

# SPINAL CORD

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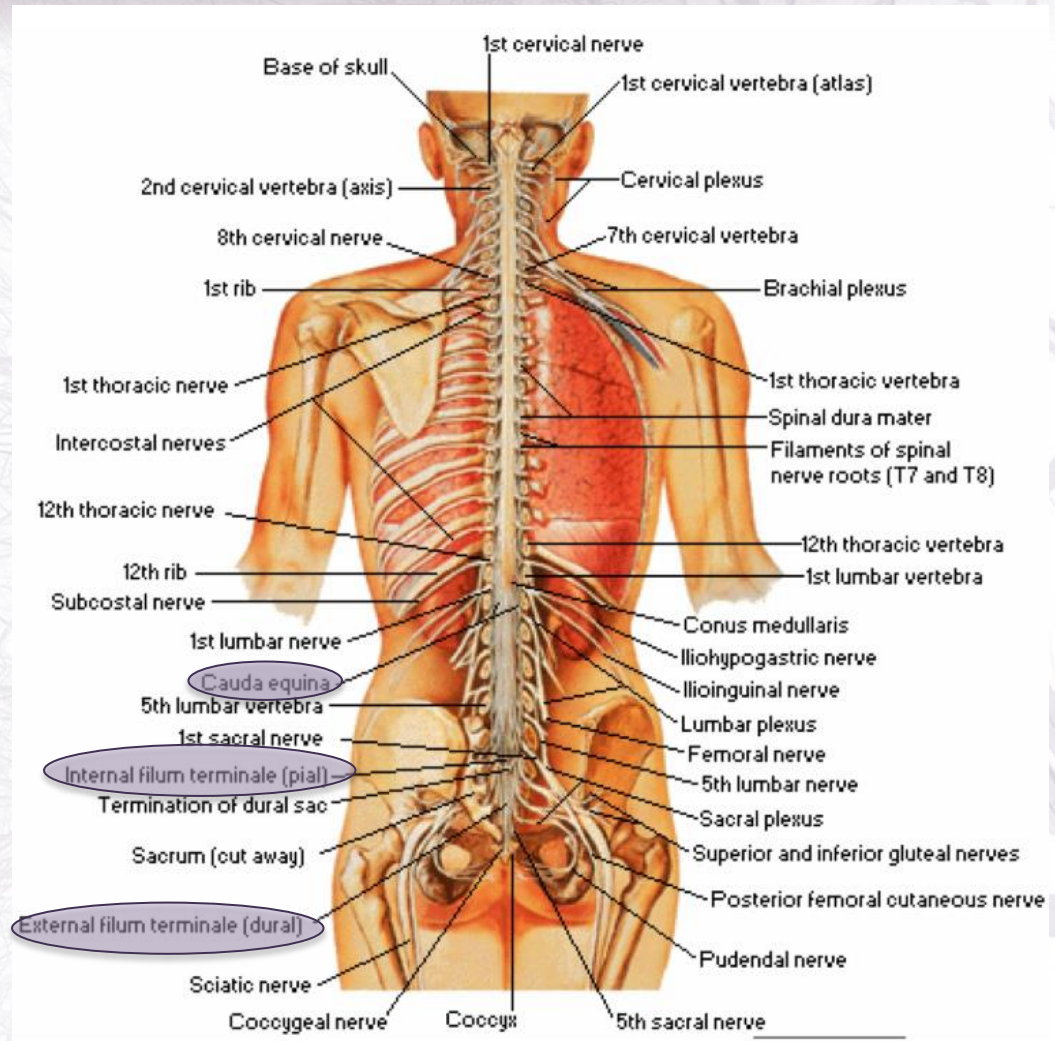
تنويه: هذا العمل لا يعتبر مصدر رئيسي للمذاكرة وإنما للمراجعة فقط

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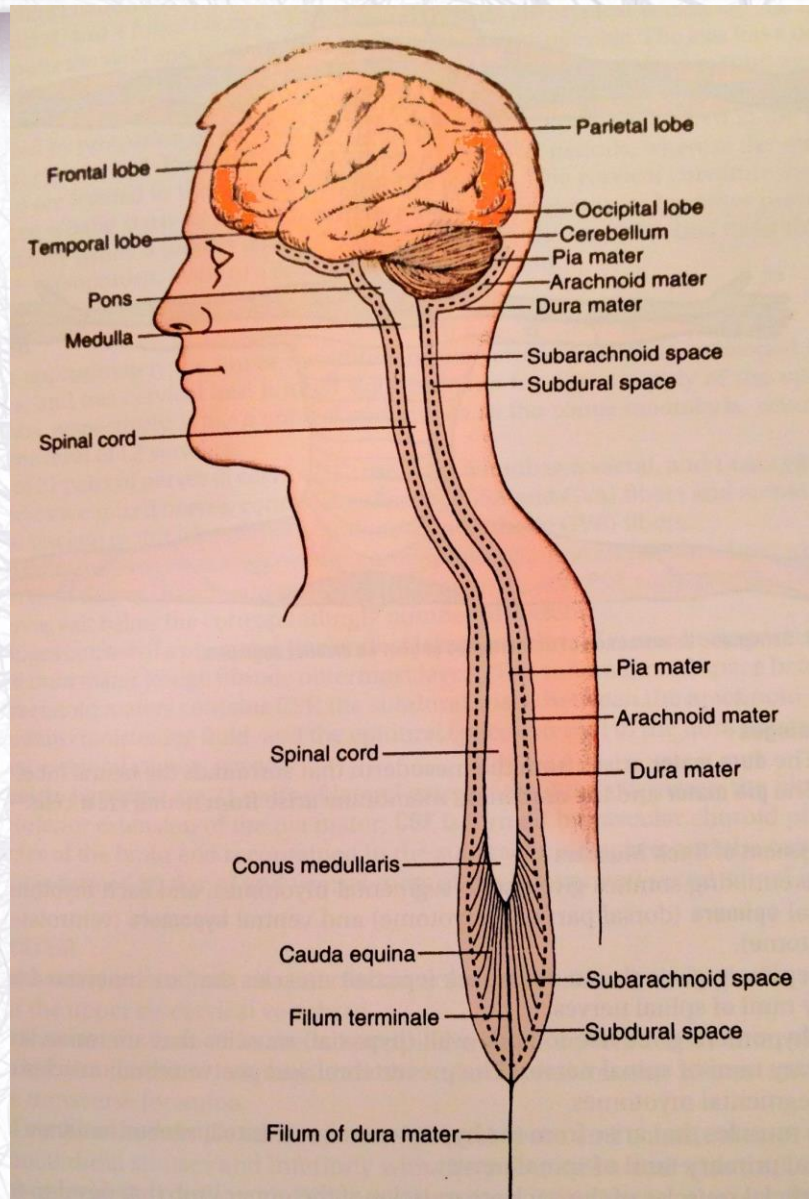
# Introduction:

- The spinal cord extends from the **foramen magnum** to **L2**.
- Tapered end is known as **conus medullaris** but the extended non-neuronal cord is called **filum terminale**
- The pia mater forms the **filum terminale** which anchors the SC to the **coccyx**
- Has **31** pairs of spinal nerves which supply all the body except the head and neck

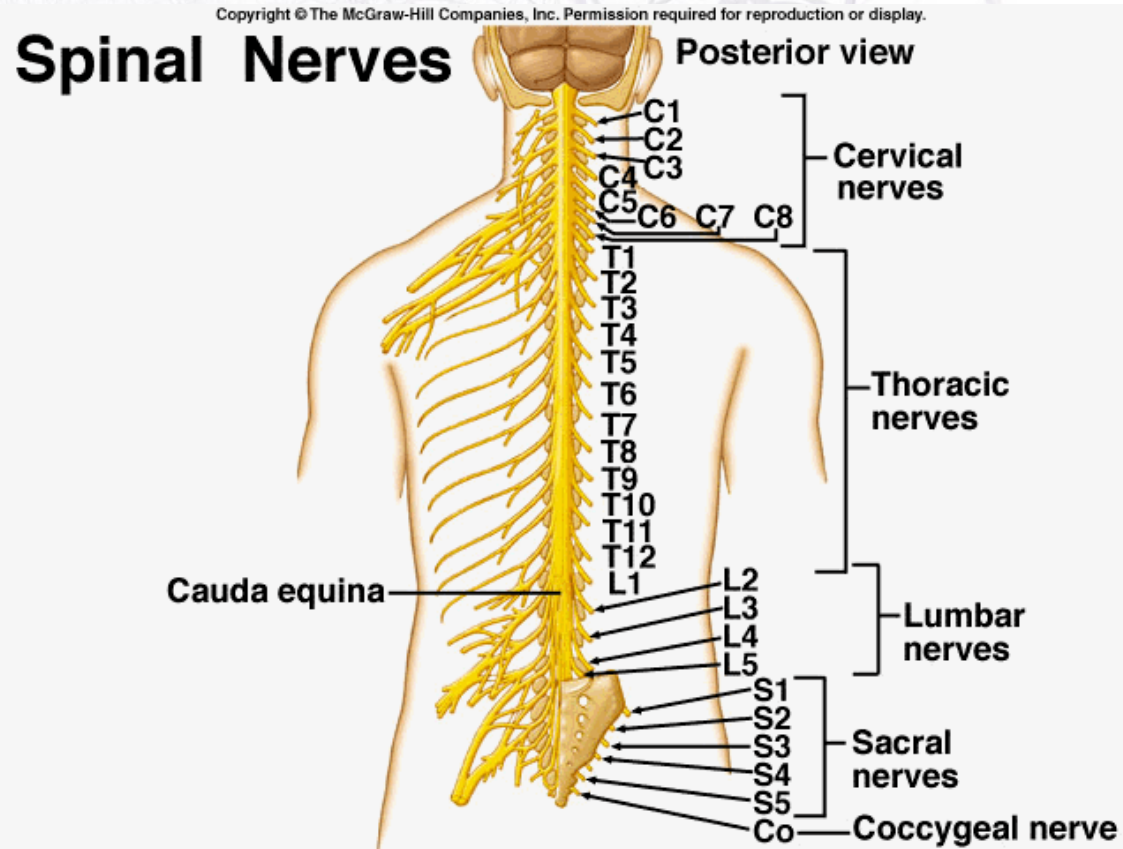




- Between dura mater and bone (**epidural space**) → where spot anesthesia is administered
- Subarachnoid space → used clinically for taking a sample of CSF (**spinal tap**)
- **Fissure** (wider with space) and **Septum/sulcus** (separation with no space in between)
- The **terminal ventricle** marks the end of the central canal
- Preganglionic neurons come from the **lateral horn**



- The first spinal nerve emerges between the skull and the atlas.
- The last four spinal nerves emerge from the sacral foramina.
- The central canal in the spinal cord is lined by ependymal cells



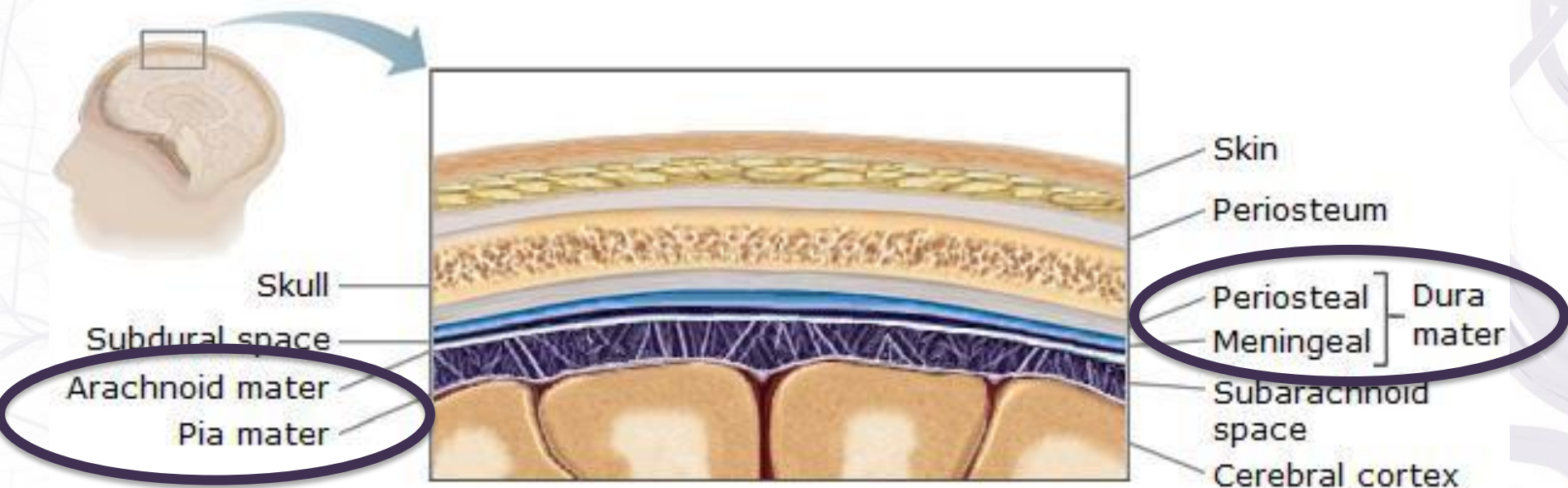


# Meninges:

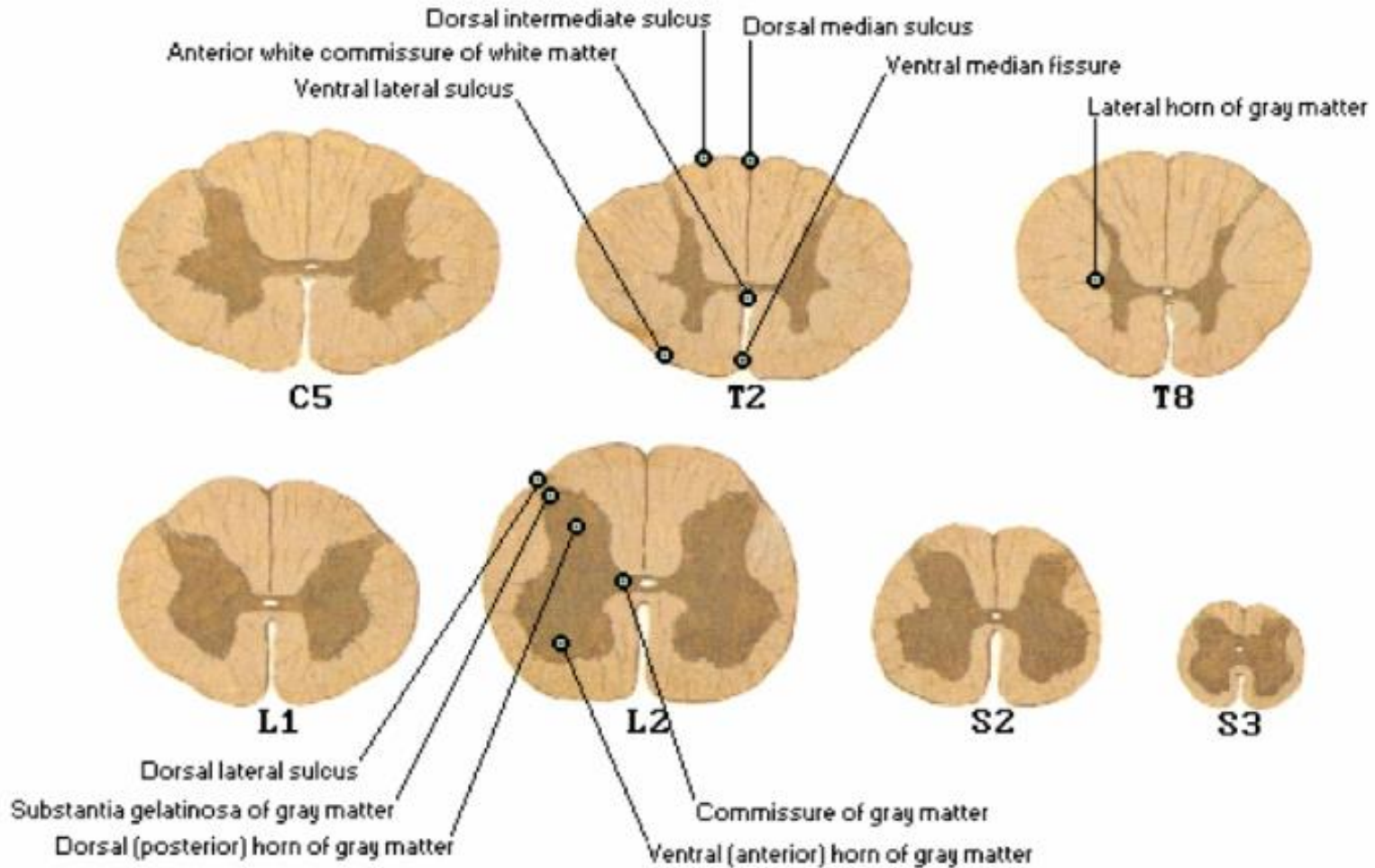
In to out: PAD

Pia – Arachnoid - Dura

## Cross-section of Skull and Meninges



The gray and white matter have different distributions in different regions of the SC.



Sections through spinal cord at various levels



# Spinal Cord

Gray Matter  
(inner)

divided into  
laminae of  
Rexed

Dorsal  
Horn:  
(sensory in fn.)

- substantia gelatinosa (II)
- nucleus proprius (IV)
- nucleus dorsalis (VII)
- visceral afferent (VII)

Lateral  
Horn:  
(symp. & para..)

Ventral  
Horn:  
(motor in fn.)

Renshaw  
cells (interneurons)  
innerv. intra-  
fusal...

LMN  
(lower motor neuron)  
(α-neurons, γ-neur.)

innervate  
extrafusal  
mus. fib.

Under the  
influence  
of brain.

Types:

From T1 - L2/3

gives pregang. symp.  
fibers

S2 - 4

pregang.  
Parasymp.  
fibers.

White Matter  
(outer)

\* color due to myelinated nerve fibers. (also responsible for saltatory conduction in nerves).

\* no nerve cell bodies.

\* arranged in  
funiculi (columns):

ant.    post.    lat.

but the fibers are arranged in vertical bundles.

\* white commissure contains decussating nerve fibers (they cross one another to form X shapes)

\* note: neurons supplying flexor muscles are located dorsal to those supplying extensor muscles.



Anatomy: L2

nerve cell grps. in the:  
**Dorsal Horn**

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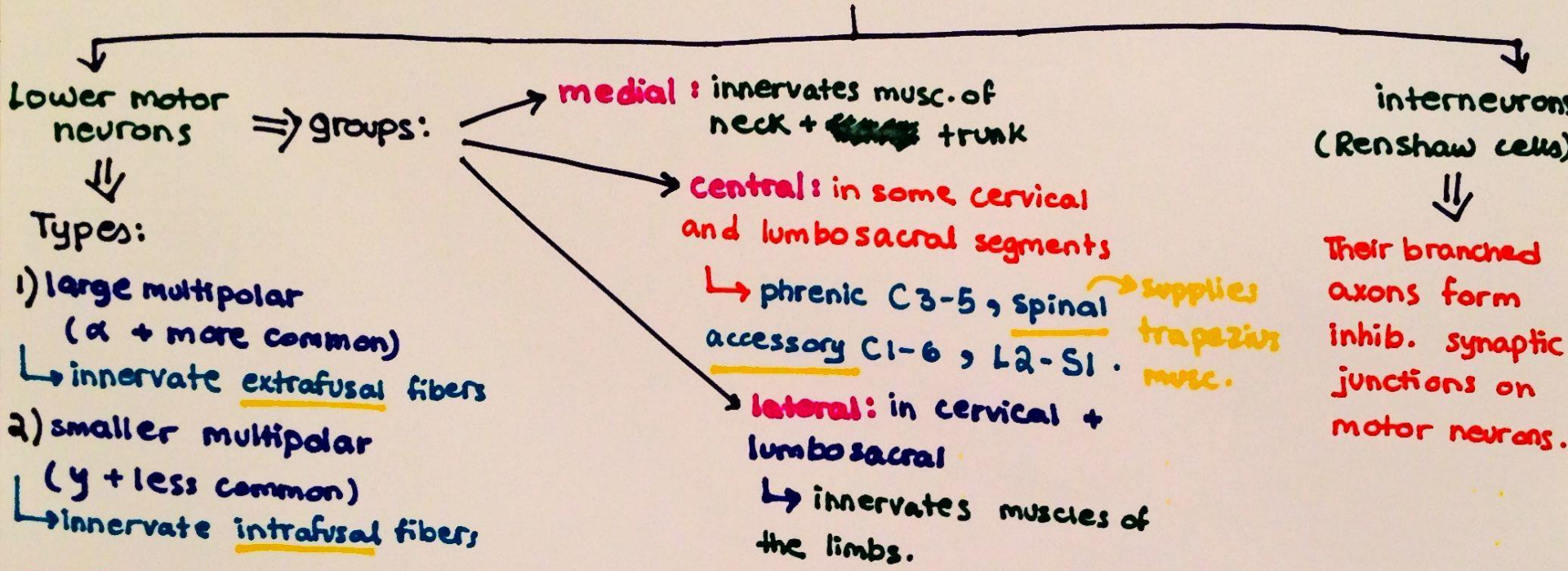
	Substantia gelatinosa	nucleus proprius / principal sensory nucleus	nucleus dorsalis / clarks column / nucleus thoracis	visceral afferent nucleus
Laminae :	Rexed Laminae II (2)	IV (4)	VII (7)	VII (7)
Location :	apex of horn	ant. to substantia gelat.	base of dorsal horn	lat. to nuc. dorsalis
Character:	large neurons	large neurons	mostly large neurons	mostly <b>medium-sized</b> neurons
On Spinal cord (loc.):	throughout the spinal cord length	throughout the spinal cord length	<b>C8 → L3-4</b>	<b>T1 → L3</b>
Afferents:	dorsal root fibers assoc. w/ pain, temp, and crude touch	dorsal root fibers assoc. w/ senses of position & movement (proprioception) and 2 point discrimination & vibration	dorsal root fibers assoc. w/ info. from muscle spindles & tendon organs.	visceral afferents



Anatomy: L2

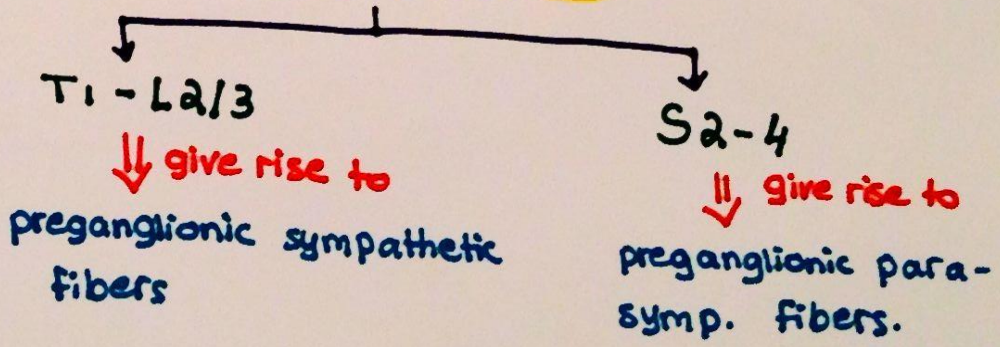
# Nerve Cell Groups in: The Ventral Horn

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NOTE: both  $\alpha$  +  $\gamma$  neurons are under the influence of descending paths in the brain (upper motor neurons)

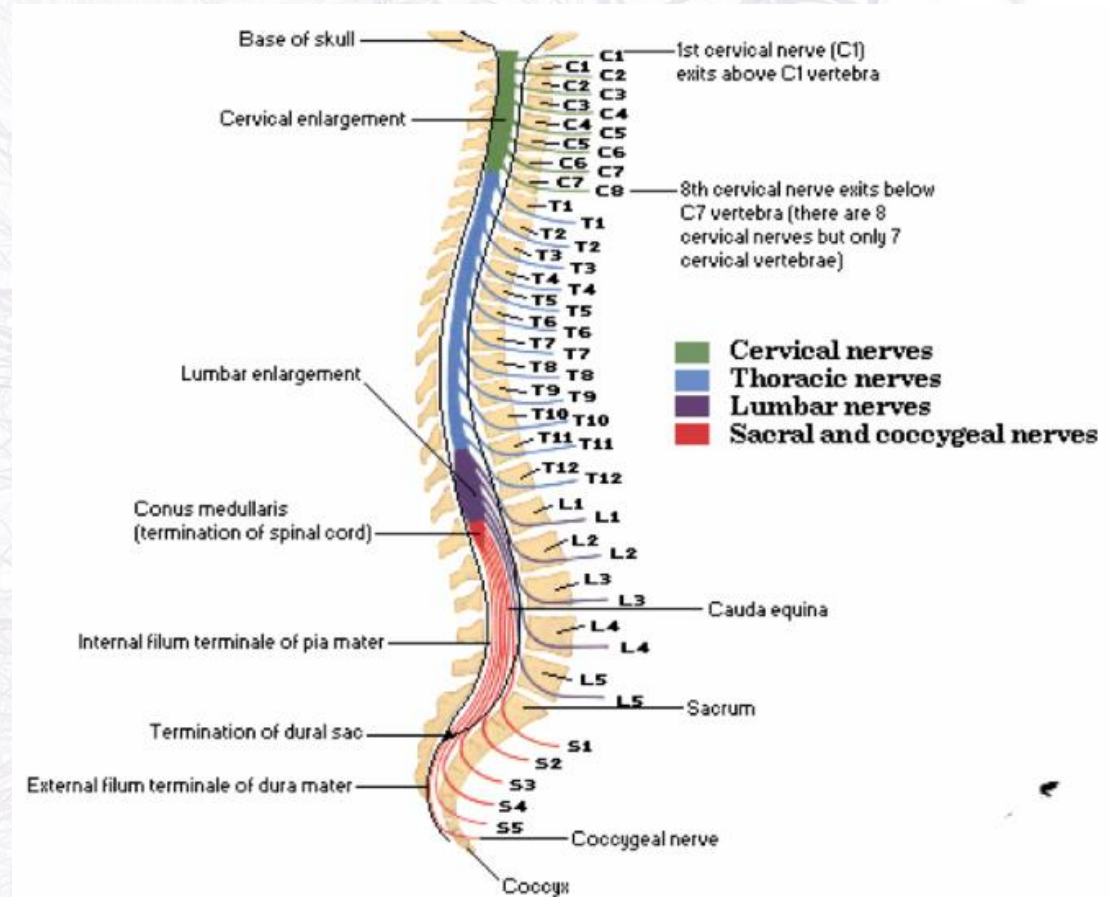
# \*\* Nerve cell groups in: The Lateral Horn





# Spinal Nerves:

- Eight pairs cervical, twelve pairs thoracic, five pairs lumbar, five pairs sacral, one pair coccygeal.
- Each spinal nerve will start as **rootlets** (each from either dorsal or ventral) and those 2 rootlets will join laterally forming the spinal nerve. In turn, the spinal nerve will divide itself giving 2 rami: a larger anterior ramus, and a smaller posterior one.





# Plexuses:

- The ventral rami will form plexuses except in the thoracic region (where we have the intercostal nerves):

**C1 – C4: Cervical plexus**

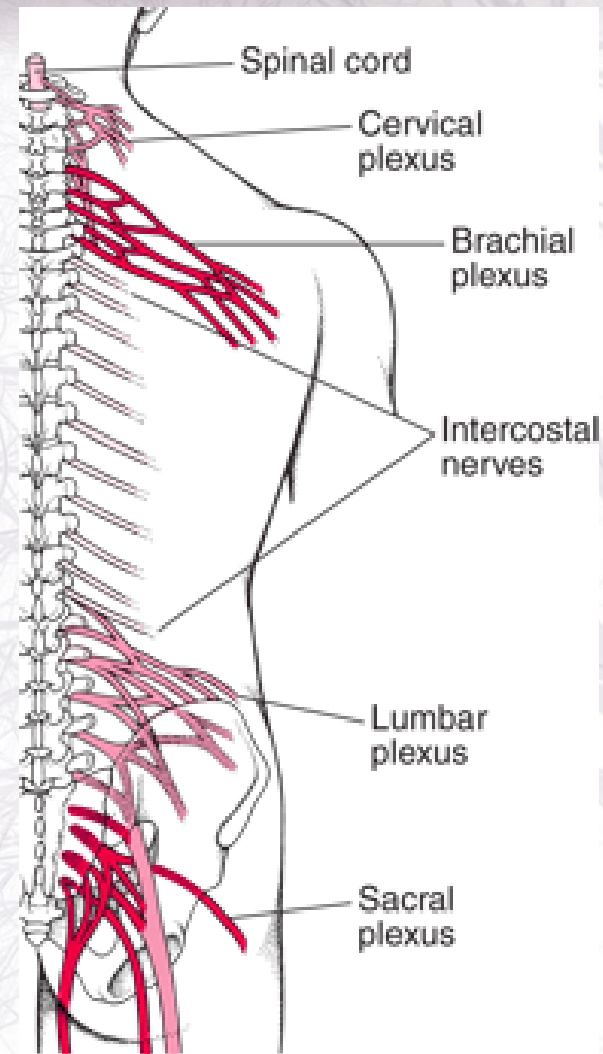
**C5 – T1: Brachial plexus**

**L1 – L4: Lumbar plexus**

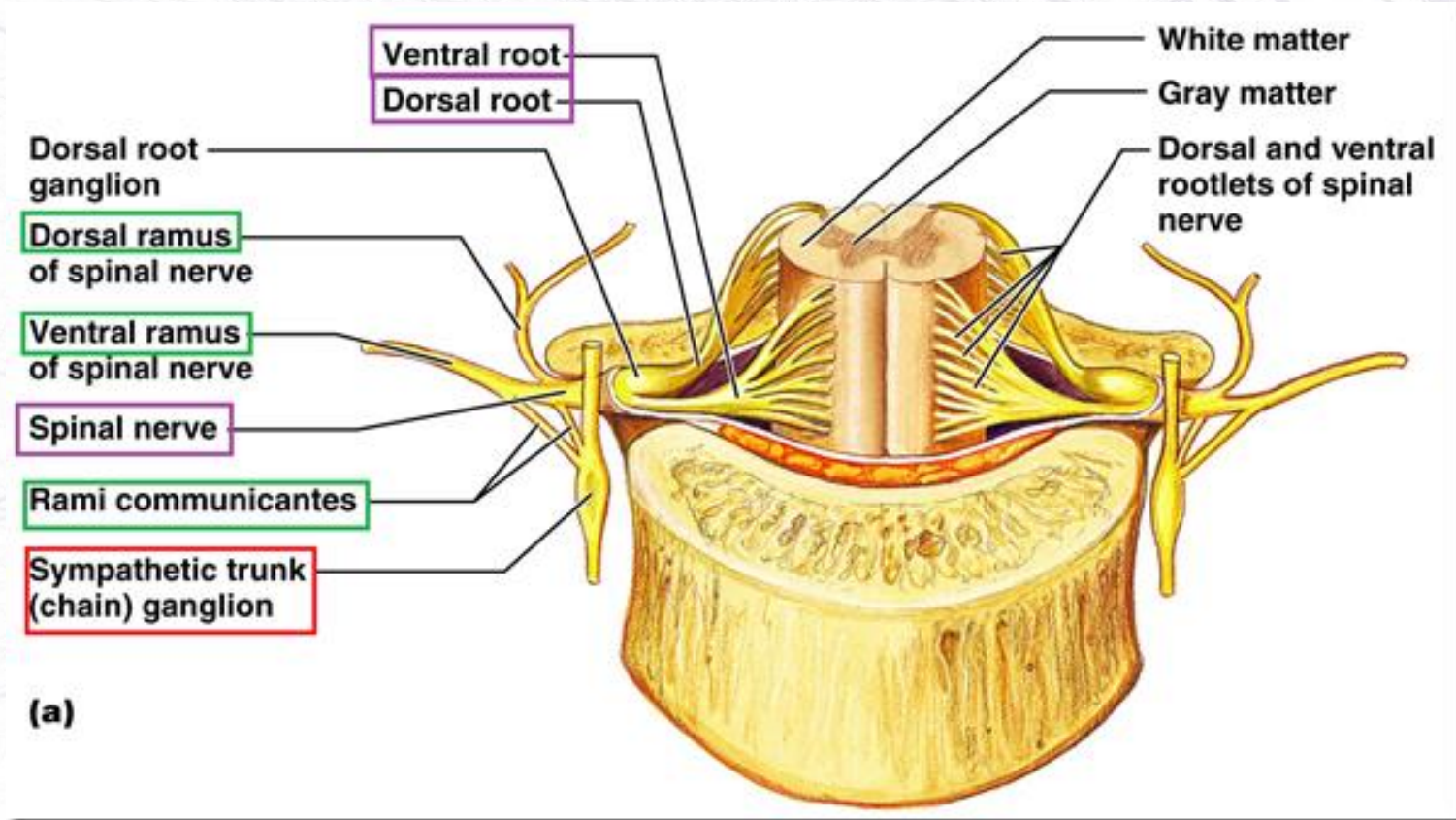
**L4 – S4: Sacral plexus**

**S5 – C0: Coccygeal plexus**

- The spinal nerves are connected to the sympathetic chain of ganglia by **communicating rami**.



- The dorsal rami innervate the deep muscles of the trunk that are responsible for movements of the vertebral column and the skin near the midline of the back.





# Questions:

**Q1: substantia gelatinosa is located in:**

- A) Rexed lamina 1
- B) Rexed lamina 2
- C) Rexed lamina 4
- D) Rexed lamina 10

**Q2: True or False: the amount of white mater increases as we ascend the SC**

- A) T
- B) F

**Q3: True or False: The neurons supplying flexor muscles are located ventral to those supplying extensor muscles**

- A) T
- B) F

**Q4: True or False: ventral rami tend to be larger in size than the dorsal rami**

- A) T
- B) F

**Answers:**

Q1: B

Q2: A

Q3: B

Q4: A

# Questions:

**Q5: Which one of these spaces contains CSF :**

- a) Subarachnoid
- b) Epidural space
- c) Subdural space

**Q6: Which one of the following is located at the base of the dorsal horn:**

- a) Substantia Gelatinosa
- b) Visceral Afferent Nucleus
- c) Nucleus thoracicus
- d) Nucleus Proprius

**Q7: Spinal cord extends from foramen magnum to :**

- a) 4th sacral vertebra
- b) second lumbar vertebra
- c) 1st coccygeal vertebra
- d) second sacral vertebra

**Answers:**

Q5: A

Q6: C

Q7: B

GOOD LUCK 😊