle) gluteal line
Iliac crest
Posterior gluteal line
Iliac tubercle
Posterior superior iliac spine
Anterior superior iliac spine
Greater sciatic foramen
Ischial spine
Anterior inferior iliac spine
Sacrospinous ligament
Piriformis
Sacrum
Sacrotuberous ligament
Coccyx
Lesser sciatic foramen
Obturator internus
Ischial tuberosity
Lesser trochanter
Shaft of femur
Ischial ramus

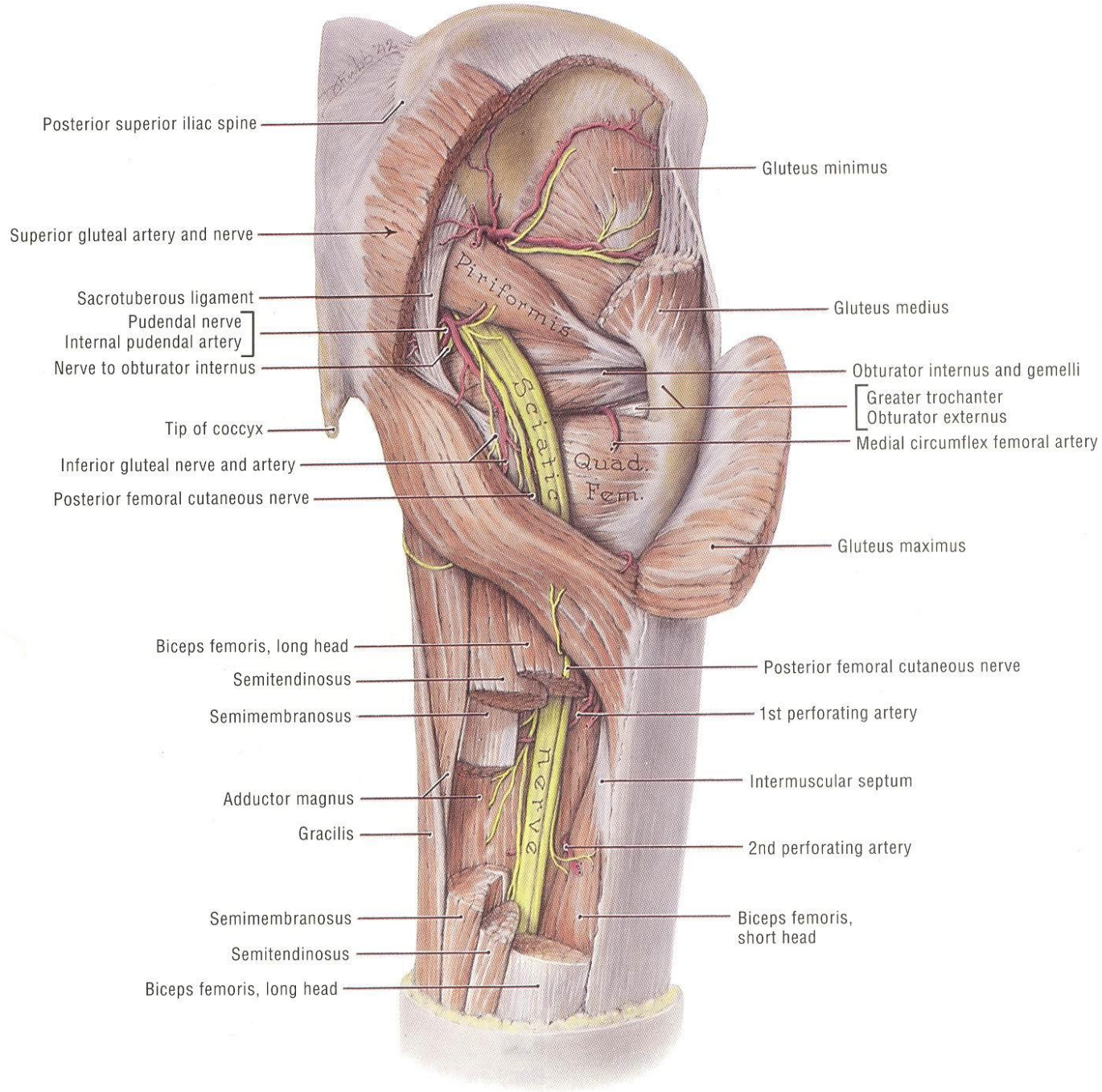
Posterior View of Sciatic Nerve




KEN
HUB

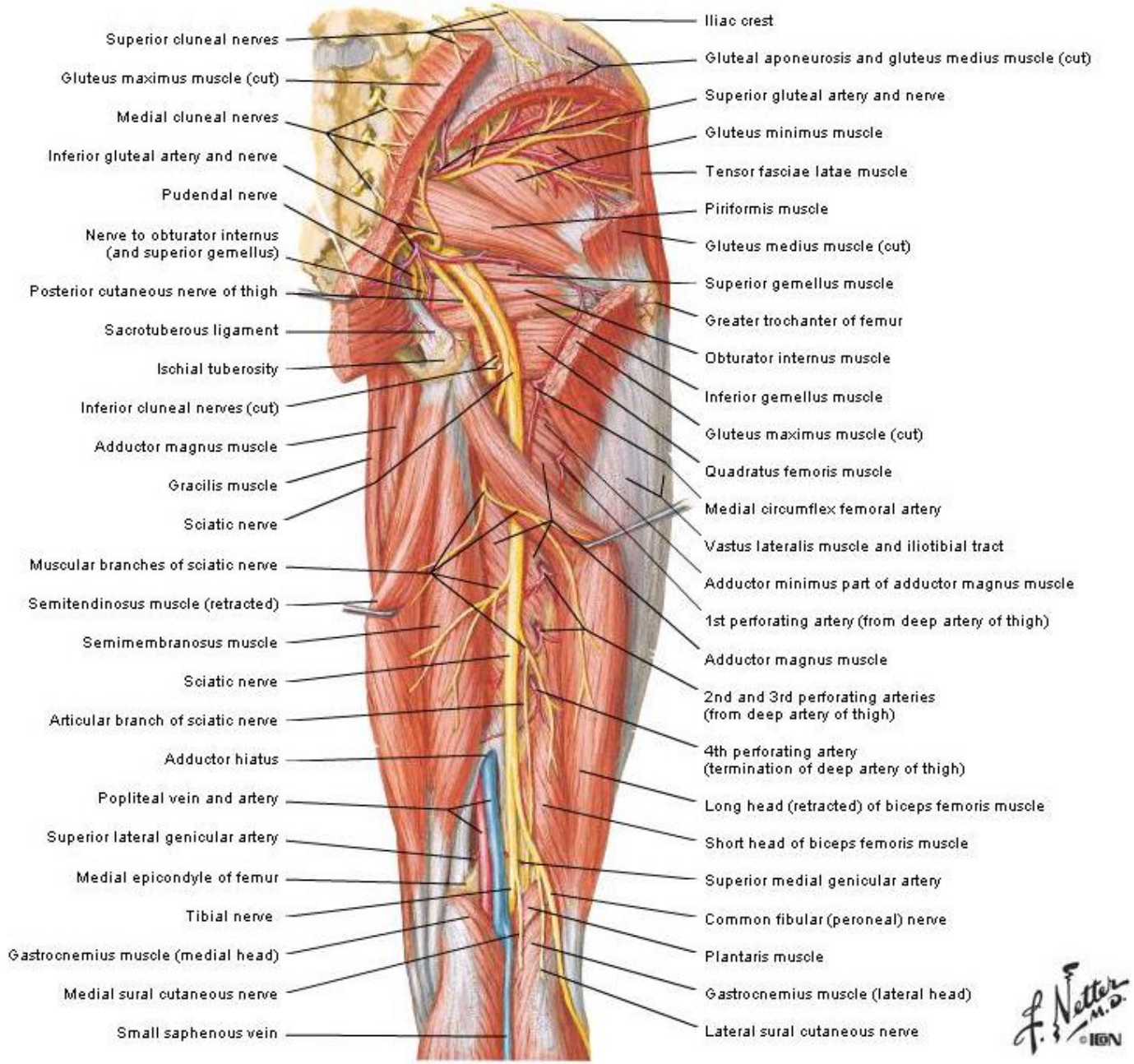

Posterior cutaneous nerve of thigh
Nerve to obturator internus (and superior gemellus)
Pudendal nerve
Ischial spine
Sacrospinous ligament
Perforating cutaneous nerve
Sacrotuberous ligament
Inferior anal (rectal) nerve
Dorsal nerve of penis
Perineal nerve
Posterior scrotal
Perineal branches of
Superior gemellus muscle
Tensor fasciae latae muscle
Gluteus medius muscle (cut)
Obturator internus muscle
Nerve to quadratus femoris (and inferior gemellus) supplying articular branch to hip joint
Greater trochanter of femur
Intertrochanteric crest
Inferior gemellus muscle
Quadratus femoris muscle
Gluteus maximus muscle (cut)




Posterior superior iliac spine
Superior gluteal artery and nerve
Sacrotuberous ligament
Pudendal nerve
Internal pudendal artery
Nerve to obturator internus
Tip of coccyx
Inferior gluteal nerve and artery
Posterior femoral cutaneous nerve
Biceps femoris, long head
Semitendinosus
Semimembranosus
Adductor magnus
Gracilis
Semimembranosus
Semitendinosus
Biceps femoris, long head
Piriformis
Sciatic
Quad. Fem.
Gluteus minimus
Gluteus medius
Obturator internus and gemelli
Greater trochanter
Obturator externus
Medial circumflex femoral artery
Gluteus maximus
Posterior femoral cutaneous nerve
1st perforating artery
Intermuscular septum
2nd perforating artery
Biceps femoris, short head

Arteries and Nerves of Thigh (Deep Dissection)

Posterior View



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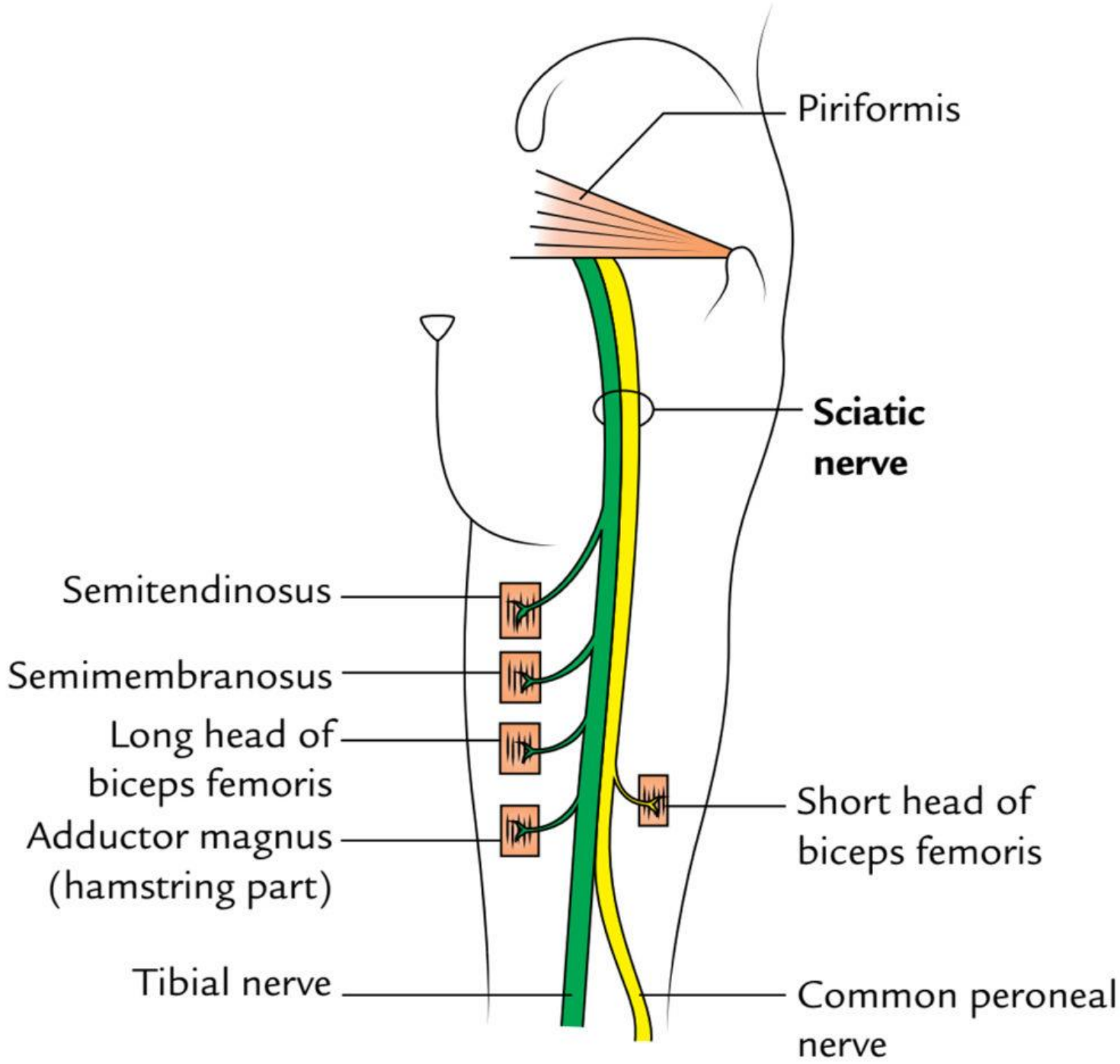

Piriformis
Sciatic nerve
Semitendinosus
Semimembranosus
Long head of biceps femoris
Adductor magnus (hamstring part)
Short head of biceps femoris
Tibial nerve
Common peroneal nerve

The Sciatic Nerve

- Motor functions
  - Leg flexion at the knee (see also tibial and peroneal nerves, which are the two most important branches clinically of the sciatic nerve)
  - The hamstring muscles (semitendinosus, semimembranosus, biceps femoris) are innervated by the sciatic nerve itself before it divides into the tibal and common peroneal nerve

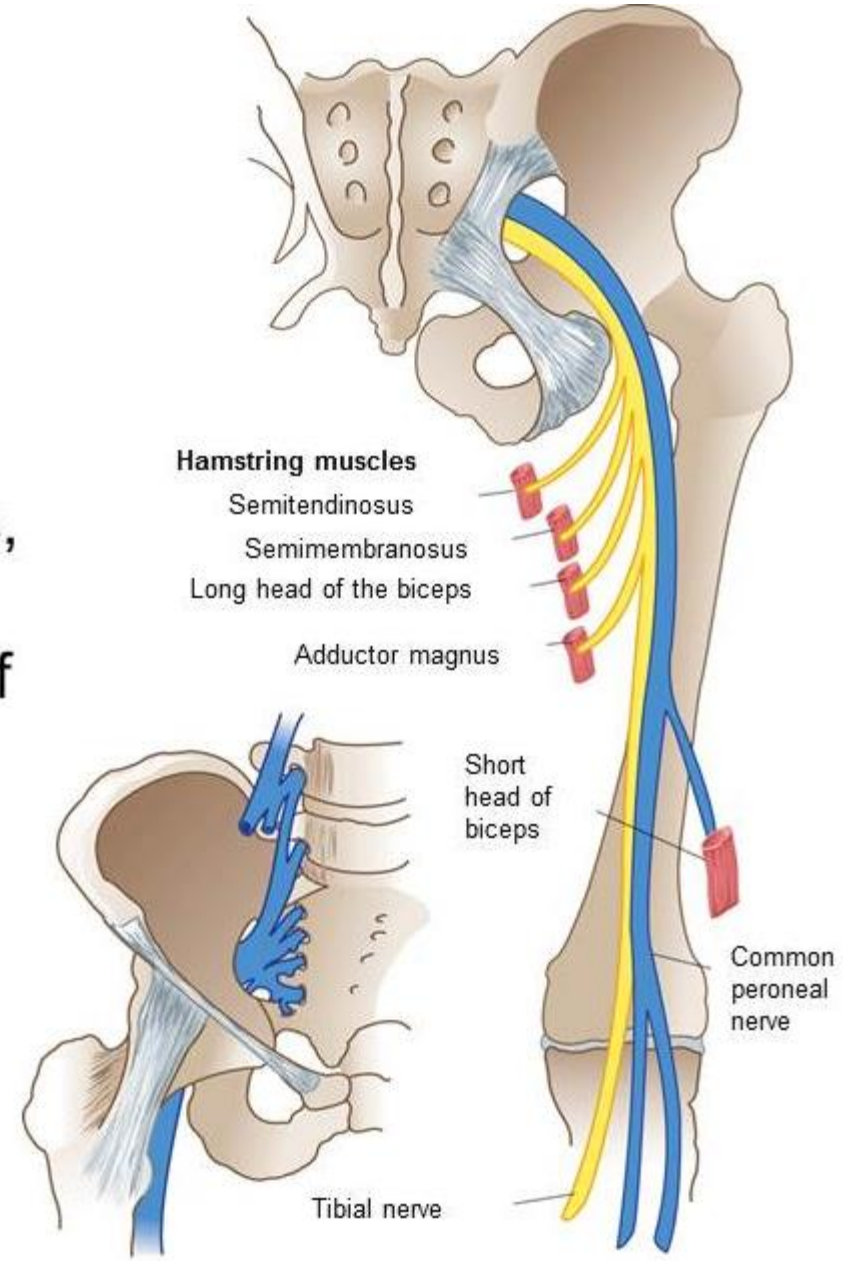
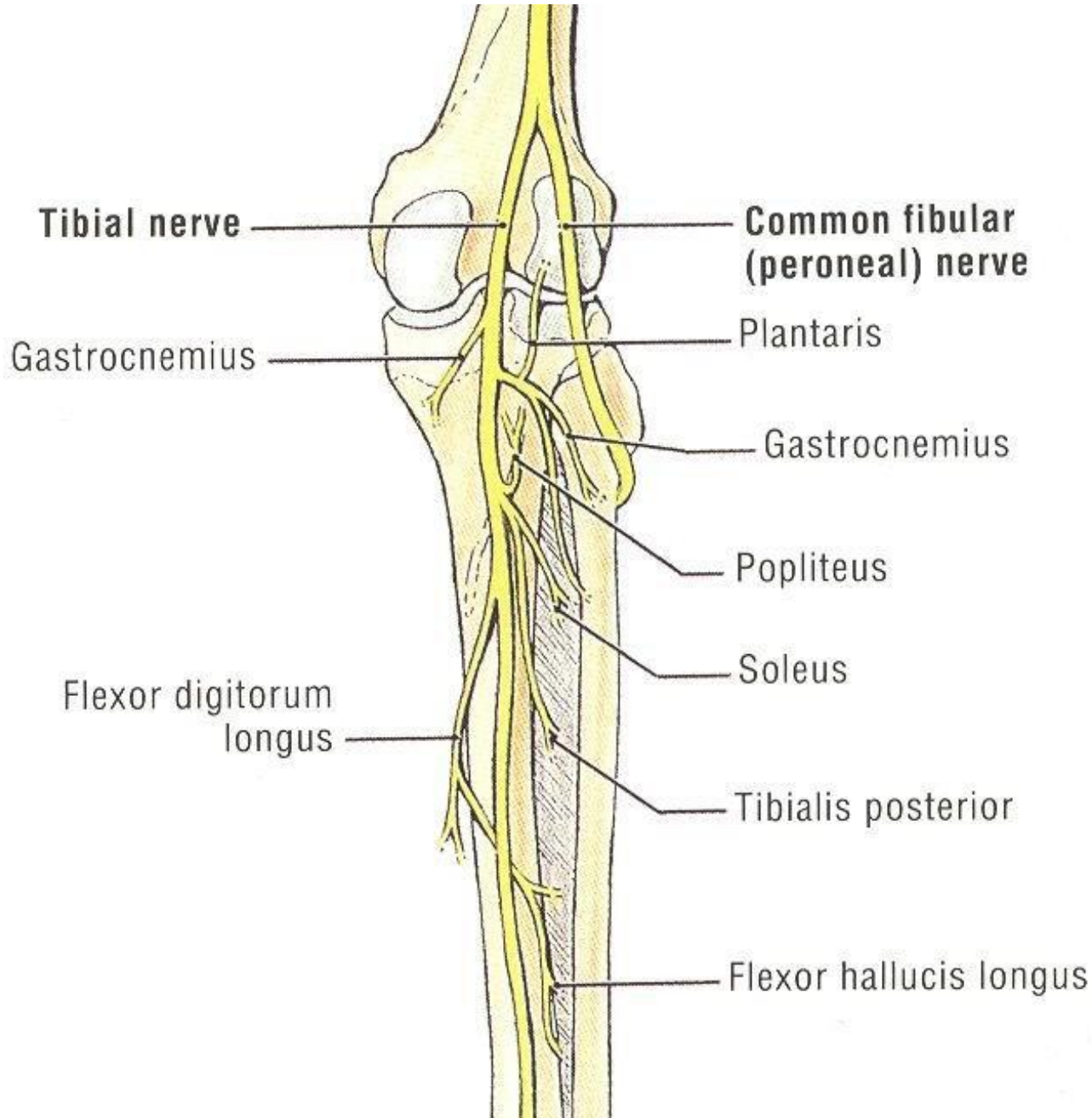


Figure 28-15. The Sciatic nerve (L4, 5;S1-3_In: Waxman SG. *Clinical Neuroanatomy*. 26th ed. New York, NY: McGraw-Hill; 2010. http://www.accessphysiotherapy.com. Accessed March 22, 2012.

Tibial N.


Tibial nerve
Common fibular (peroneal) nerve
Gastrocnemius
Plantaris
Gastrocnemius
Popliteus
Soleus
Flexor digitorum longus
Tibialis posterior
Flexor hallucis longus

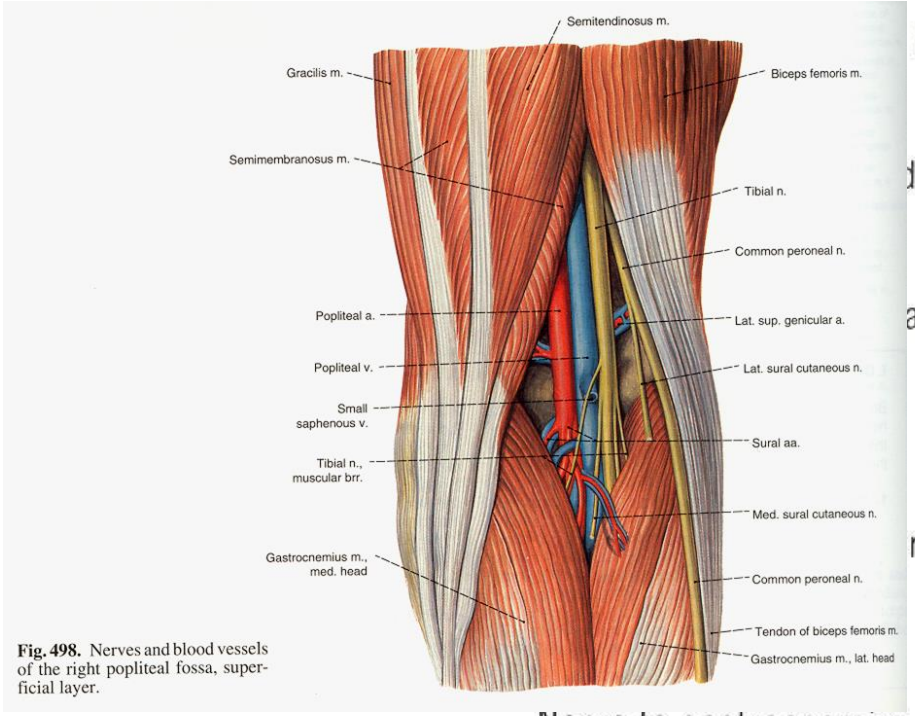


Fig. 498. Nerves and blood vessels of the right popliteal fossa, superficial layer.

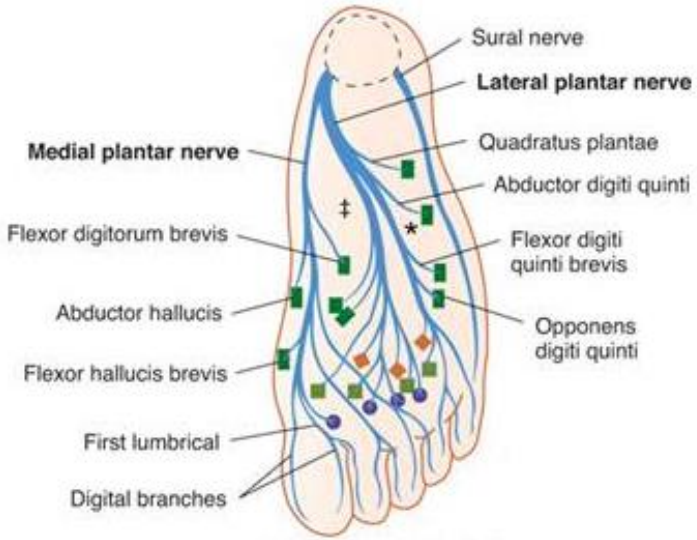
- Muscular b.
- med. sural Cutaneous n.

✓Communicating fibular n.

❖Sural n.

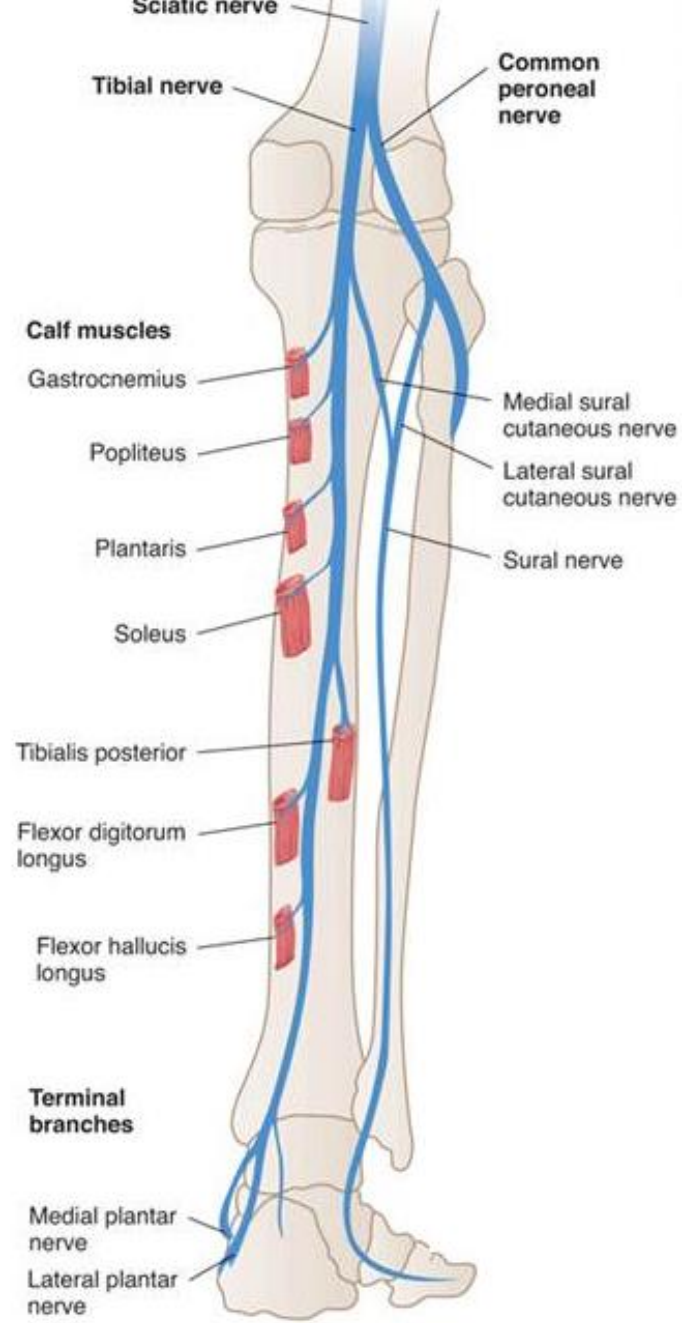
The Tibial Nerve

- Motor functions
  - Foot plantar flexion and inversion, toe flexion



Plantar view of the foot

★ Superficial branch of lateral plantar nerve
‡ Deep branch of lateral plantar nerve
Adductor hallucis (transverse and oblique)
Plantar interossei (3)
Dorsal interossei (4)
Lateral lumbricales (3)



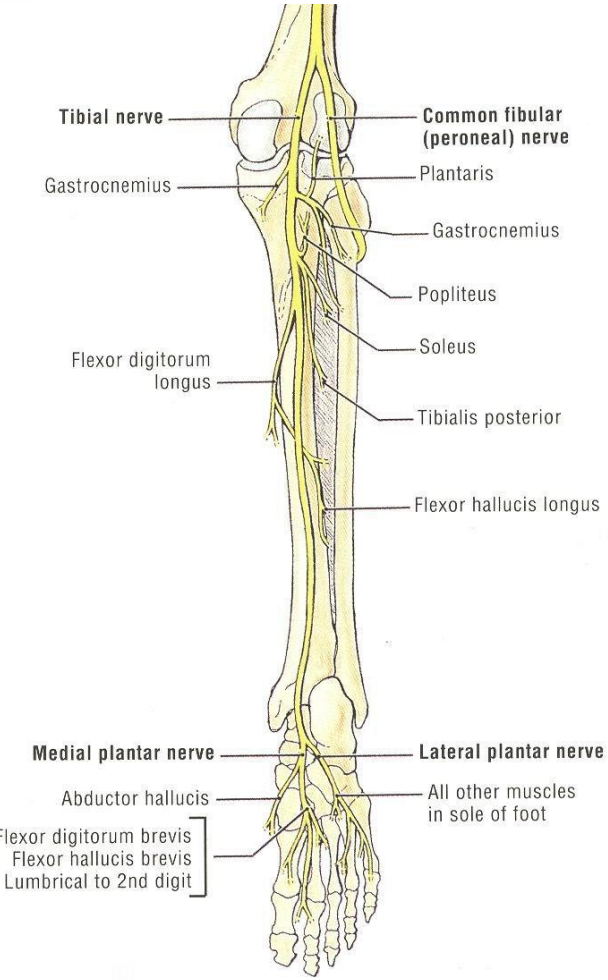
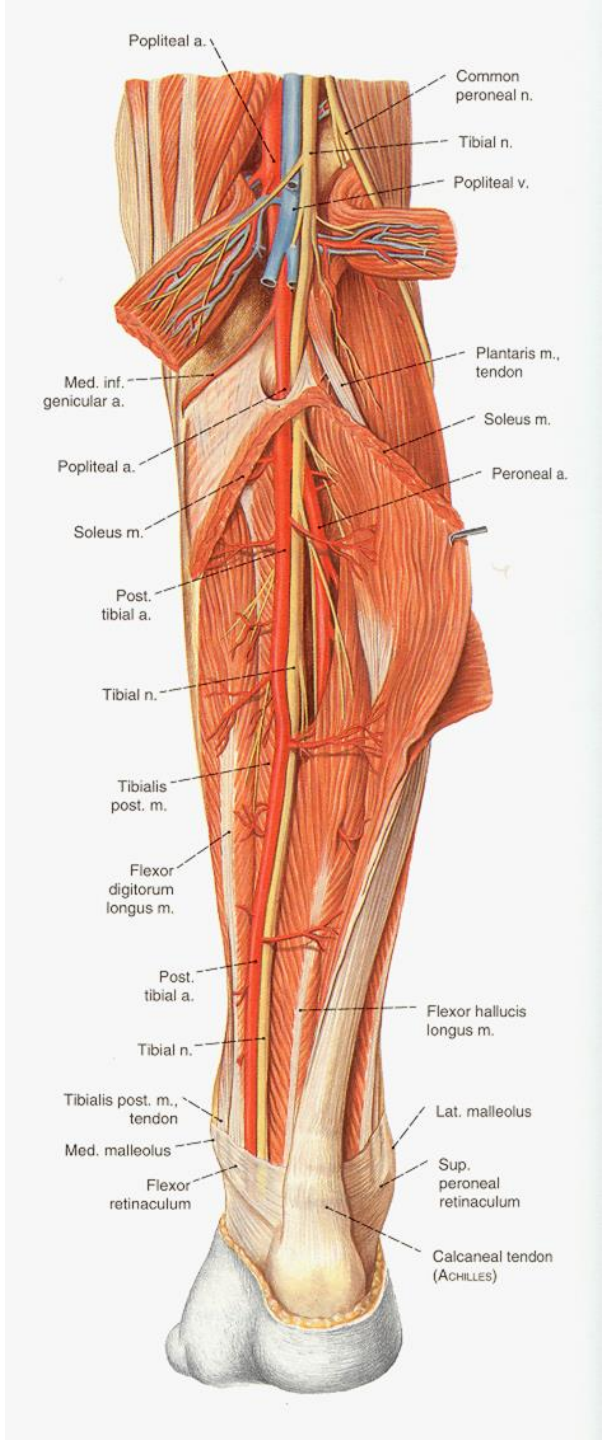
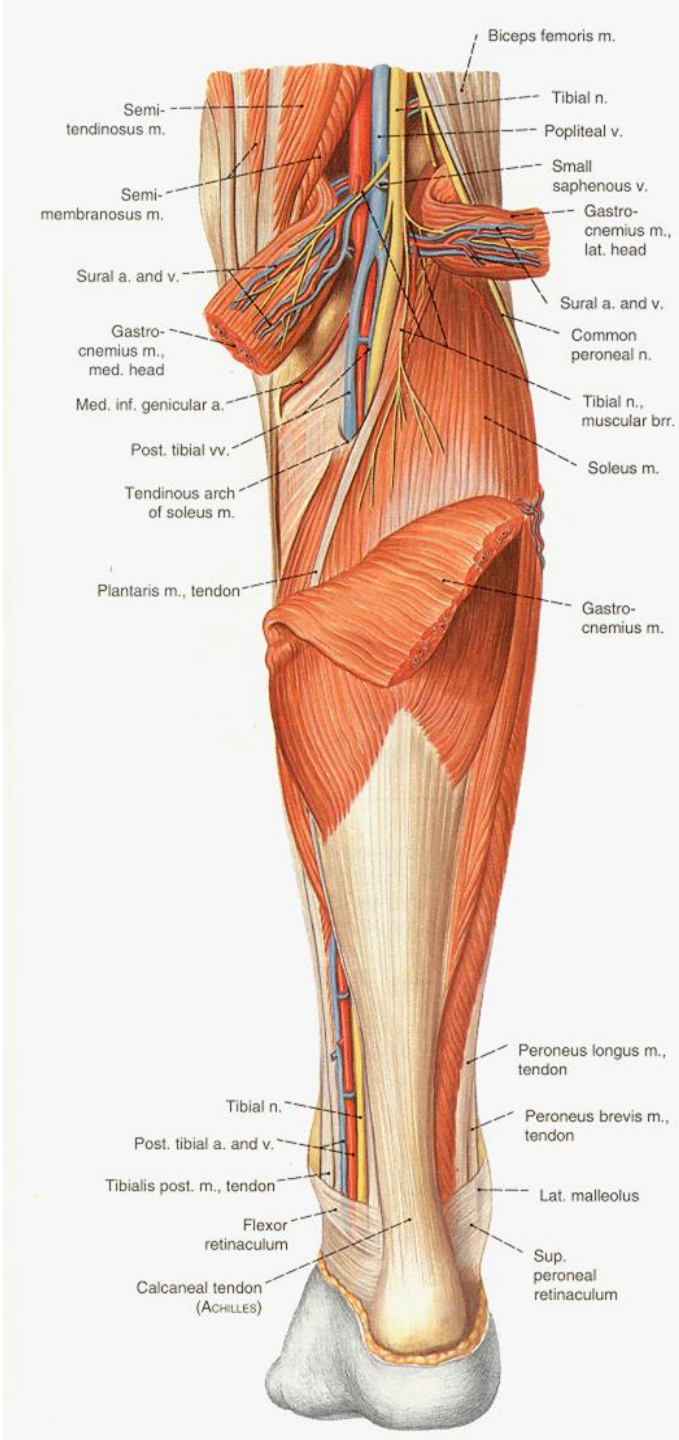
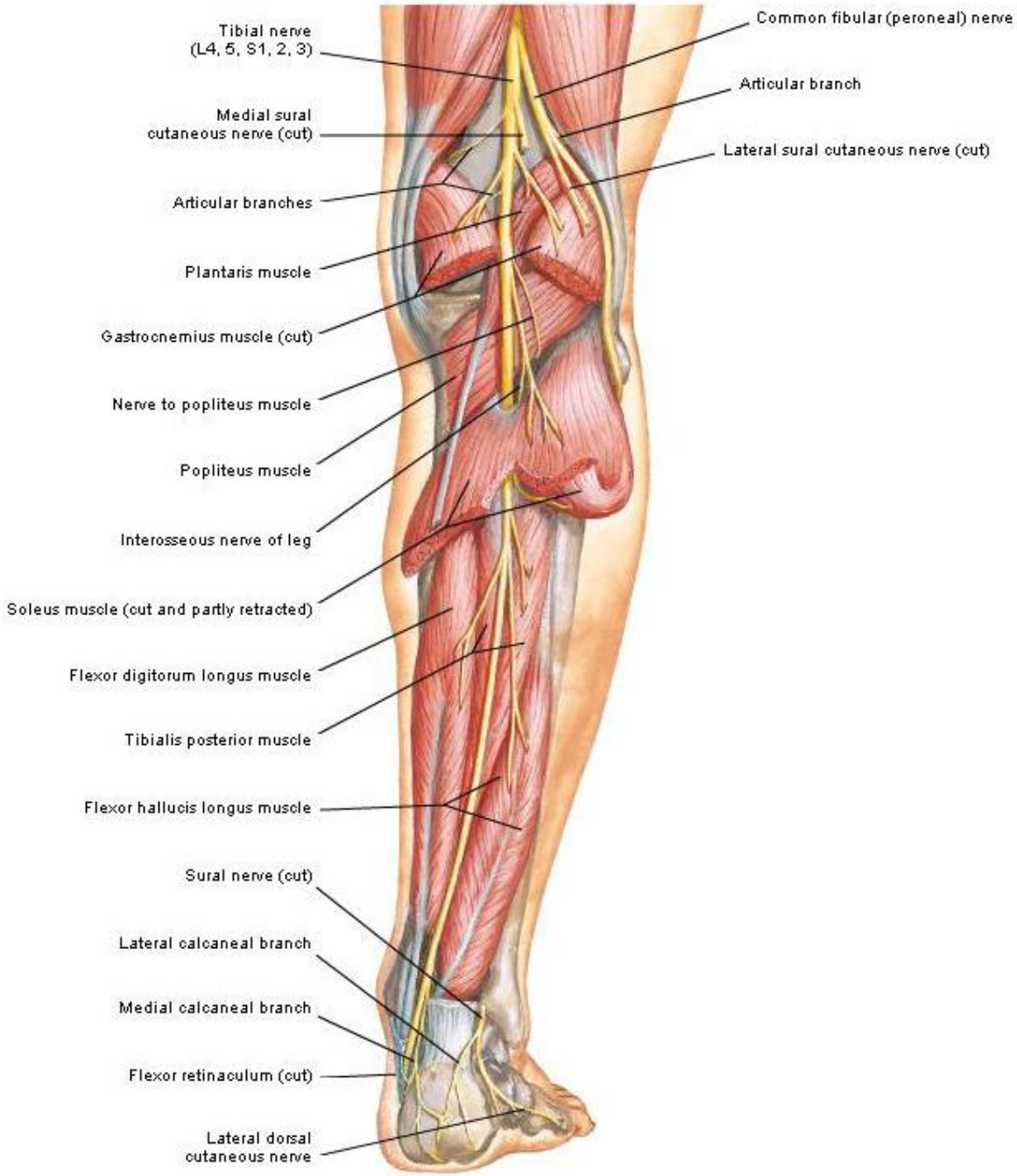


Figure 28-17 . The tibial nerve (L4, 5; S1 –3). In: Waxman SG. *Clinical Neuroanatomy*. 26th ed. New York, NY: McGraw-Hill; 2010.


Popliteal a.
Common peroneal n.
Tibial n.
Popliteal v.
Plantaris m., tendon
Med. inf. genicular a.
Soleus m.
Popliteal a.
Peroneal a.
Soleus m.
Post. tibial a.
Tibial n.
Tibialis post. m.
Flexor digitorum longus m.
Post. tibial a.
Flexor hallucis longus m.
Tibial n.
Tibialis post. m., tendon
Lat. malleolus
Med. malleolus
Sup. peroneal retinaculum
Flexor retinaculum
Calcaneal tendon (Achilles)


Biceps femoris m.
Semi-tendinosus m.
Tibial n.
Popliteal v.
Small saphenous v.
Semi-membranosus m.
Gastro-cnemius m., lat. head
Sural a. and v.
Sural a. and v.
Gastro-cnemius m., med. head
Common peroneal n.
Tibial n., muscular brr.
Med. inf. genicular a.
Post. tibial vv.
Soleus m.
Tendinous arch of soleus m.
Plantaris m., tendon
Gastro-cnemius m.
Peroneus longus m., tendon
Tibial n.
Peroneus brevis m., tendon
Post. tibial a. and v.
Tibialis post. m., tendon
Lat. malleolus
Flexor retinaculum
Sup. peroneal retinaculum
Calcaneal tendon (Achilles)

Tibial Nerve



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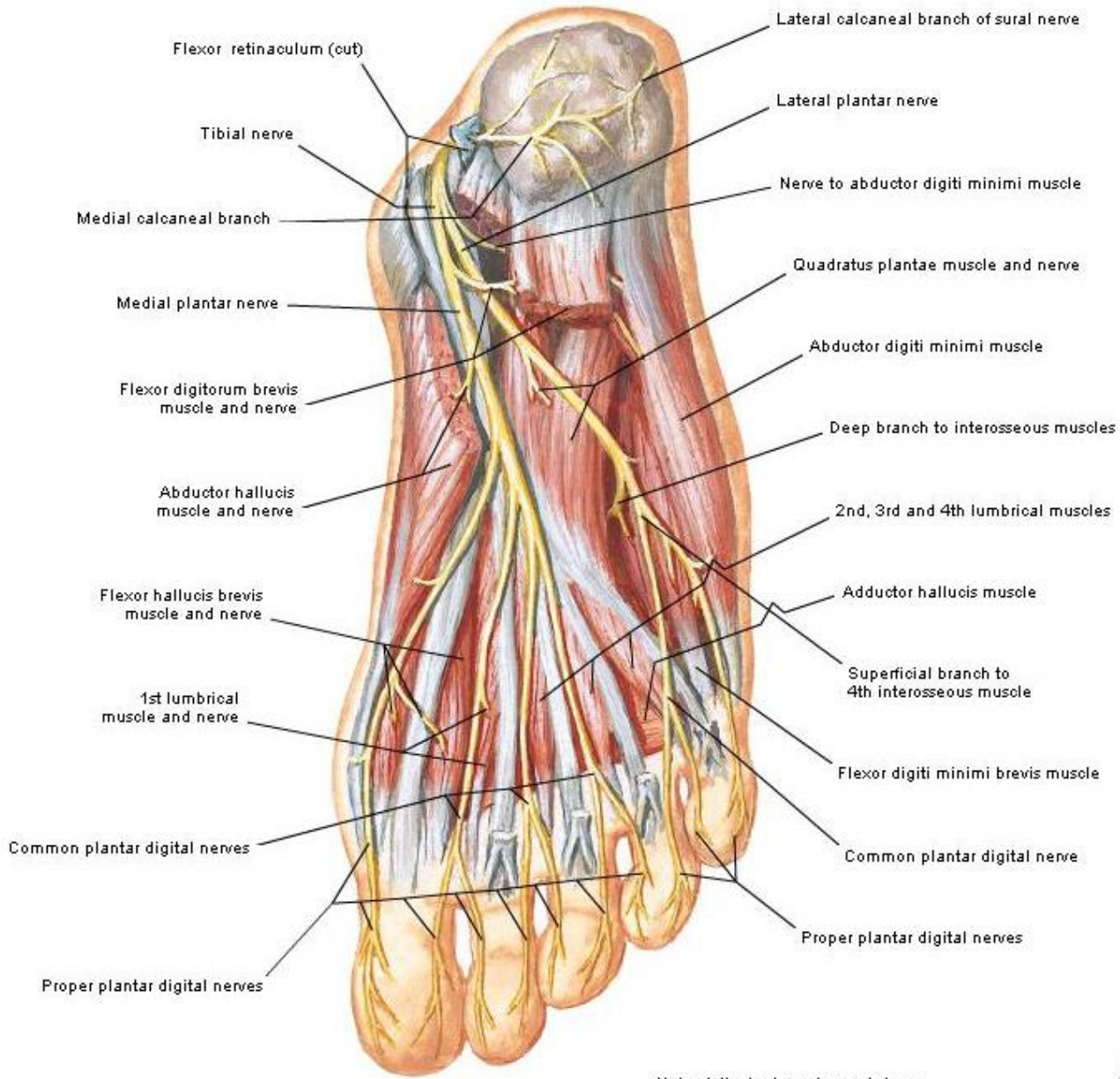
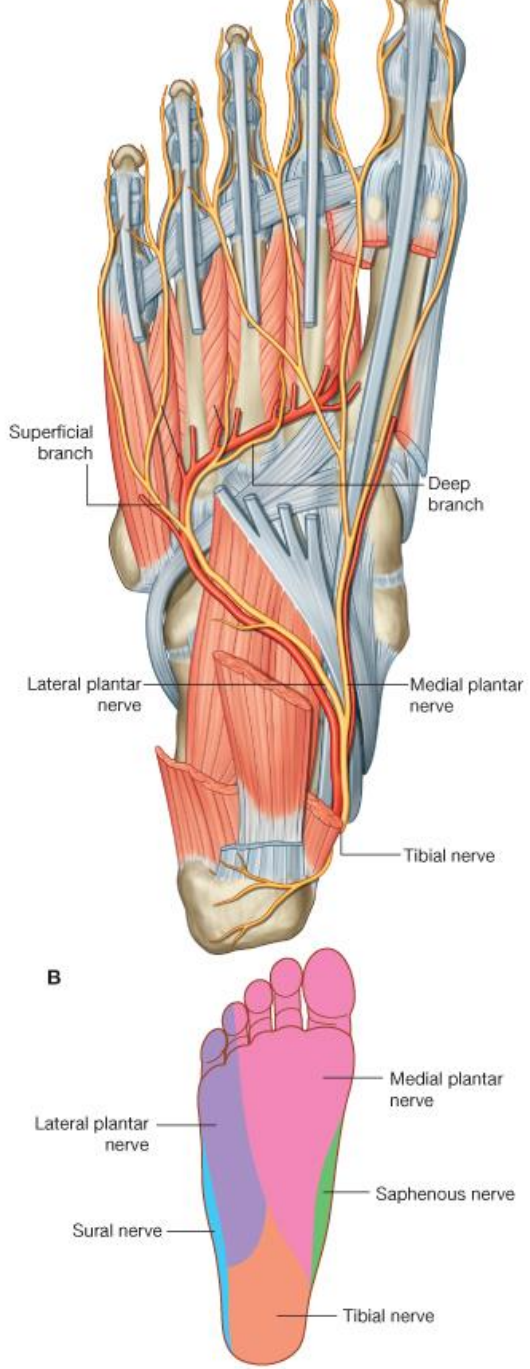
Tibial Nerve
Plantar View

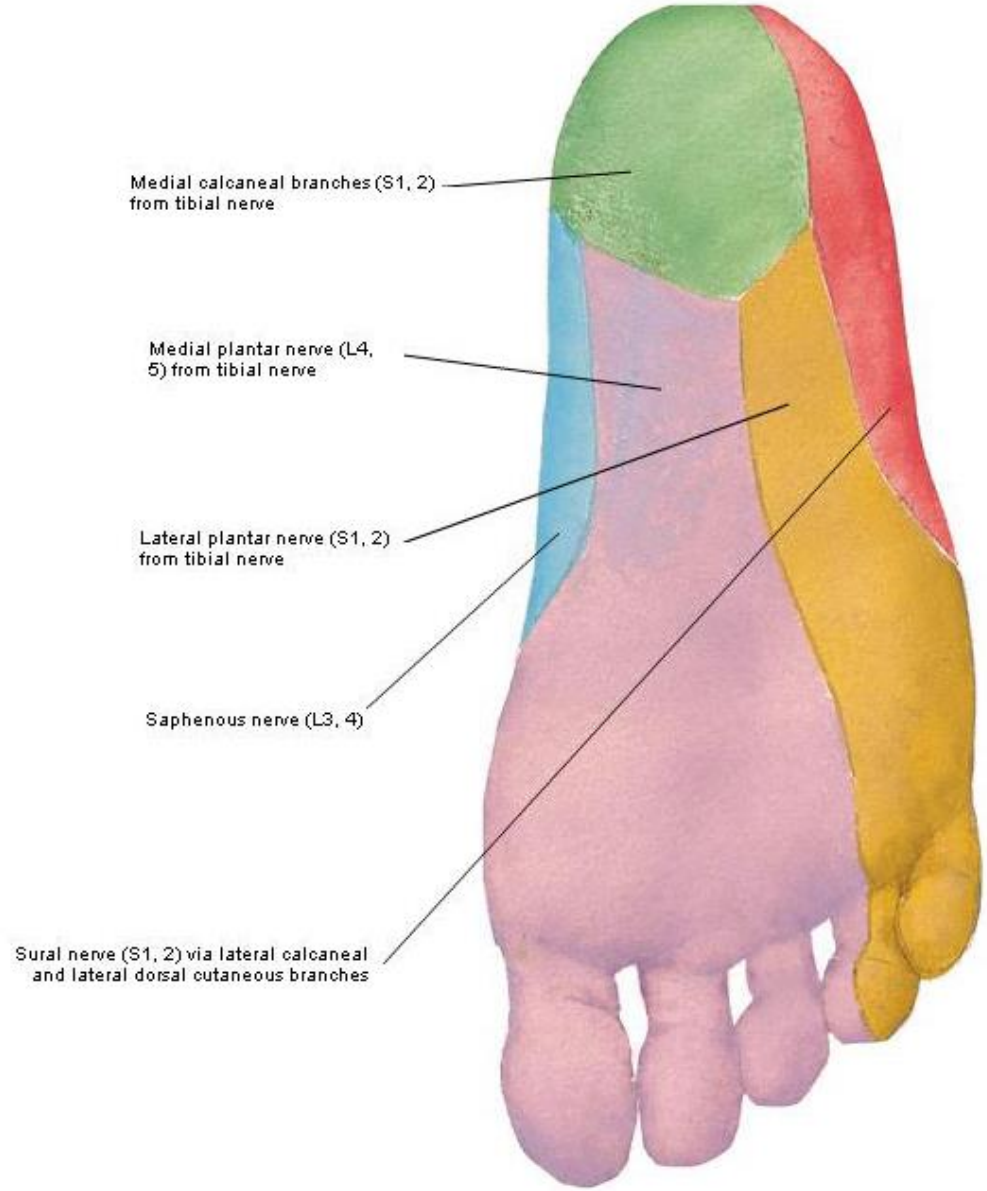


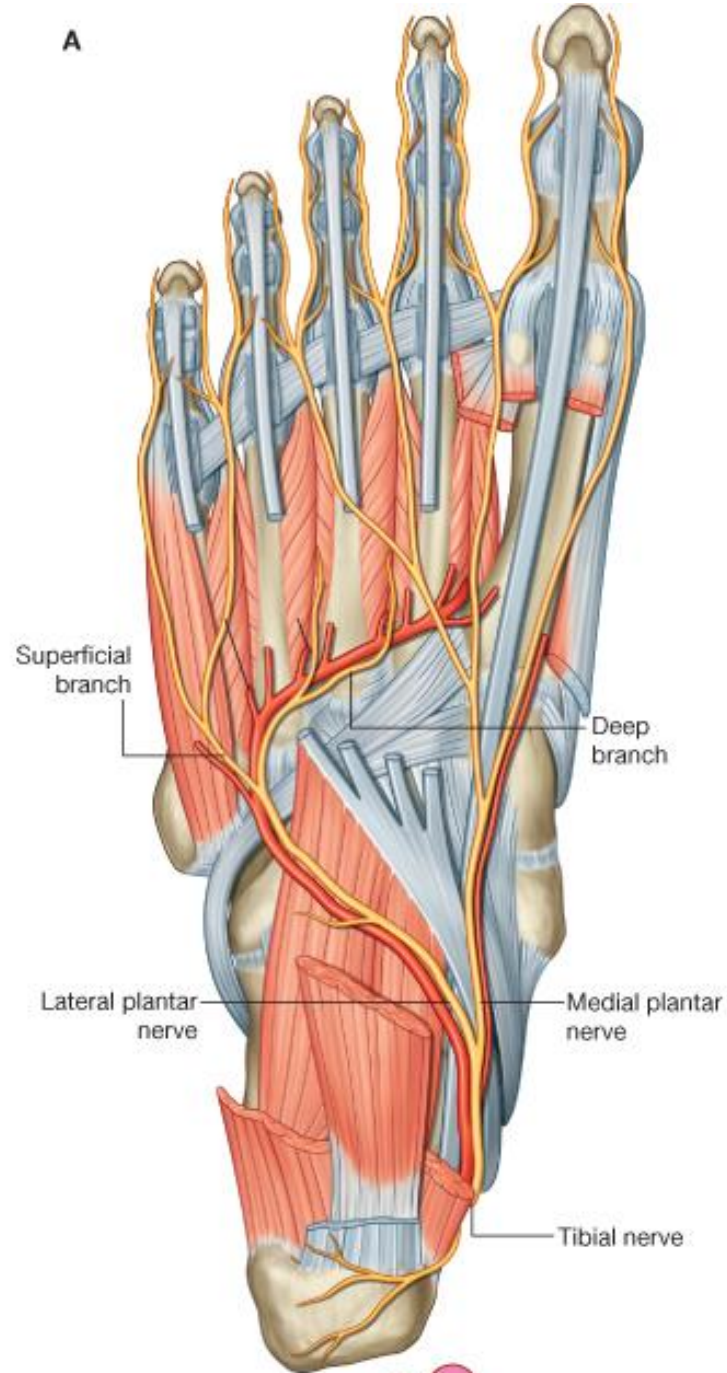
Note: Articular branches not shown



Tibial Nerve

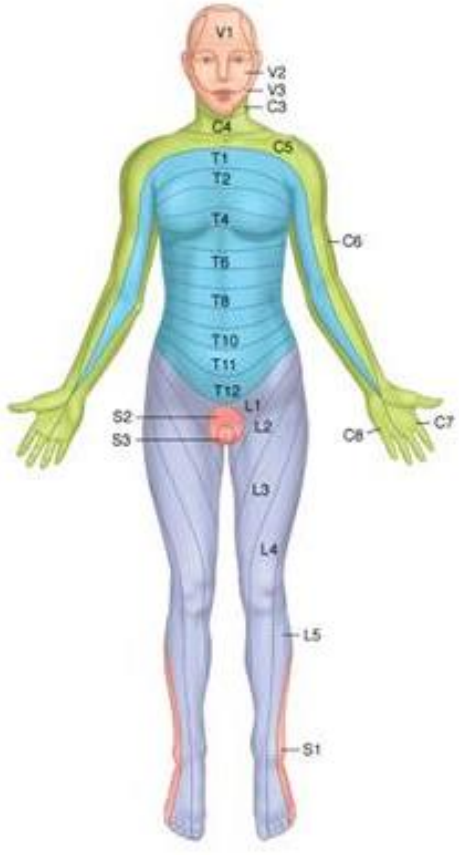
Cutaneous Innervation of Sole of Foot

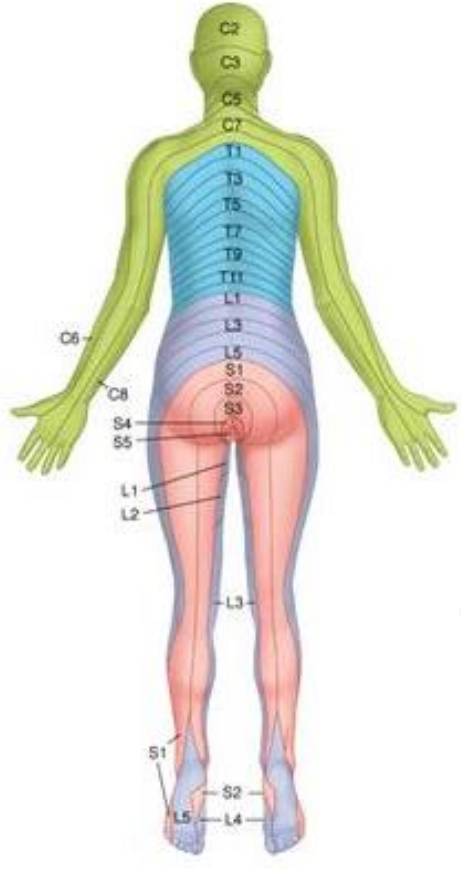


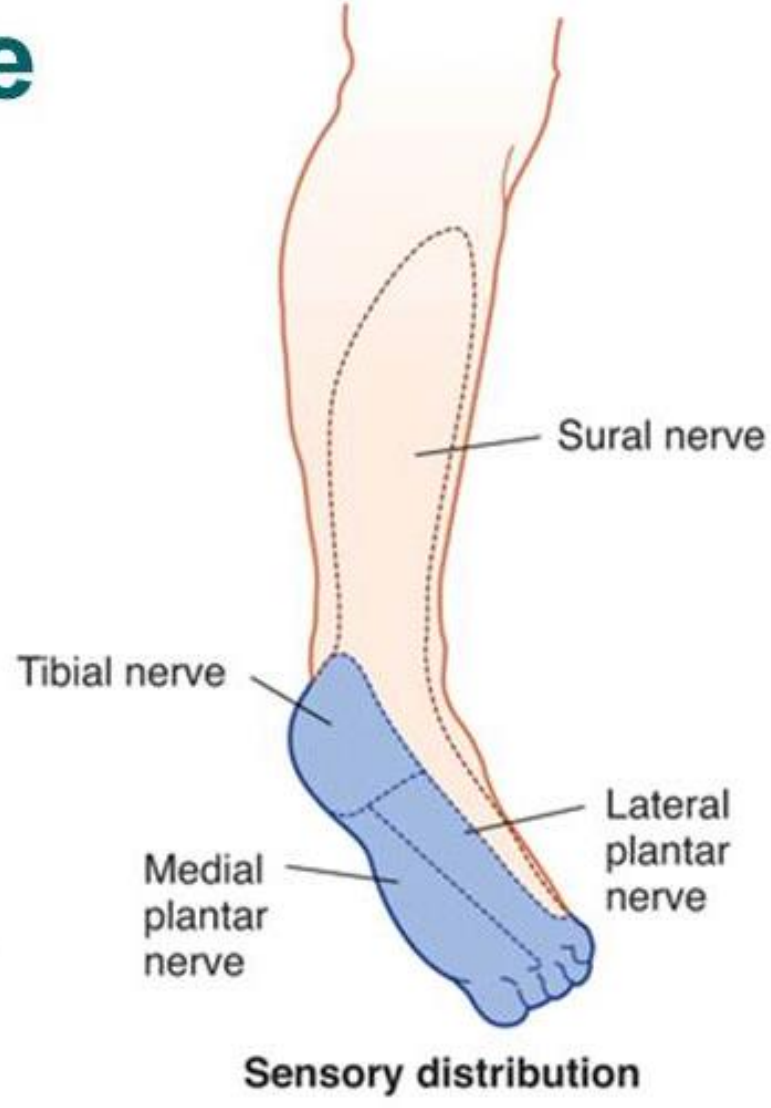

A
Superficial branch
Deep branch
Lateral plantar nerve
Medial plantar nerve
Tibial nerve

The Tibial Nerve

- Sensory distribution



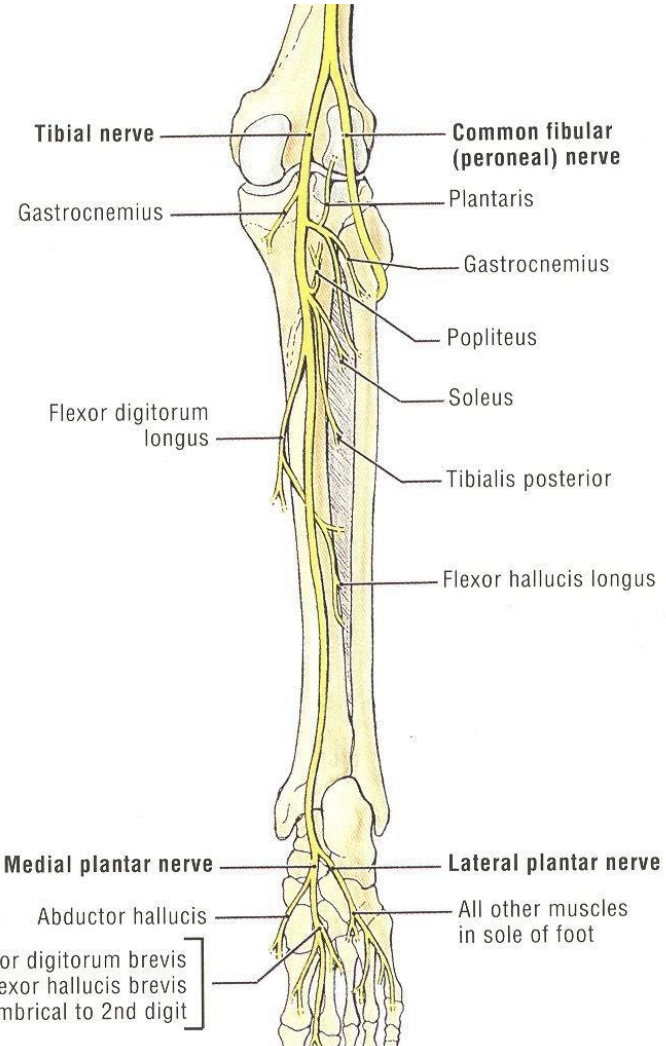


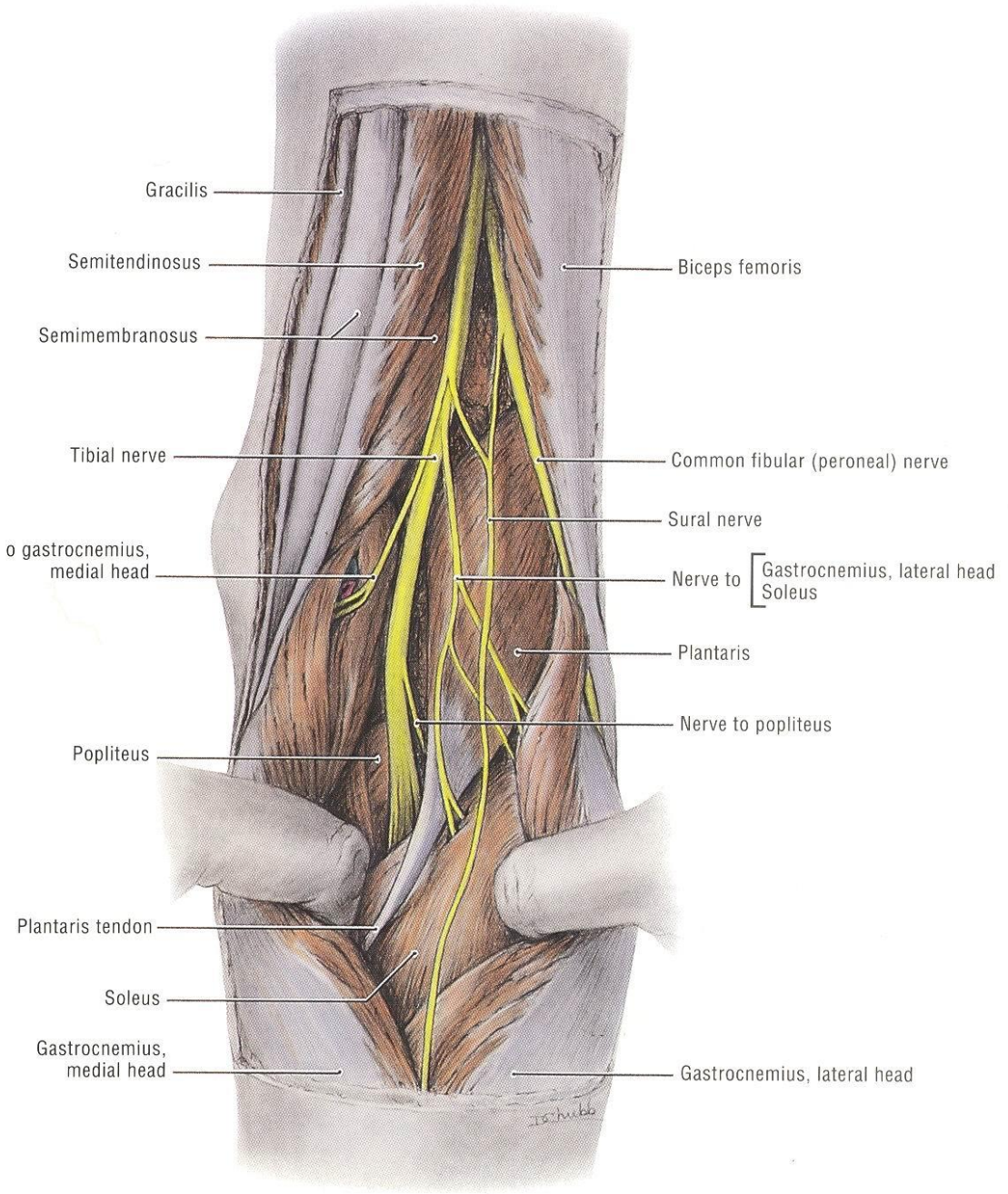


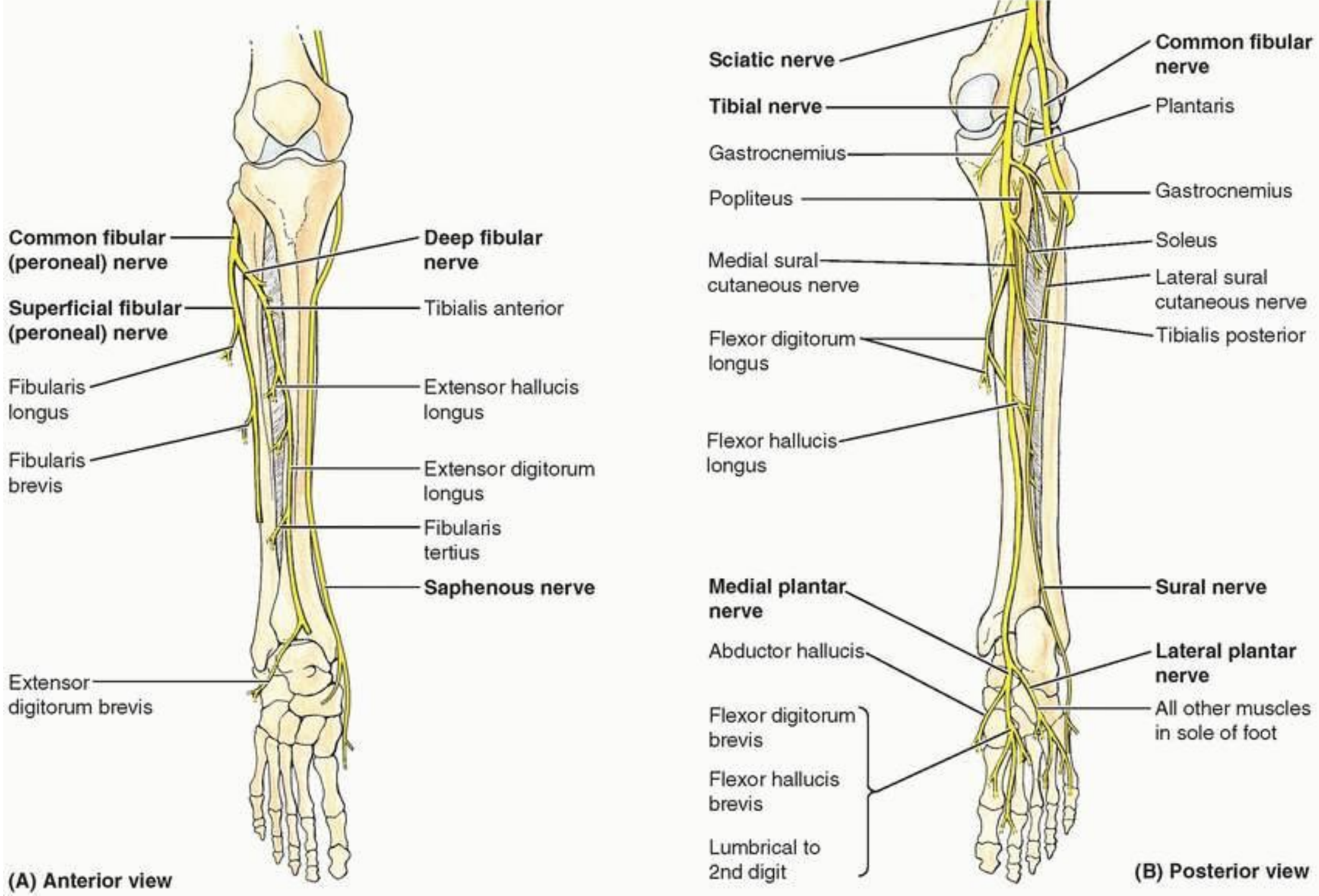
Sensory distribution

Common proneal N.

- Communicating fibular n.
- Lat. Sural Cutaneous n.

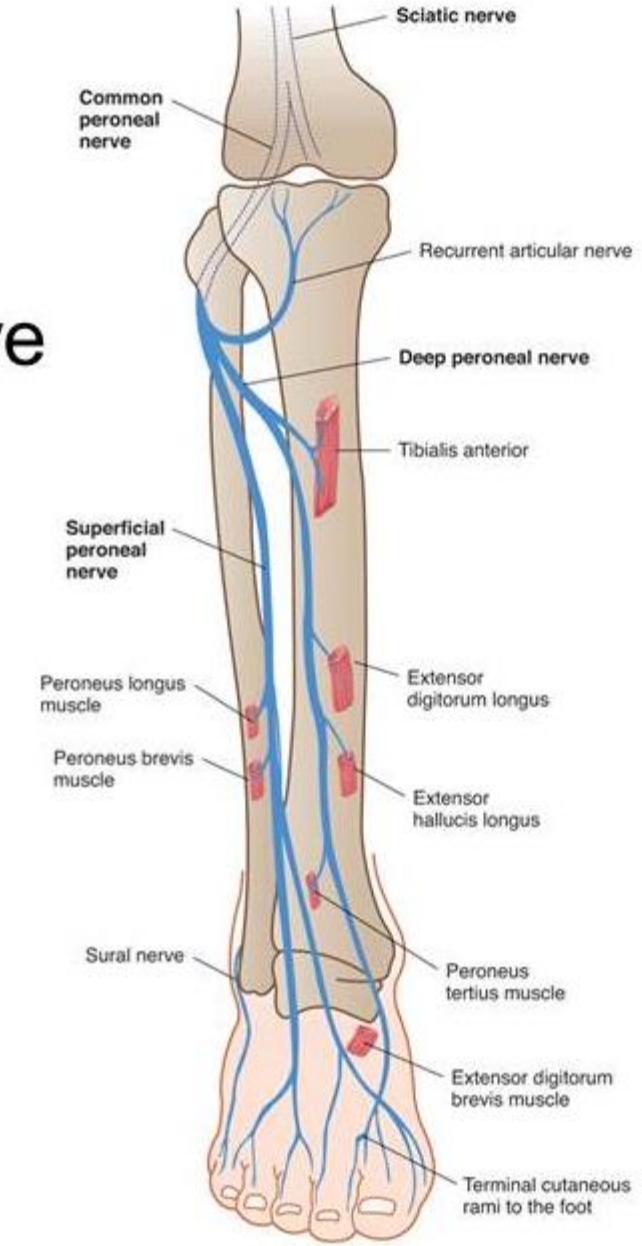




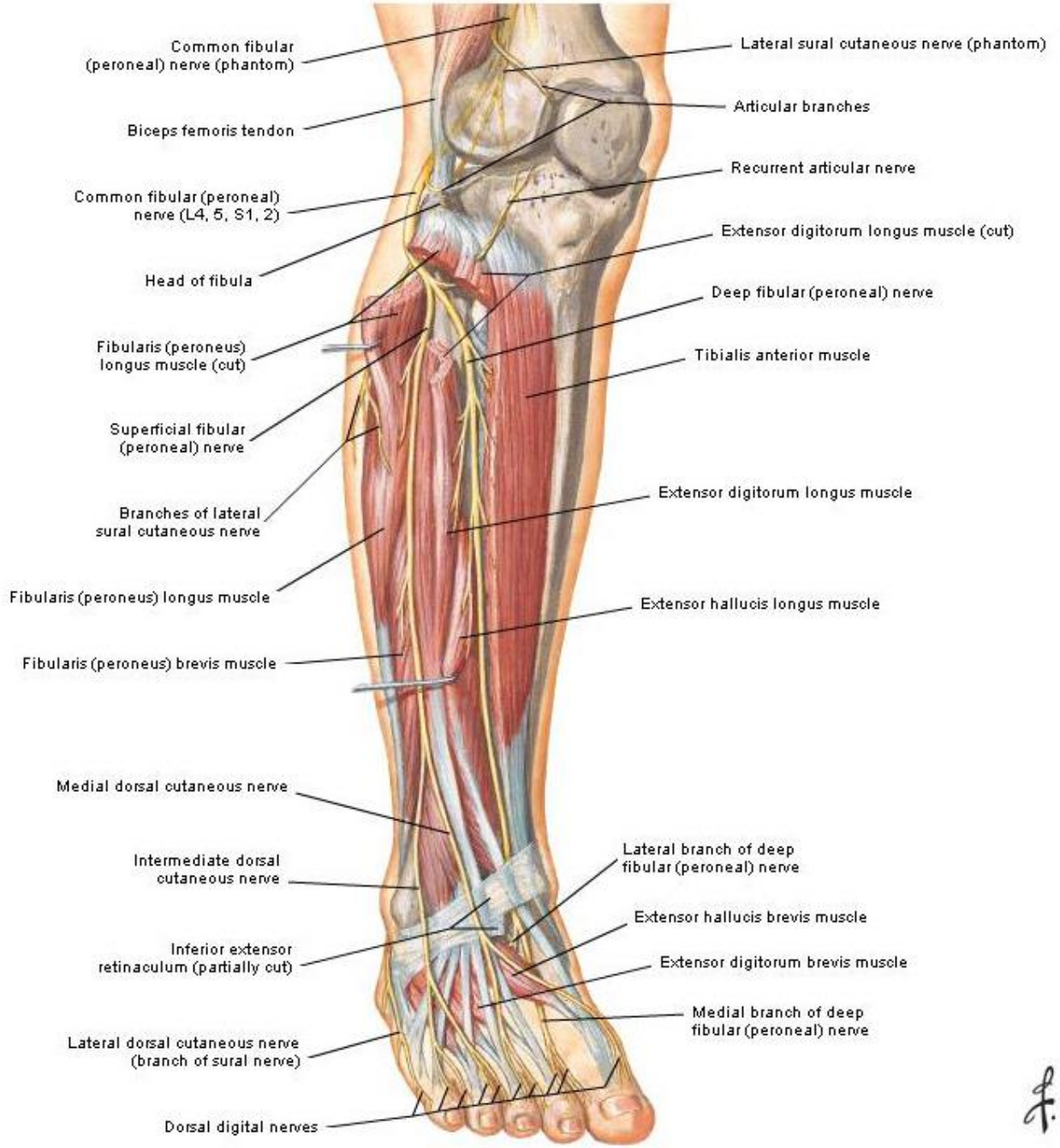

Common fibular (peroneal) nerve
Deep fibular nerve
Superficial fibular (peroneal) nerve
Tibialis anterior
Fibularis longus
Extensor hallucis longus
Fibularis brevis
Extensor digitorum longus
Fibularis tertius
Saphenous nerve
Extensor digitorum brevis
(A) Anterior view
Sciatic nerve
Common fibular nerve
Tibial nerve
Plantaris
Gastrocnemius
Popliteus
Gastrocnemius
Soleus
Medial sural cutaneous nerve
Lateral sural cutaneous nerve
Flexor digitorum longus
Tibialis posterior
Flexor hallucis longus
Medial plantar nerve
Sural nerve
Abductor hallucis
Lateral plantar nerve
Flexor digitorum brevis
All other muscles in sole of foot
Flexor hallucis brevis
Lumbrical to 2nd digit
(B) Posterior view

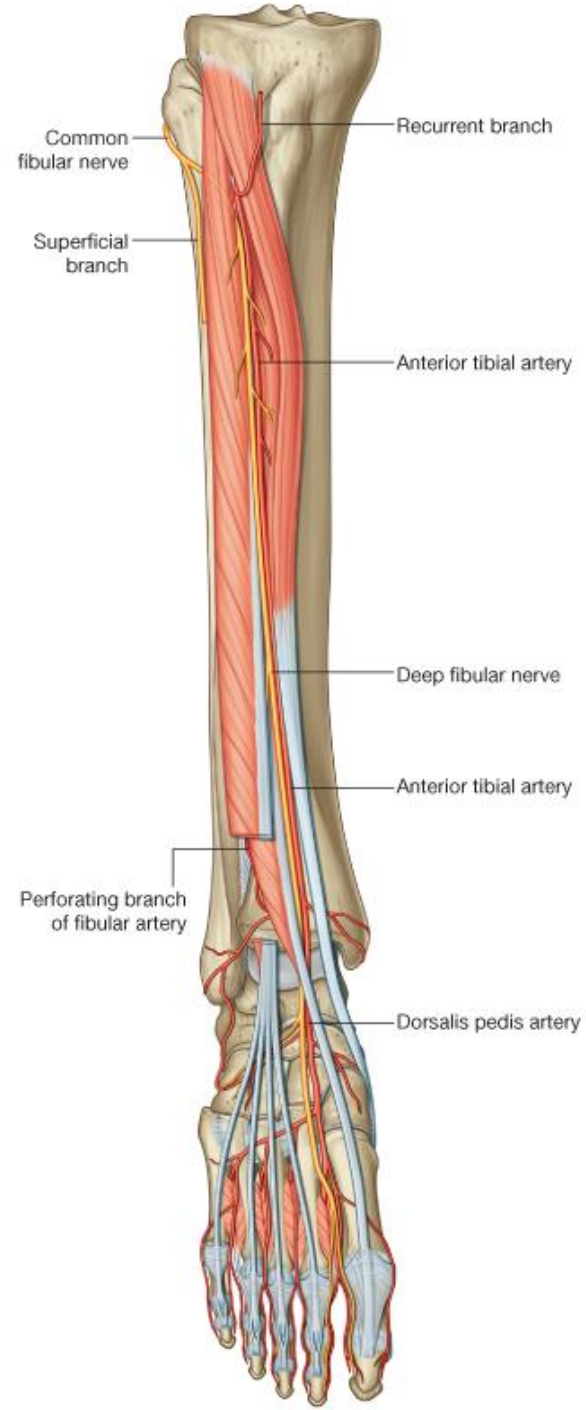
The Common Peroneal Nerve

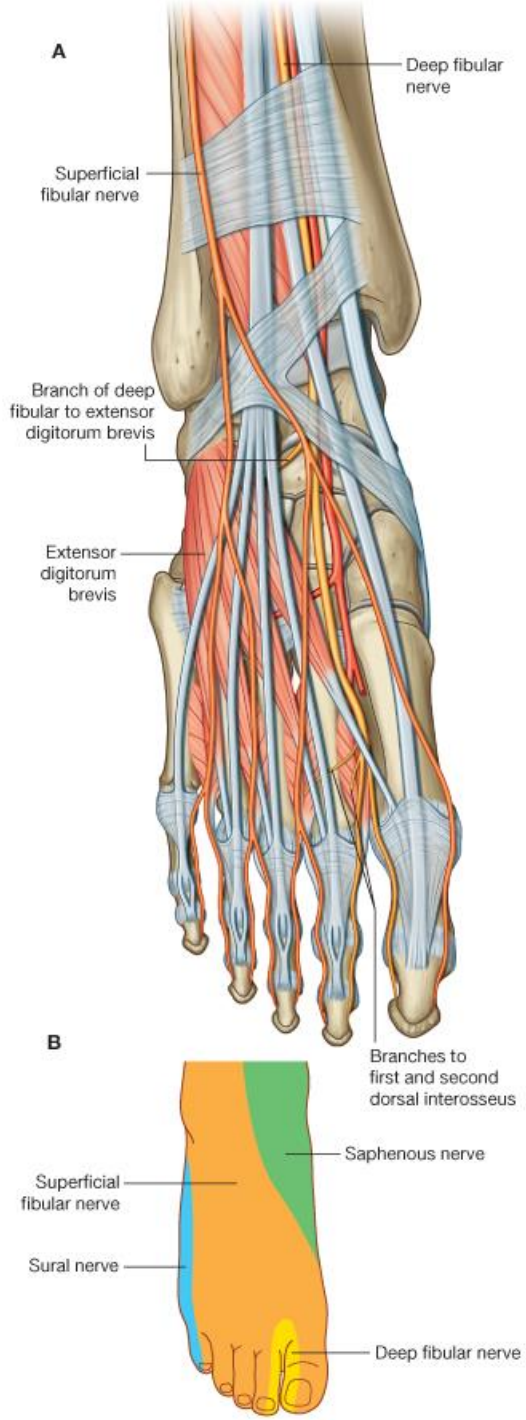
- Superficial peroneal nerve
  - Motor functions
    - Foot eversion
- Deep peroneal nerve
  - Motor functions
    - Foot dorsiflexion, toe extension



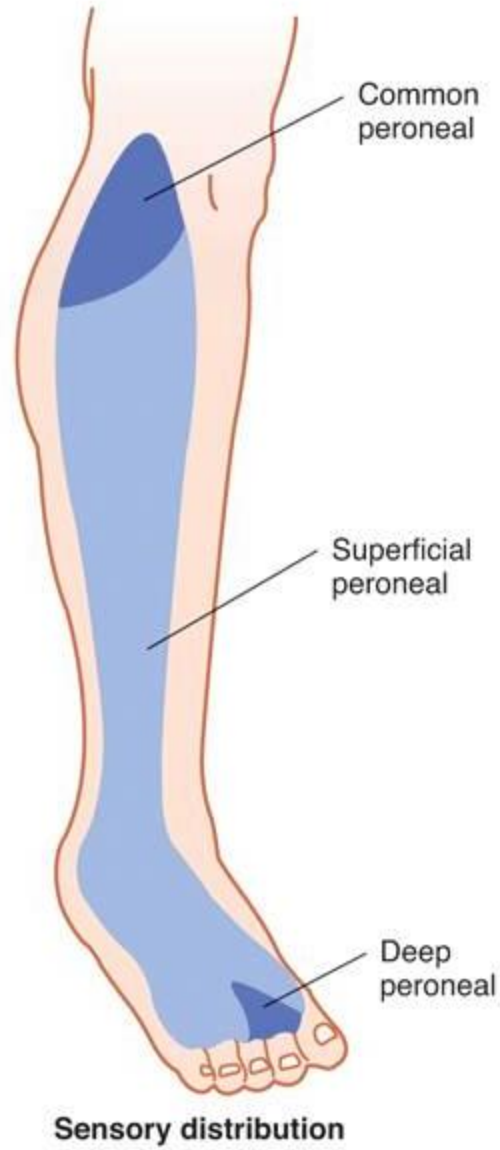
Common Fibular (Peroneal) Nerve

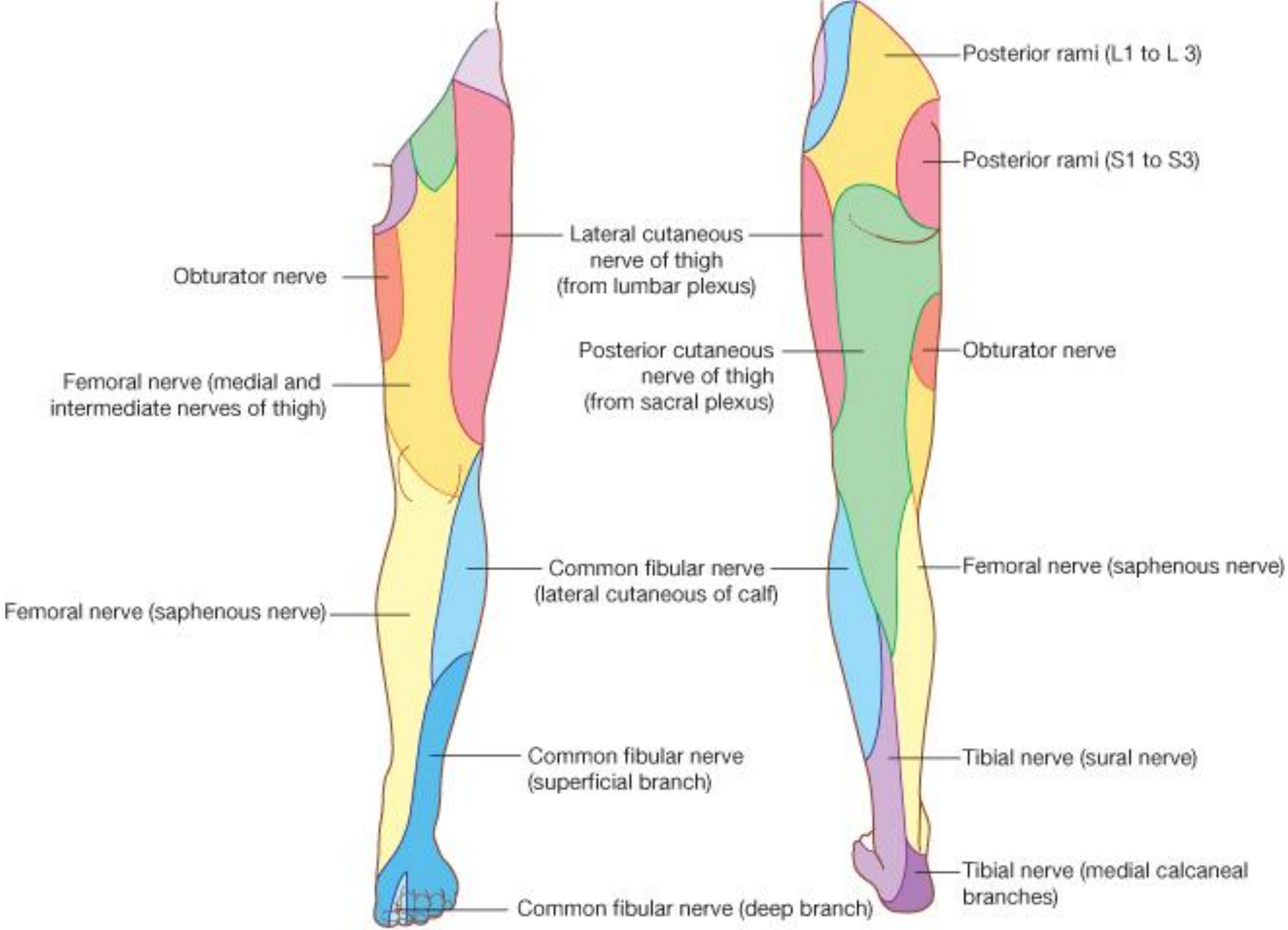


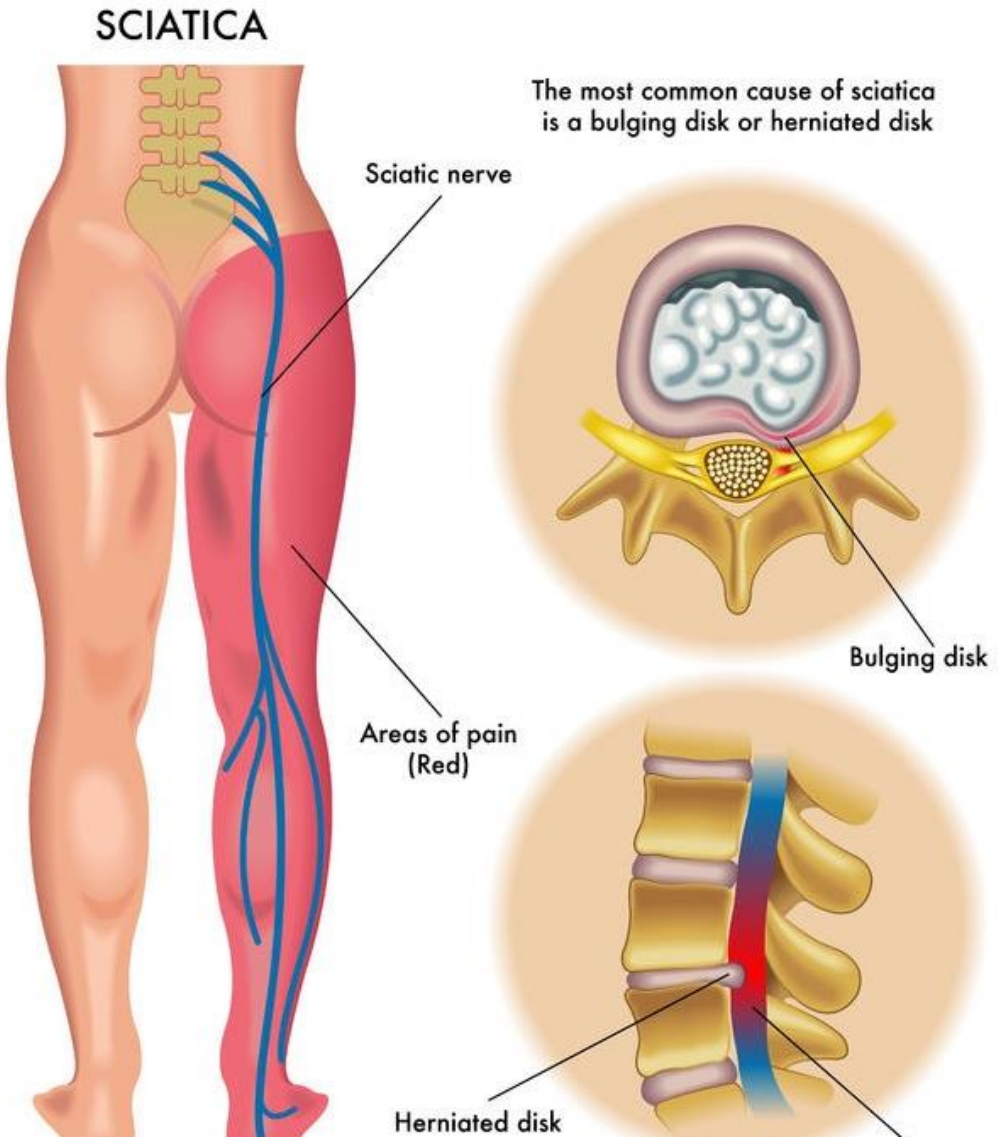




The Common Peroneal Nerve with Superficial and Deep Peroneal Sensory Distribution



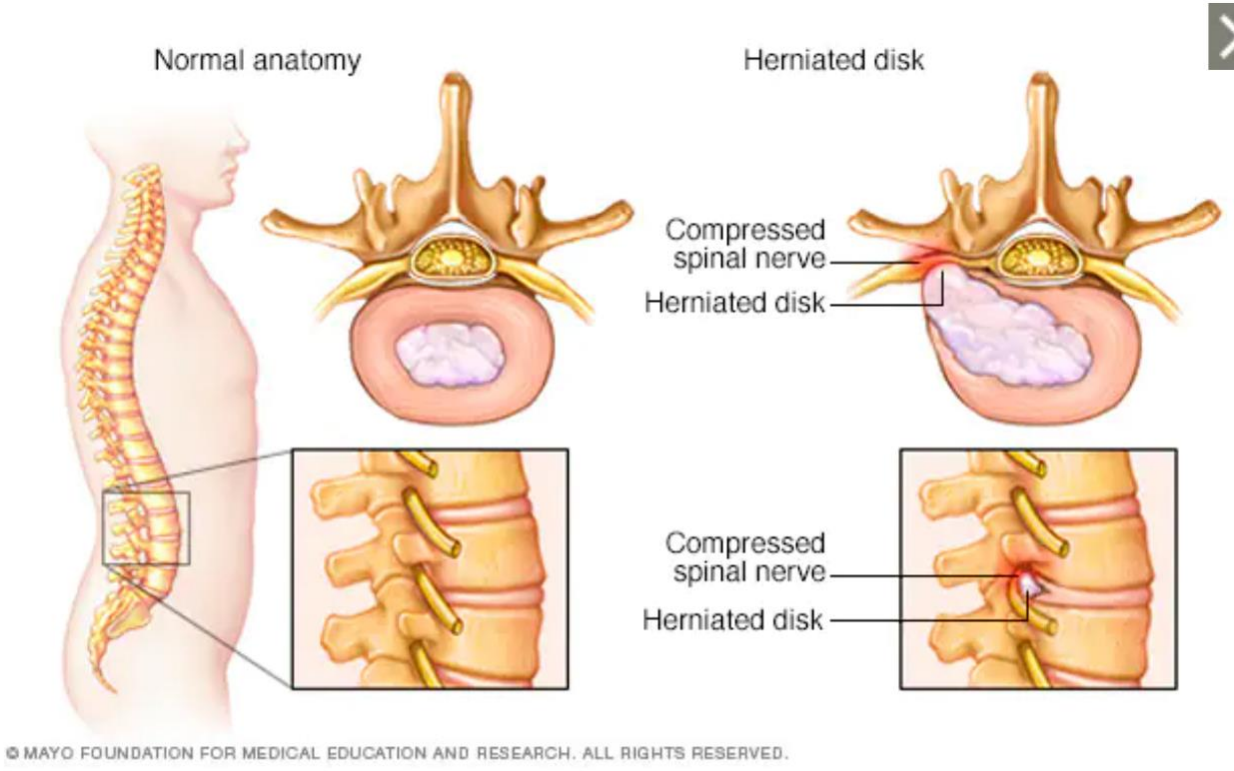




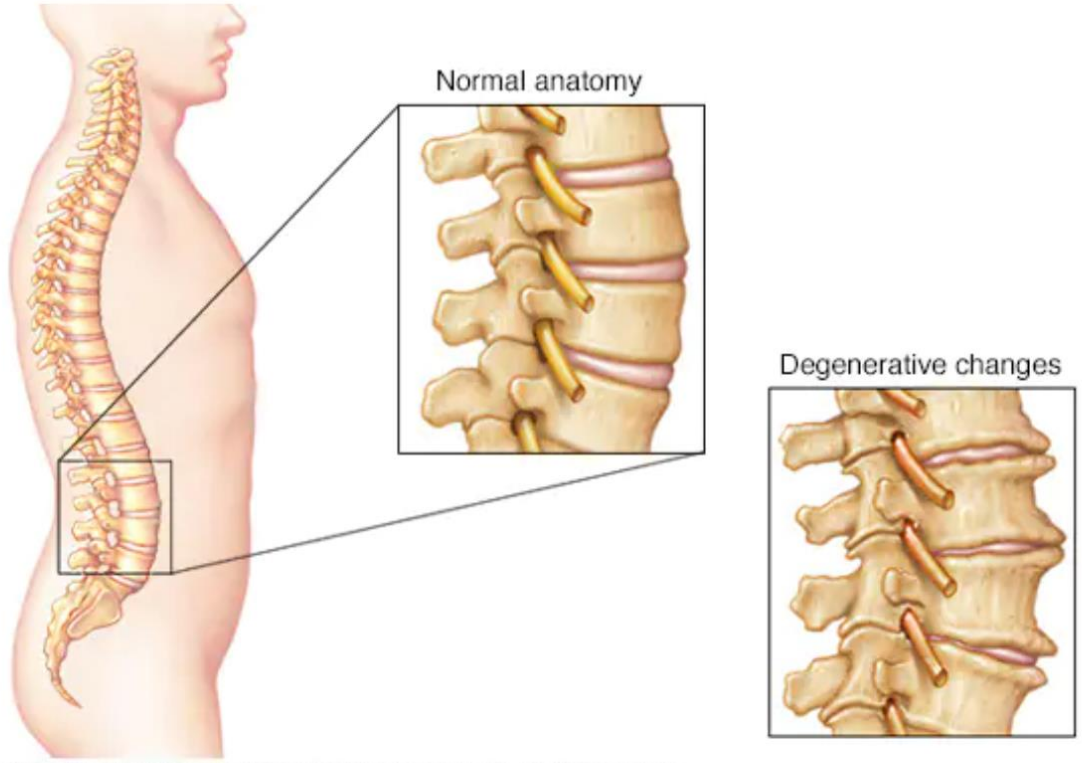
Sciatica refers to pain that radiates along the path of the sciatic nerve, which branches from your lower back through your hips and buttocks and down each leg. Typically, sciatica affects only one side of your body.

Sciatica most commonly occurs when a herniated disk, bone spur on the spine or narrowing of the spine (spinal stenosis) compresses part of the nerve. This causes inflammation, pain and often some numbness in the affected leg.

Although the pain associated with sciatica can be severe, most cases resolve with non-operative treatments in a few weeks. People who have severe sciatica that's associated with significant leg weakness or bowel or bladder changes might be candidates for surgery.

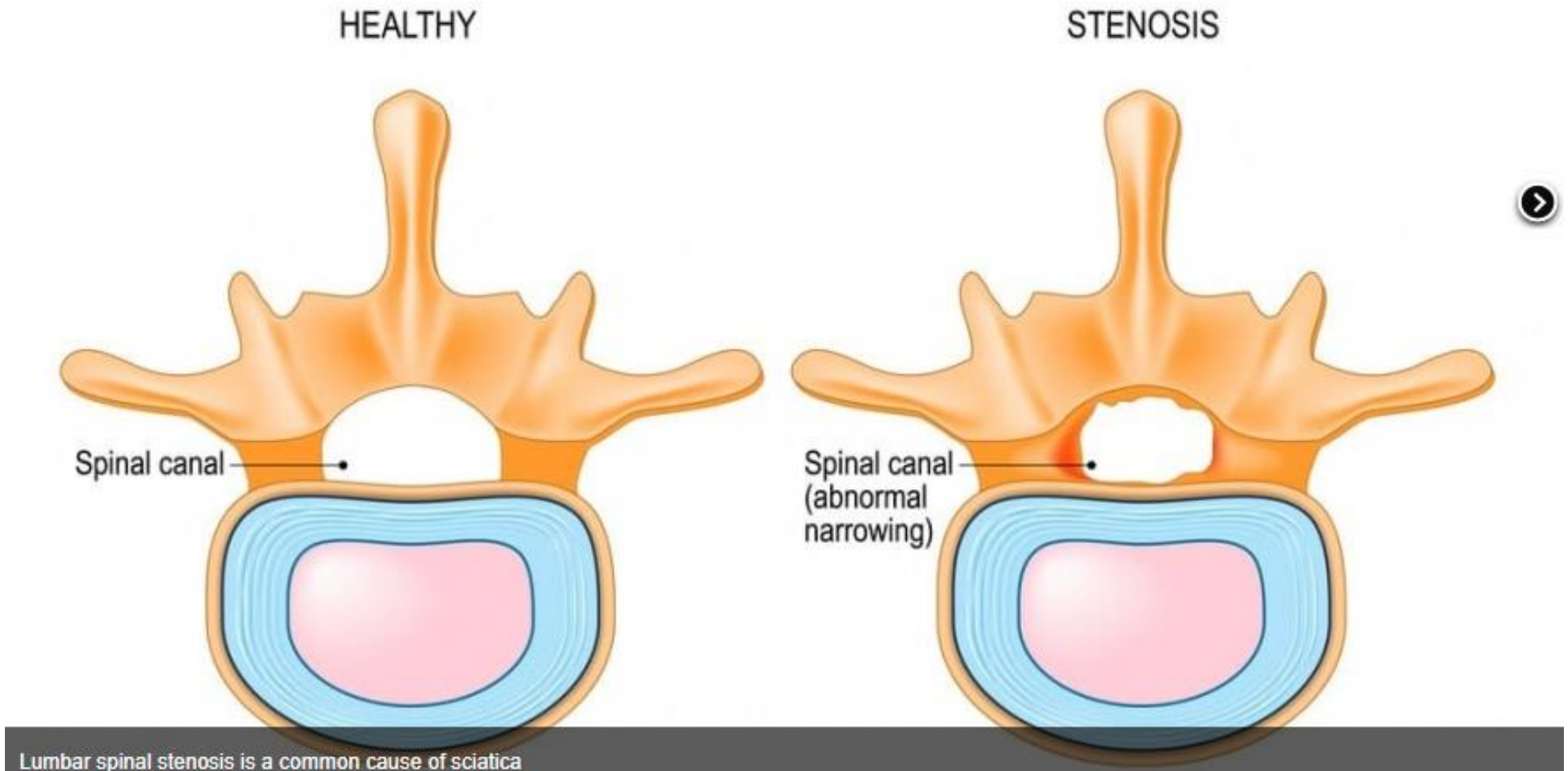


Herniated disk

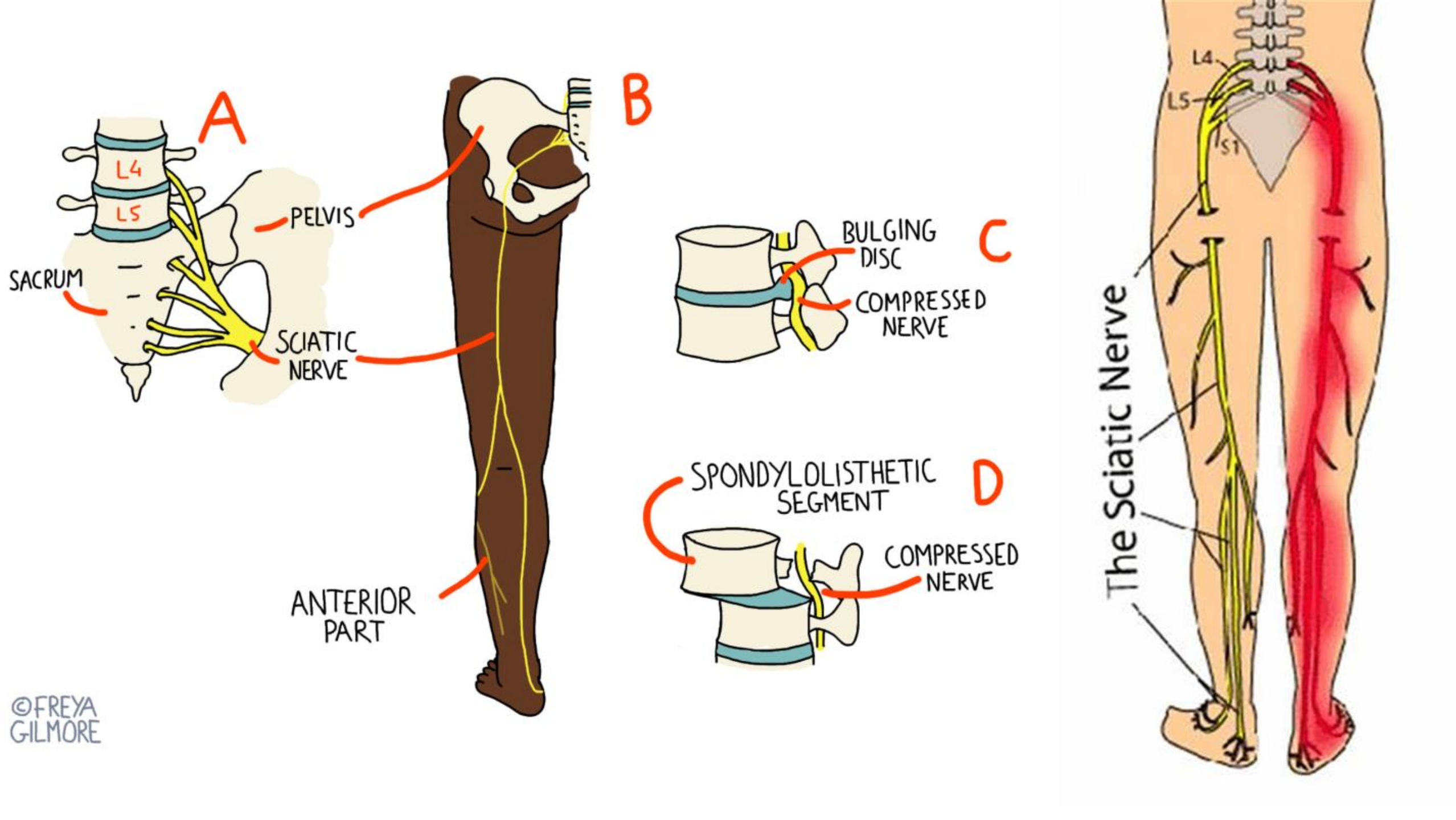


Bone spurs on spine

STENOSIS



Lumbar spinal stenosis is a common cause of sciatica


A
L4
L5
SACRUM
PELVIS
SCIATIC NERVE
B
ANTERIOR PART
BULGING DISC
C
COMPRESSED NERVE
SPONDYLOLISTHETIC SEGMENT
D
COMPRESSED NERVE
The Sciatic Nerve
L4
L5
S1
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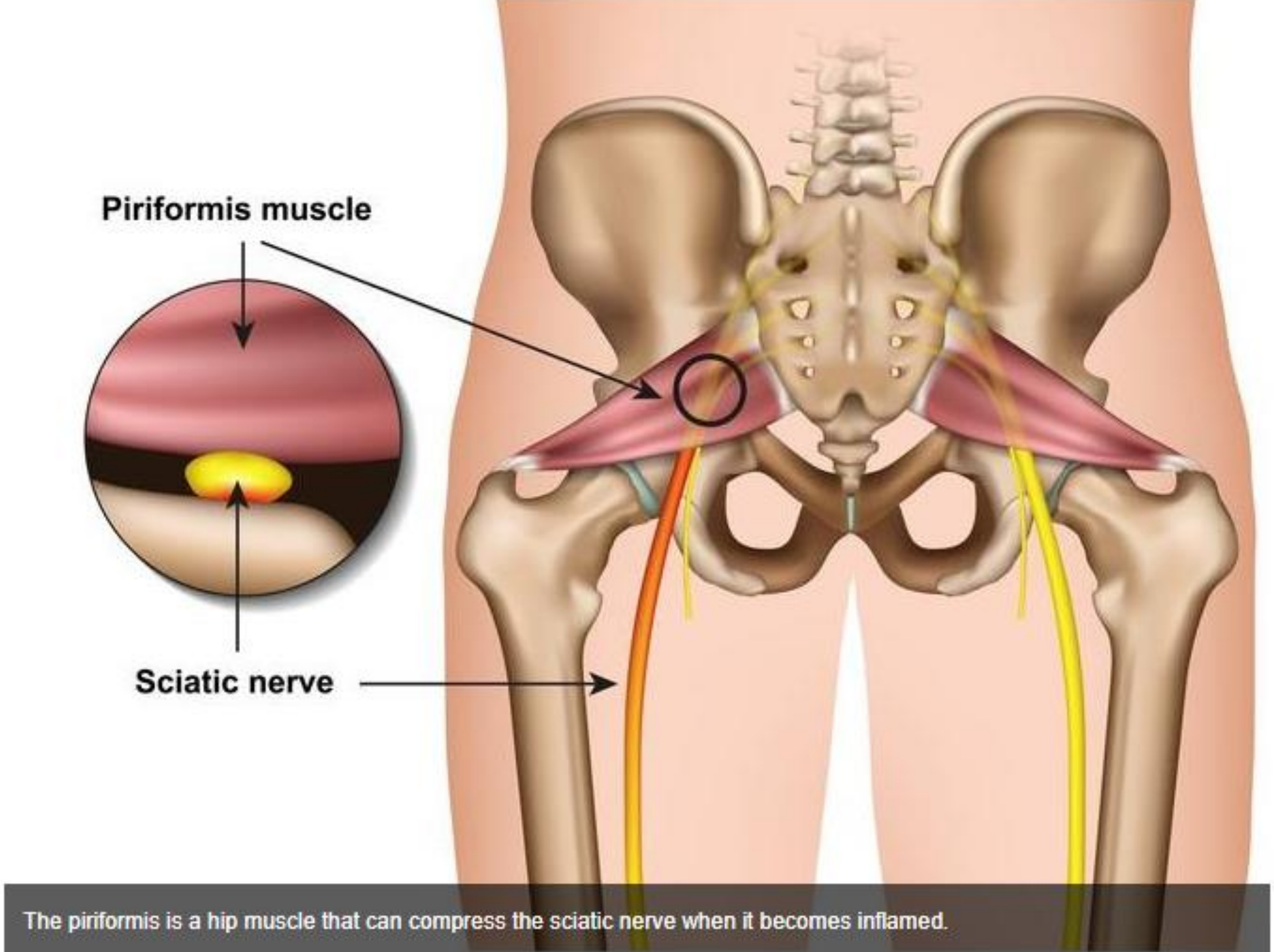
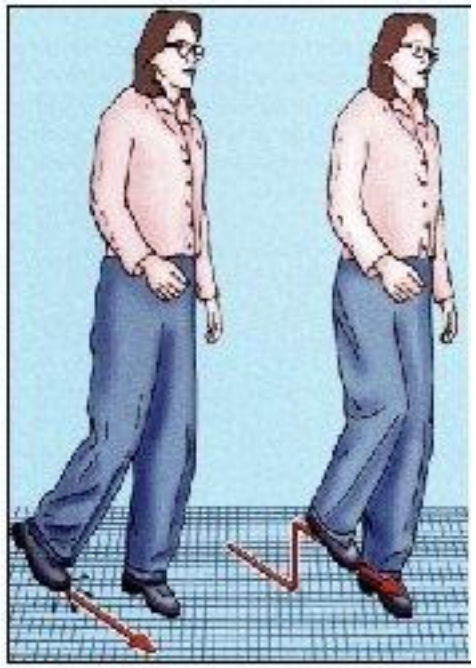


The piriformis is a hip muscle that can compress the sciatic nerve when it becomes inflamed.

EFFECTS OF SCIATIC NERVE INJURY

- MOTOR EFFECT:
  - **Marked wasting of the muscles below the knee.**
  - **Weak flexion of the knee (sartorius & gracilis are intact).**
  - **Weak extension of hip (gluteus maximus is intact).**
  - **All the muscles below the knee are paralyzed, and the weight of the foot causes it to assume the *plantar-flexed position*, or *Foot Drop*.**
  - ***(Stamping gait)*.**



Sciatic nerve injury

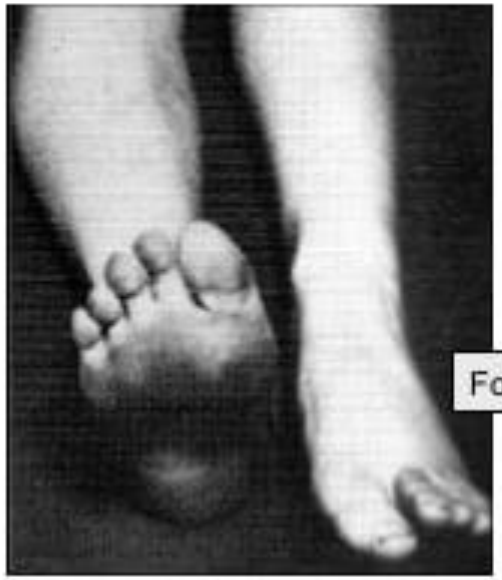
Deformity

- Foot drop.

- Wasting of the calf muscles
- Loss of Achilles tendon reflex

Cause

- Paralysis of muscles of the extensor and peroneal compartments (supplied by the common peroneal n.). The weight of the foot causes it to be plantar flexed.
- Muscles supplied by the tibial n.
- Gastrocnemius, soleus and plantaris (supplied by the tibial nerve).



Foot drop

Wasting of calf muscles


Peroneal nerve
Foot drop
Brace

Foot Drop


Normal Right Leg:
Foot In Dorsiflexion
Right Leg:
Foot Drop
Peroneal Nerve
Innervates Muscles
Of The Anterior Leg
Common
Peroneal Nerve
Deep Peroneal
Nerve
Superficial
Peroneal Nerve
Damage To
Peroneal
Nerve Impairs
Dorsiflexion
Of The Foot
Muscles Of The
Anterior Leg
Raise The Foot
(Dorsiflexion)
Ability To Raise
Foot Is Lost
X
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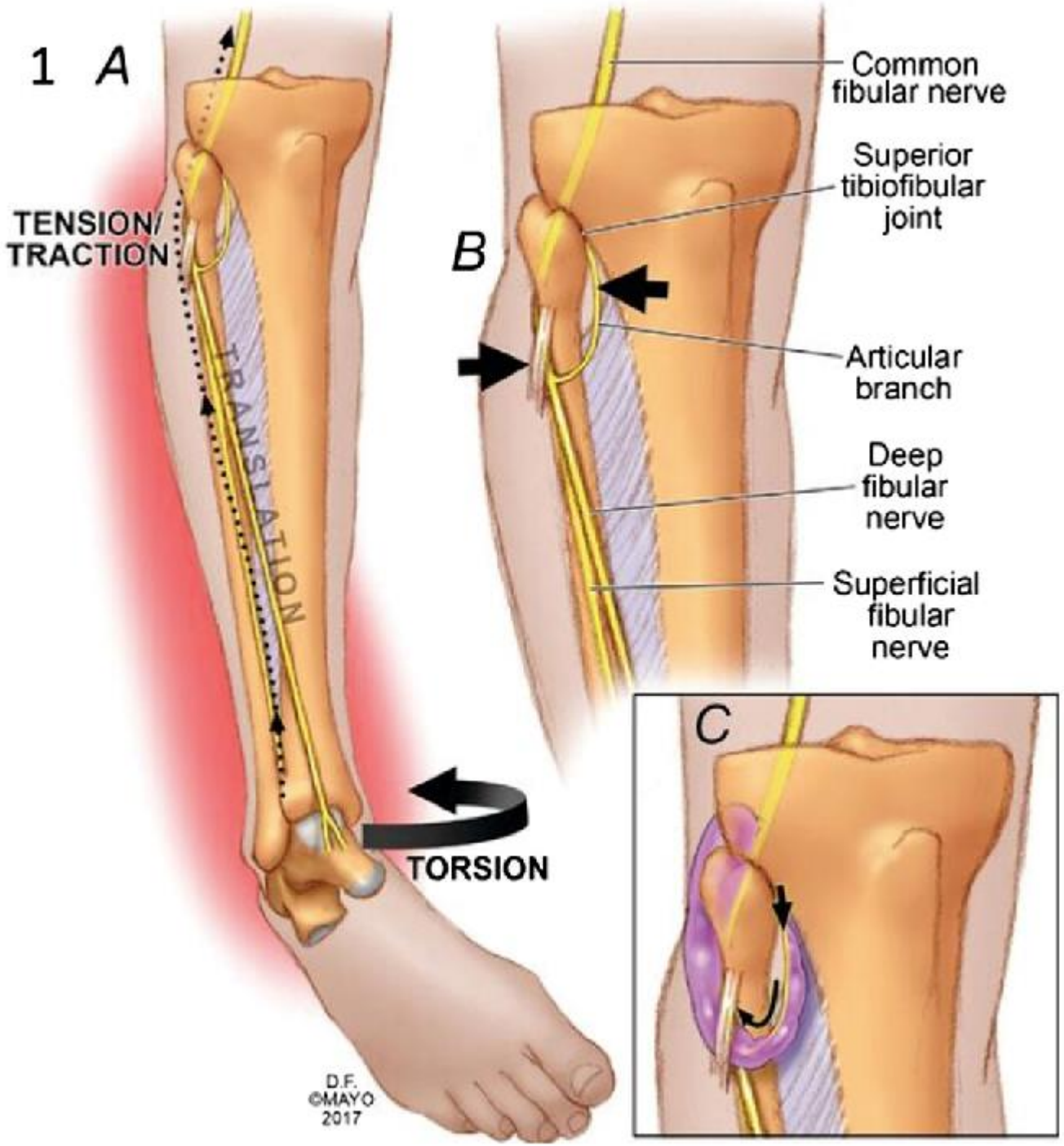
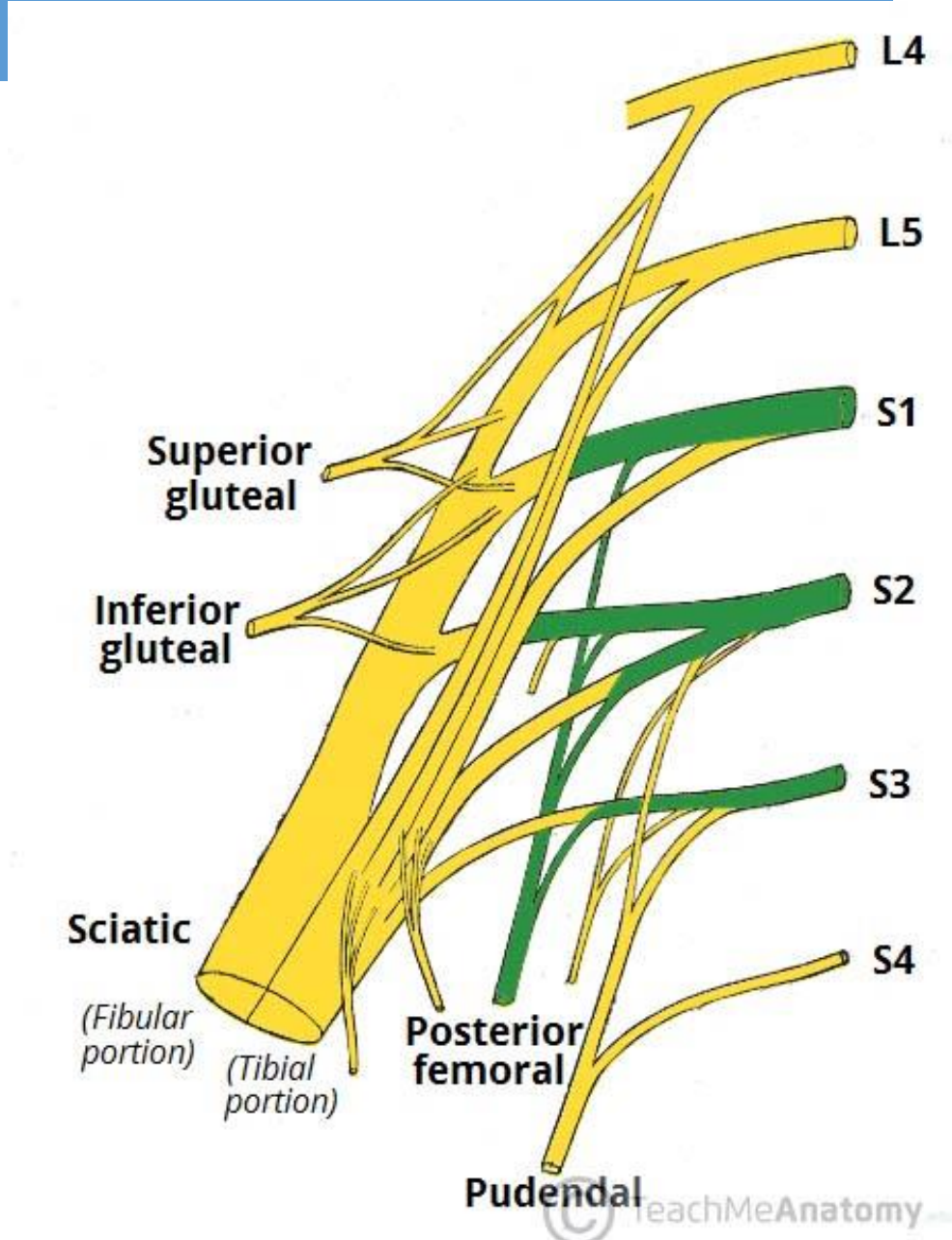
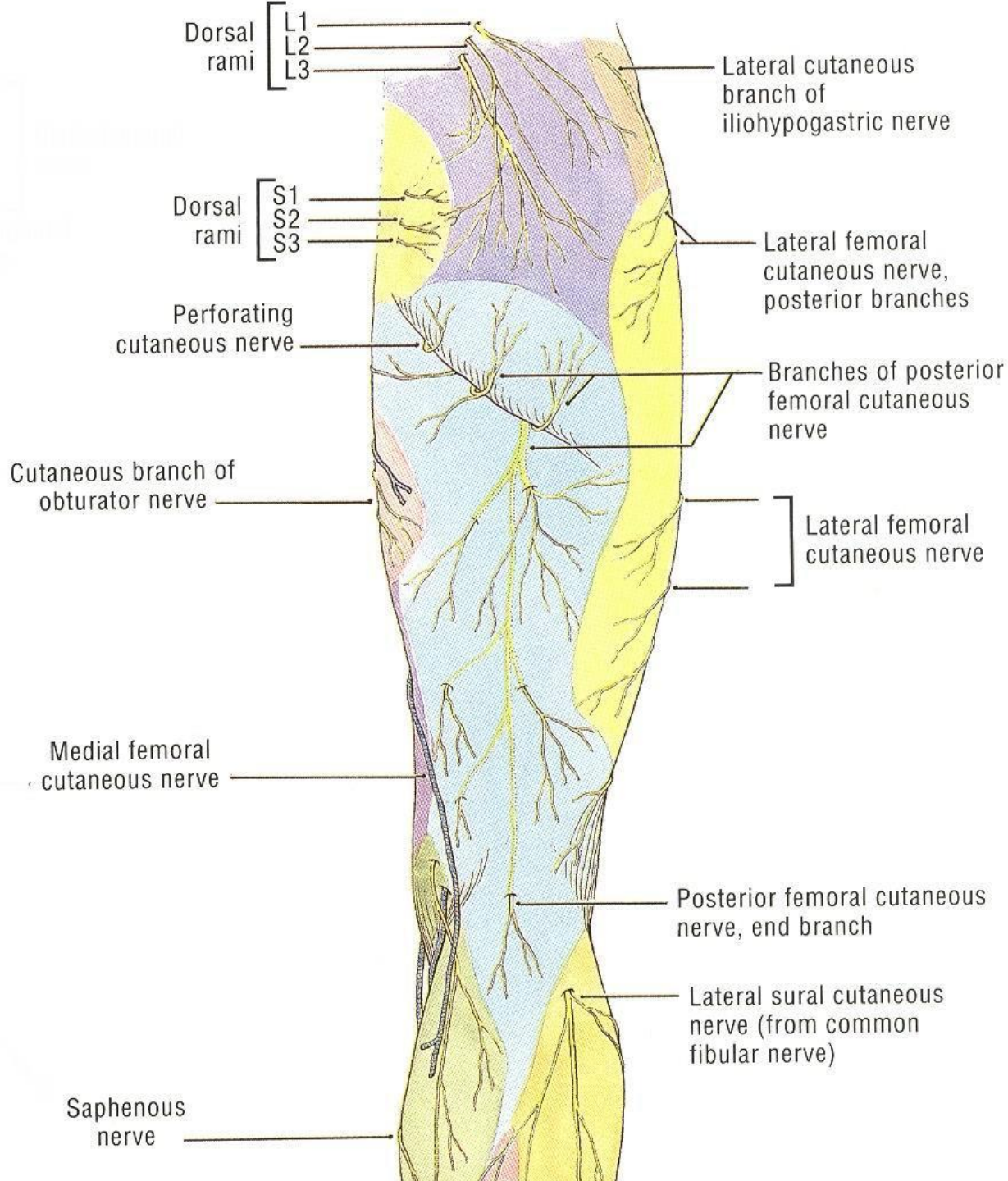
A) a concomitant ankle injury and peroneal neuropathy
B) fibulae tunnel
C) an intraneural ganglion cyst



Post. Cutaneous n. of thigh




Dorsal rami
L1
L2
L3
Lateral cutaneous branch of iliohypogastric nerve
Dorsal rami
S1
S2
S3
Lateral femoral cutaneous nerve, posterior branches
Perforating cutaneous nerve
Branches of posterior femoral cutaneous nerve
Cutaneous branch of obturator nerve
Lateral femoral cutaneous nerve
Medial femoral cutaneous nerve
Posterior femoral cutaneous nerve, end branch
Lateral sural cutaneous nerve (from common fibular nerve)
Saphenous nerve