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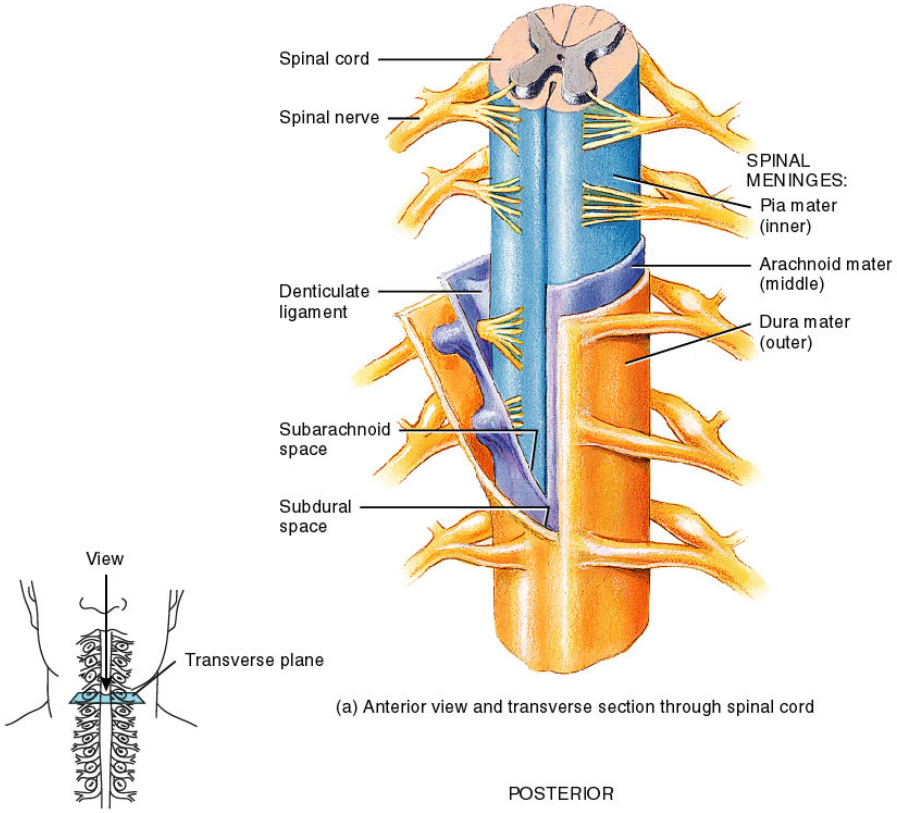
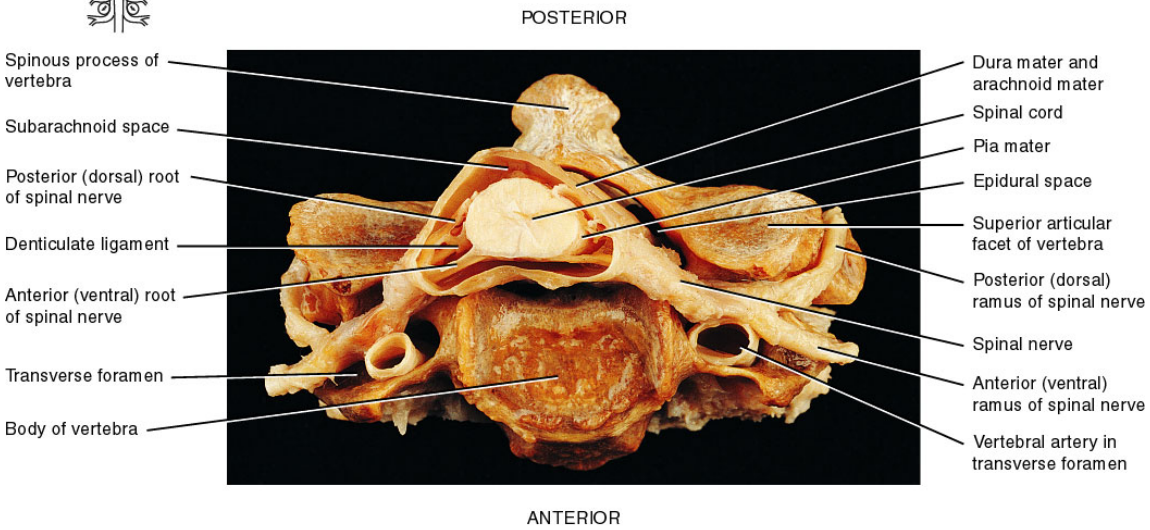
The Spinal Cord and Nerves

Meninges

- Epidural space
- **Dura Mater tissue**
  - Subdural Space
- **Arachnoid tissue**
  - Subarachnoid space (cerebrospinal fluid)
- **Pia Mater tissue**
  - Brain and spinal cord



(a) Anterior view and transverse section through spinal cord

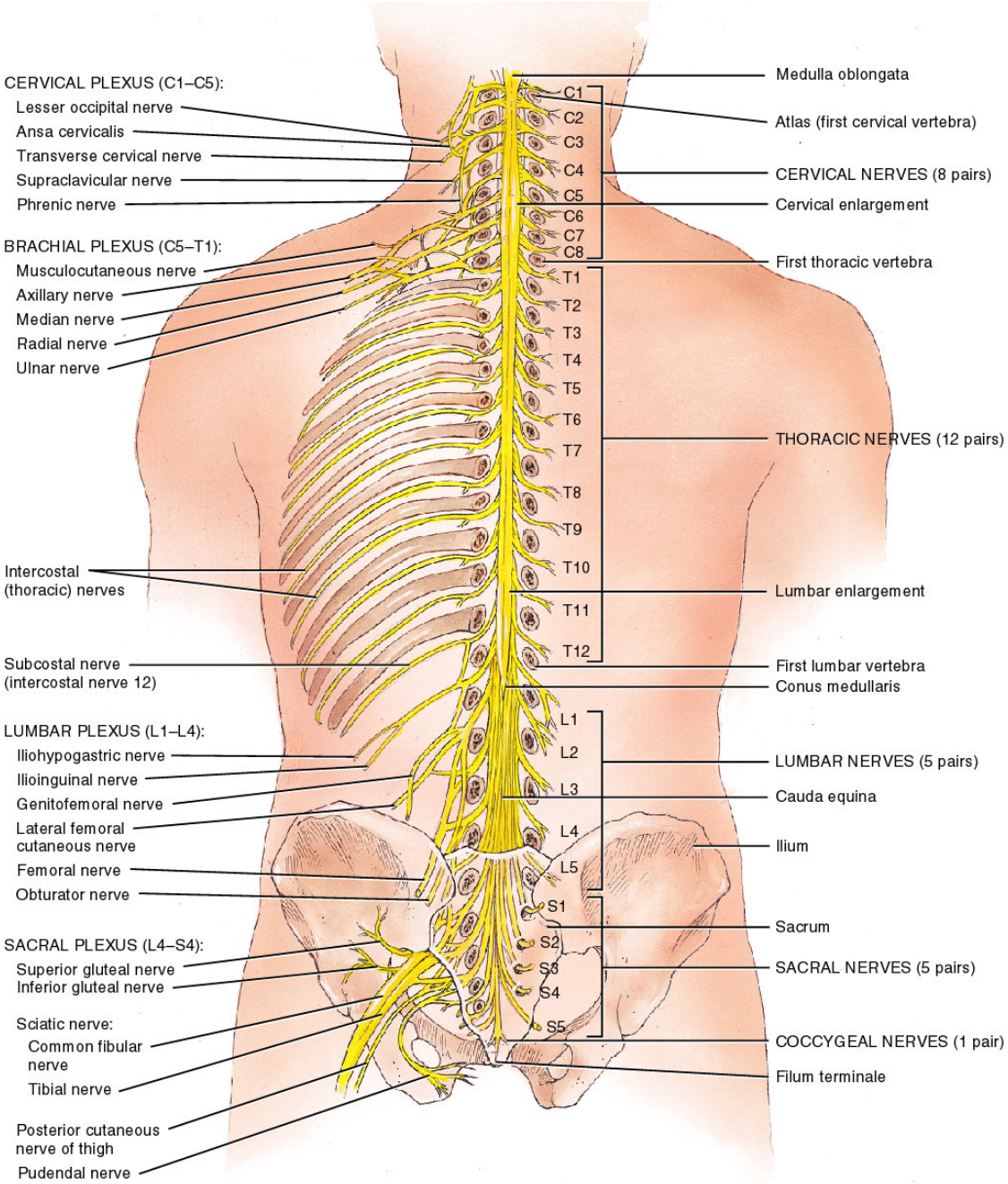


(b) Transverse section of the spinal cord within a cervical vertebra

Conus Medullaris

Cauda Equina

Filium Terminale



Posterior view of entire spinal cord and portions of spinal nerves

13.02

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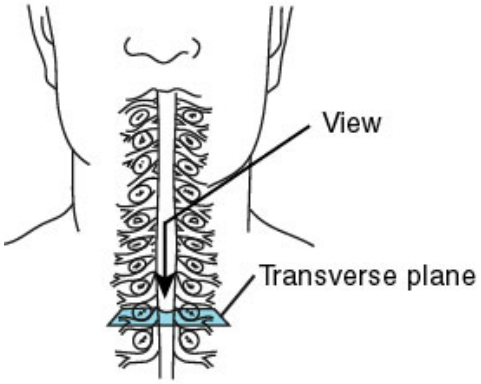
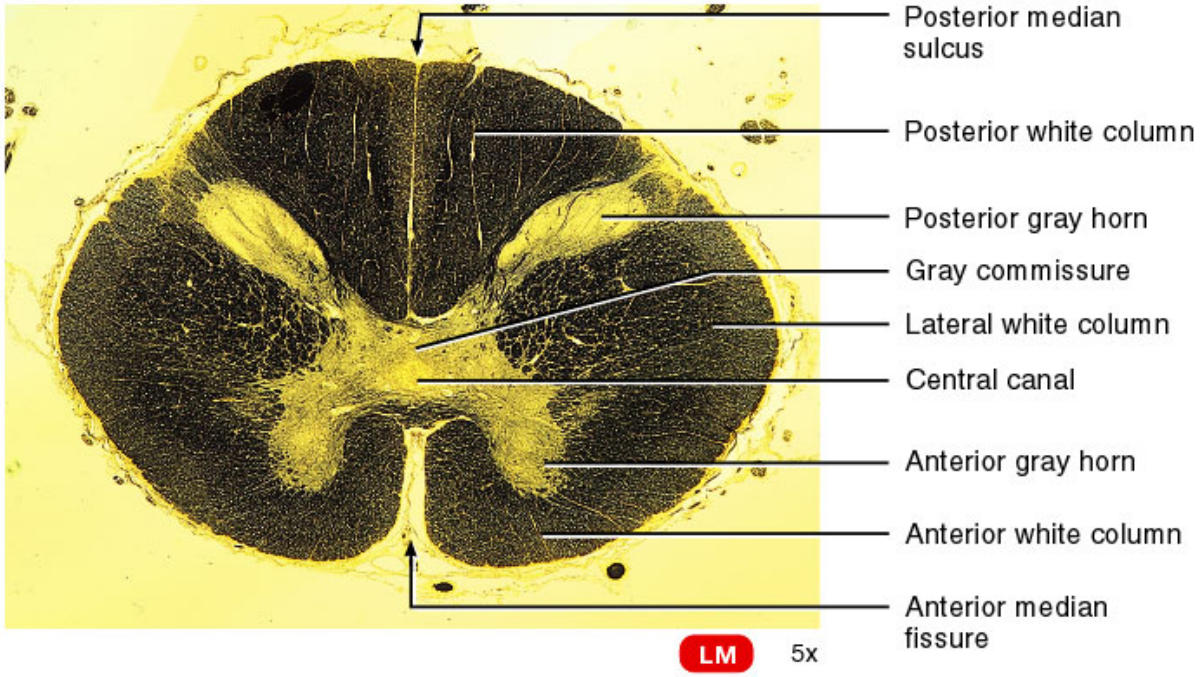
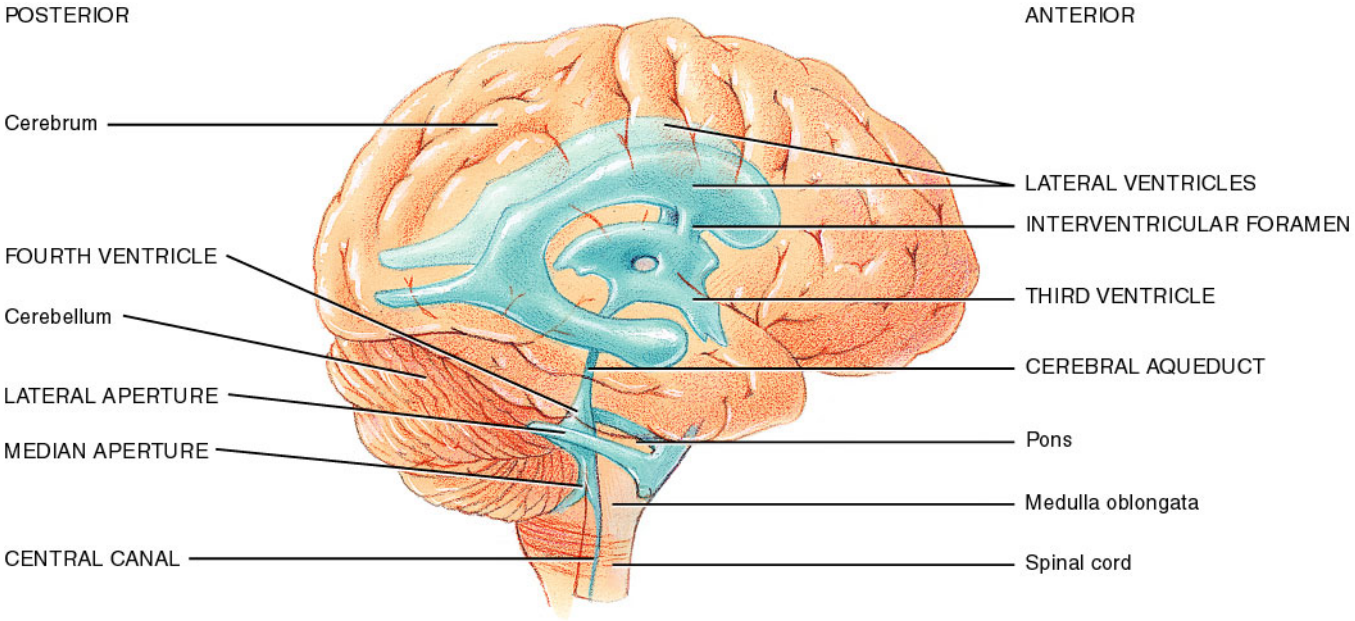




(b) Transverse section of the thoracic spinal cord

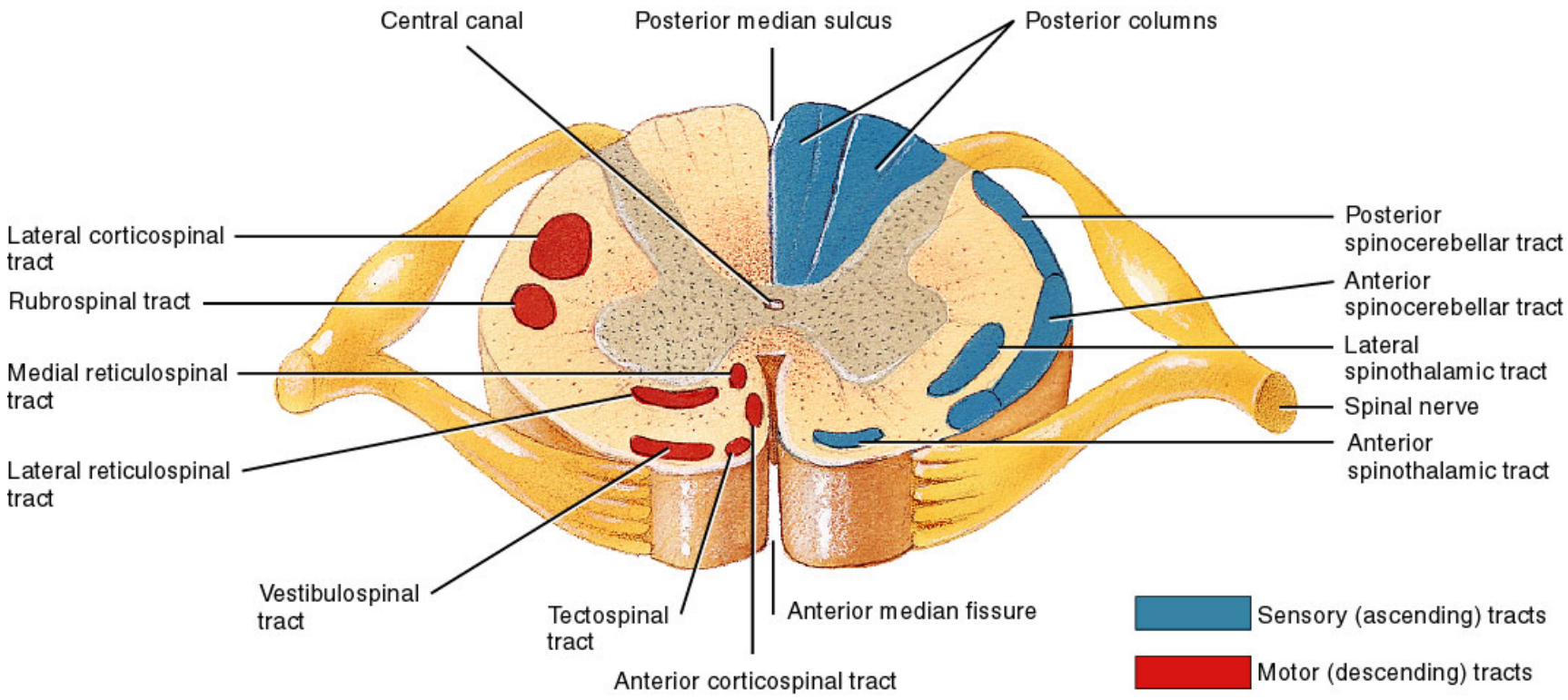
13.03b

Ventricles

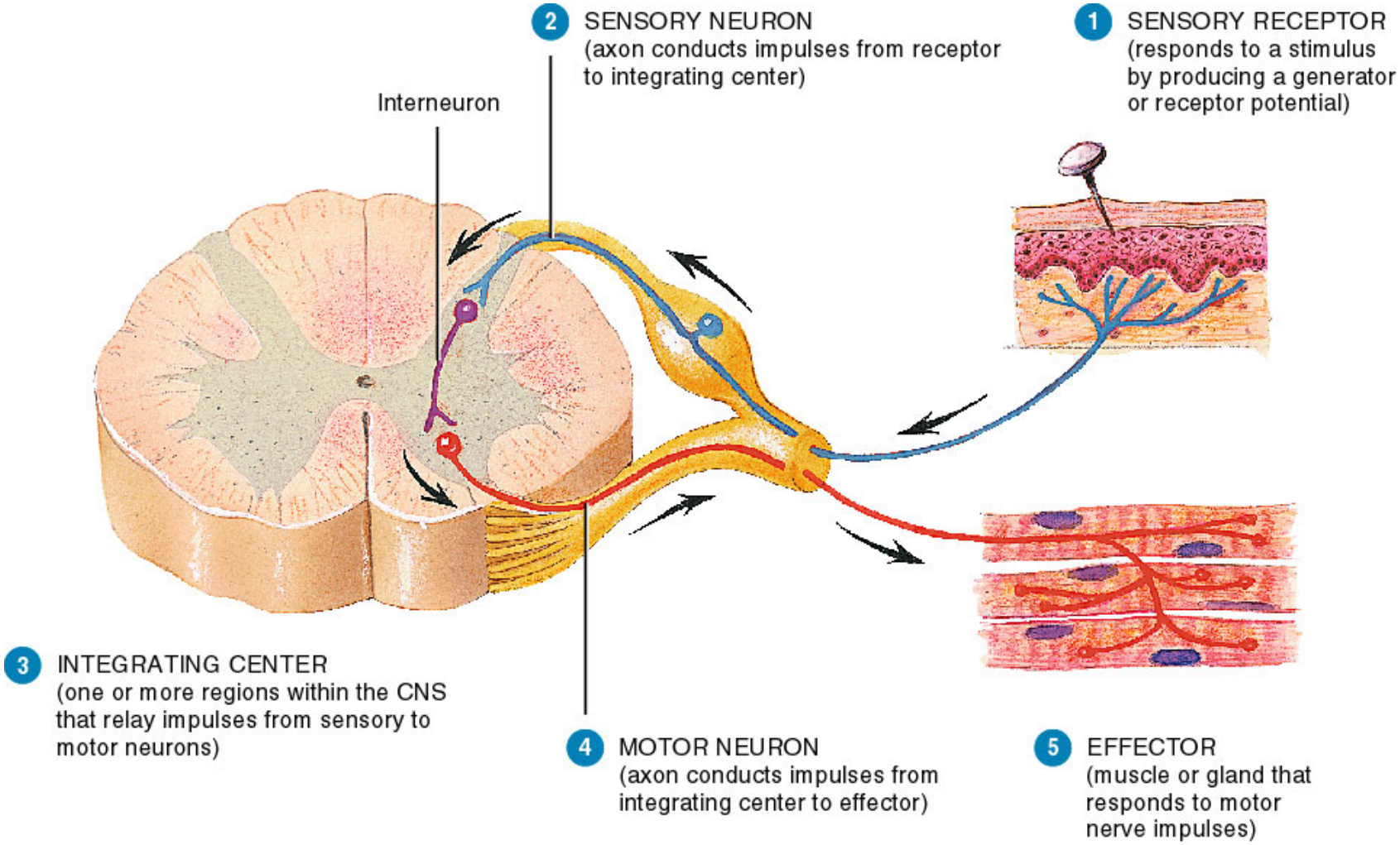


Right lateral view of brain

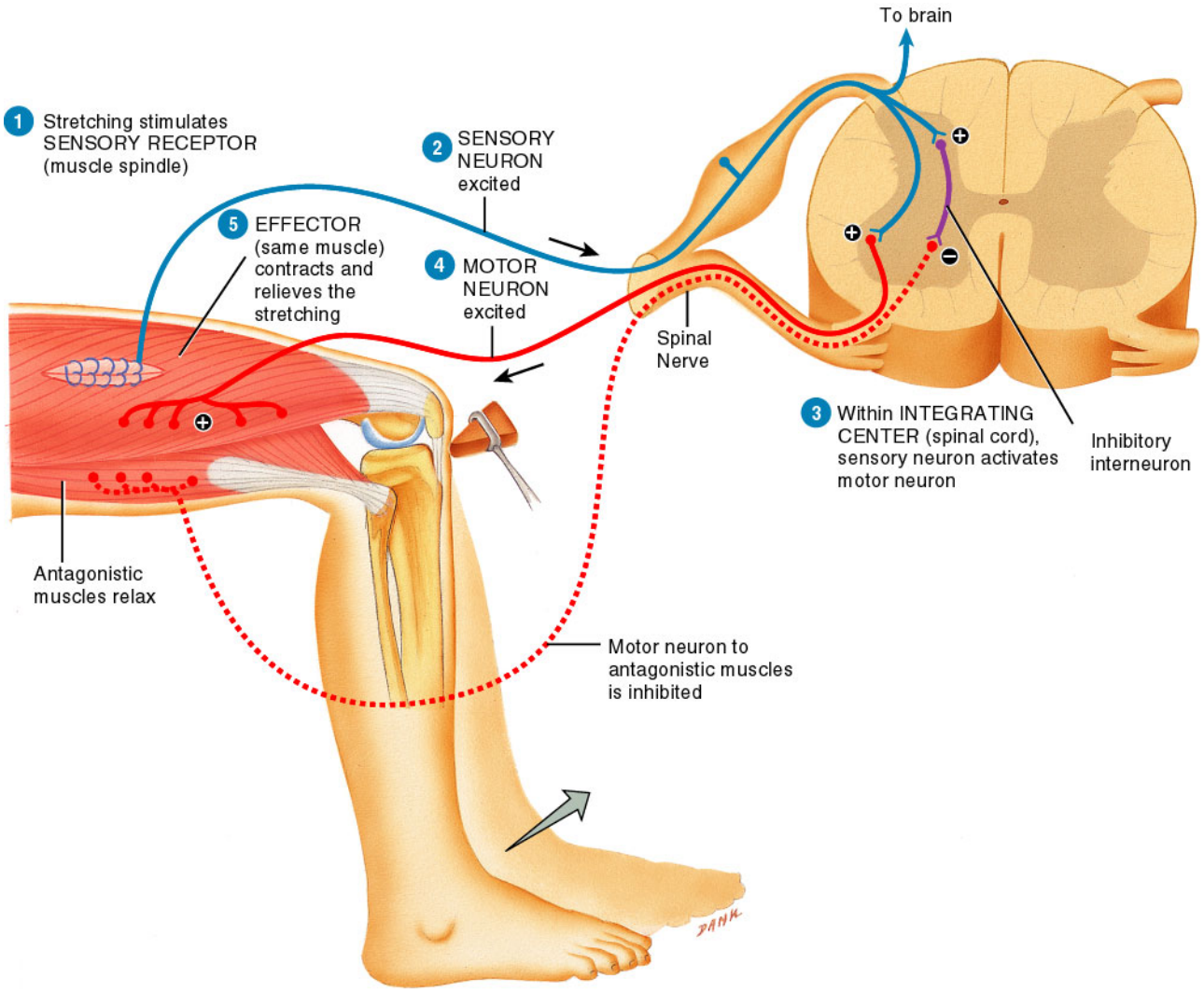
14.03


Central canal
Posterior median sulcus
Posterior columns
Lateral corticospinal tract
Rubrospinal tract
Medial reticulospinal tract
Lateral reticulospinal tract
Vestibulospinal tract
Tectospinal tract
Anterior corticospinal tract
Anterior median fissure
Posterior spinocerebellar tract
Anterior spinocerebellar tract
Lateral spinothalamic tract
Spinal nerve
Anterior spinothalamic tract
Sensory (ascending) tracts
Motor (descending) tracts

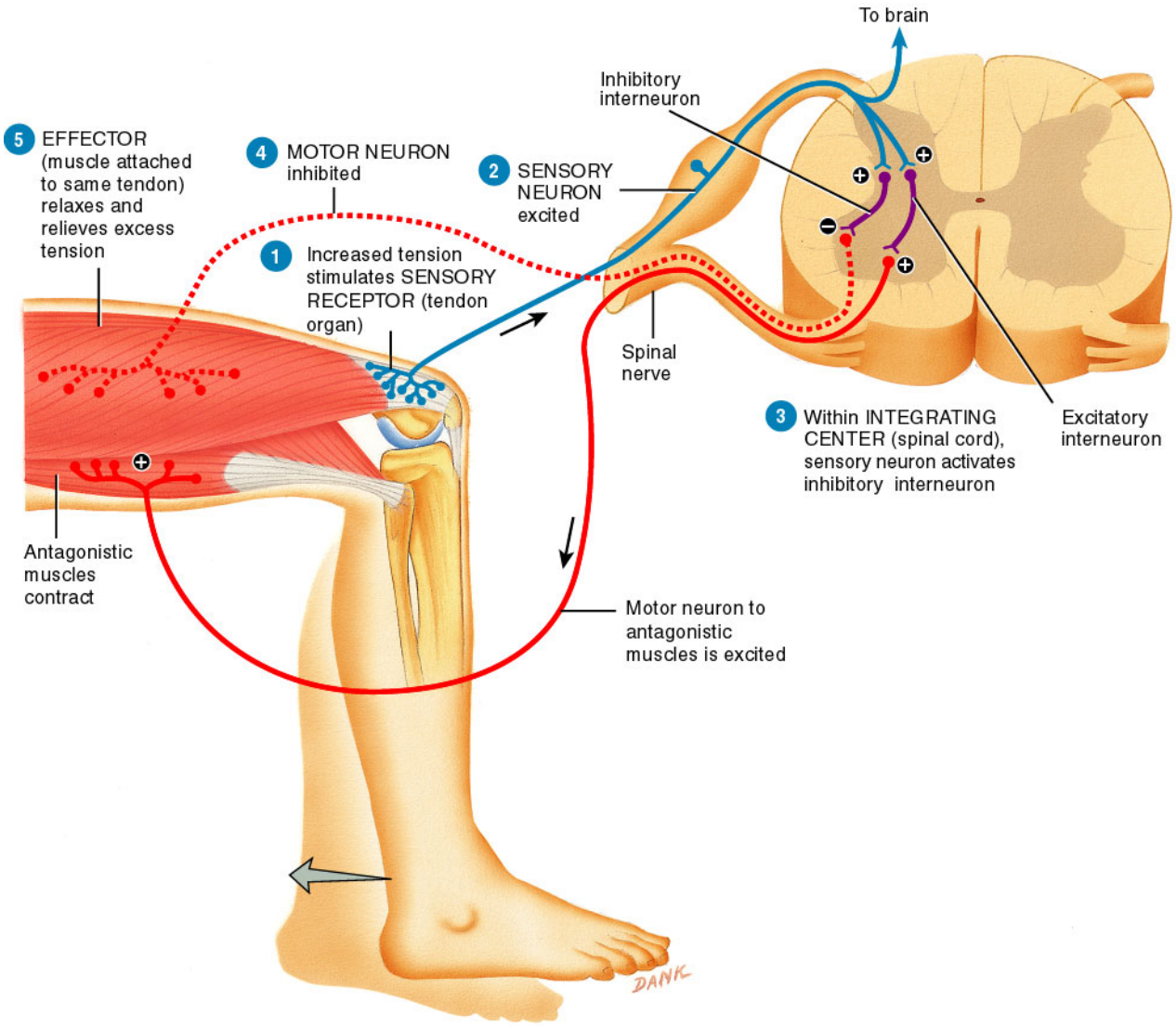
13.04


2 SENSORY NEURON
(axon conducts impulses from receptor to integrating center)
1 SENSORY RECEPTOR
(responds to a stimulus by producing a generator or receptor potential)
Interneuron
3 INTEGRATING CENTER
(one or more regions within the CNS that relay impulses from sensory to motor neurons)
4 MOTOR NEURON
(axon conducts impulses from integrating center to effector)
5 EFFECTOR
(muscle or gland that responds to motor nerve impulses)

13.05


To brain
1 Stretching stimulates SENSORY RECEPTOR (muscle spindle)
2 SENSORY NEURON excited
5 EFFECTOR (same muscle) contracts and relieves the stretching
4 MOTOR NEURON excited
Spinal Nerve
3 Within INTEGRATING CENTER (spinal cord), sensory neuron activates motor neuron
Inhibitory interneuron
Antagonistic muscles relax
Motor neuron to antagonistic muscles is inhibited

13.06



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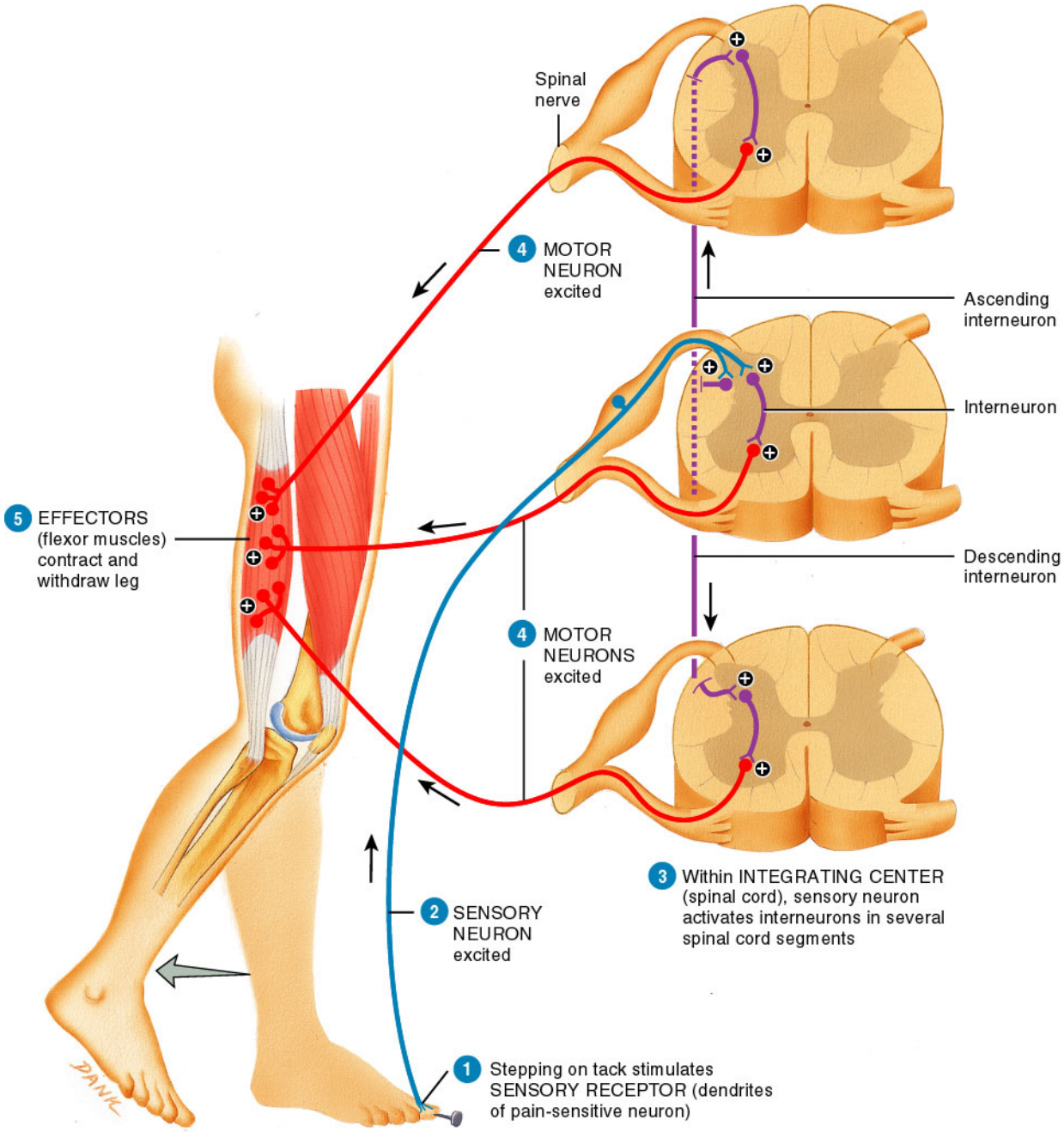
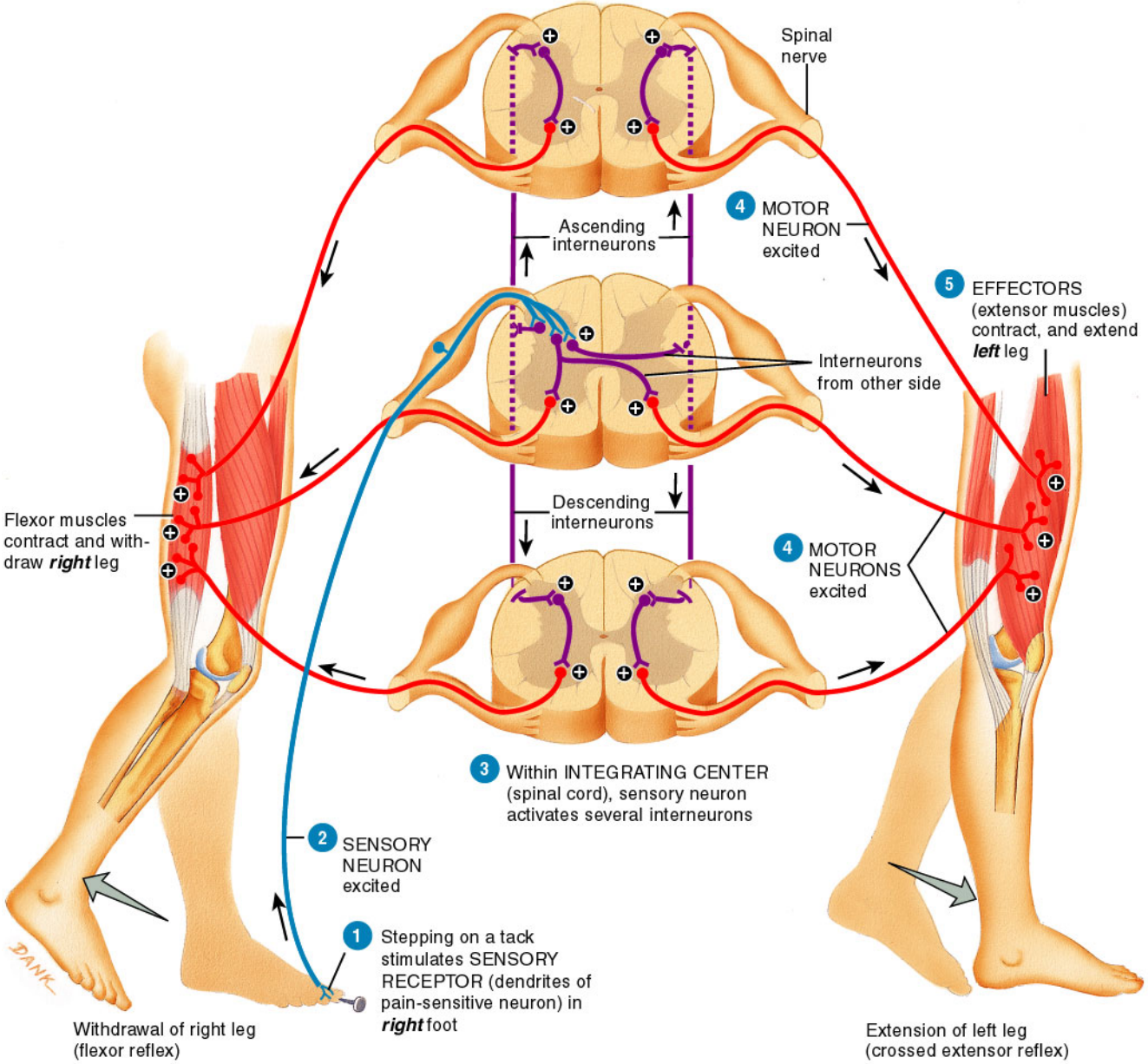
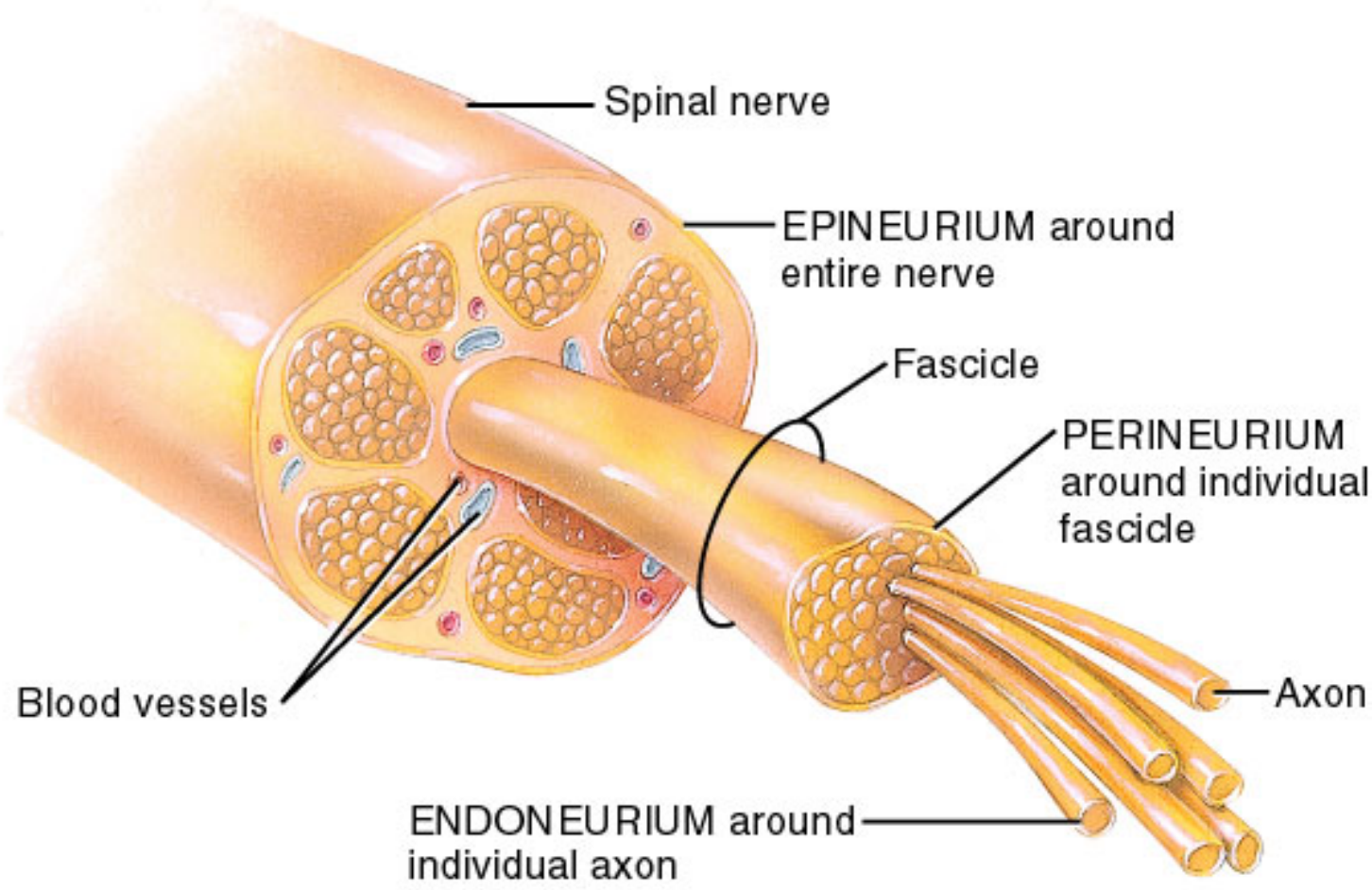

Spinal nerve
4 MOTOR NEURON excited
Ascending interneuron
Interneuron
5 EFFECTORS (flexor muscles) contract and withdraw leg
Descending interneuron
4 MOTOR NEURONS excited
3 Within INTEGRATING CENTER (spinal cord), sensory neuron activates interneurons in several spinal cord segments
2 SENSORY NEURON excited
1 Stepping on tack stimulates SENSORY RECEPTOR (dendrites of pain-sensitive neuron)
DANK

13.08

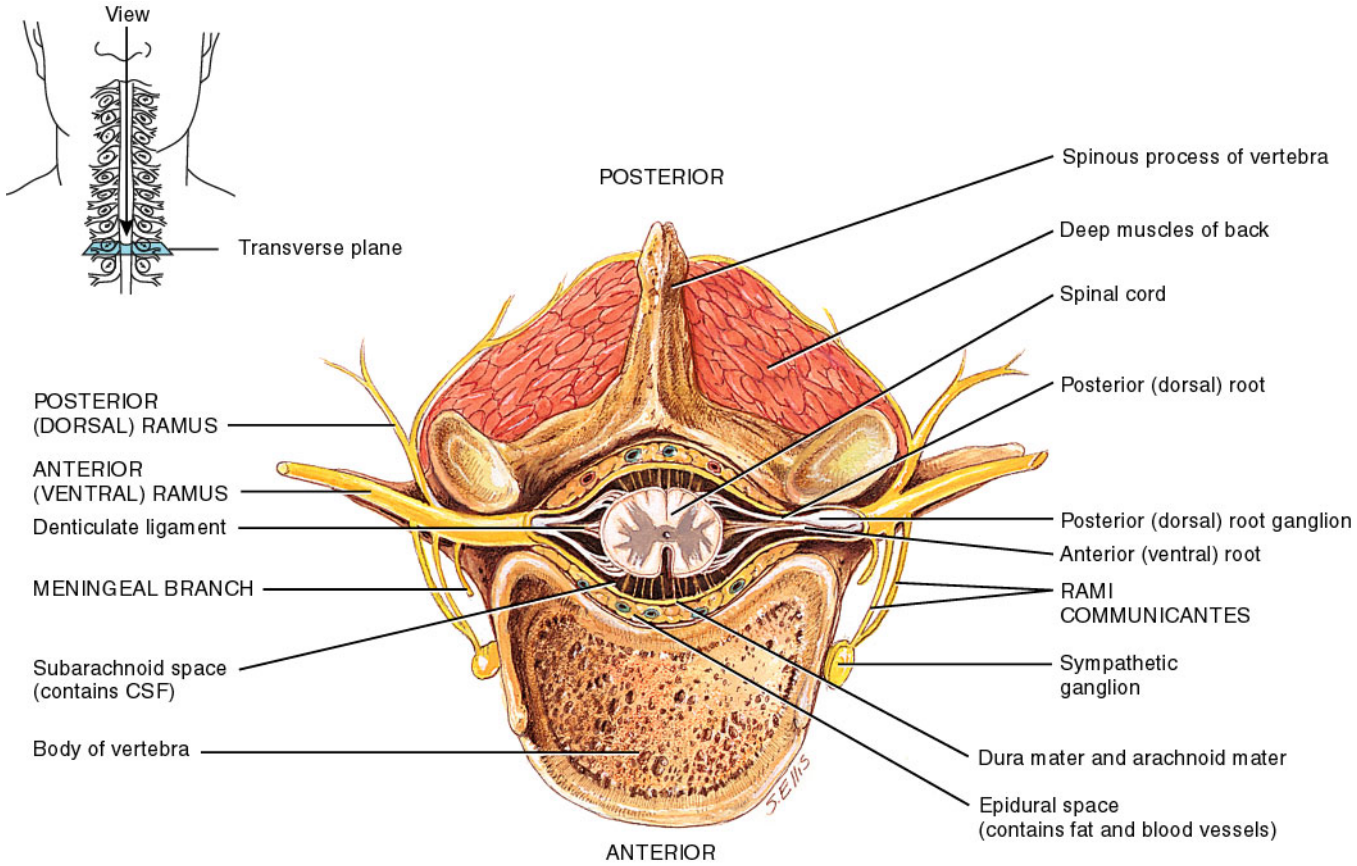

Spinal nerve
4 MOTOR NEURON excited
Ascending interneurons
5 EFFECTORS (extensor muscles) contract, and extend *left* leg
Interneurons from other side
Flexor muscles contract and withdraw *right* leg
Descending interneurons
4 MOTOR NEURONS excited
3 Within INTEGRATING CENTER (spinal cord), sensory neuron activates several interneurons
2 SENSORY NEURON excited
1 Stepping on a tack stimulates SENSORY RECEPTOR (dendrites of pain-sensitive neuron) in *right* foot
Withdrawal of right leg (flexor reflex)
Extension of left leg (crossed extensor reflex)

13.09

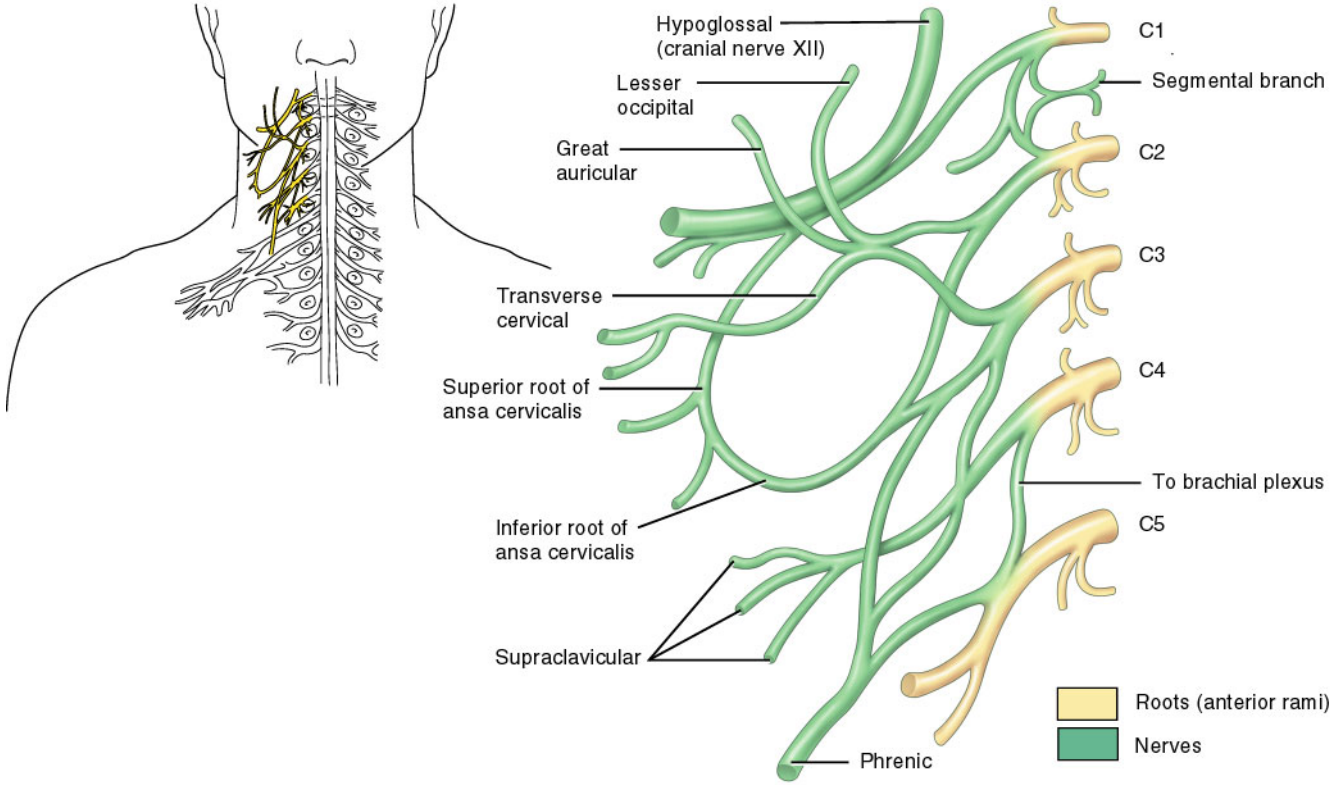


(a) Transverse section showing the coverings of a spinal nerve

13.10a


View
Transverse plane
POSTERIOR
Spinous process of vertebra
Deep muscles of back
Spinal cord
Posterior (dorsal) root
POSTERIOR
(DORSAL) RAMUS
ANTERIOR
(VENTRAL) RAMUS
Denticulate ligament
MENINGEAL BRANCH
Subarachnoid space
(contains CSF)
Body of vertebra
Posterior (dorsal) root ganglion
Anterior (ventral) root
RAMI
COMMUNICANTES
Sympathetic
ganglion
Dura mater and arachnoid mater
Epidural space
(contains fat and blood vessels)
ANTERIOR

13.11



Origin of cervical plexus

13.12

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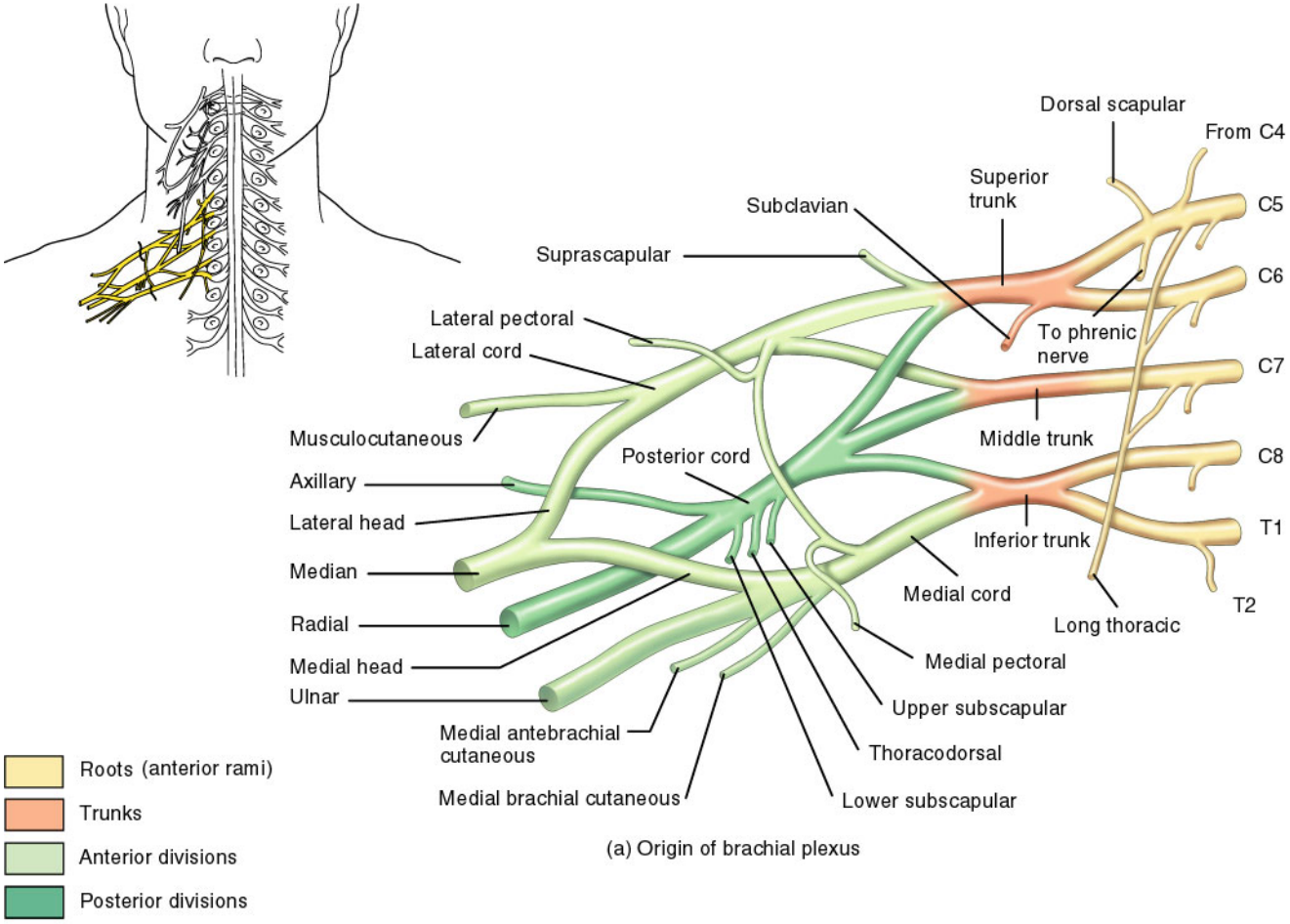
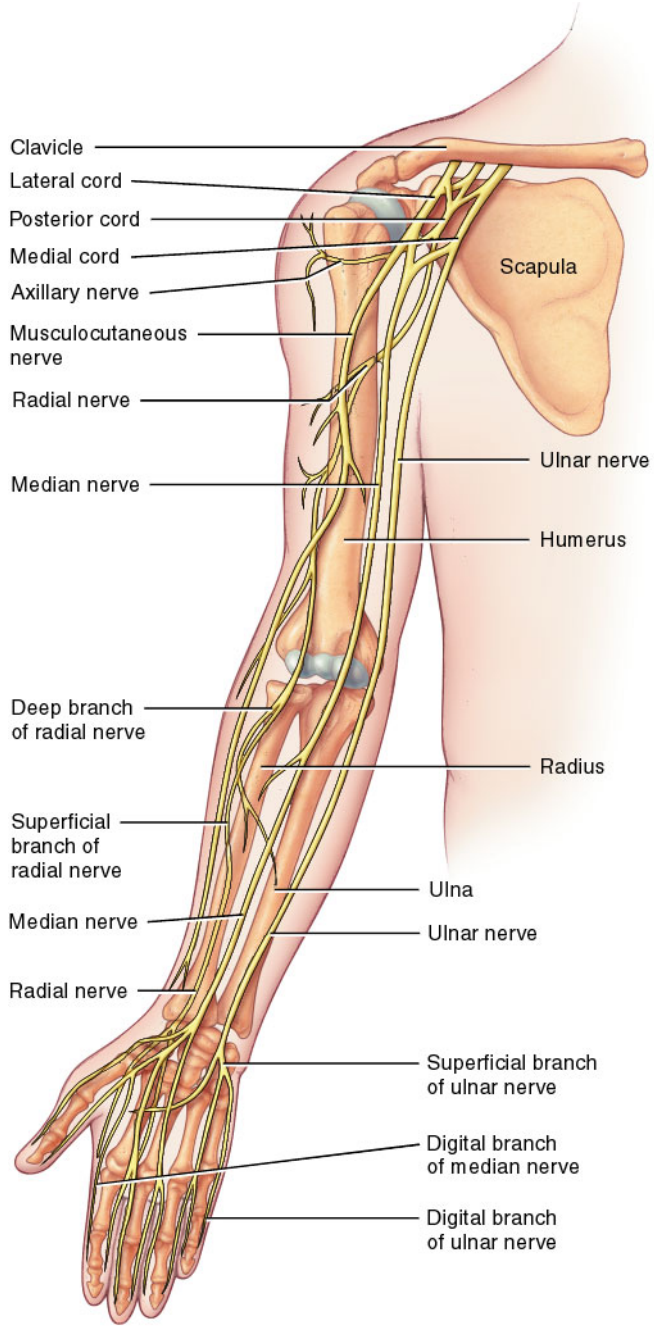


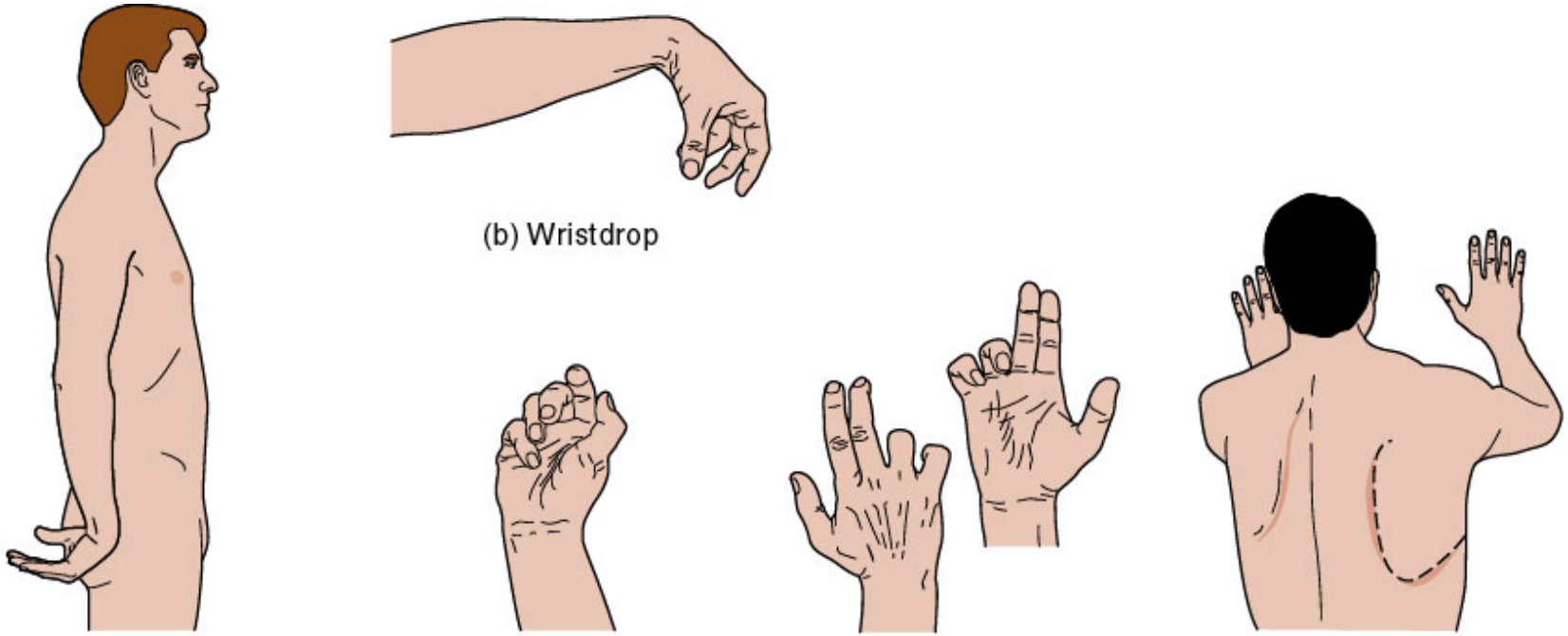
(a) Origin of brachial plexus

13.13a



(b) Distribution of nerves from the brachial plexus

13.13b



(a) Erb-Duchenne palsy (waiter's tip)

(b) Wristdrop

(c) Median nerve palsy

(d) Ulnar nerve palsy

(e) Winging of left scapula

13.14

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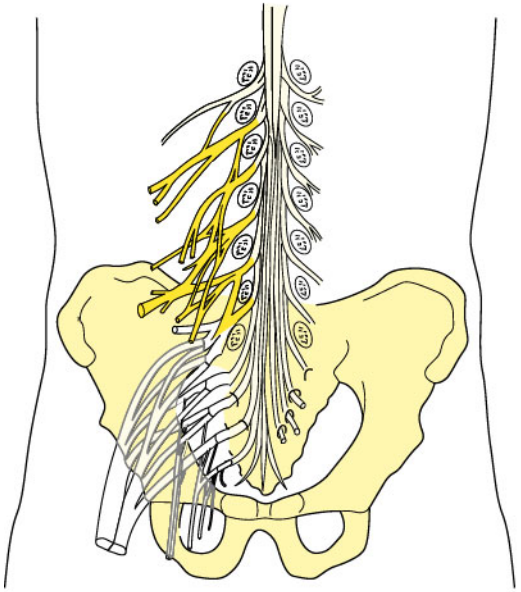
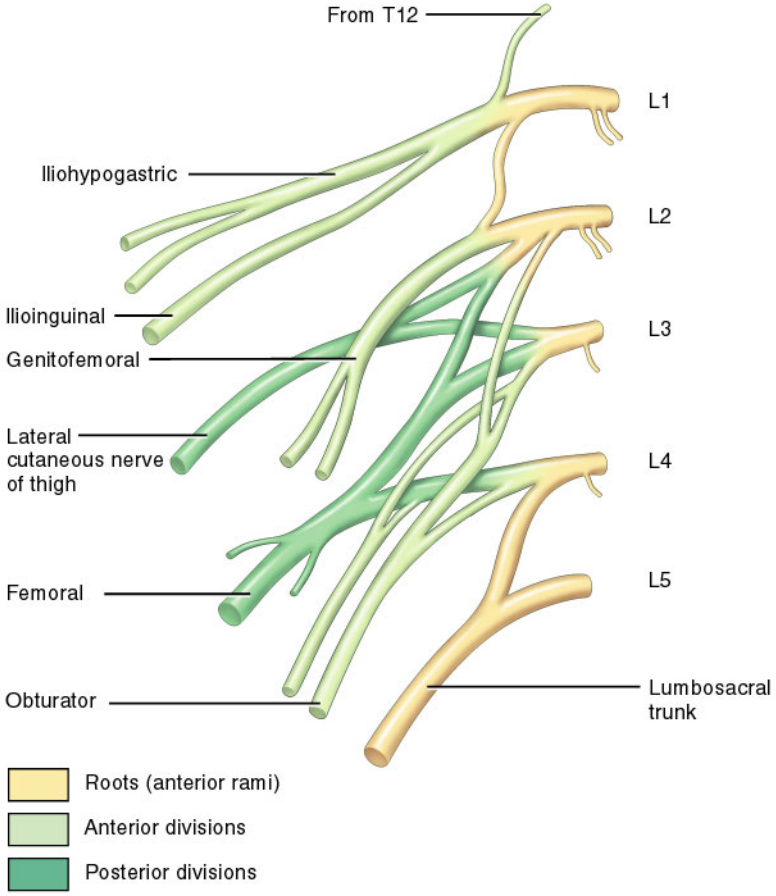
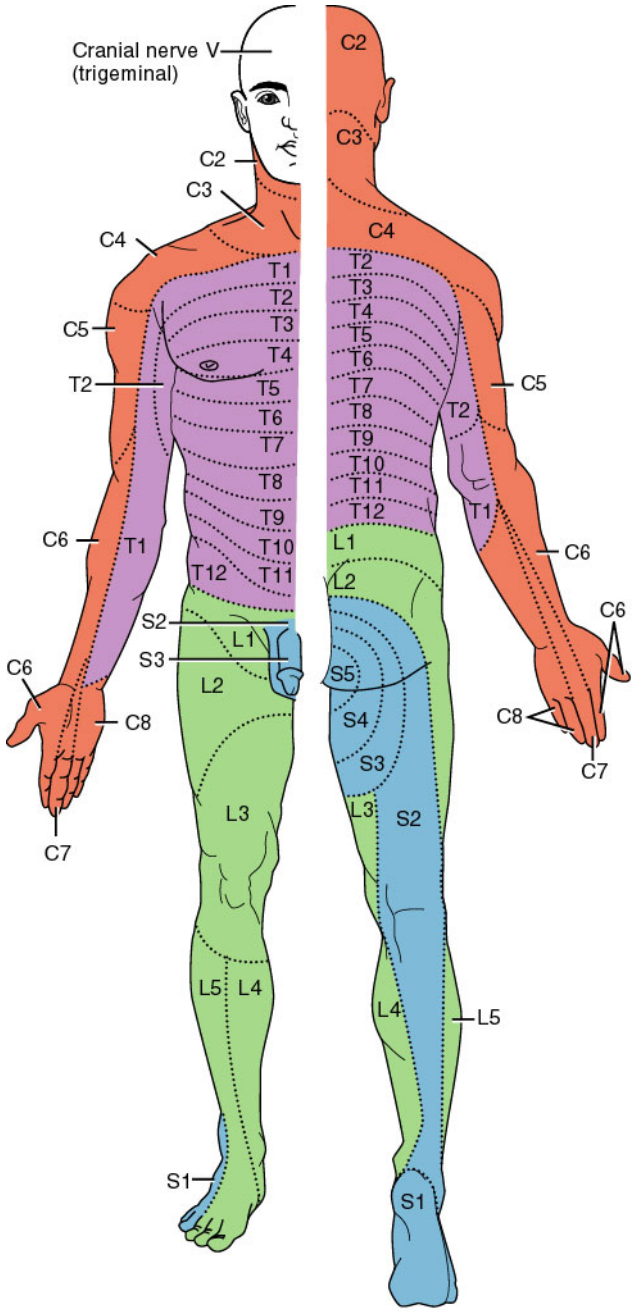




(a) Origin of lumbar plexus

13.15a



(a) Anterior view (b) Posterior view

Terms

- Shingles
- Poliomyelitis
- Meningitis
- Nerve block
- Neuritis