In the name of GOD

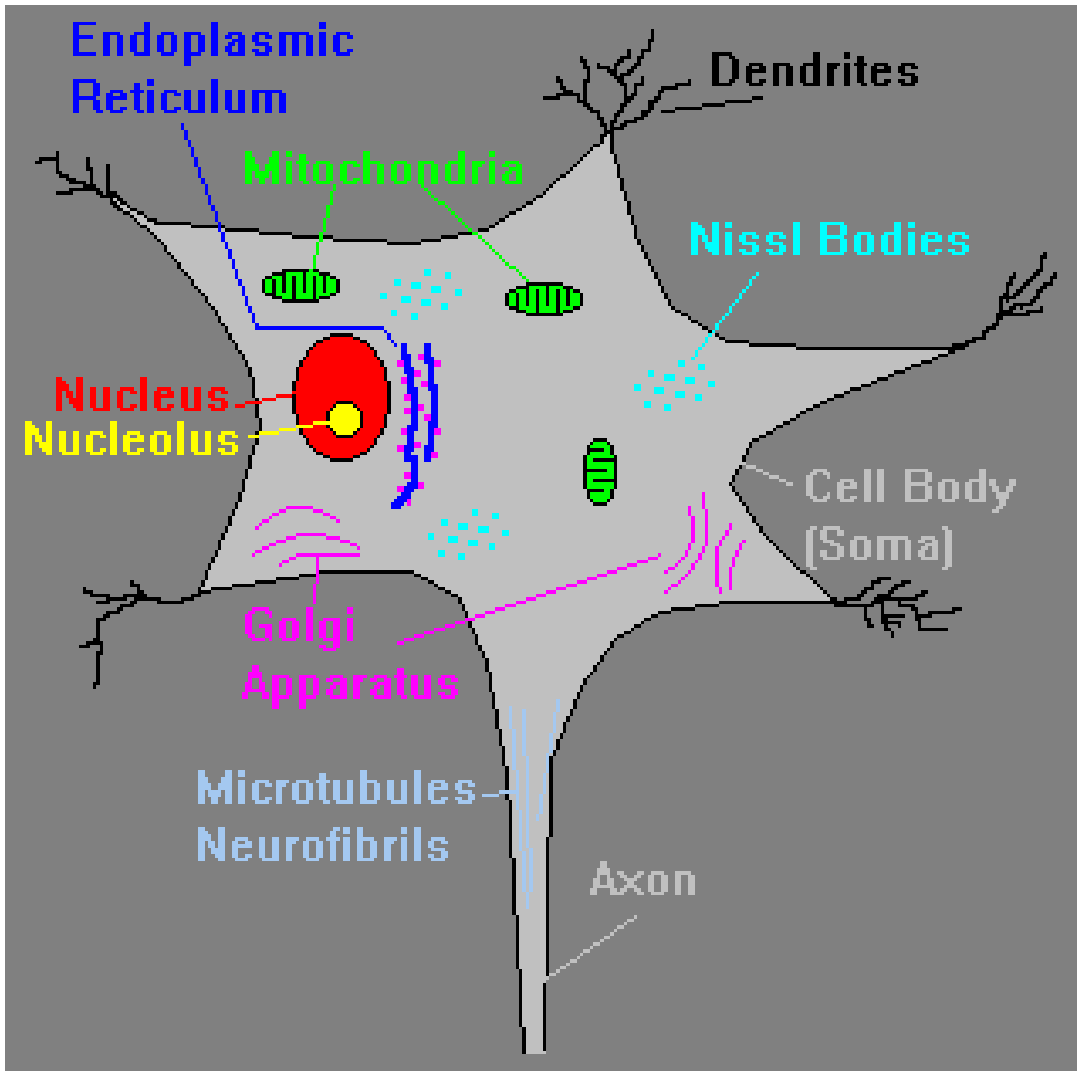
Nervous System

For

Medicine Student

By

Dr. Saeednia

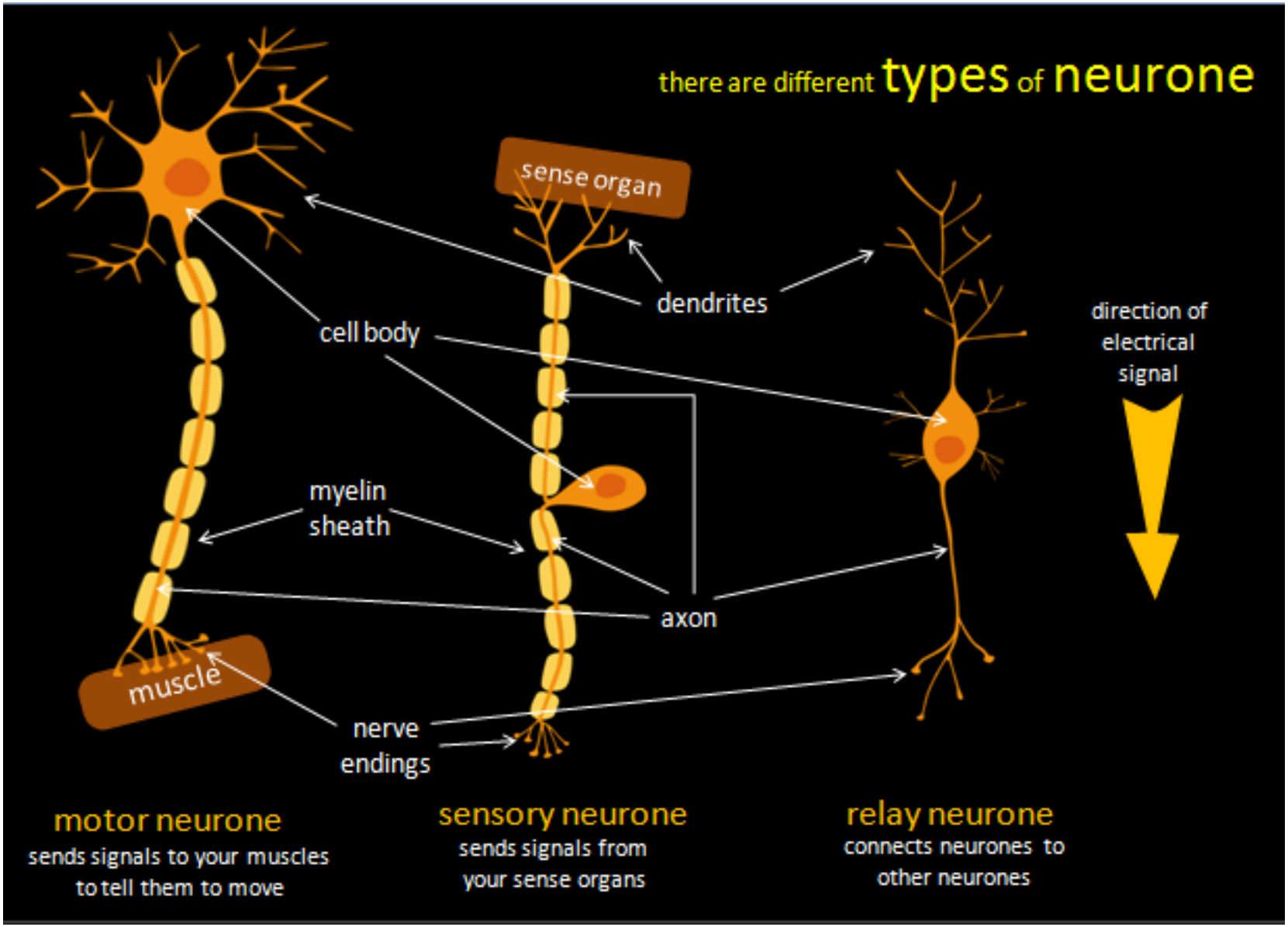


Nerve cell

Body

Dendrite

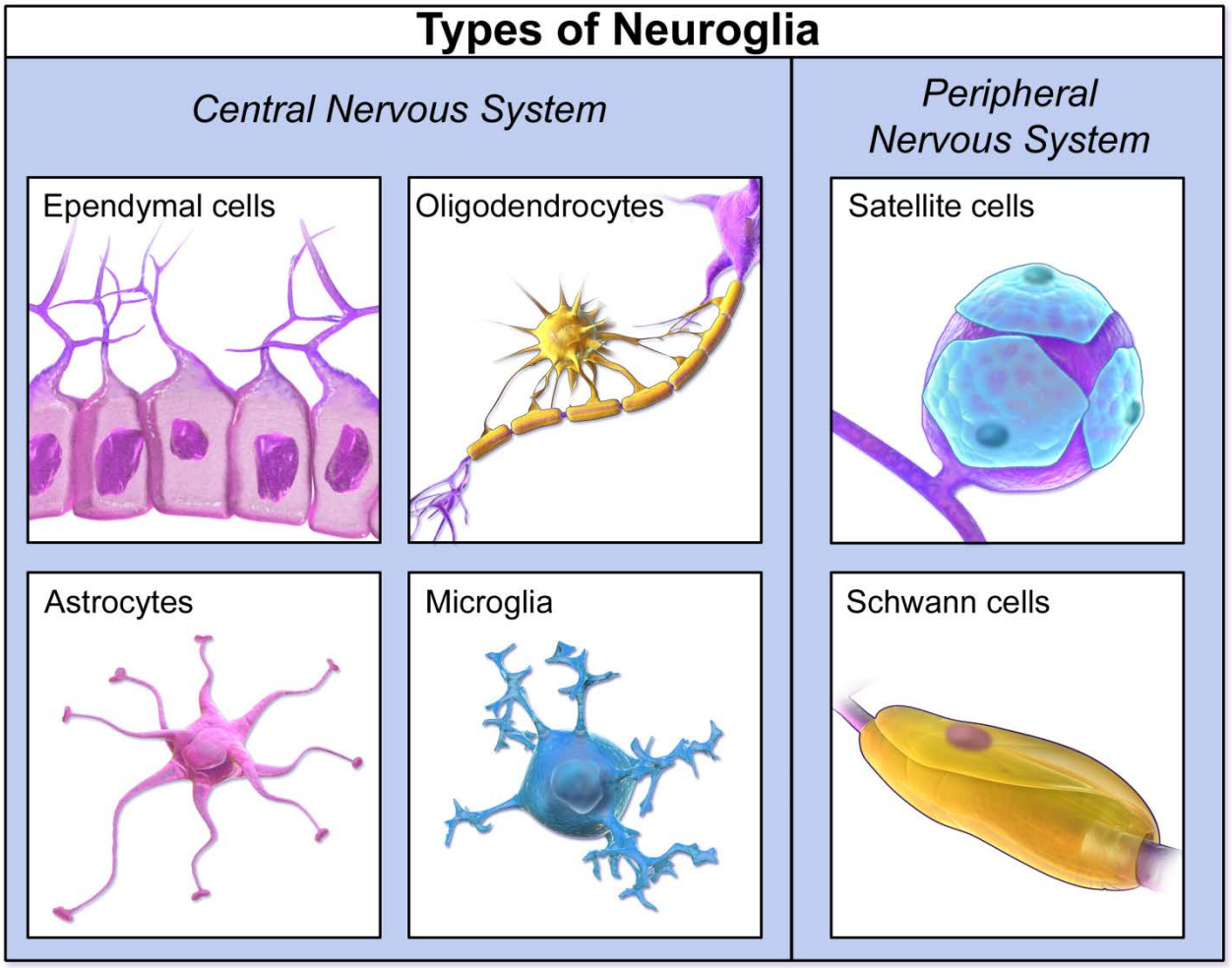
Axon


there are different types of neurone
sense organ
dendrites
cell body
direction of electrical signal
myelin sheath
axon
muscle
nerve endings
motor neurone
sends signals to your muscles to tell them to move
sensory neurone
sends signals from your sense organs
relay neurone
connects neurones to other neurones

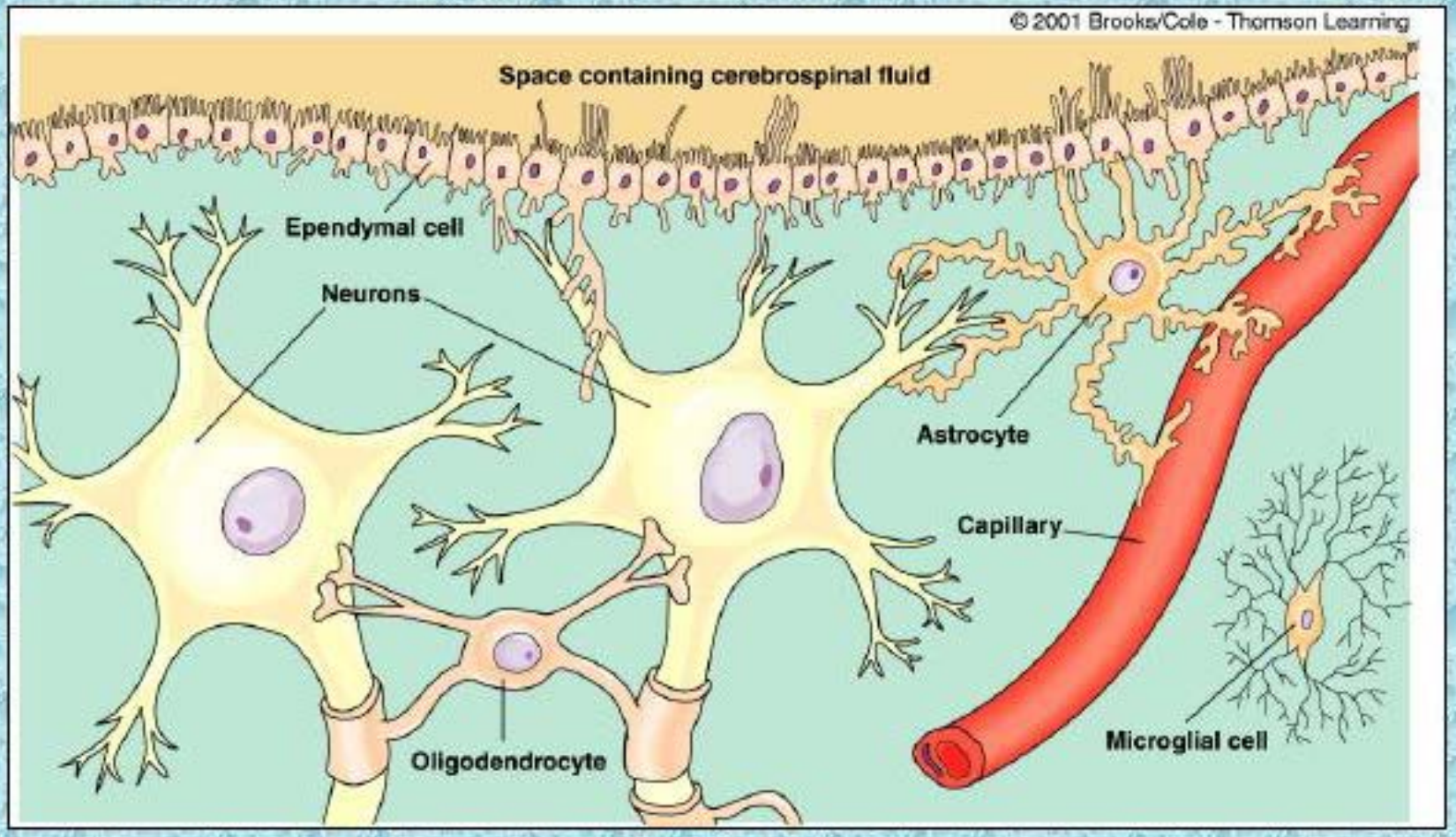
Neuroglial functions:

Protection
Nutrition

Have ability of division

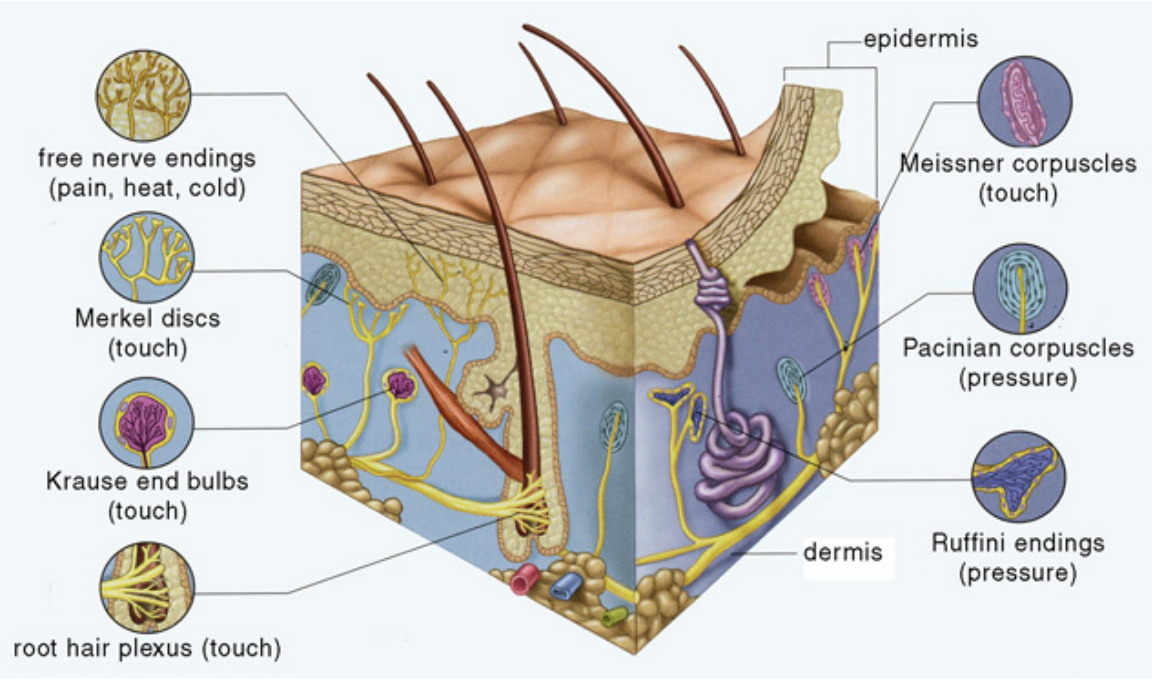


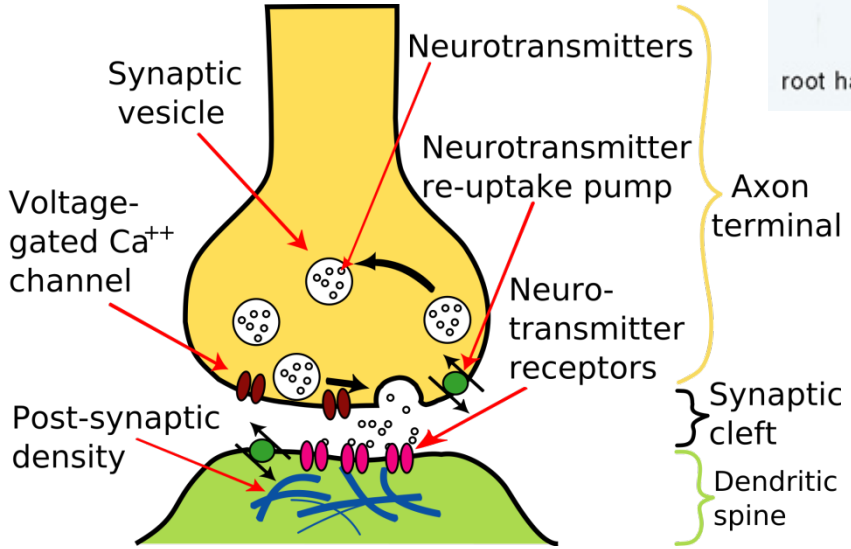
Glial Cells of the CNS

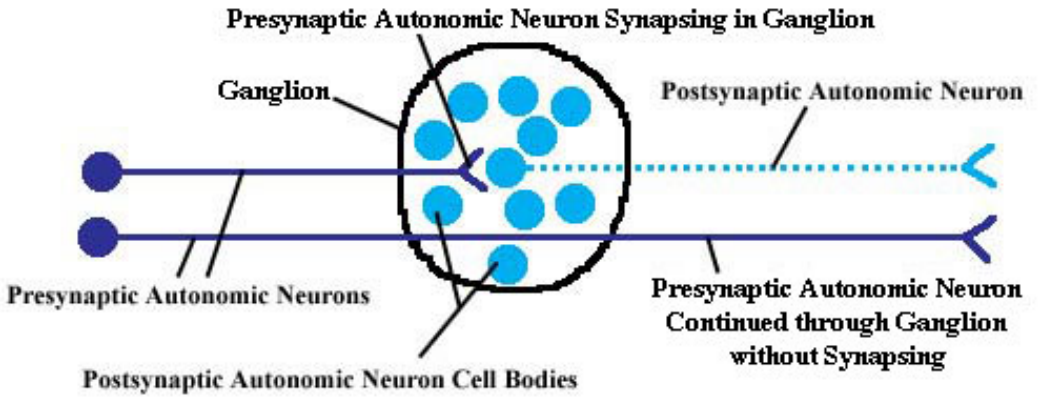


Synapse
Ganglion
Nucleus
Receptor :

Extro receptor
Proprio receptor
Intro receptor





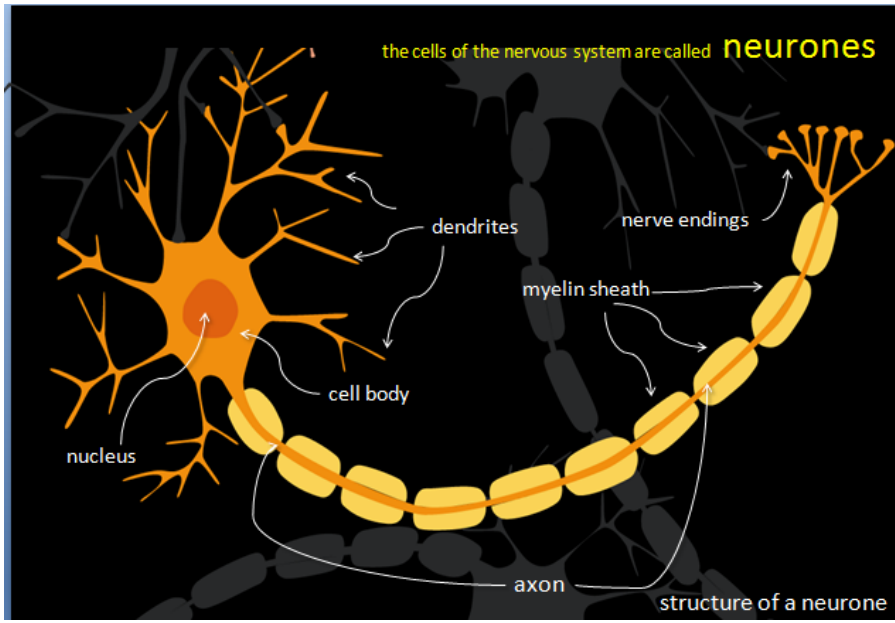


Nervous system

Central nervous system :
Brain
Spinal cord

Peripheral nervous system :

Cranial nerve
Spinal nerve
ganglions



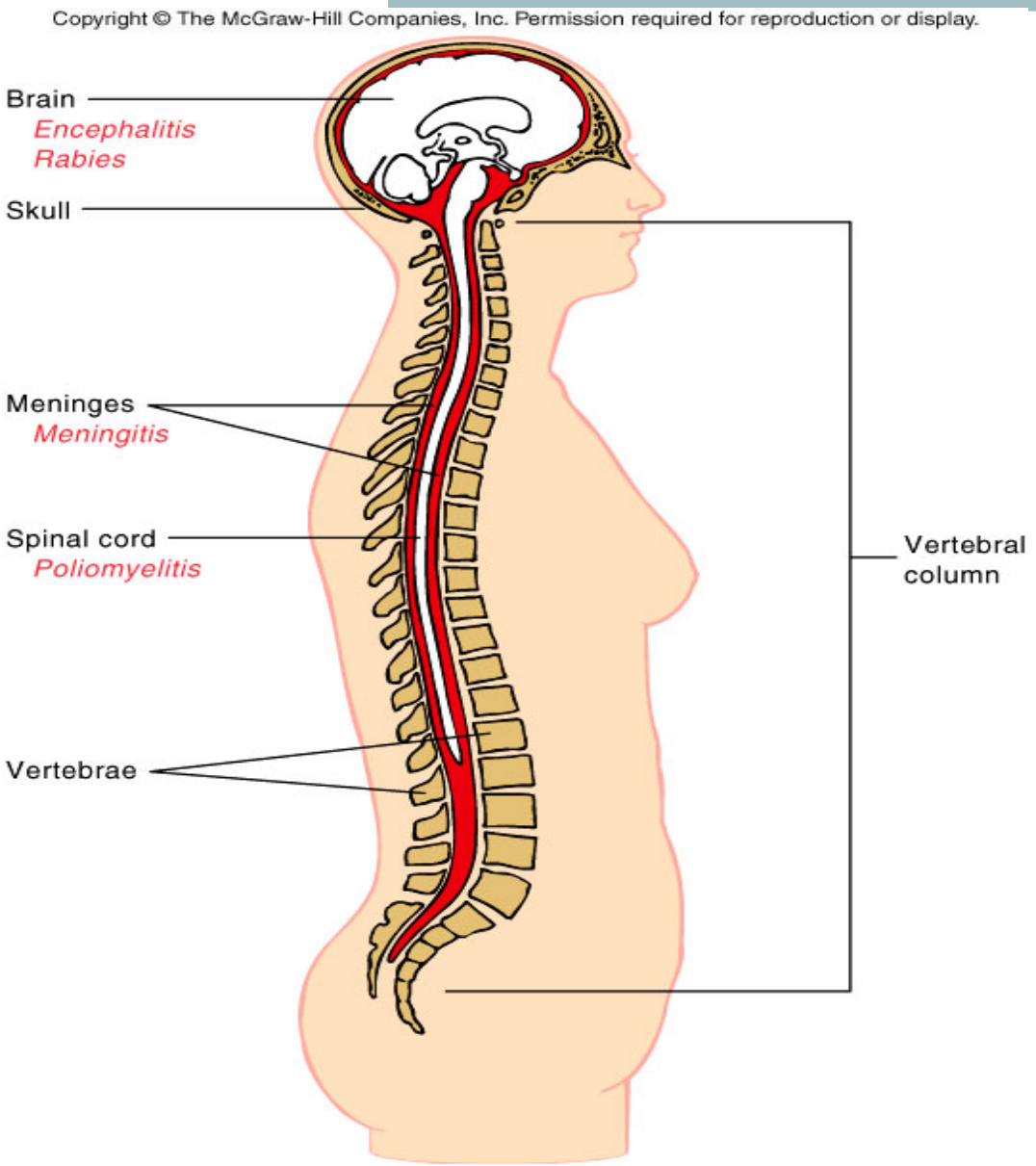
The Spinal Cord

* The spinal cord sends messages to the brain.

* The spinal cord is the part of the nervous system that connects the brain to the rest of the nervous system.

Spinal cord

A. **External Feature**
B. Segments
C. Spinal Cord & Vertebral Canal
D. Spinal Cord Protection
E. Gray Mater
F. Spinal Cord Nucleus
G. White Mater
H. Spinal Tract

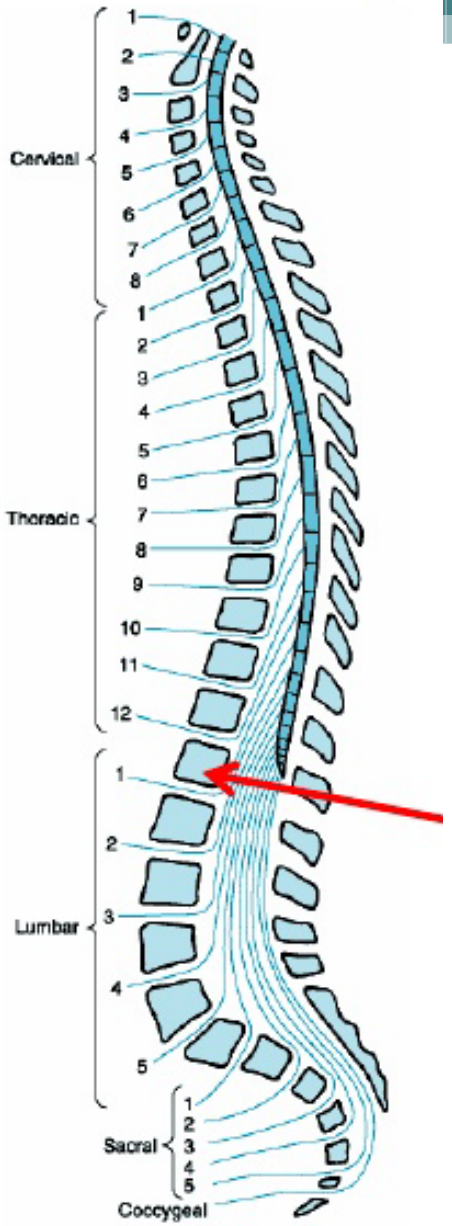


Spinal Cord Positioning

@ 3rd month ➔ same length as vertebral canal

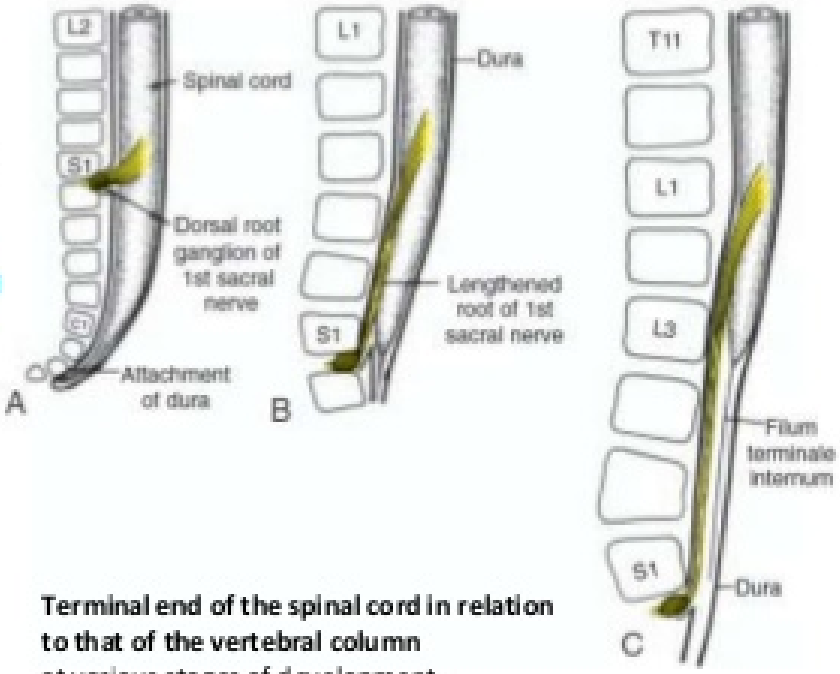
@ Birth ➔ Spinal cord terminates at 3rd lumbar vertebra

@ Adult ➔ spinal cord terminates at the level of L1



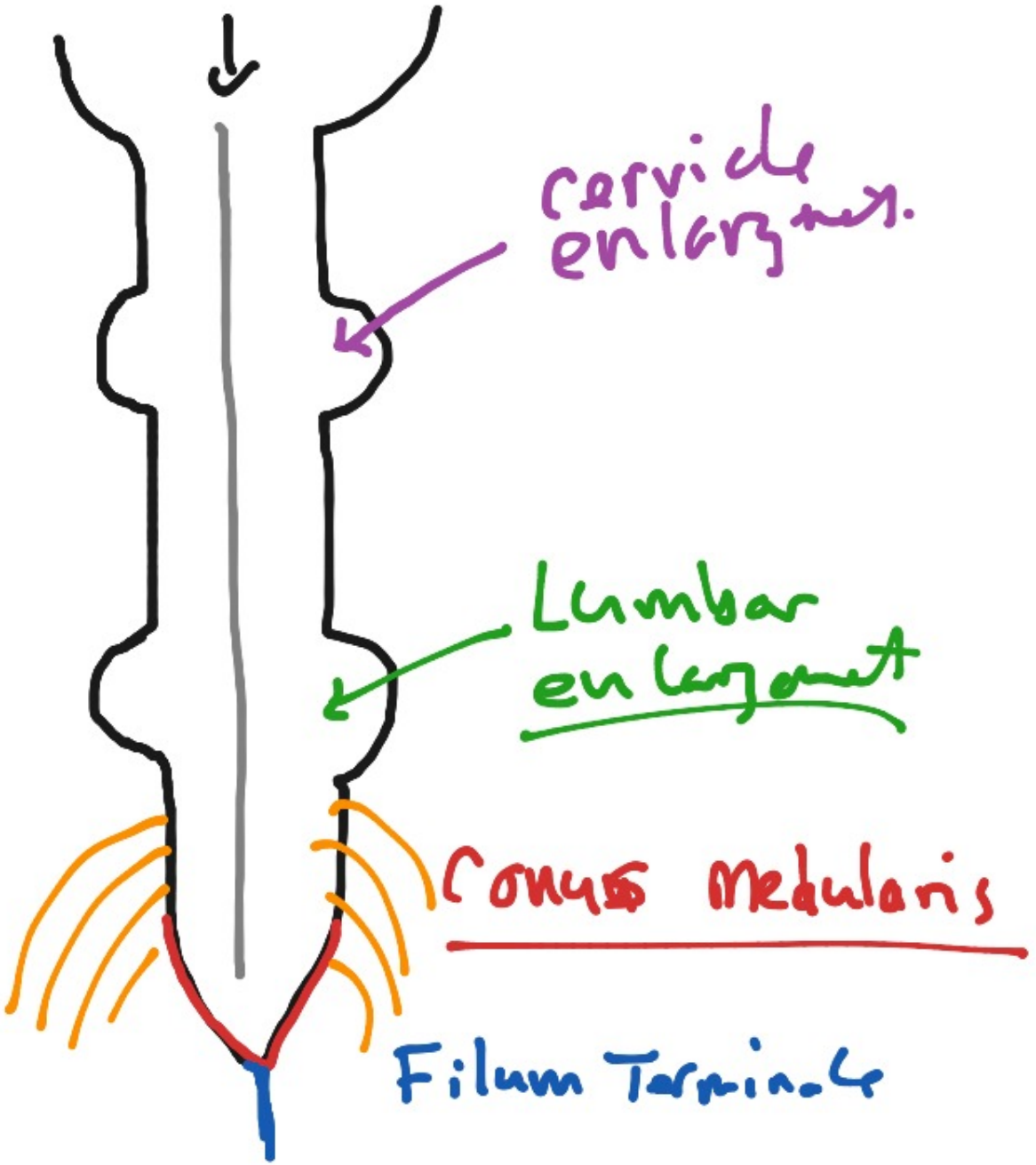
POSITIONAL CHANGES OF THE CORD

- In the third month of development the spinal cord extends the entire length of the embryo, and spinal nerves pass through the intervertebral foramina at their level of origin.
- With increasing age, the vertebral column and dura lengthen more rapidly than the neural tube, and the terminal end of the spinal cord gradually shifts to a higher level.
- **At birth, this end is at the level of the third lumbar vertebra**.
- *As a result of this disproportionate* growth, spinal nerves run obliquely from their segment of origin in the spinal cord to the corresponding level of the vertebral column.
- The dura remains attached to the vertebral column at the coccygeal level.
- In the adult, the spinal cord terminates at the level of L2 to L3,
- The dural sac and subarachnoid space extend to S2.
- Below L2 to L3, a threadlike extension of the pia mater forms the **filum terminale, which is attached to** the periosteum of the first coccygeal vertebra and which marks the tract of regression of the spinal cord.
- Nerve fibers below the terminal end of the cord collectively constitute the **cauda equina.**

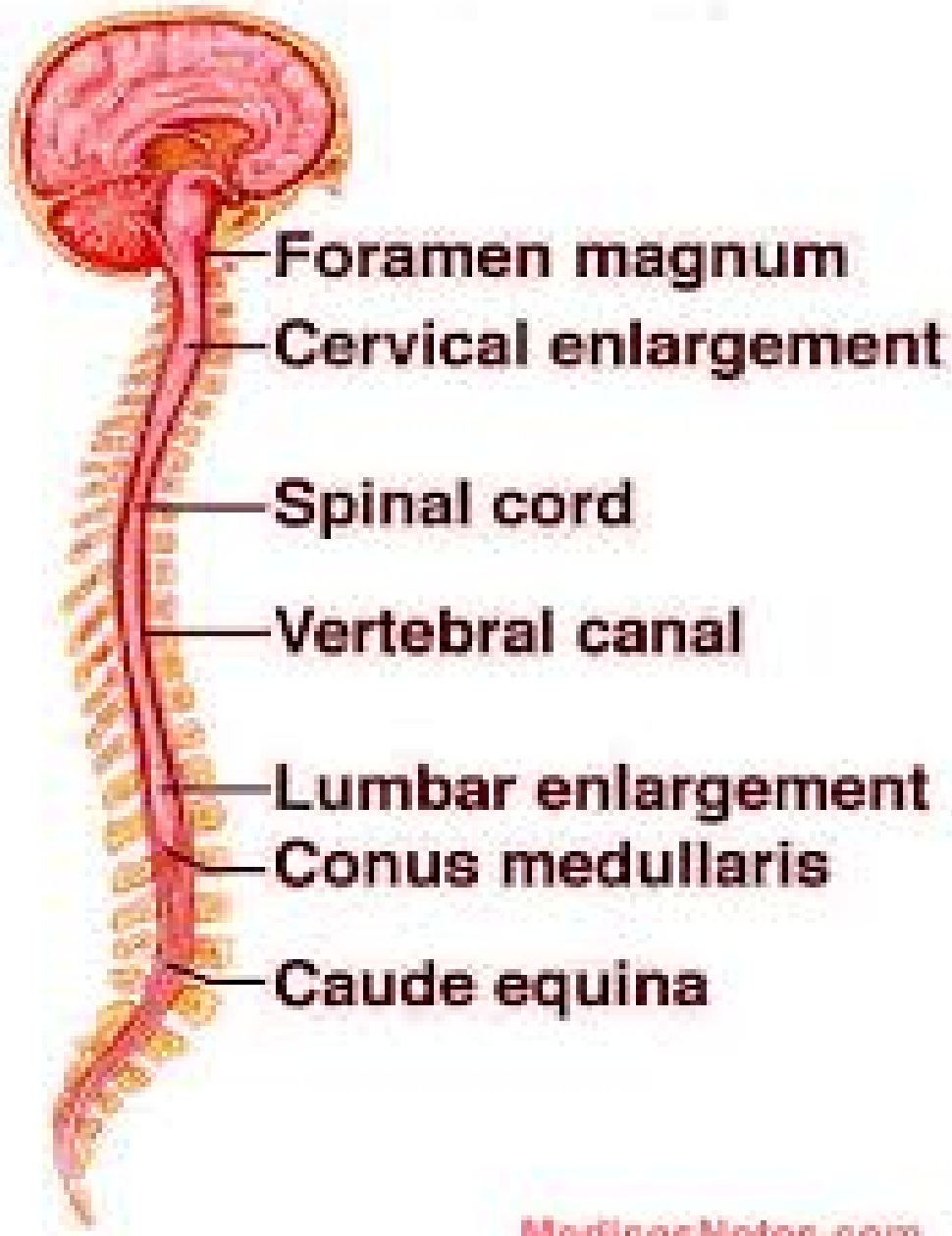


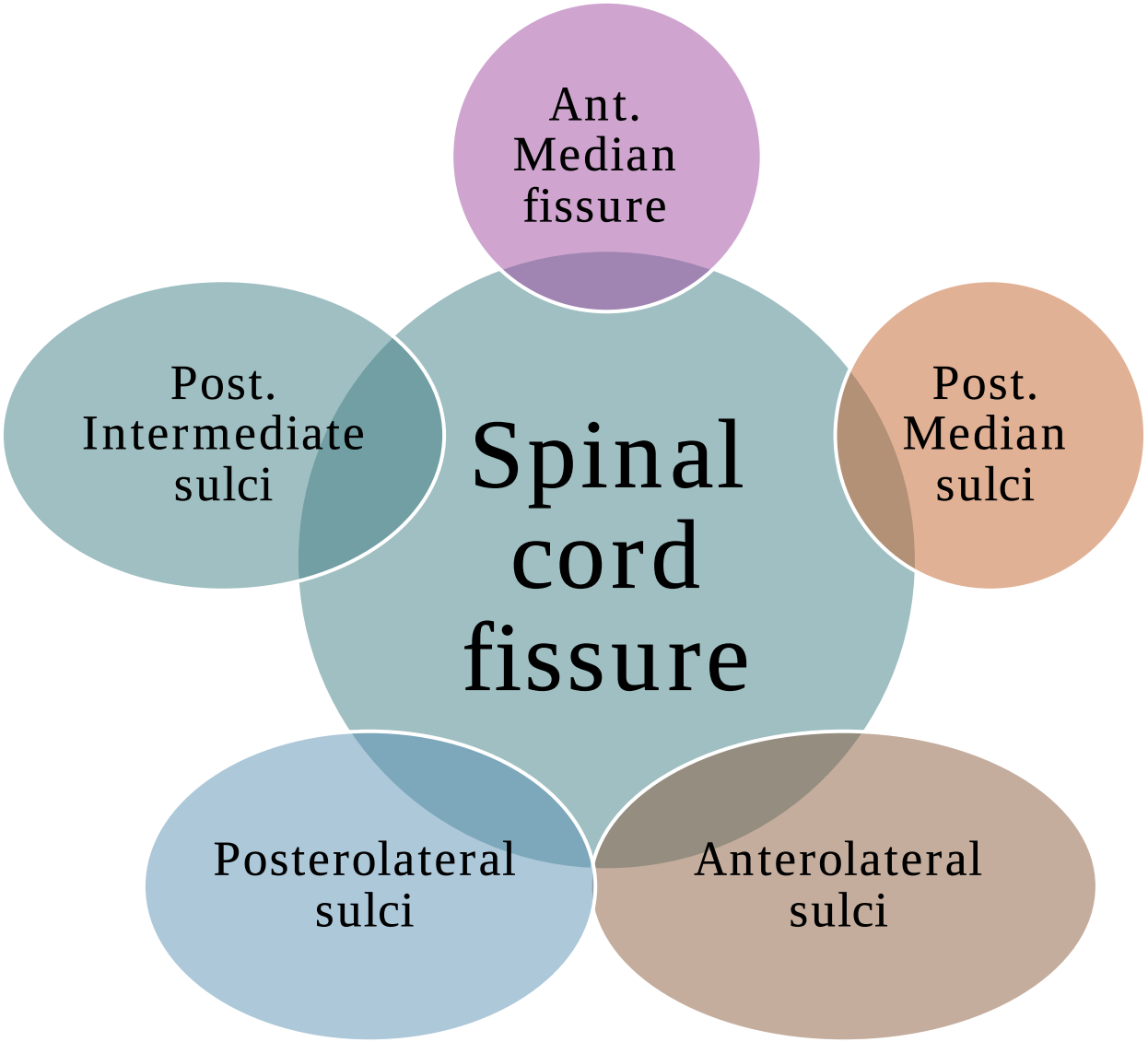
Terminal end of the spinal cord in relation to that of the vertebral column at various stages of development. **A. Approximately the third month. B. End of the fifth** month. **C. Newborn.**

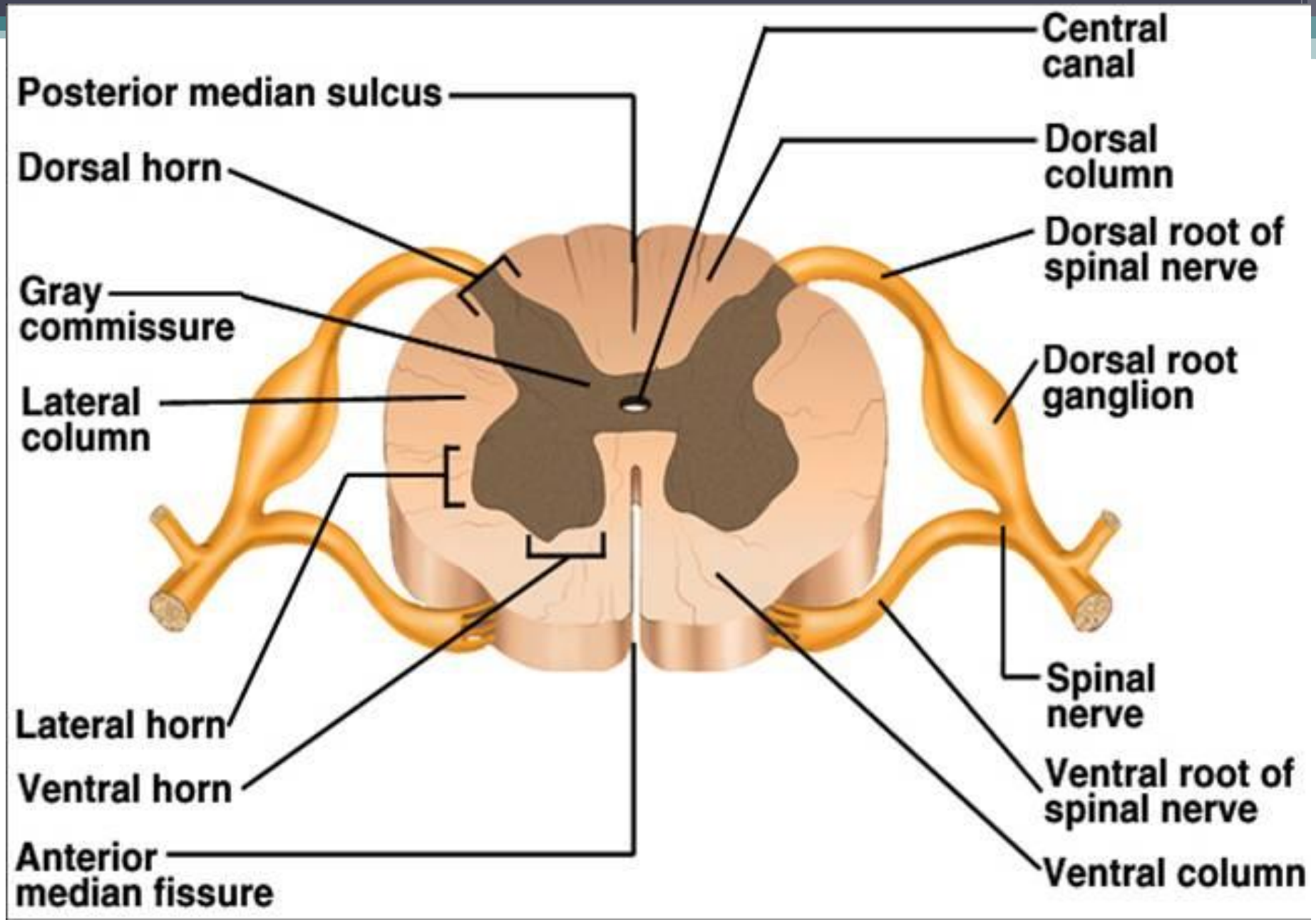
Enlargements



Spinal Cord


Foramen magnum
Cervical enlargement
Spinal cord
Vertebral canal
Lumbar enlargement
Conus medullaris
Caude equina
MedicosNotes.com


Ant. Median fissure
Post. Intermediate sulci
Spinal cord fissure
Post. Median sulci
Posterolateral sulci
Anterolateral sulci


Central canal
Posterior median sulcus
Dorsal column
Dorsal horn
Dorsal root of spinal nerve
Gray commissure
Dorsal root ganglion
Lateral column
Spinal nerve
Lateral horn
Ventral root of spinal nerve
Ventral horn
Anterior median fissure
Ventral column

A. External Feature

B. Segments

C. Spinal Cord & Vertebral Canal

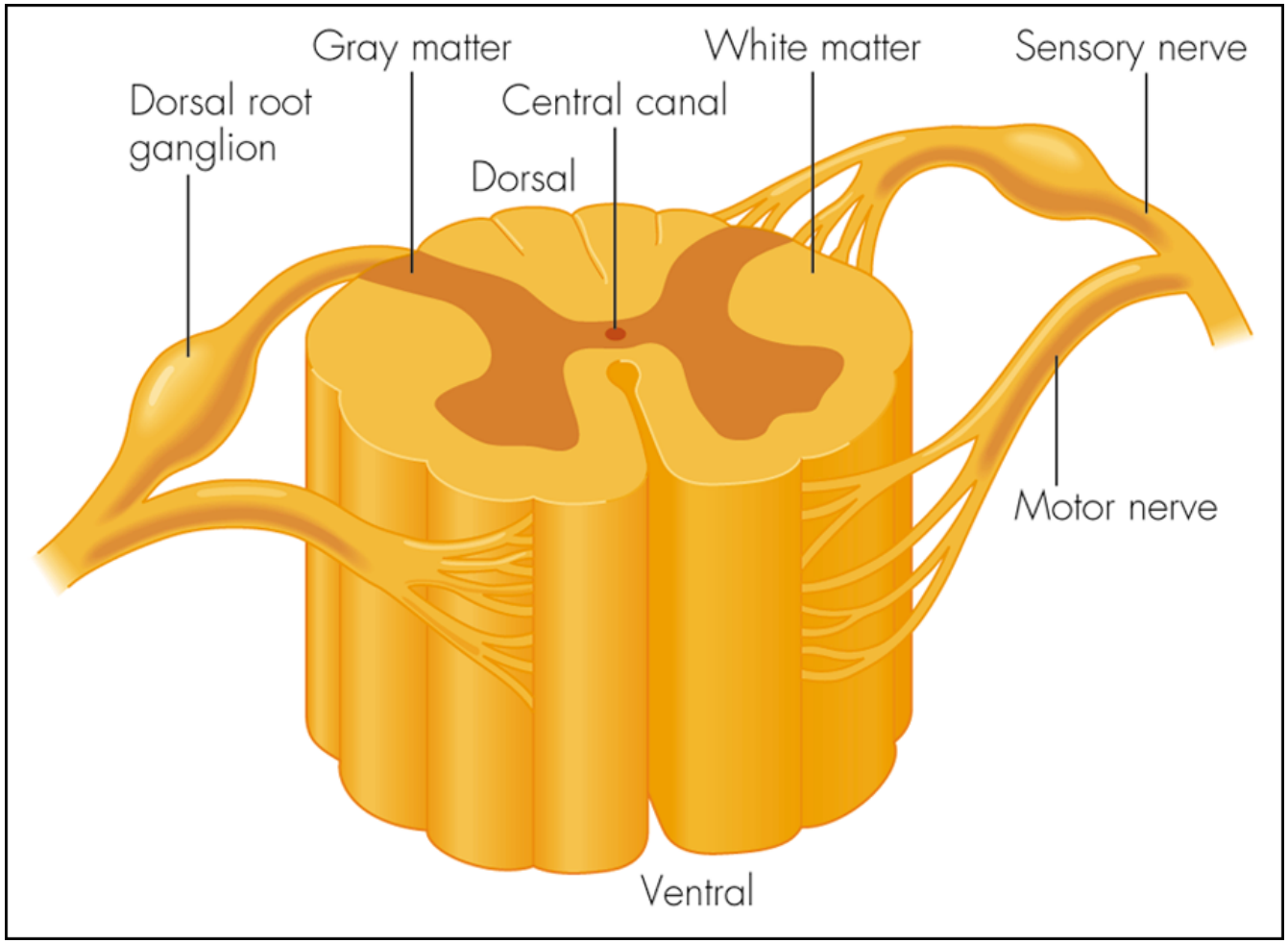
D. Spinal Cord Protection

E. Gray Mater

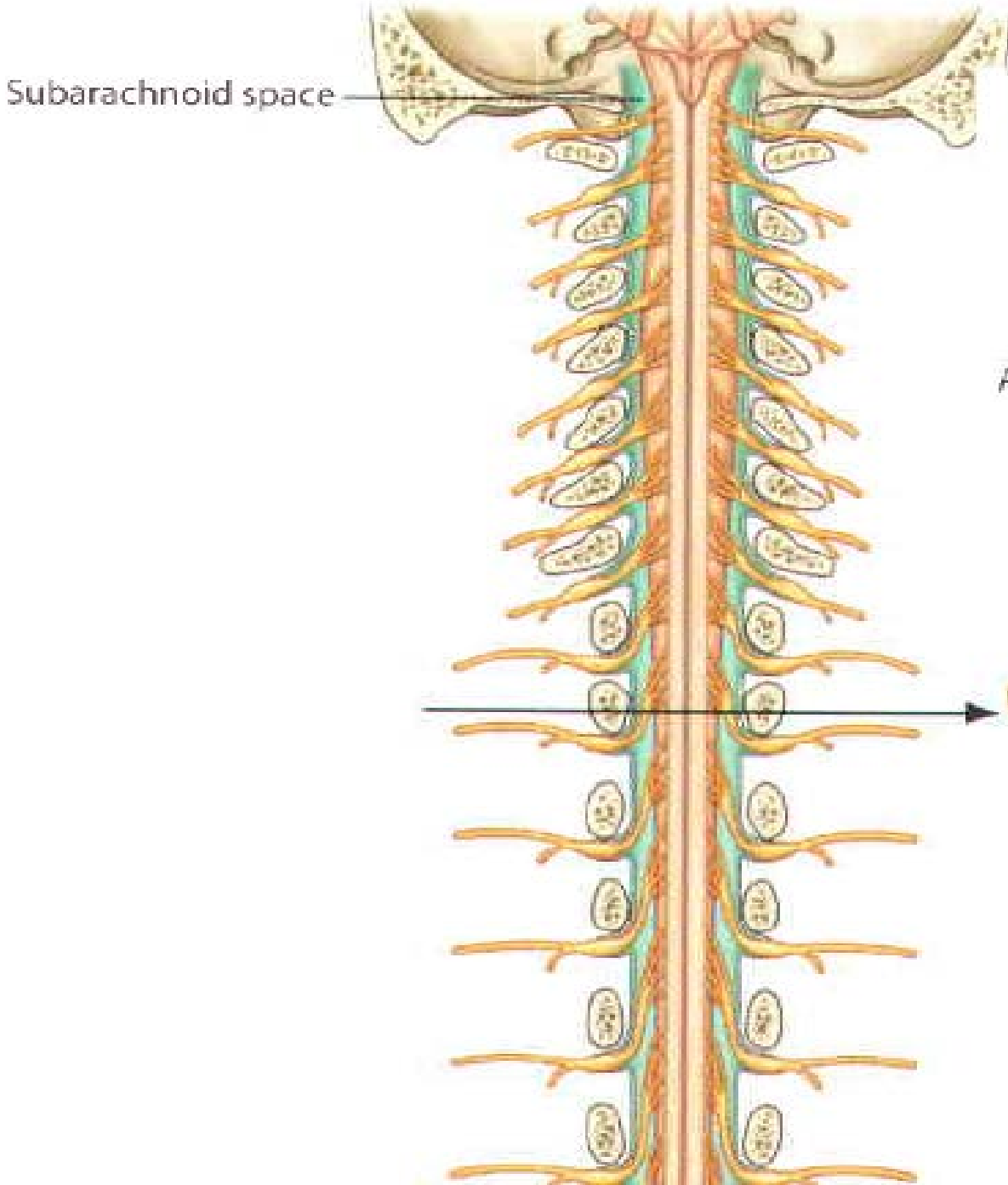
F. Spinal Cord Nucleus

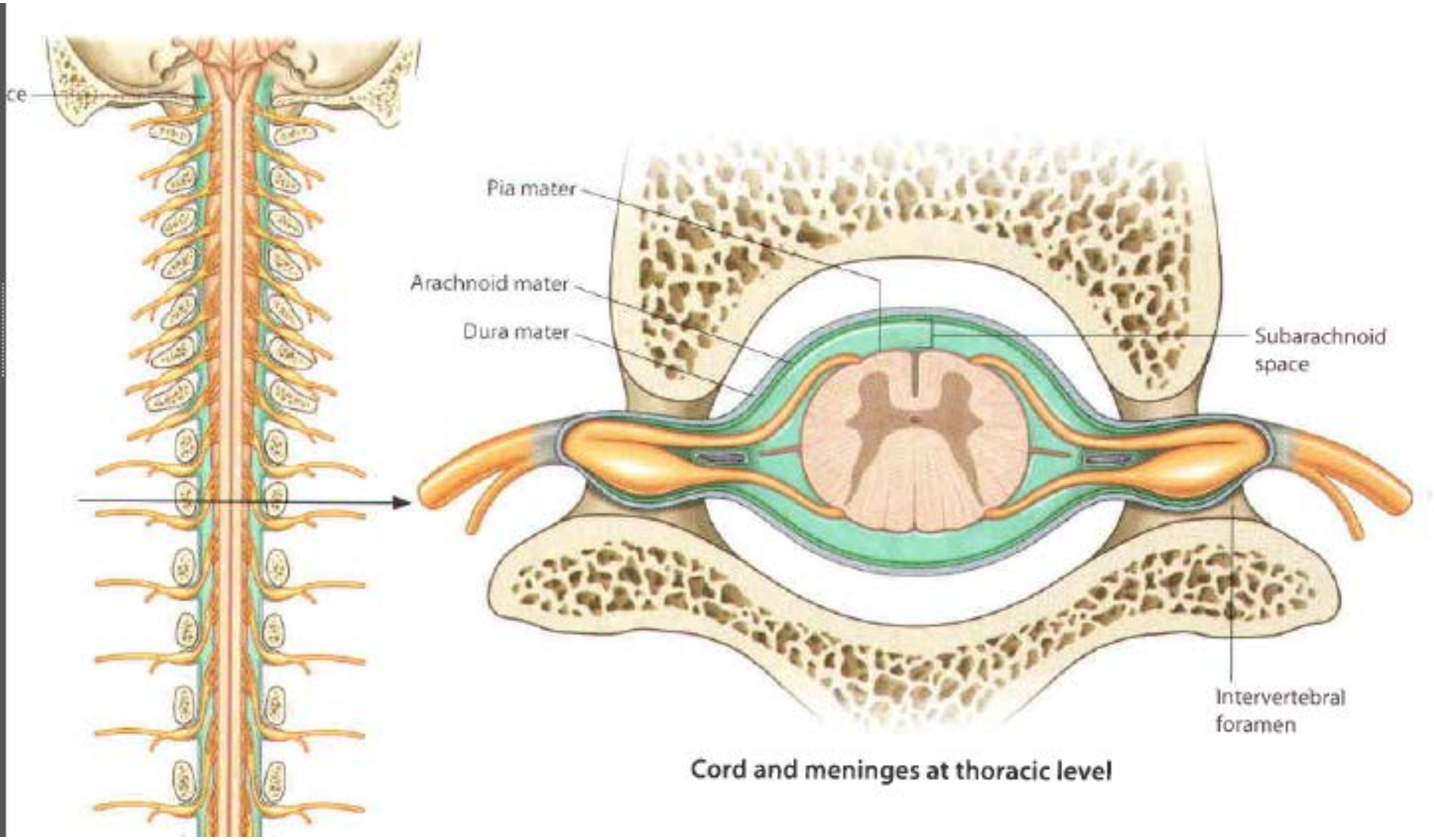
G. White Mater

H. Spinal Tract



A. External Feature
B. Segments
C. **Spinal Cord & Vertebral Canal**
D. Spinal Cord Protection
E. Gray Mater
F. Spinal Cord Nucleus
G. White Mater
H. Spinal Tract





Cord and meninges at thoracic level

Spinal cord

A. External Feature
B. Segments
C. Spinal Cord & Vertebral Canal
D. Spinal Cord Protection
E. Gray Mater
F. Spinal Cord Nucleus
G. White Mater
H. Spinal Tract

a) Vertebrae

b) Meninges

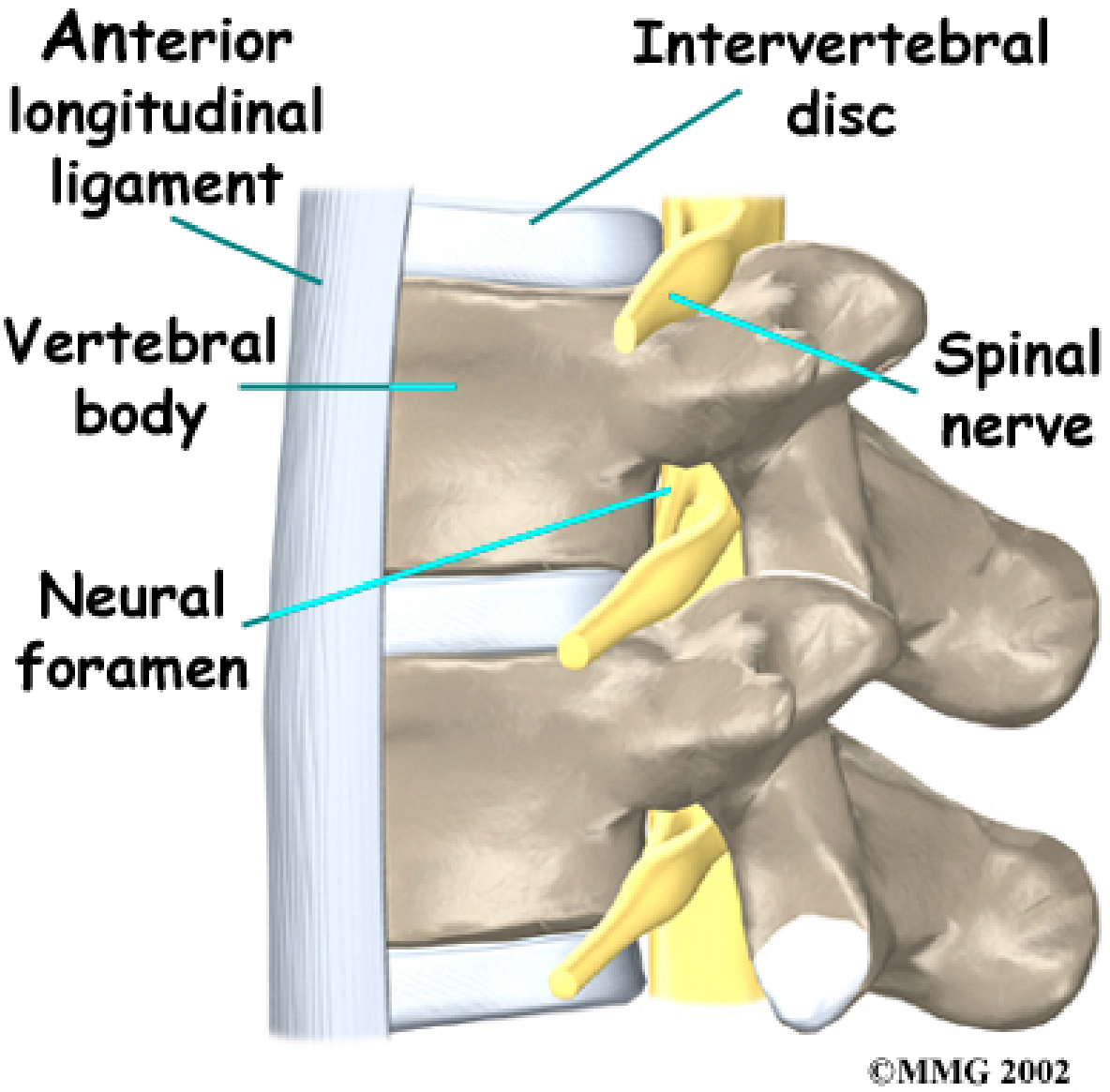
c) CSF

d) Spinal ligaments

e) Filum terminale

f) Spinal nerve

Vertebrae


Anterior longitudinal ligament
Intervertebral disc
Vertebral body
Spinal nerve
Neural foramen
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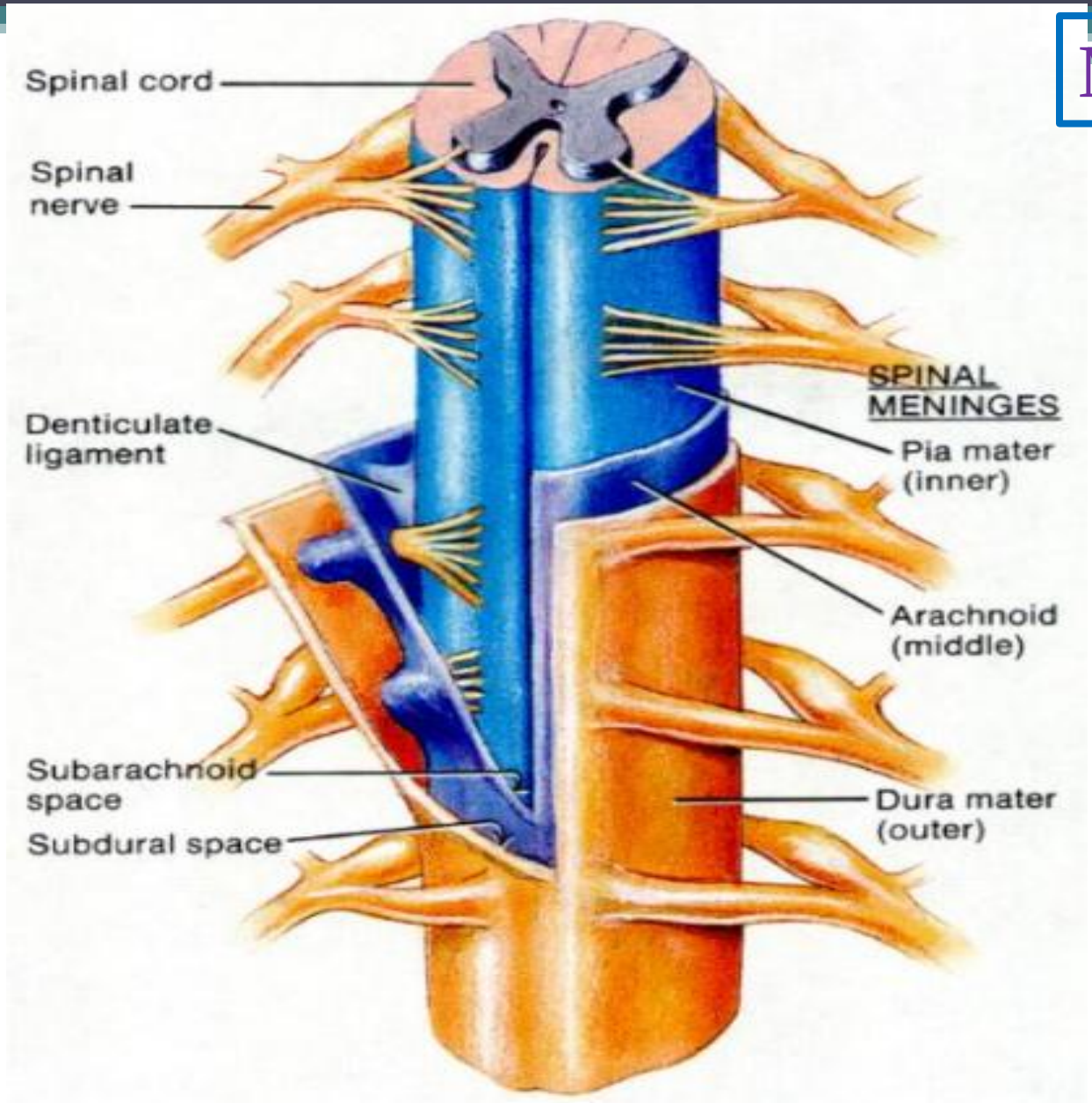
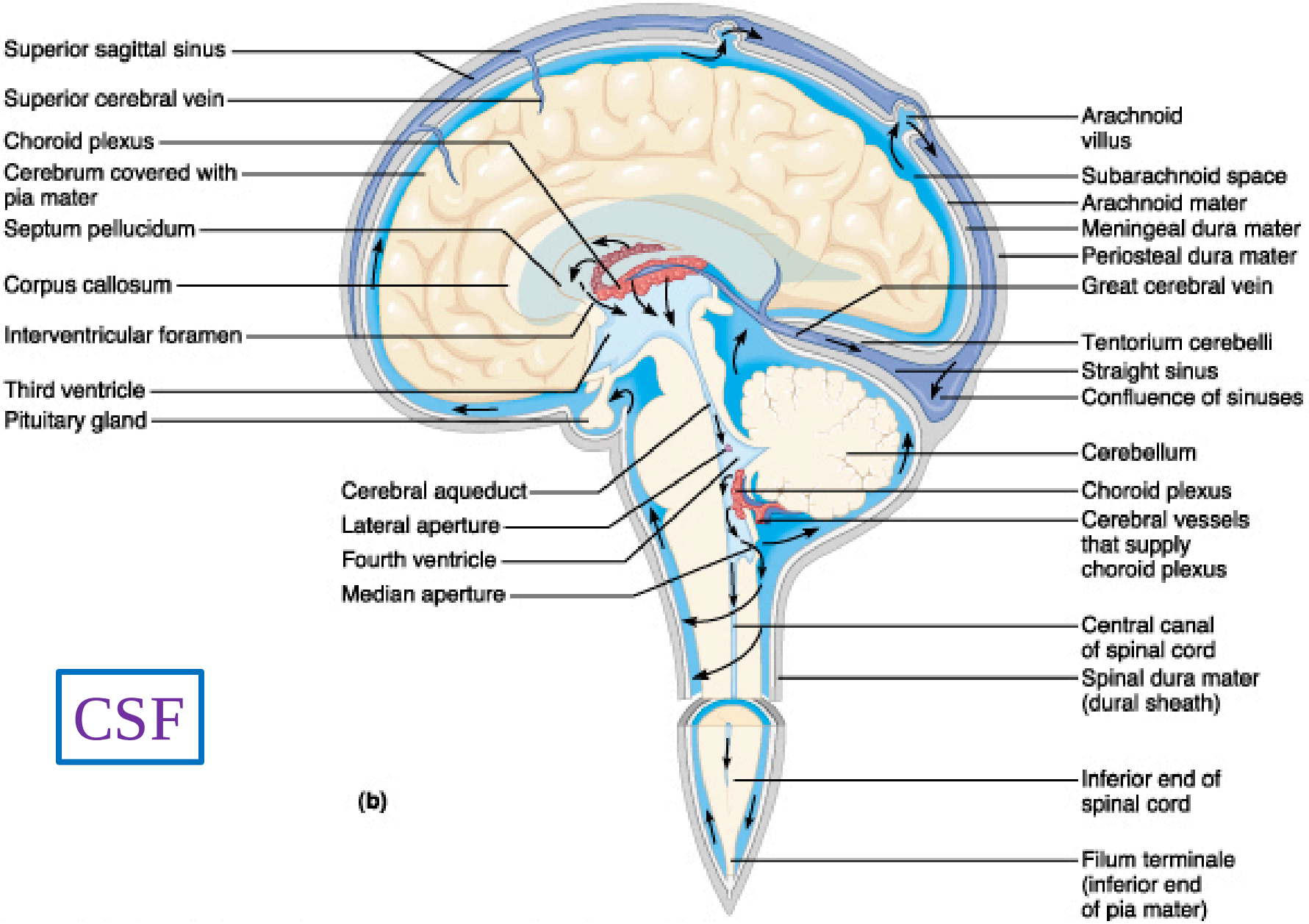
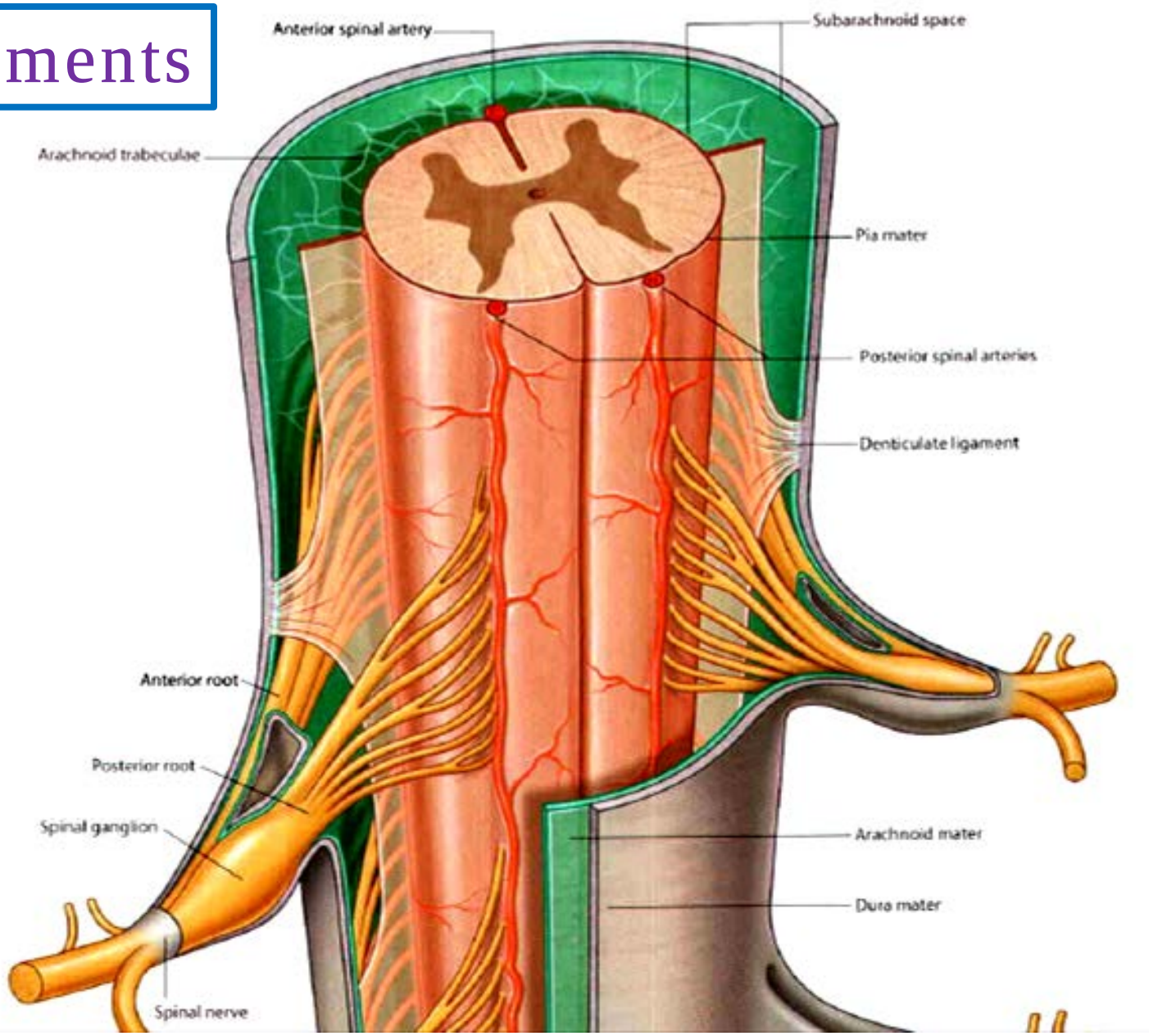
Meninges


Spinal cord
Spinal nerve
SPINAL MENINGES
Denticulate ligament
Pia mater (inner)
Arachnoid (middle)
Subarachnoid space
Dura mater (outer)
Subdural space

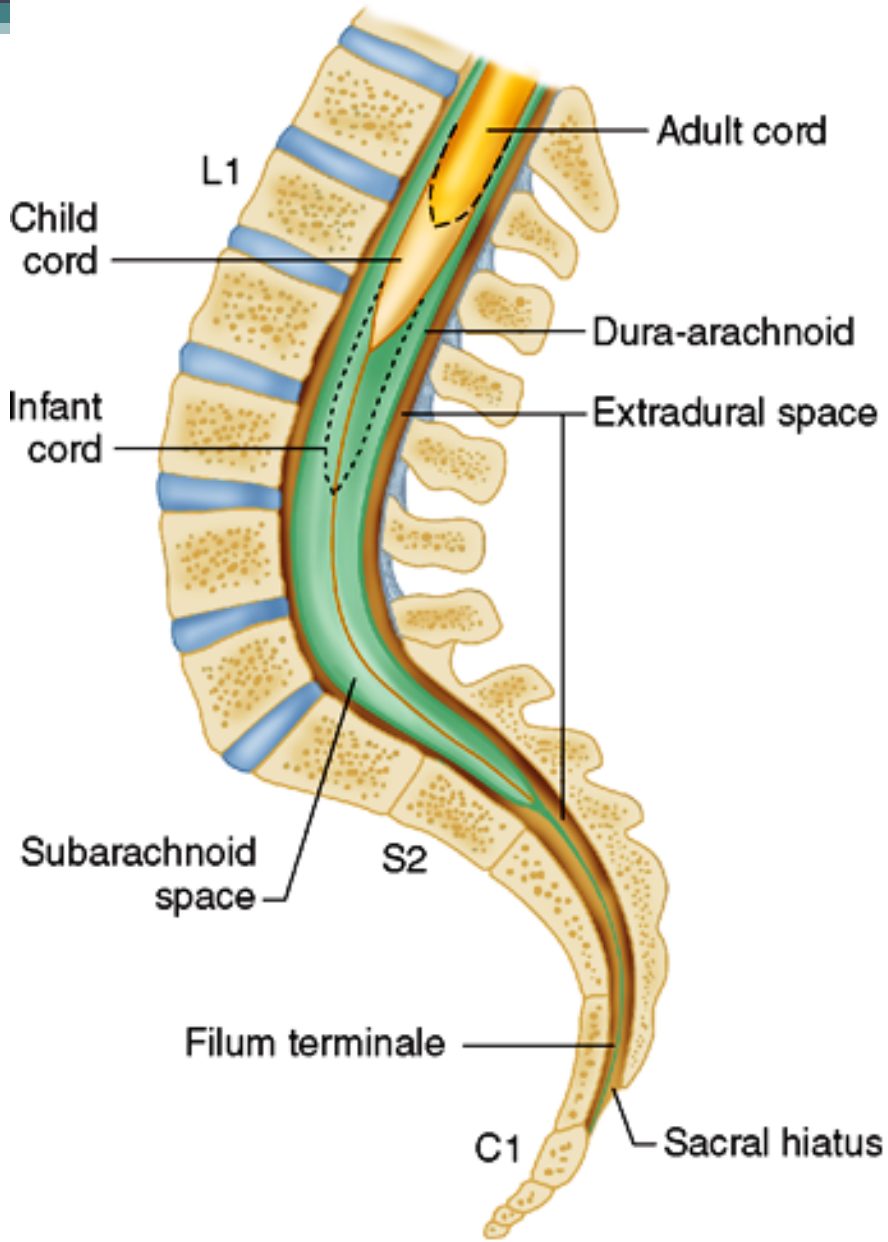

Superior sagittal sinus
Superior cerebral vein
Choroid plexus
Cerebrum covered with pia mater
Septum pellucidum
Corpus callosum
Interventricular foramen
Third ventricle
Pituitary gland
Cerebral aqueduct
Lateral aperture
Fourth ventricle
Median aperture
(b)
Arachnoid villus
Subarachnoid space
Arachnoid mater
Meningeal dura mater
Periosteal dura mater
Great cerebral vein
Tentorium cerebelli
Straight sinus
Confluence of sinuses
Cerebellum
Choroid plexus
Cerebral vessels that supply choroid plexus
Central canal of spinal cord
Spinal dura mater (dural sheath)
Inferior end of spinal cord
Filum terminale (inferior end of pia mater)

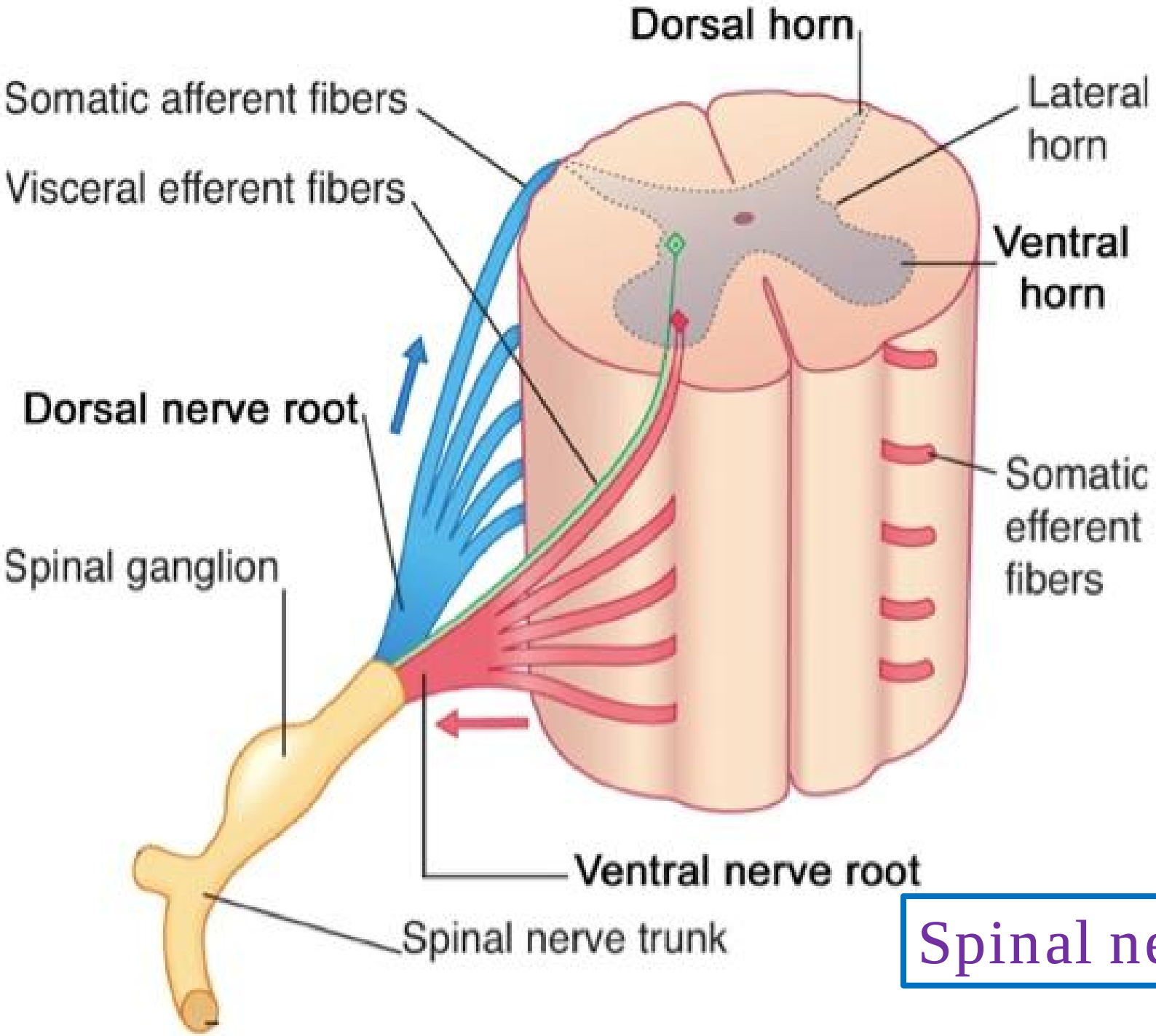
CSF

Spinal ligaments



Filum terminale





Spinal nerve

Spinal cord

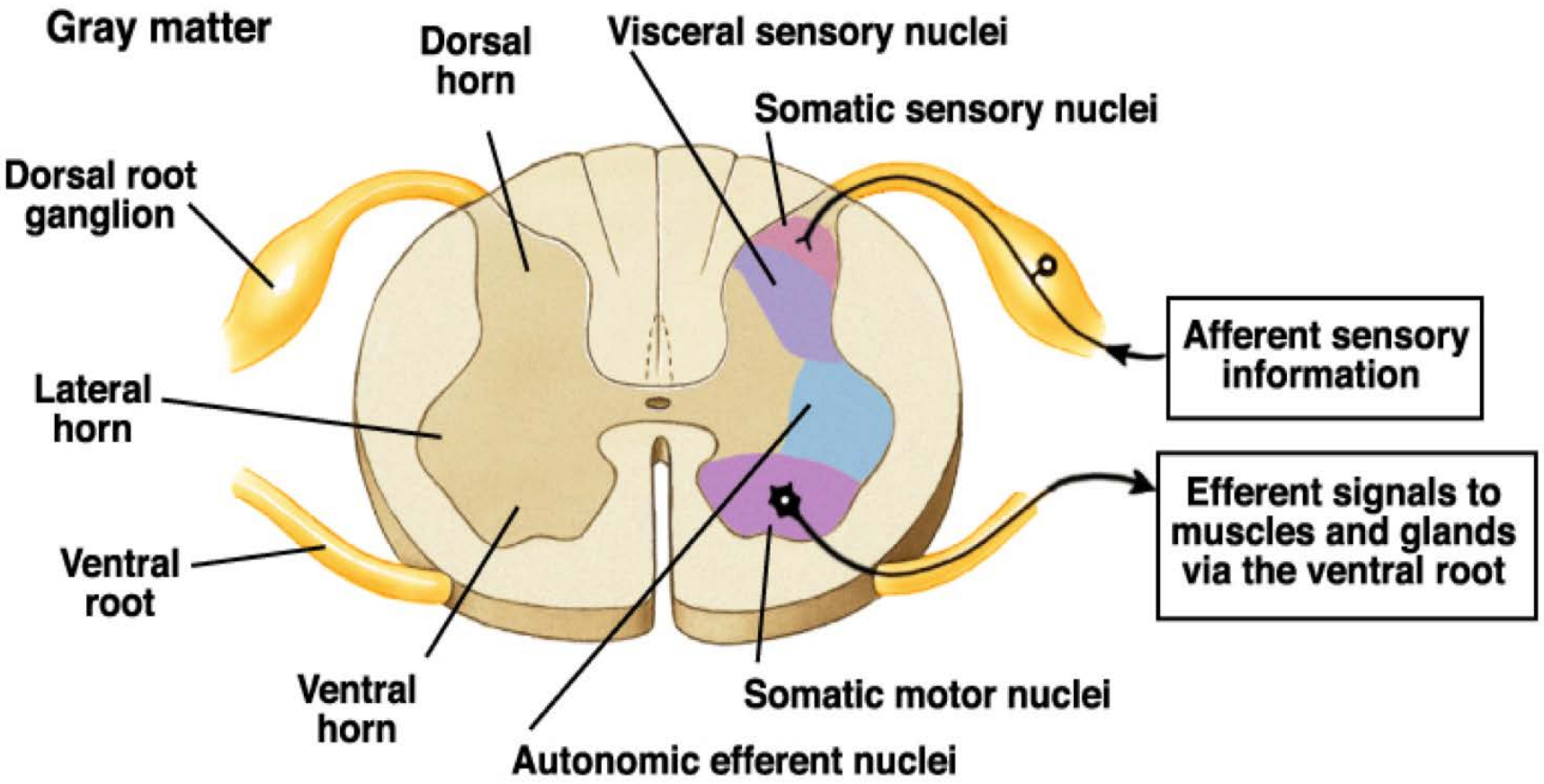
A. External Feature
B. Segments
C. Spinal Cord & Vertebral Canal
D. Spinal Cord Protection
E. Gray Mater
F. Spinal Cord Nucleus
G. White Mater
H. Spinal Tract

a) Ant. Horn

b) Post. Horn

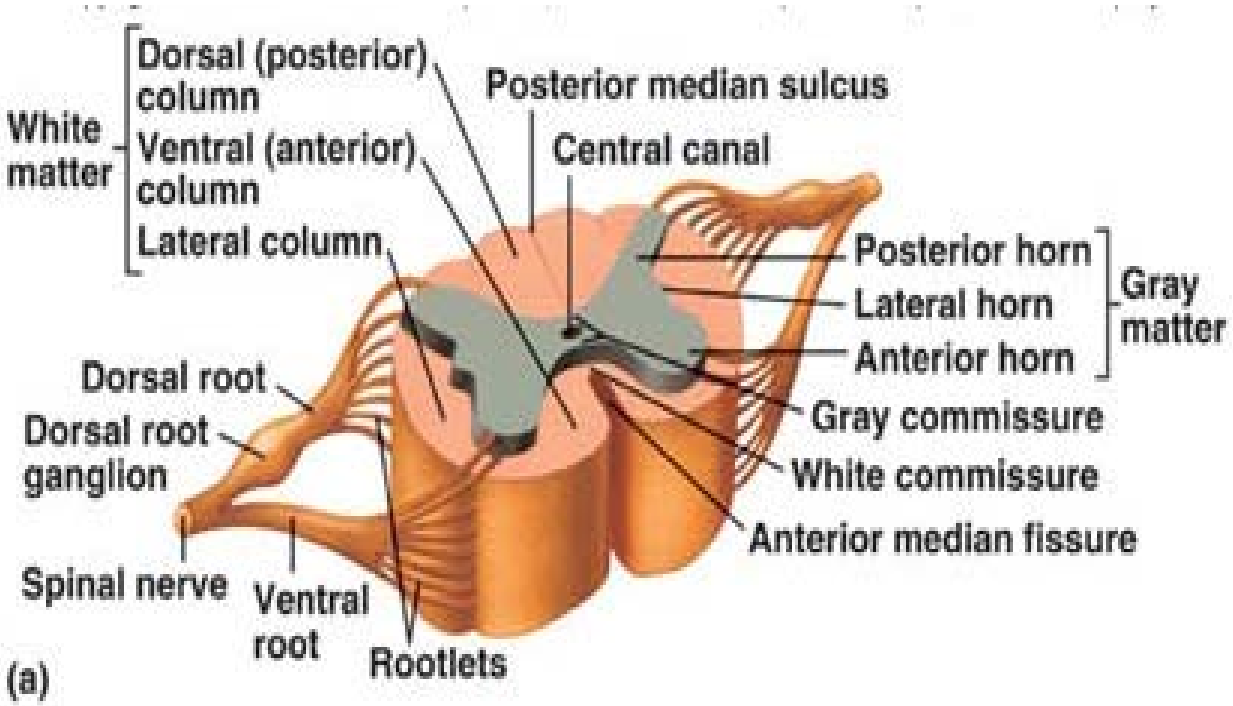
c) Lat. Horn

d) Central Canal


Gray matter
Dorsal horn
Visceral sensory nuclei
Somatic sensory nuclei
Dorsal root ganglion
Afferent sensory information
Lateral horn
Efferent signals to muscles and glands via the ventral root
Ventral root
Ventral horn
Somatic motor nuclei
Autonomic efferent nuclei

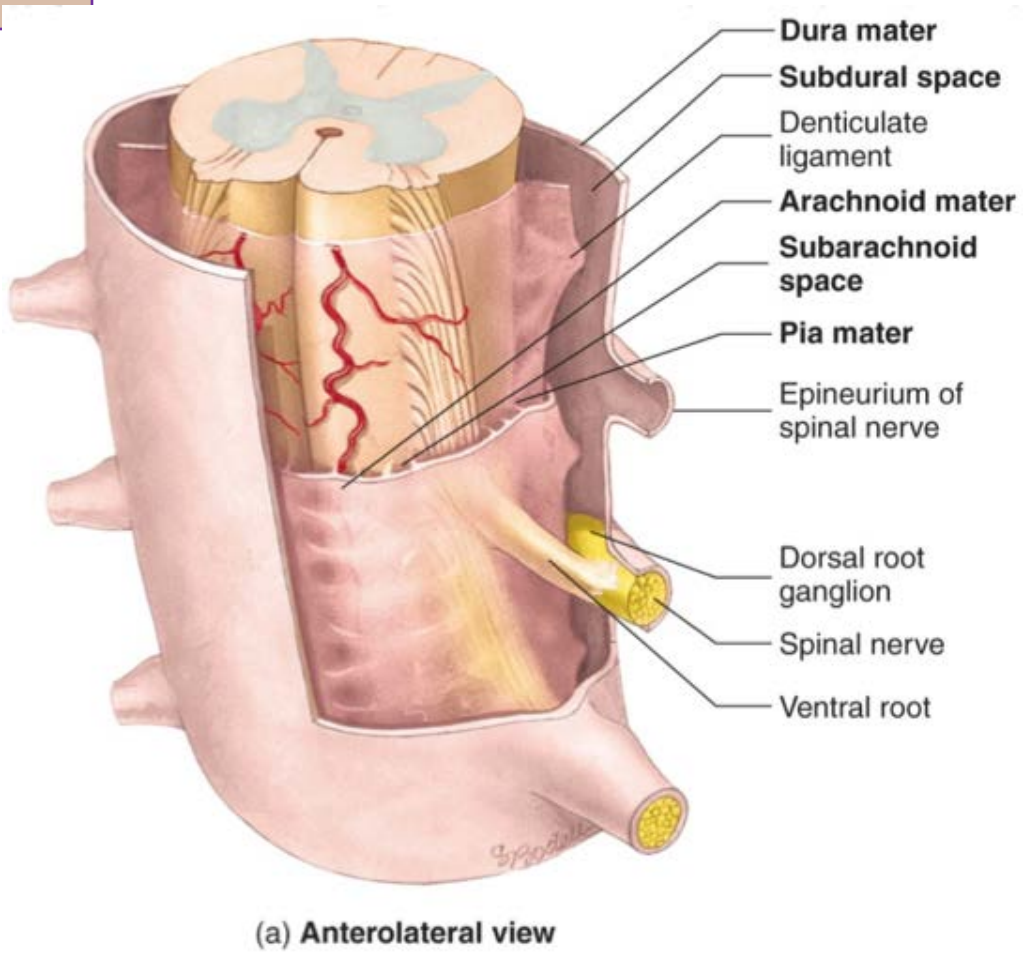
Spinal cord

B. Segments
C. Spinal Cord & Vertebral Canal
D. Spinal Cord Protection
E. Gray Mater
F. Spinal Cord Nucleus
G. White Mater
H. Spinal Tract

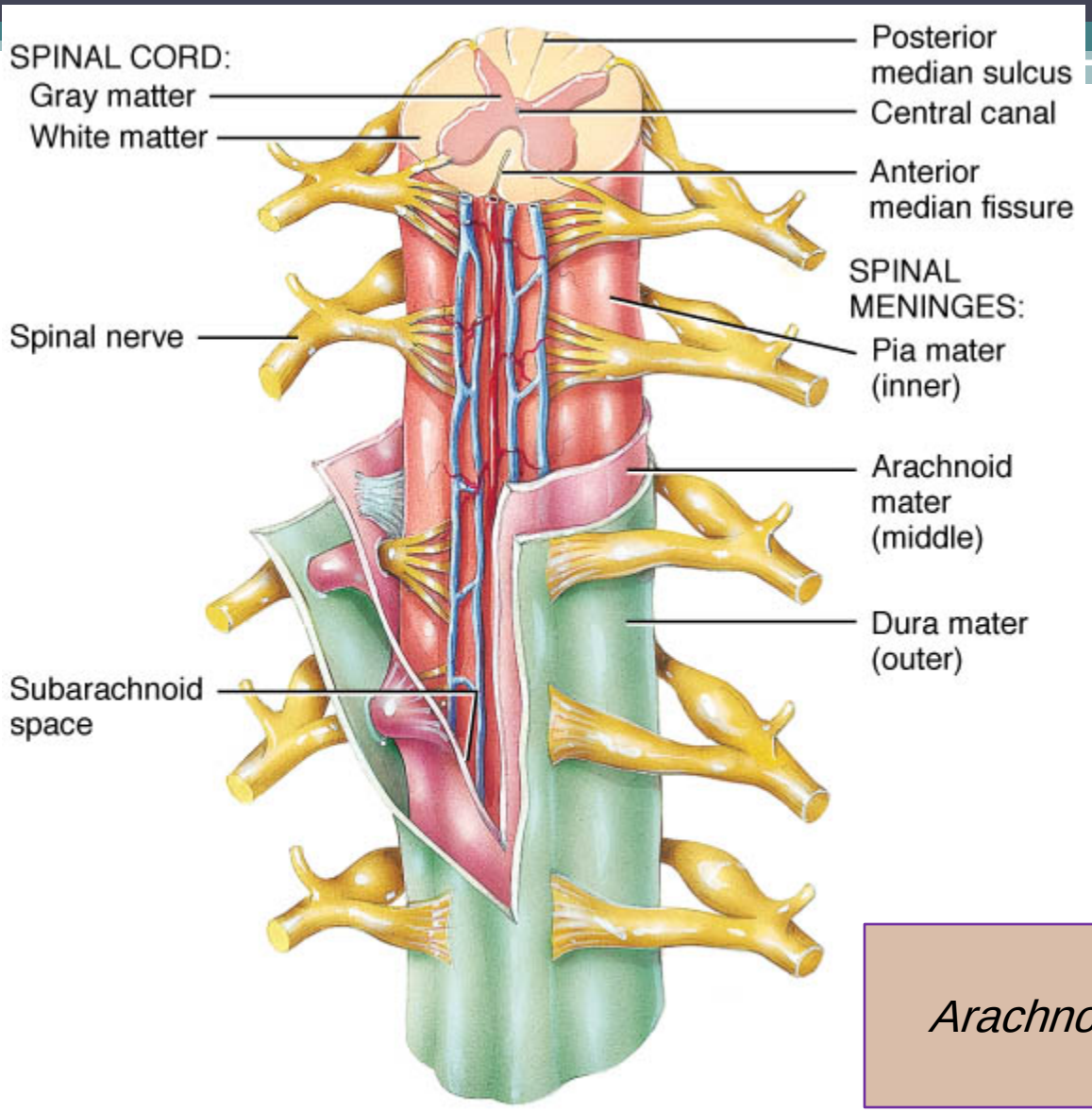


Meninges Layers :

- Cerebral Meningeal Layers
- *Spinal Meningeal Layers*



(a) **Anterolateral view**

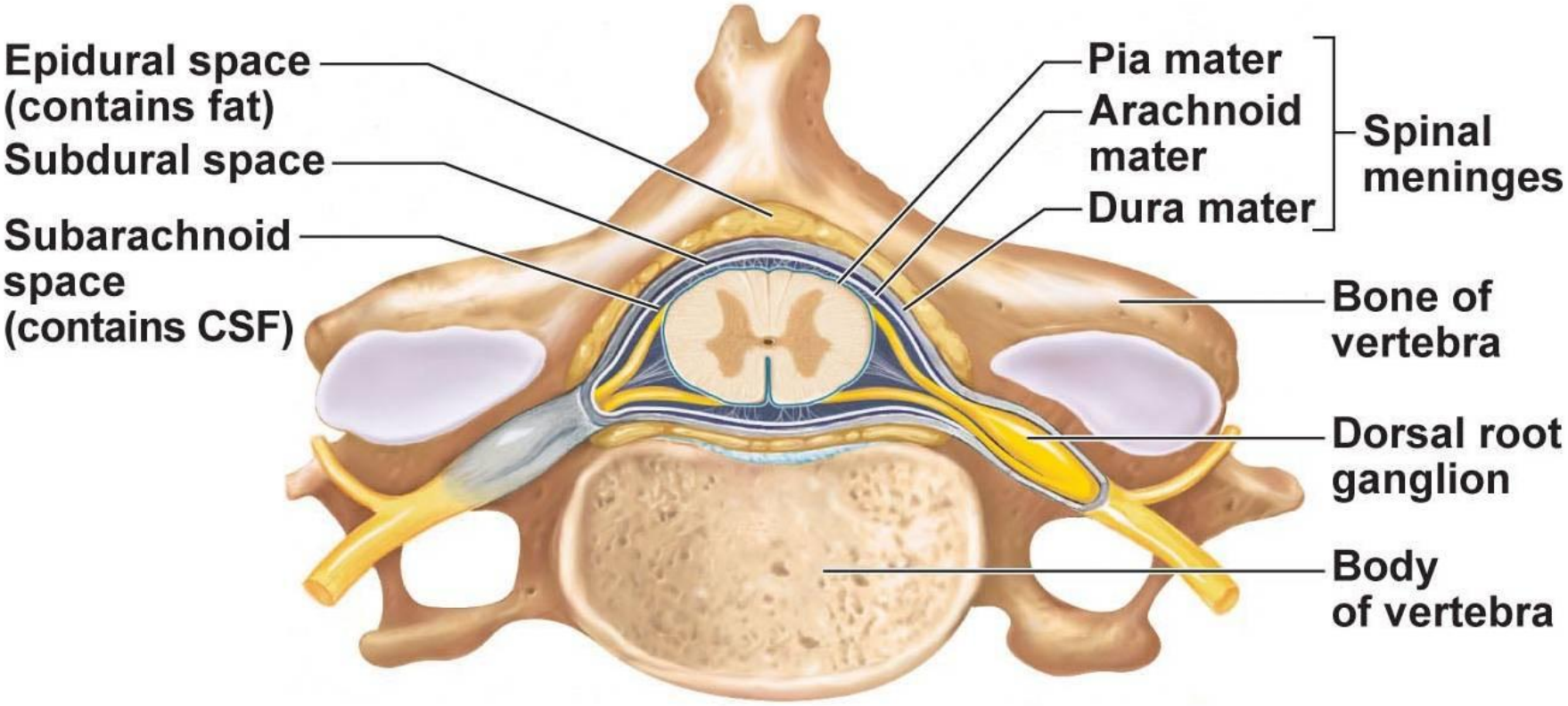


Dura mater
Arachnoid membraine
Pia mater

Anterior view and transverse section through spinal cord

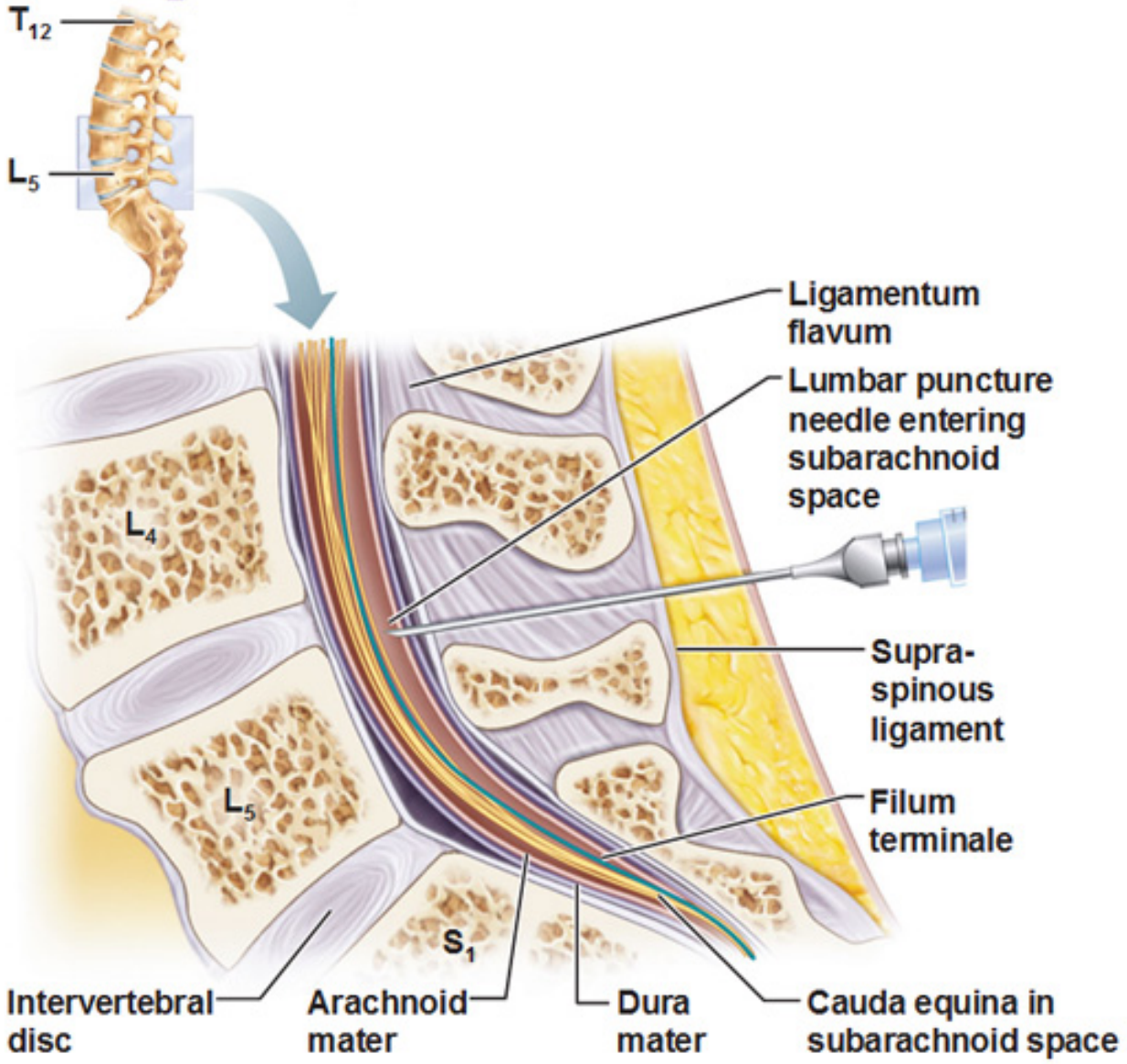
Dura mater

- Dense, strong fibrous membrane
- Encloses the spinal cord & cauda equina
- Continuous above with meningeal layer of dura covering the brain
- Ends at the level of S2
- Separated from wall of vertebral canal by the extradural space
- Contains loose areolar tissue & internal vertebral venous space



(a) Cross section of spinal cord and vertebra

Diagram of Lumbar Puncture



Spinal cord

A. External Feature
B. Segments
C. Spinal Cord & Vertebral Canal
D. Spinal Cord Protection
E. Gray Mater
F. Spinal Cord Nucleus
G. White Mater
H. Spinal Tract

a) Ascending tract

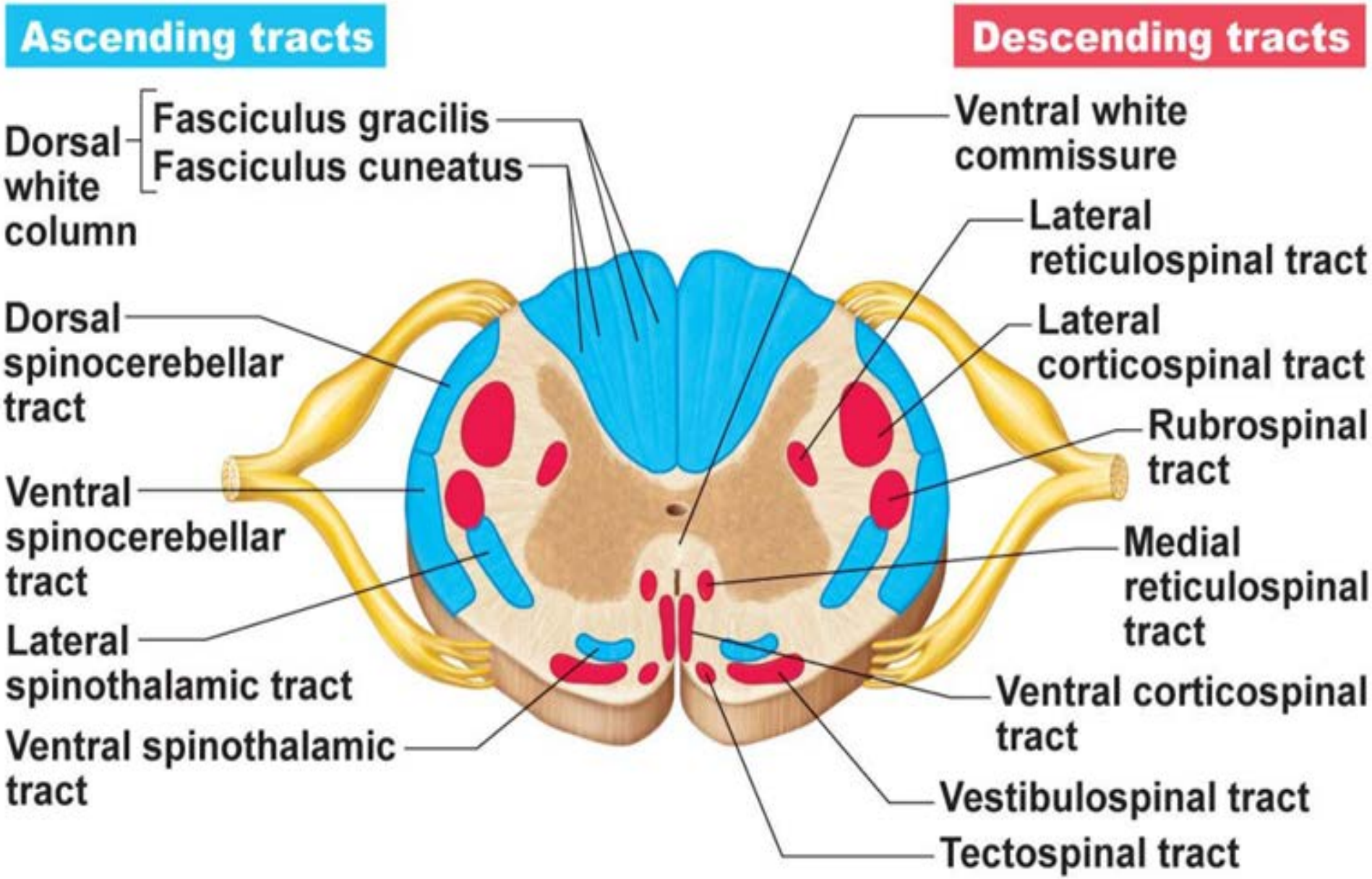
b) Descending tract

Ascending Tracts

- Ant. Spinothalamic
- Ant. Spinocerebellar
- Post. Spinocerebellar
- Lat. Spinothlamic
- Spinotectal
- Spinoreticular
- Gracilis fasciculus
- Cuneatus fasciculus

Descending Tracts

Ant. Corticospinal
Tectospinal
Vestibulospinal
Olivospinal
Ant. Reticulospinal
Lat. Corticospinal
Rubrospinal
Lat. Reticulospinal
Gracilospinal
Cuneatospinal
spinospinal


Ascending tracts
Descending tracts
Dorsal white column
Fasciculus gracilis
Fasciculus cuneatus
Dorsal spinocerebellar tract
Ventral spinocerebellar tract
Lateral spinothalamic tract
Ventral spinothalamic tract
Ventral white commissure
Lateral reticulospinal tract
Lateral corticospinal tract
Rubrospinal tract
Medial reticulospinal tract
Ventral corticospinal tract
Vestibulospinal tract
Tectospinal tract