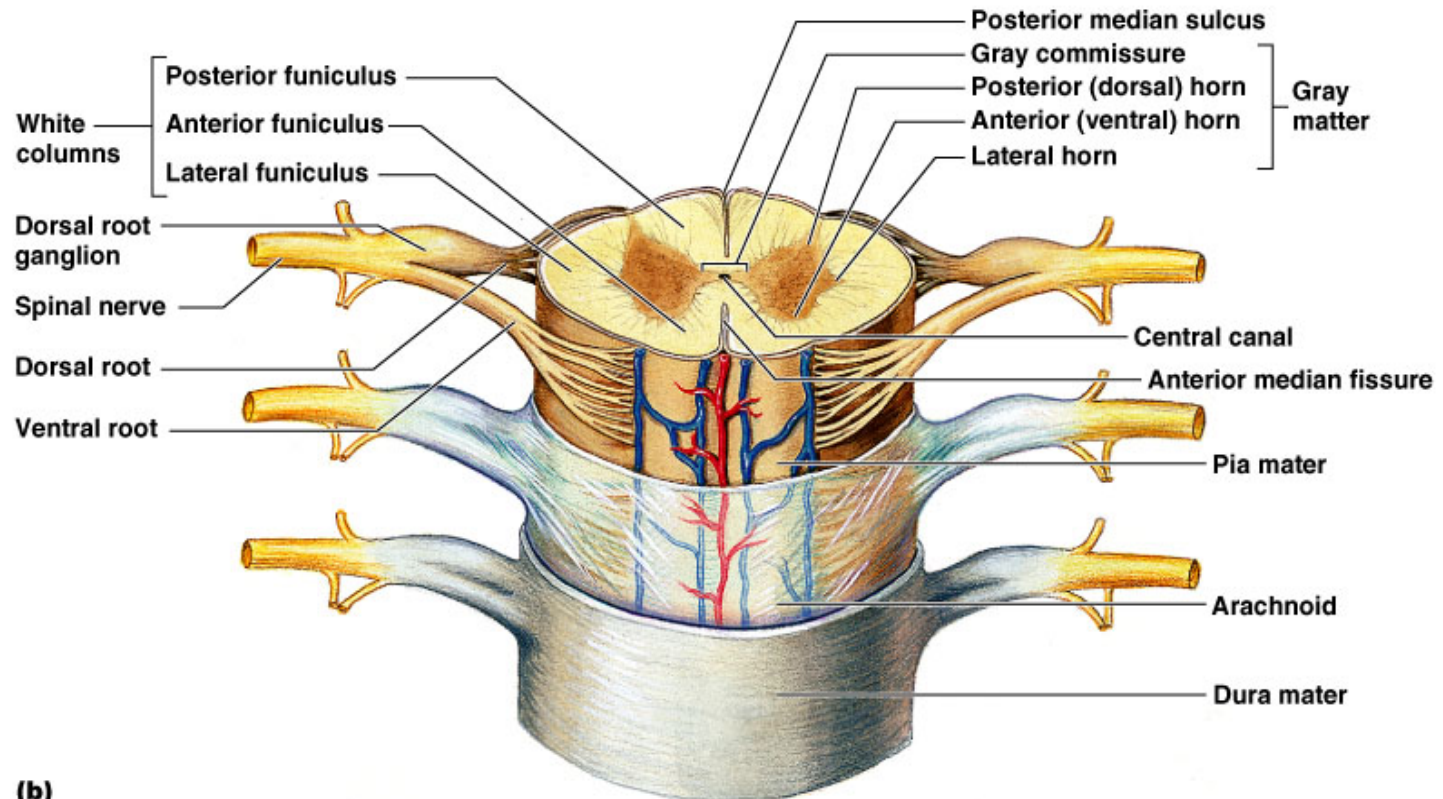


Spinal Cord, Spinal Nerves

A&P lab

Dr. Kandula

Anatomy of Spinal Cord

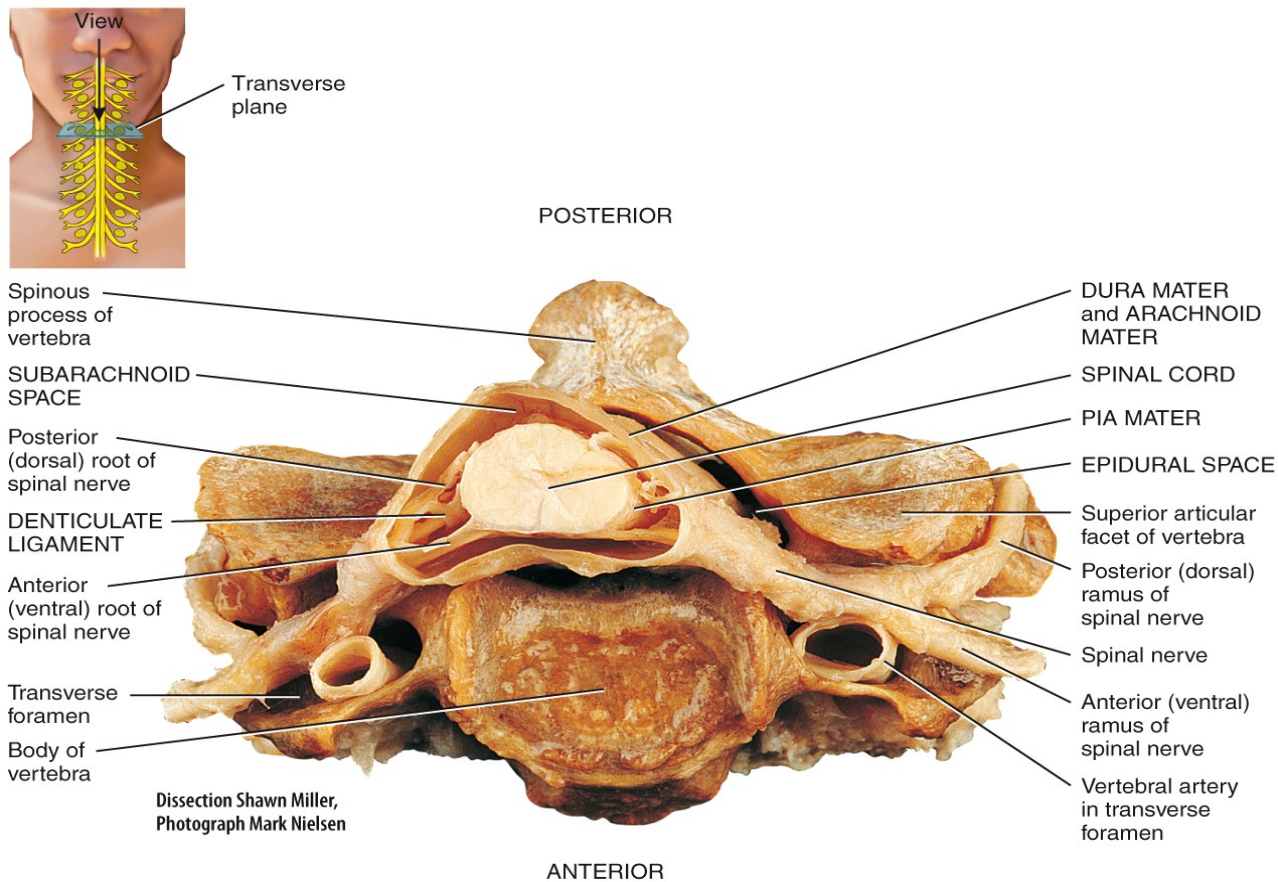


(b)

Meninges

- Connective tissue membranes that protect and surround brain and spinal cord
- Outermost layer is **dura mater**, dense irregular connective tissue
- Middle layer is **arachnoid mater**; avascular thin layer ; elastic and collagen fibers
- Inner layer is **pia mater**; elastic and collagen fibers adheres to surface of brain and spinal cord; richly vascular; has **denticulate ligaments** that attach to vertebrae

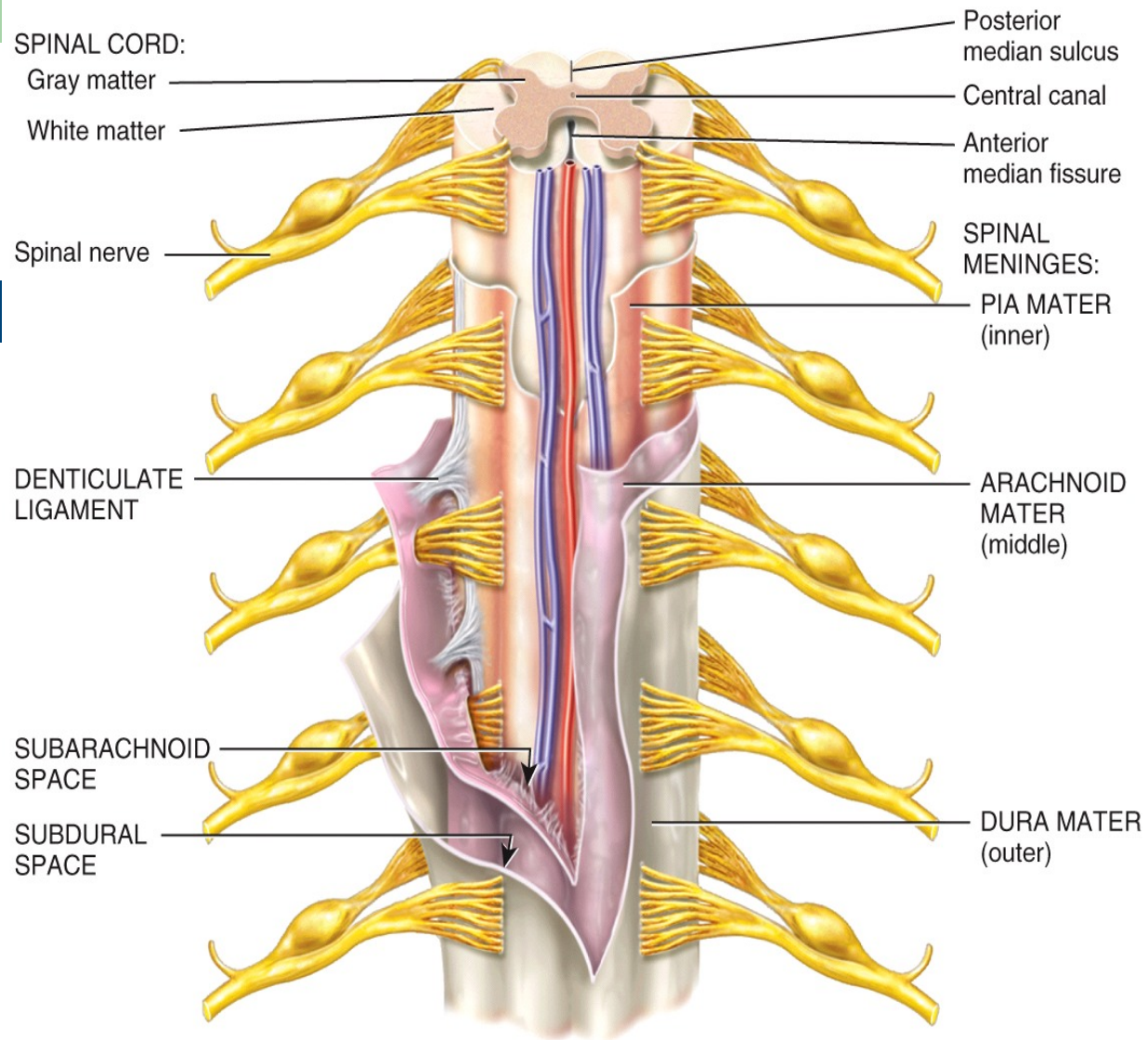
Meninges and Spaces



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

Spaces

- **Epidural space** - This is a space between the dura mater and the vertebral bone; it is filled with **adipose tissue and connective tissue**
- **Subdural space** – found between dura mater and arachnoid; contains **interstitial fluid**
- **Subarachnoid space** – between pia mater and arachnoid; contains **cerebrospinal fluid**



(a) Anterior view and transverse section through spinal cord

Denticulate ligaments

- Extensions of **pia mater** connect the spinal cord to the dura mater and the vertebral bodies
- Help to hold the spinal cord in position

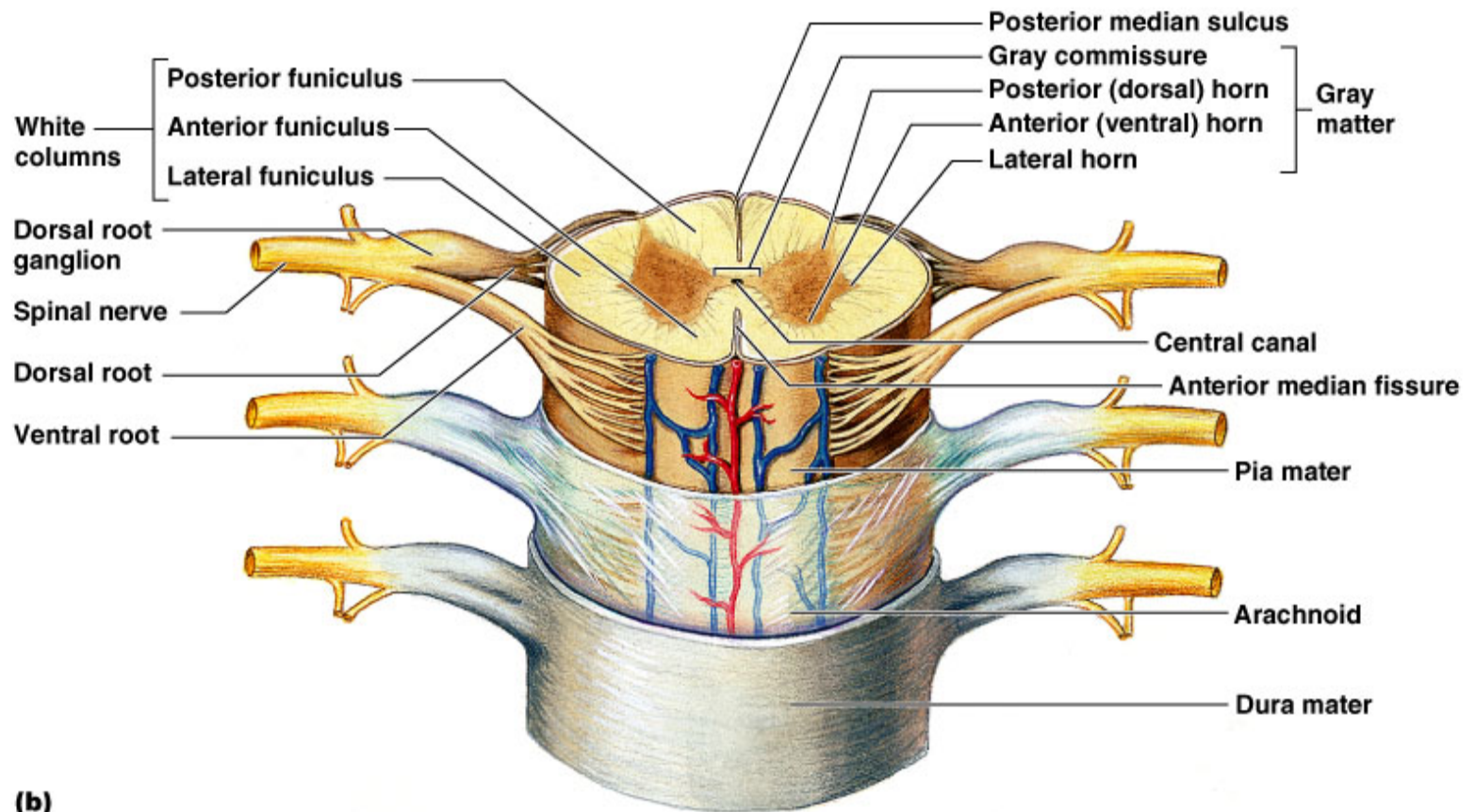
Functions of the Spinal Cord

1. Process reflexes
2. Integrates EPSPs* and IPSPs**
3. Conducts sensory impulses to the brain and motor impulses to effectors

* Excitatory postsynaptic potentials

** Inhibitory postsynaptic potentials

Anatomy of Spinal Cord



Spinal cord

- Begins at **foramen magnum**
- 16 – 18 inches long
- Ends at level of **lumbar vertebra L1 or L2** in a conical end called **conus medullaris**
- Below this in the vertebral column – **cauda equina**
- **Filum terminale** – pia mater extension

CERVICAL PLEXUS (C1–C5):

Lesser occipital nerve
Great auricular
Ansa cervicalis
Transverse cervical nerve
Supraclavicular nerve
Phrenic nerve

BRACHIAL PLEXUS (C5–T1):

Musculocutaneous nerve
Axillary nerve
Median nerve
Radial nerve
Ulnar nerve

Intercostal
(thoracic) nerves

Subcostal nerve
(intercostal nerve 12)

Second lumbar vertebra

LUMBAR PLEXUS (L1–L4):

Iliohypogastric nerve
Ilioinguinal nerve
Genitofemoral nerve
Lateral femoral
cutaneous nerve

Femoral nerve
Obturator nerve

SACRAL PLEXUS (L4–S4):

Superior gluteal nerve
Inferior gluteal nerve

Sciatic nerve:

Common fibular
nerve
Tibial nerve
Posterior cutaneous
nerve of thigh
Pudendal nerve

Medulla oblongata

Atlas (first cervical vertebra)

CERVICAL NERVES (8 pairs)

Cervical enlargement

First thoracic vertebra

THORACIC NERVES (12 pairs)

Lumbar enlargement

First lumbar vertebra

Conus medullaris

LUMBAR NERVES (5 pairs)

Cauda equina

Ilium of hip bone

Sacrum

SACRAL NERVES (5 pairs)

COCCYGEAL NERVES (1 pair)

Filum terminale

Posterior view of entire spinal cord and portions of spinal nerves

Spinal cord

- 2 enlargements in transverse section
cervical
lumbar
- Anterior surface – **anterior median fissure**
- Posterior surface – **posterior median sulcus**
- Central hollow tube – **central canal** filled with **CSF**

Spinal cord

- Gray matter on the inside
- White matter on the outside
- Gray matter is composed of neuron bodies
 - Found in center of spinal cord and looks like a butterfly
 - **Dorsal, ventral and lateral horns**
 - **Gray commissure**

Spinal cord

- White matter is composed of axons covered in myelin
- 3 columns of white matter are called **funiculi**
 - **Posterior, anterior and lateral**
 - Each contains several tracts of axons.

Spinal Nerves

- Spinal nerves connect the CNS to sensory receptors, muscles, and glands and are part of the peripheral nervous system
- **31 pairs** of spinal nerves
- **Anterior and posterior roots** attach a spinal nerve to a segment of the spinal cord

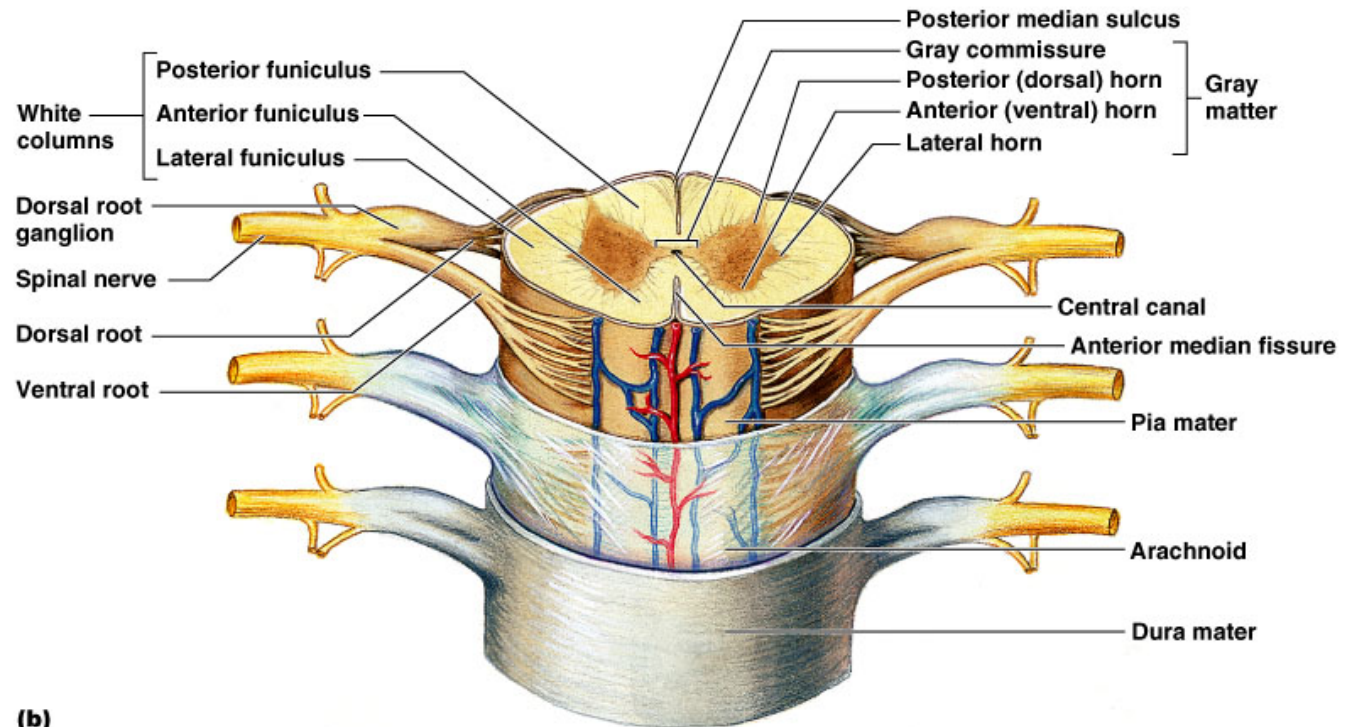
Spinal nerves

- **31 pairs of spinal nerves (all pairs)**
 - 8 cervical**
 - 12 thoracic**
 - 5 lumbar**
 - 5 sacral**
 - 1 coccygeal**

Spinal Nerve

- Attached to spinal cord by 2 roots
- **Dorsal root**
- **Ventral root**
- Dorsal root has a ganglion on it – **dorsal root ganglion** – neuron cell bodies of sensory neurons

Spinal Nerve



(b)

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Spinal nerve

After emerging from intervertebral foramen divides into

- **Dorsal ramus** – supplies skin and muscles of back
- **Ventral ramus** – skin and muscles of front of trunk and upper and lower limbs
- **Meningeal branch** – vertebrae, ligaments, meninges
- **Ramus communicantes** – communicates with autonomic nervous system / ANS.

Plexuses and nerves

- **Cervical plexus** : C₁ – C₄ and C₅ ; includes phrenic nerve (C₃ – C₅)
- **Brachial plexus** : C₄; C₅ – T₁; includes **axillary N.** (deltoid); **ulnar N.**; **median N.**; **radial N.**
- **Thoracic nerves** – 12 pairs
- **Lumbar plexus** : L₁ – L₄; **femoral N.**;
- **Sacral plexus** : L₄ – S₄; **sciatic nerve**

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Transverse cervical nerve
Supraclavicular nerve
Phrenic nerve

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Filum terminale

Posterior view of entire spinal cord and portions of spinal nerves