Introduction to Anatomy

1st Year Medical Students

2025-2026
Second Semester

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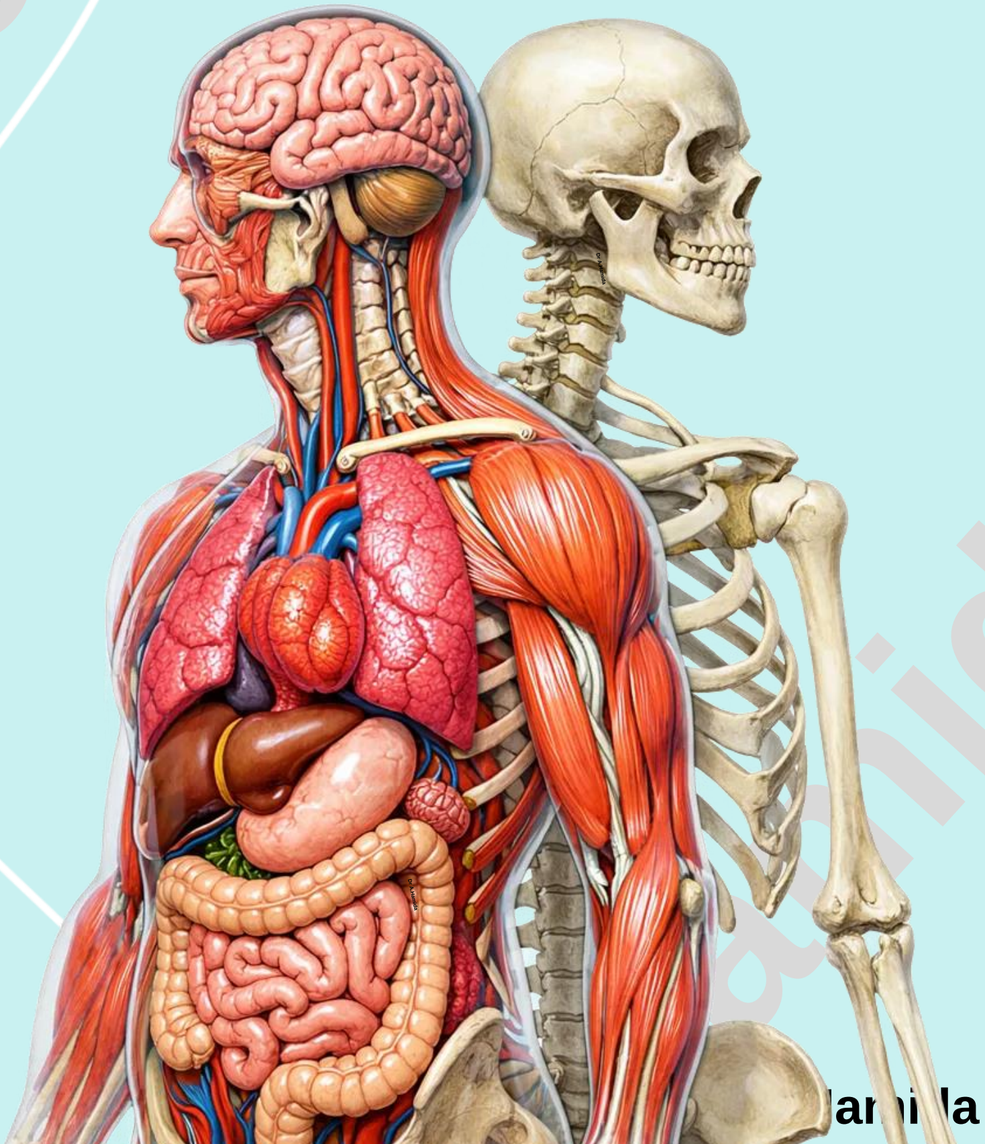
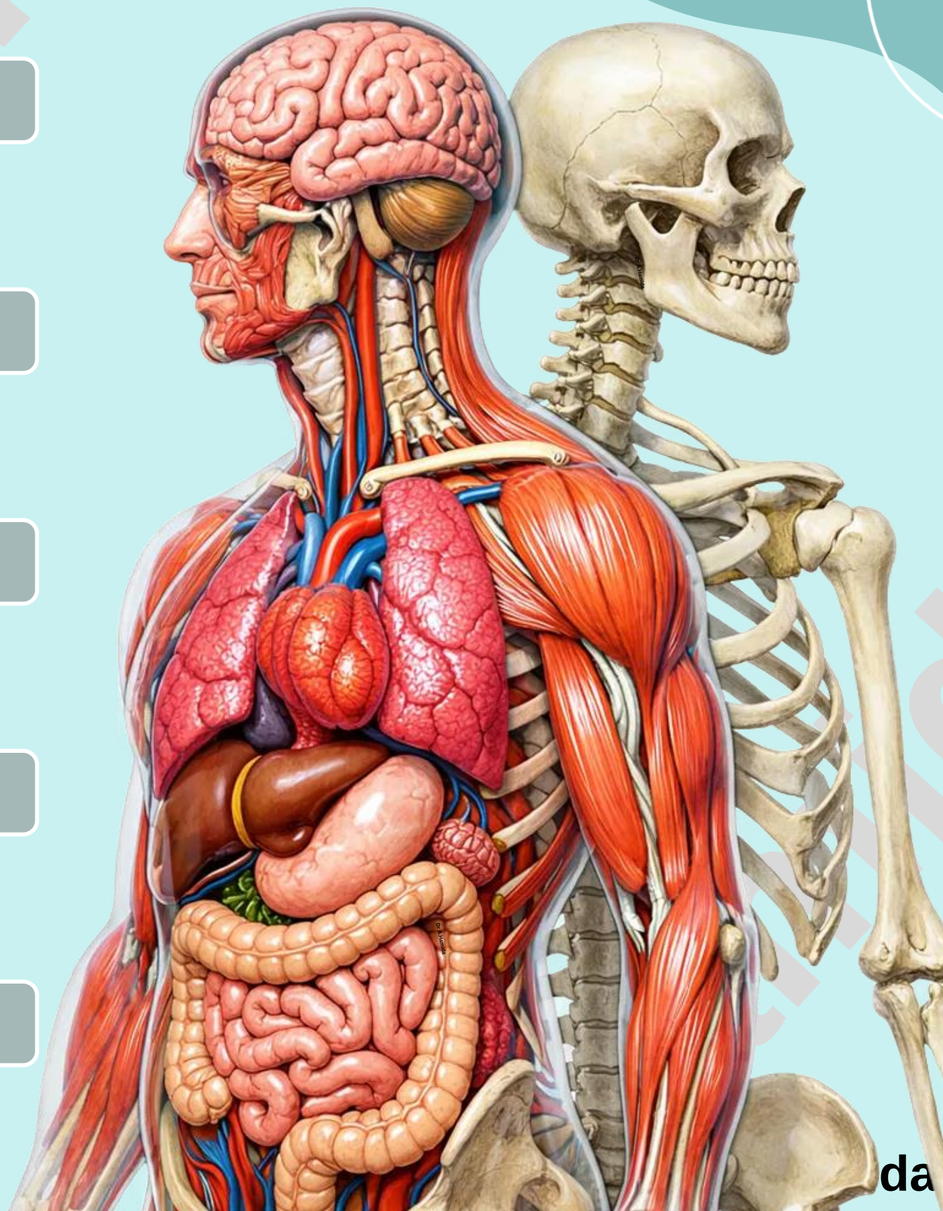


Course Outline:

Gross lecture 10

1. Introduction and Terminology
2. Skeletal System
3. Cardiovascular System
4. Lymphatic System
5. Nervous System
6. Muscular System
7. Respiratory System
8. Digestive System
9. Urinary System
10. Endocrine System



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Gross lecture10

Nervous System

5 Nervous System

Gross lecture10

❖ Divisions of the Nervous System

➢ Anatomically, the nervous system is divided into two parts:

1. Central Nervous System (CNS),

   consists of:

   i. Brain (located in the cranial cavity)

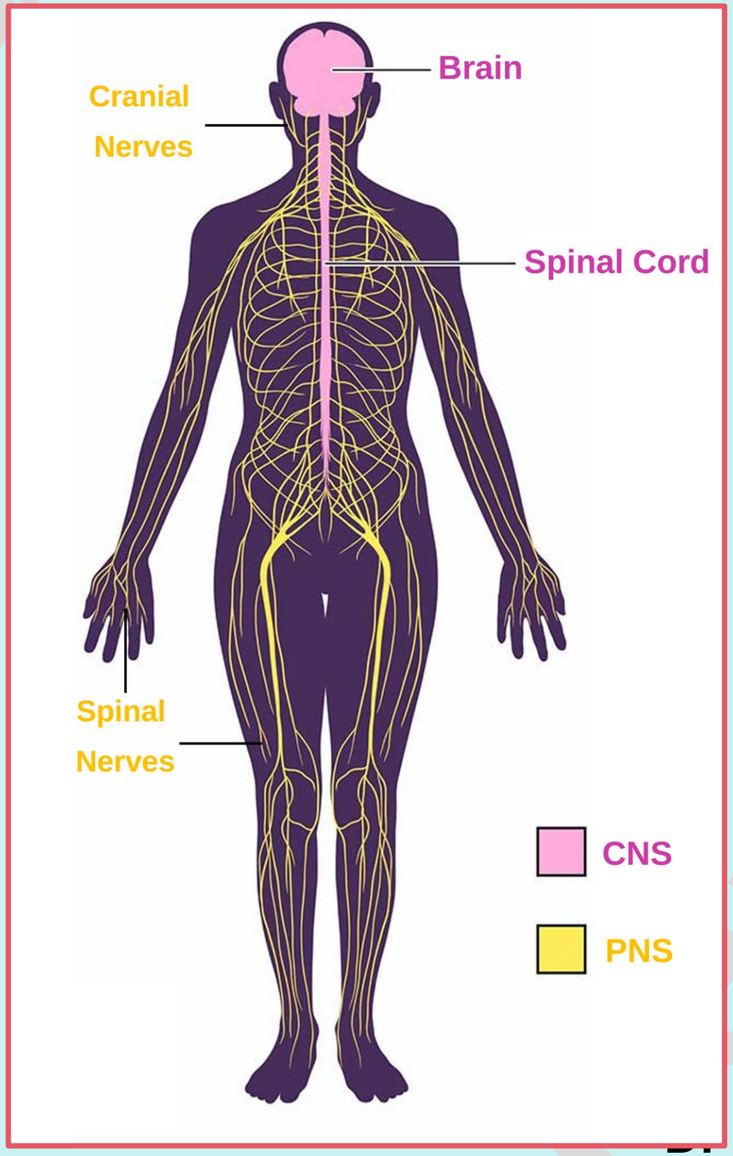
   ii. Spinal Cord (located in the vertebral canal)

2. Peripheral Nervous System (PNS),

   consists of nerves that exit from CNS:

   i. Cranial nerves (exit from the brain)

   ii. Spinal nerves (exit from the spinal cord)



5 Nervous System

Gross lecture 10

System Outline:

5.1 Nervous Tissue

5.2 Central Nervous System - Brain

5.3 Central Nervous System - Spinal Cord

5.4 Peripheral Nervous System

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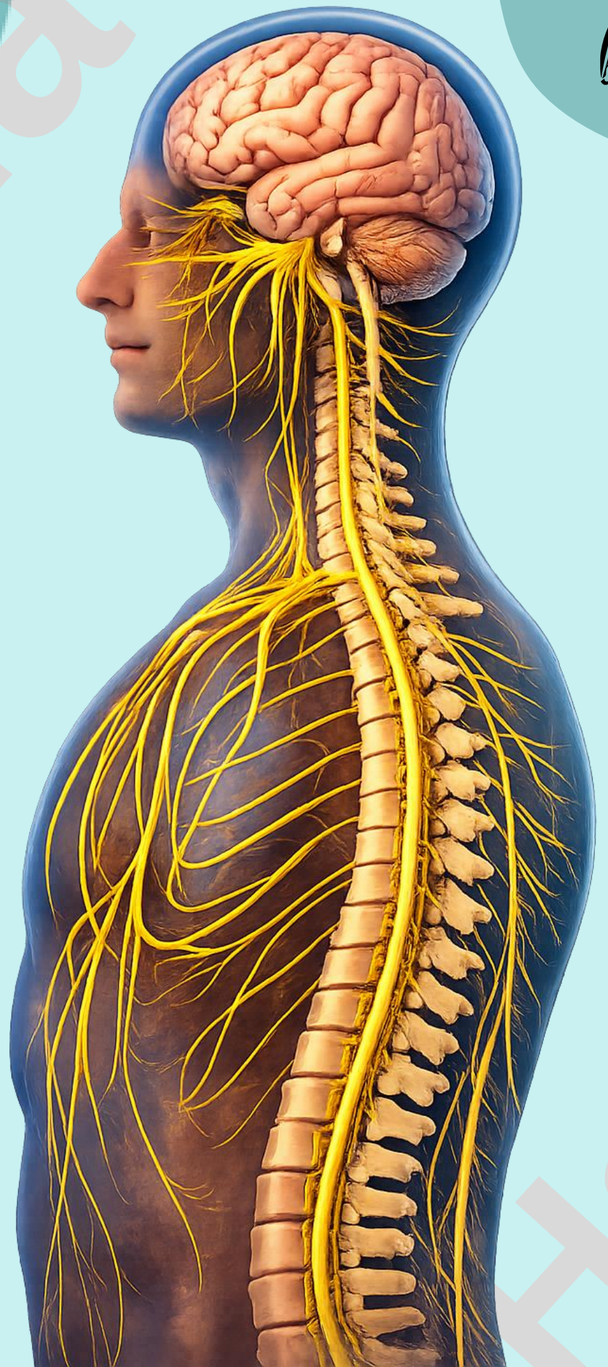
Gross lecture 10

Nervous System

4. Peripheral Nervous System



5.4 Nervous System– Peripheral Nervous System

Gross lecture 10

Lecture Outline:

- 5.4.1 Spinal Nerves
- 5.4.2 Cranial Nerves

5.4.1

Spinal Nerves

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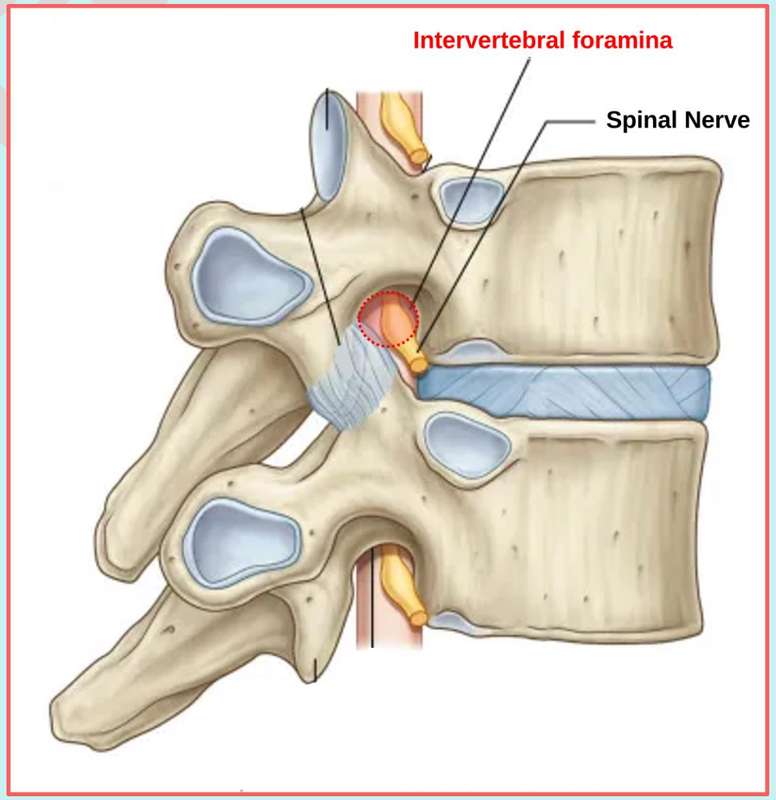
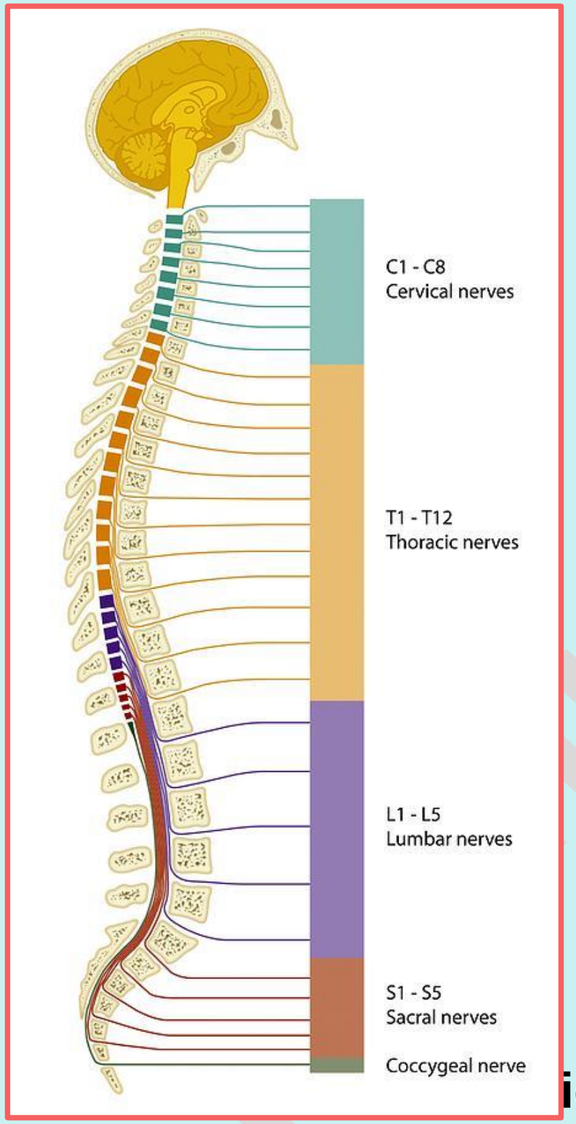
- 31 pairs of spinal nerves arise from the spinal cord and pass through **intervertebral foramina** in the vertebral column.

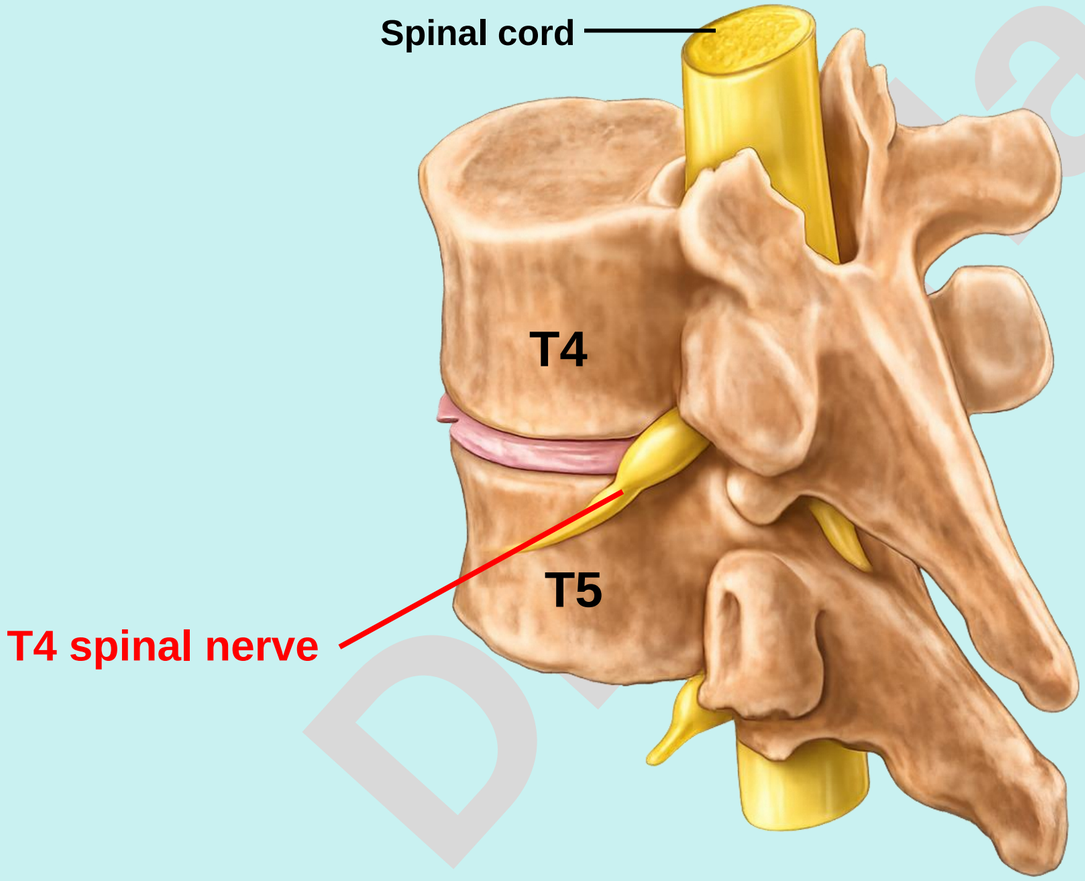
- The spinal nerves are named according to the region of the vertebral column:
  - Eight pairs of cervical nerves (C1 to C8),
  - Twelve pairs of thoracic nerves (T1 to T12),
  - Five pairs of lumbar nerves (L1 to L5),
  - Five pairs of sacral nerves (S1 to S5)
  - One pair of coccygeal nerves (Co1).

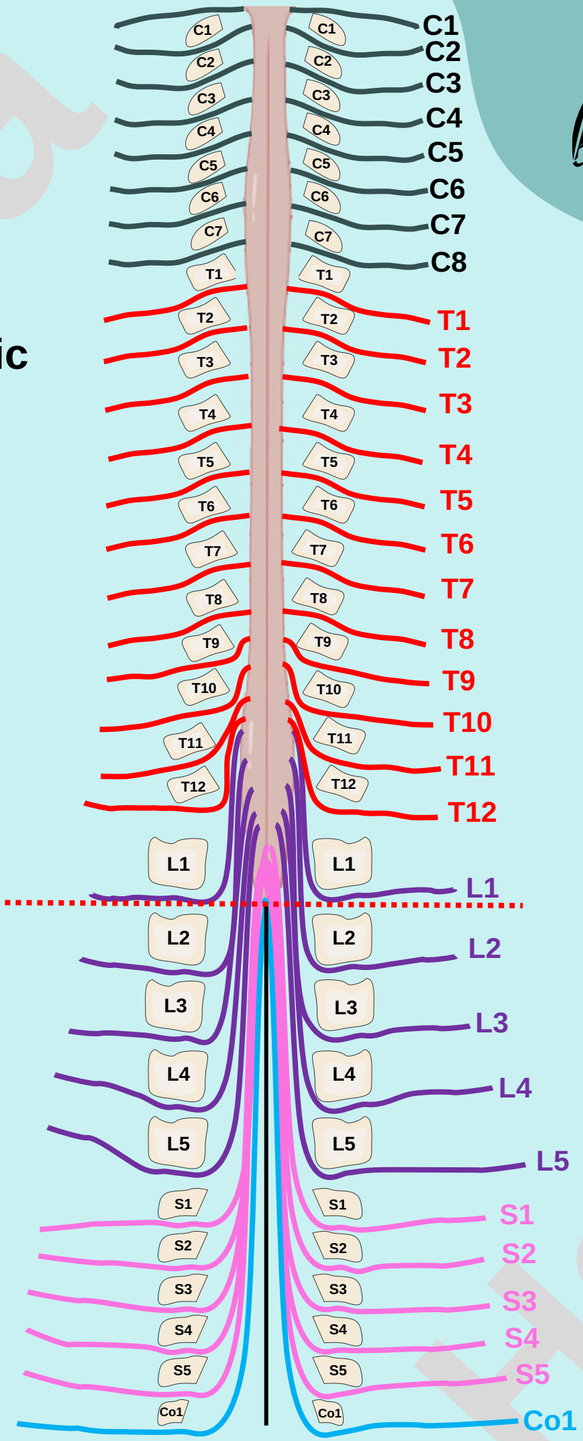




5.4.1 Spinal Nerves

- Each spinal nerve exits below the corresponding vertebra, except the cervical nerves, which exit above the corresponding vertebra (except of C8 nerve, which emerges between 7th cervical and 1st thoracic vertebrae).





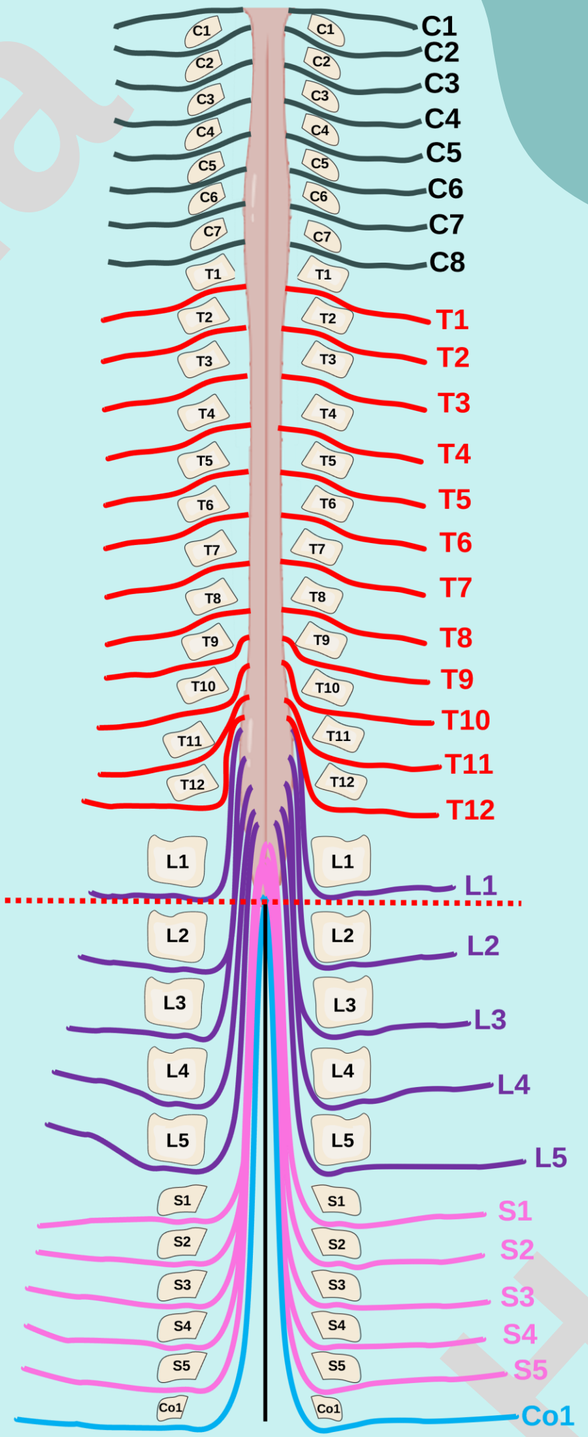
5.4.1

Spinal Nerves

Gross lecture 10

➢ Cauda Equina

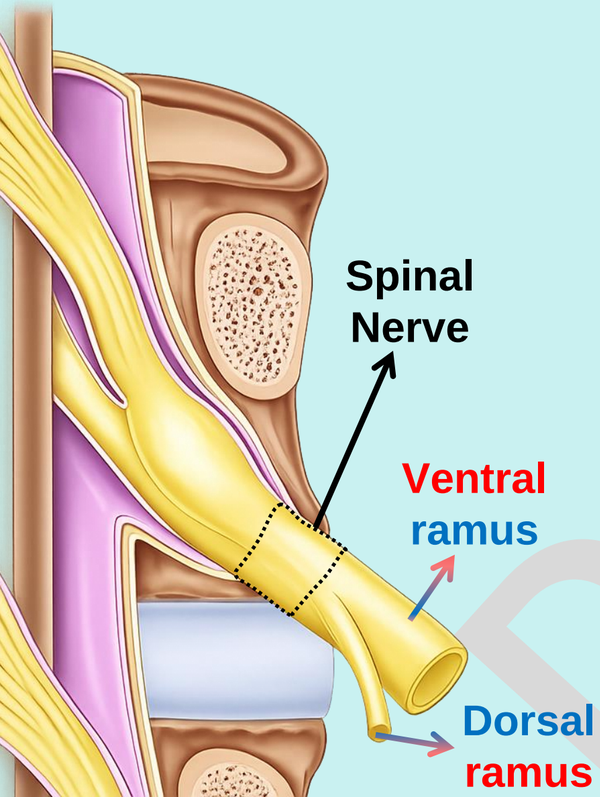
- Since the spinal cord is shorter than the vertebral column, the length of the spinal nerves increases progressively from above downward so they can reach their respective intervertebral foramina.
- The upper cervical nerves run almost horizontally; thoracic nerves run obliquely, while lumbar and sacral nerves descend almost vertically downwards.
- These descending lumbar, sacral, and coccygeal roots form a bundle around the filum terminale called the cauda equina, because it resembles a horse's tail (cauda = tail, equina = horse).

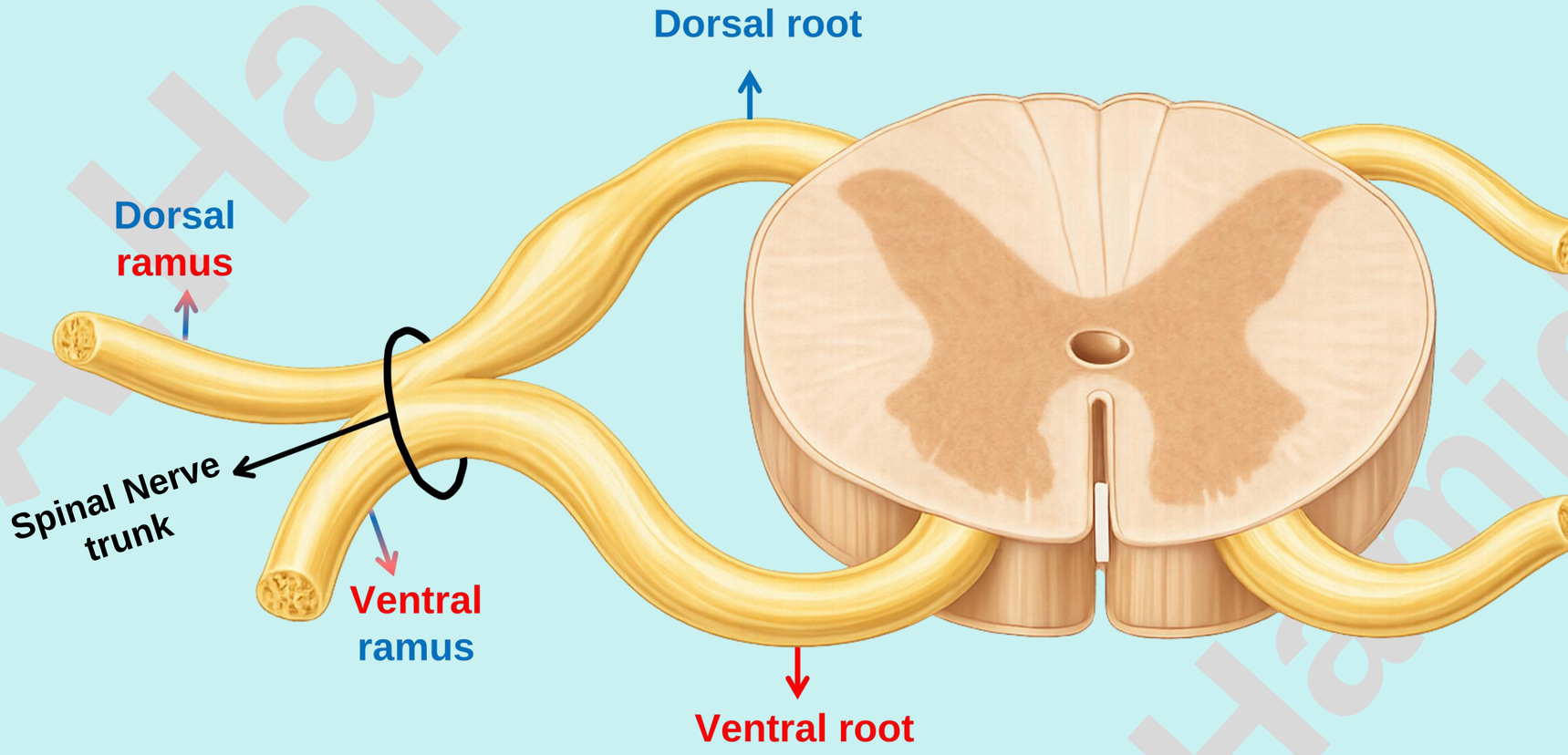


5.4.1 Spinal Nerves

Gross lecture 10

- Each spinal nerve arises from spinal cord by two roots: anterior root and posterior root
- The two roots unite at the intervertebral foramen to form the nerve trunk.
- After emerging from the intervertebral foramen, each spinal nerve divides into anterior ramus and posterior ramus.



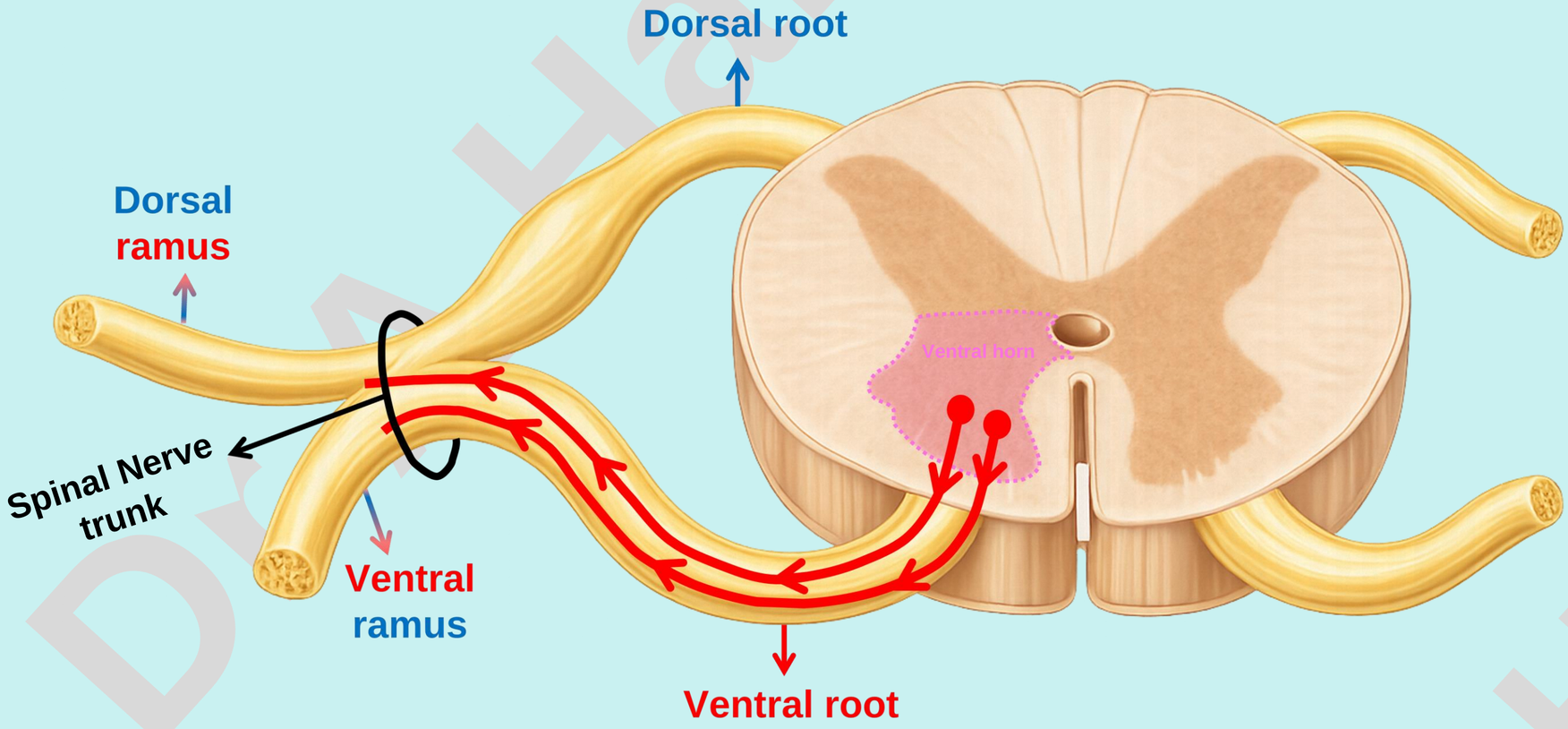


5.4.1 Spinal Nerves

➢ Each spinal nerve arises from spinal cord by two roots: anterior root and posterior root

1. Anterior Root:

- Consists of bundles of nerve fibers that carry impulses away from the spinal cord; these fibers are called motor (efferent) fibers.
- The cell bodies of these fibers are located in the anterior horn of the spinal cord.

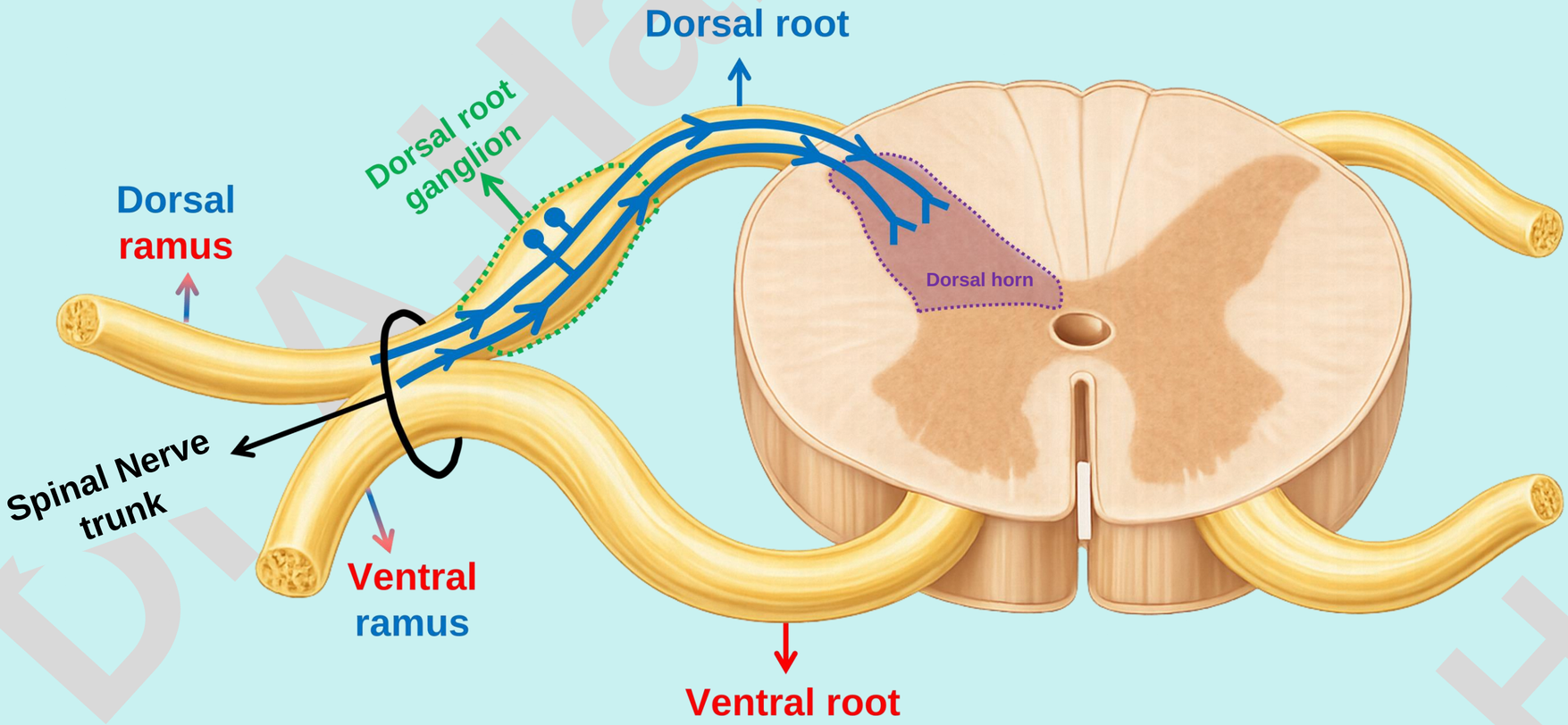


5.4.1 Spinal Nerves

➢ Each spinal nerve arises from spinal cord by two roots: anterior root and posterior root

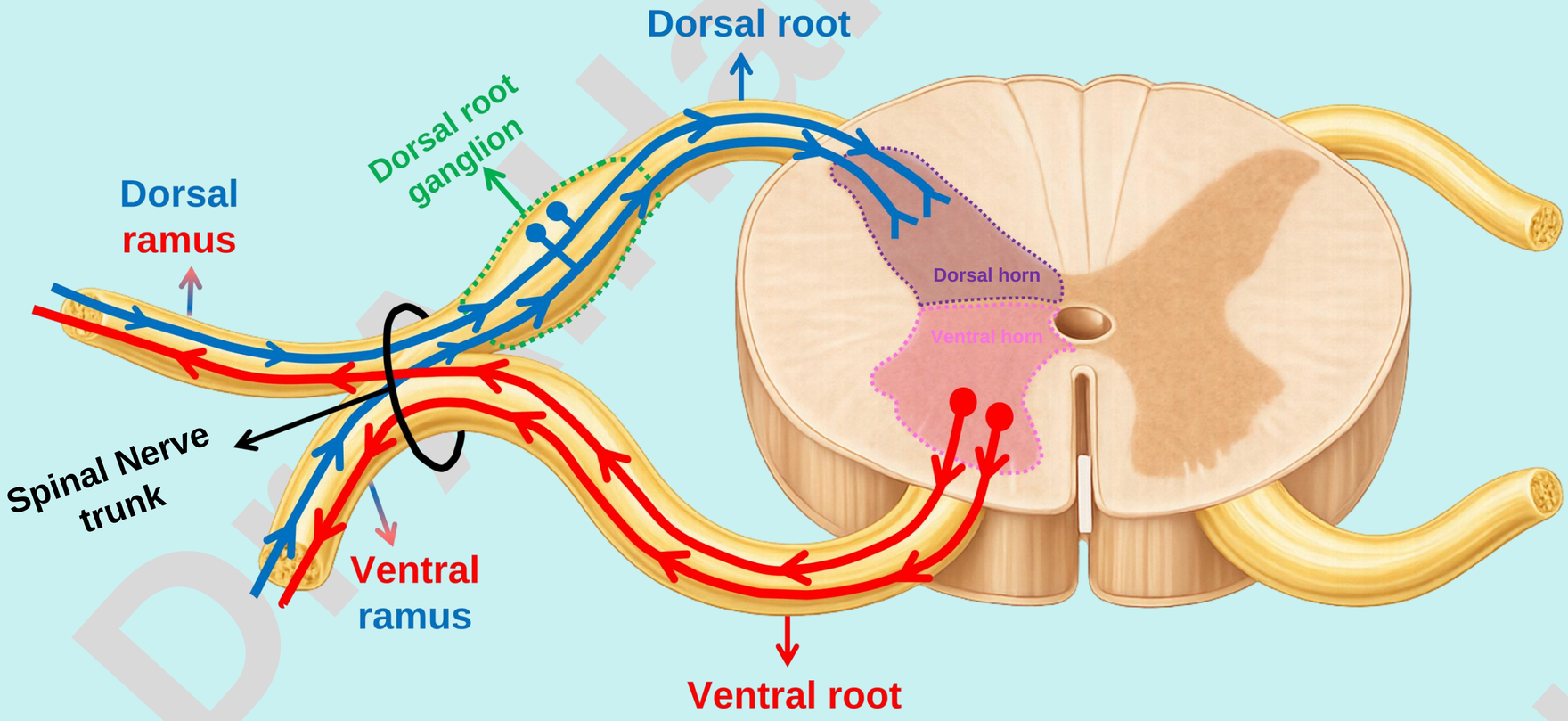
2. Posterior root:

- Consists of bundles of nerve fibers that carry impulses toward the spinal cord; these fibers are called sensory (afferent) fibers.
- The cell bodies of these fibers are located outside the spinal cord in a swelling on the posterior root called the dorsal root ganglion.



5.4.1 Spinal Nerves

- The two roots unite at the intervertebral foramen to form the nerve trunk, which contains **both motor and sensory fibers.**
- After emerging from the intervertebral foramen, each spinal nerve divides into large anterior ramus and a smaller posterior ramus, each containing **both motor and sensory fibers**.



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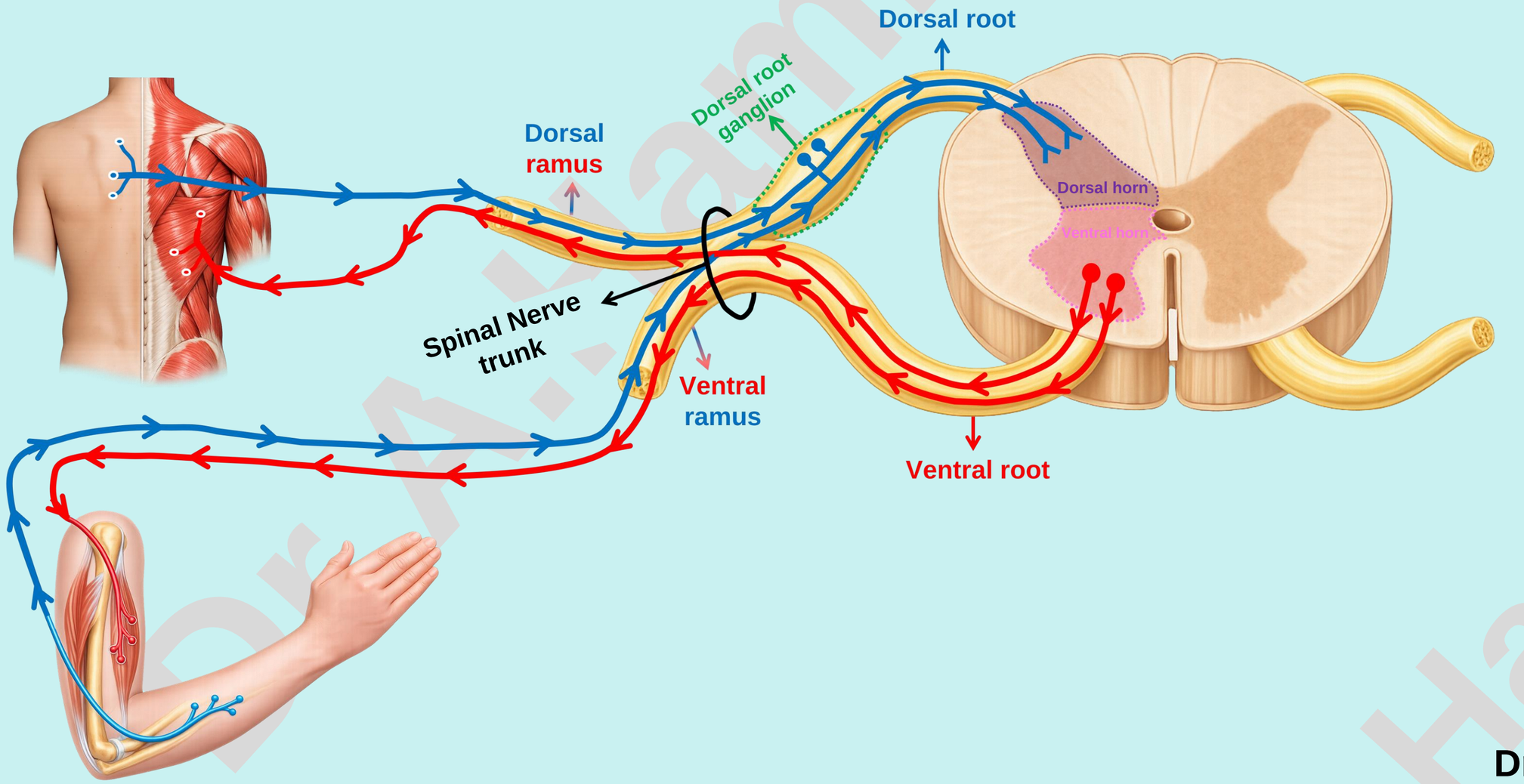
5.4.1 Spinal Nerves

- Anterior ramus: runs anteriorly to supply the muscles and skin over the anterolateral part of the body wall.
- Posterior ramus: passes posteriorly to supply the muscles and skin of the back.

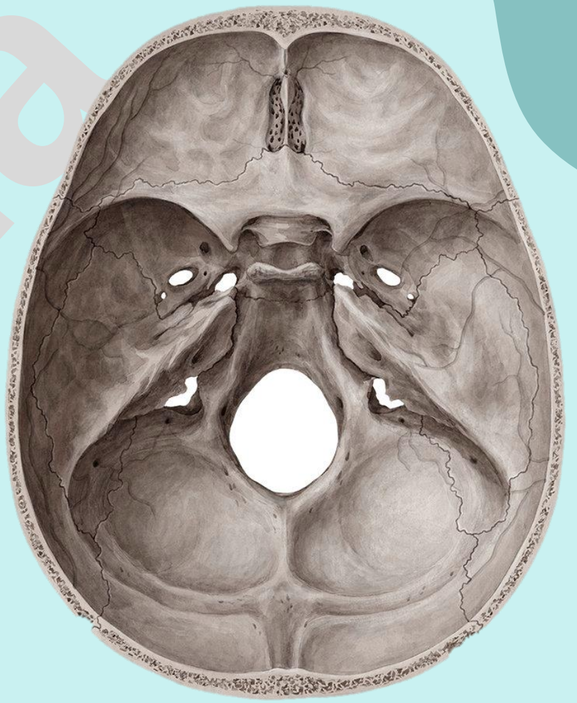


5.4.2

Cranial Nerves

Gross lecture 10

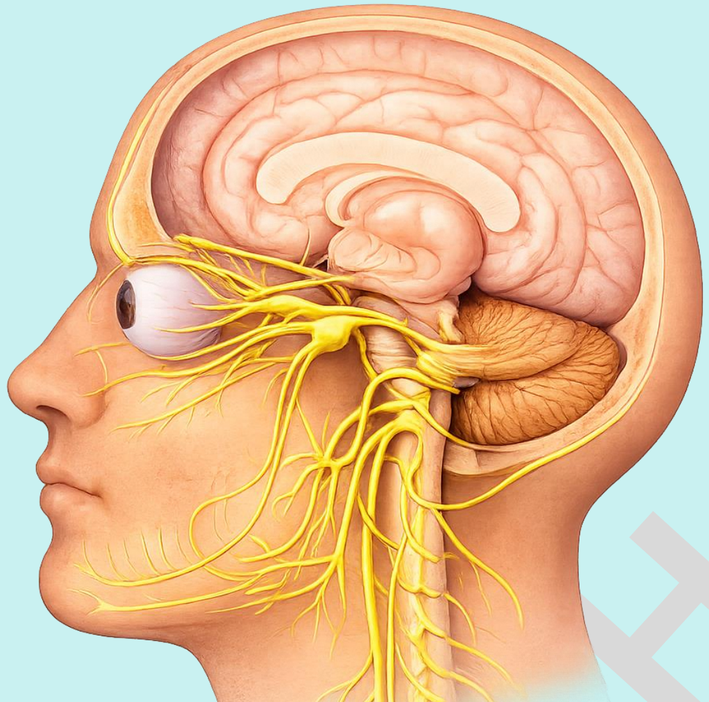
- There are 12 pairs of cranial nerves (CNs) that arise from the brain and pass through **foramina in the skull**.



- The first two arise from the **forebrain**, and the remaining ten arise from the **brainstem**.

- All cranial nerves supply structures in the **head and neck**, except the 10th CN (vagus nerve), which also supplies organs in the **thorax and abdomen**.

- A cranial nerve may contain **motor fibers (motor nerve)**, **sensory fibers (sensory nerve)** or **both (mixed nerve)**.



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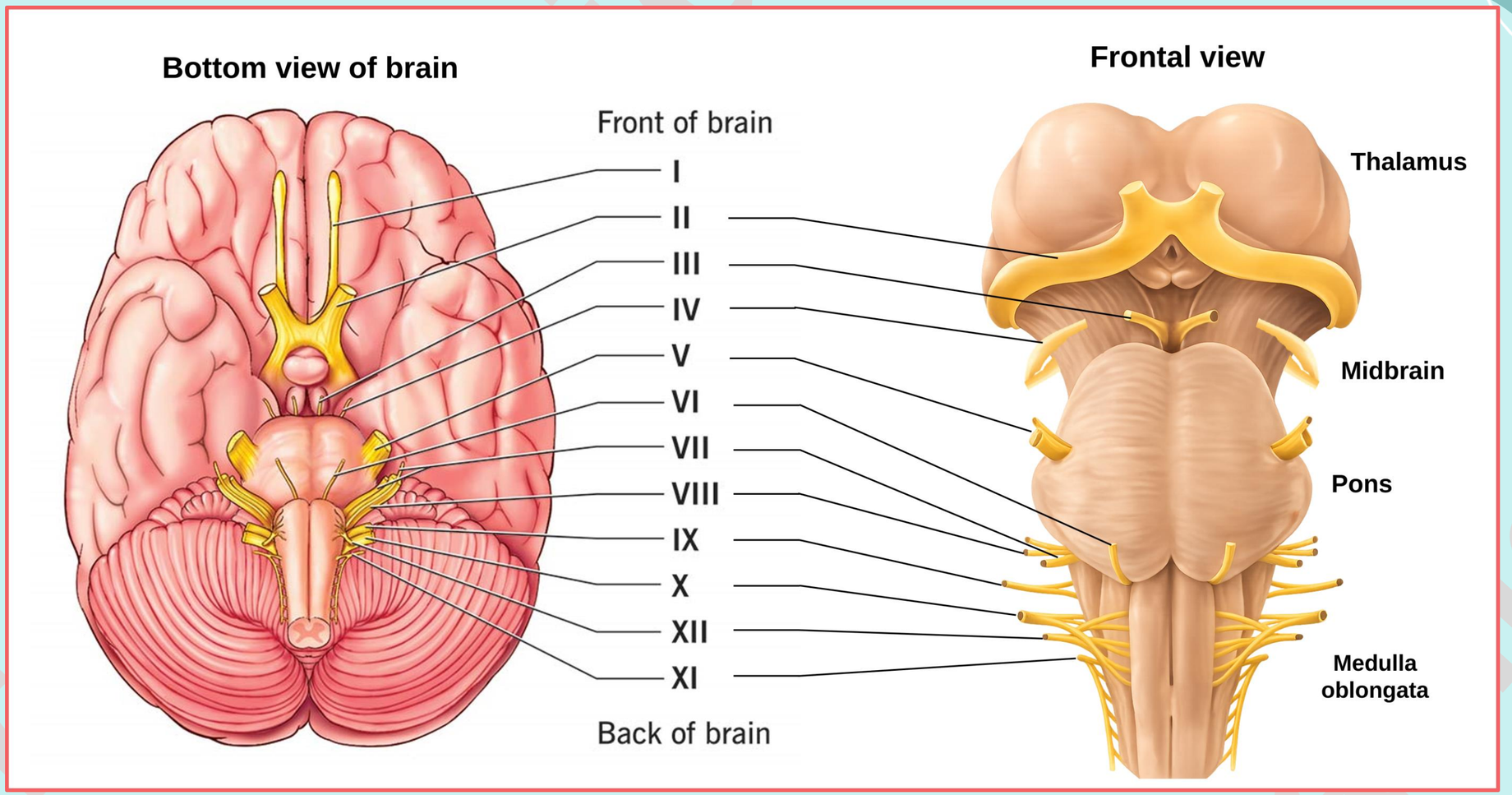
5.4.2

Cranial Nerves

Gross lecture 10

➢ The CNs are named as follows:

I. Olfactory Nerve.
II. Optic Nerve.
III. Oculomotor Nerve.
IV. Trochlear Nerve.
V. Trigeminal Nerve.
VI. Abducens Nerve.
VII. Facial Nerve.
VIII. Vestibulocochlear Nerve.
IX. Glossopharyngeal Nerve.
X. Vagus Nerve.
XI. Accessory Nerve.
XII. Hypoglossal Nerve.



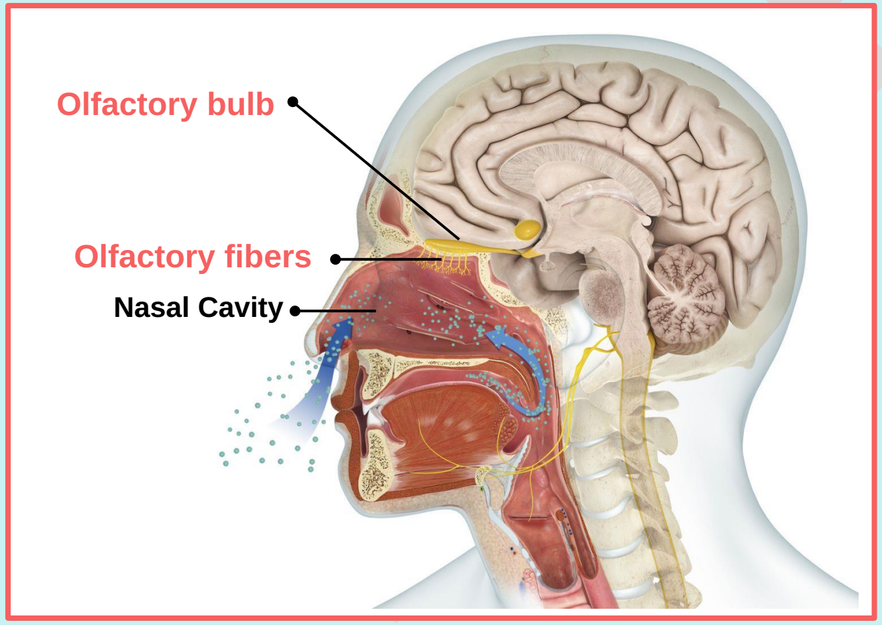
5.4.2

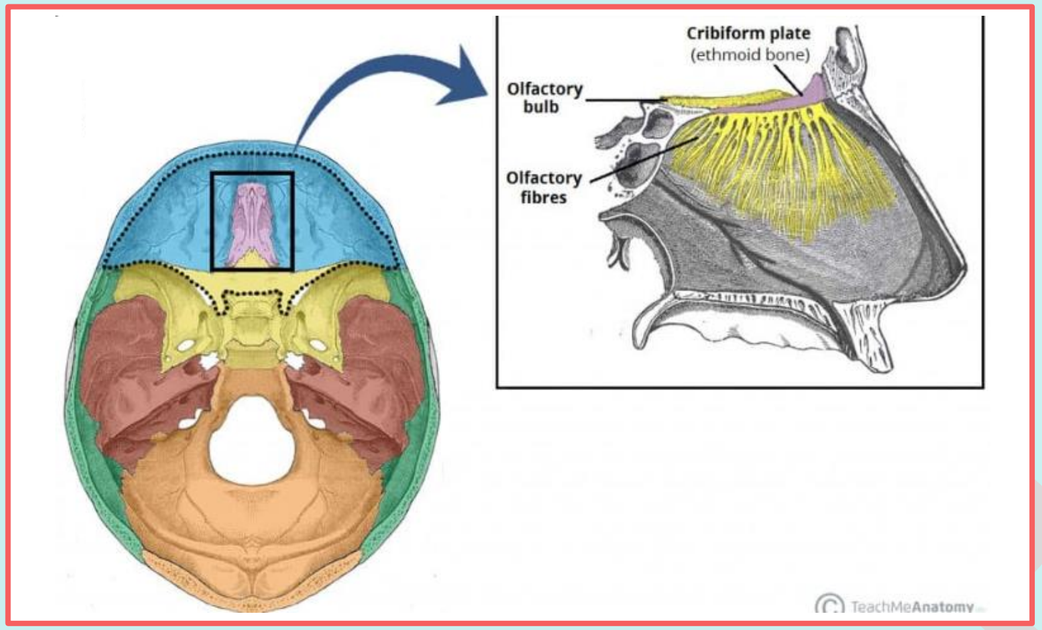
Cranial Nerves

Gross lecture 10

1. Olfactory nerve

Type	• Sensory Nerve
Course	• Begins in the olfactory receptors in the roof of the nasal cavity, then fiber passes through the cribriform plate to enter the anterior cranial fossa. • It ends in the olfactory bulb and continues as the olfactory tract, which terminates in the primary olfactory cortex in the medial temporal lobe.
Function	• Carries the sense of smell from nasal cavity.





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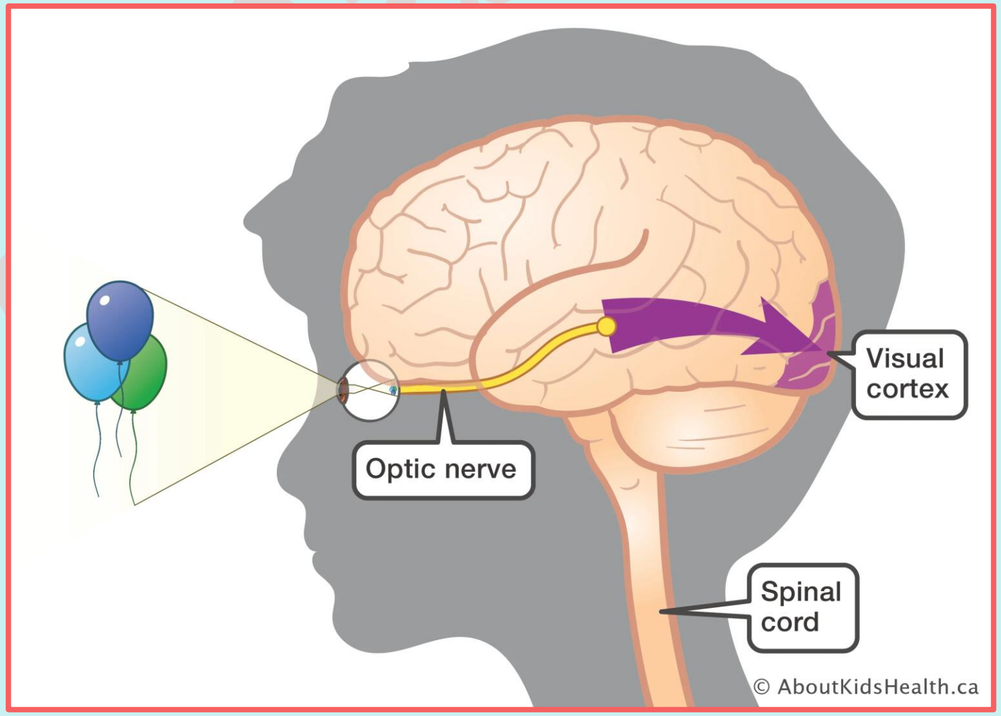
Cranial Nerves

2. Optic nerve

Type	• Sensory Nerve.
Course	• Arises from the retina of the eye, then passes posteriorly to enter the cranial cavity and terminates in the visual cortex in the occipital lobe.
Function	• Responsible for vision.



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Cranial Nerves

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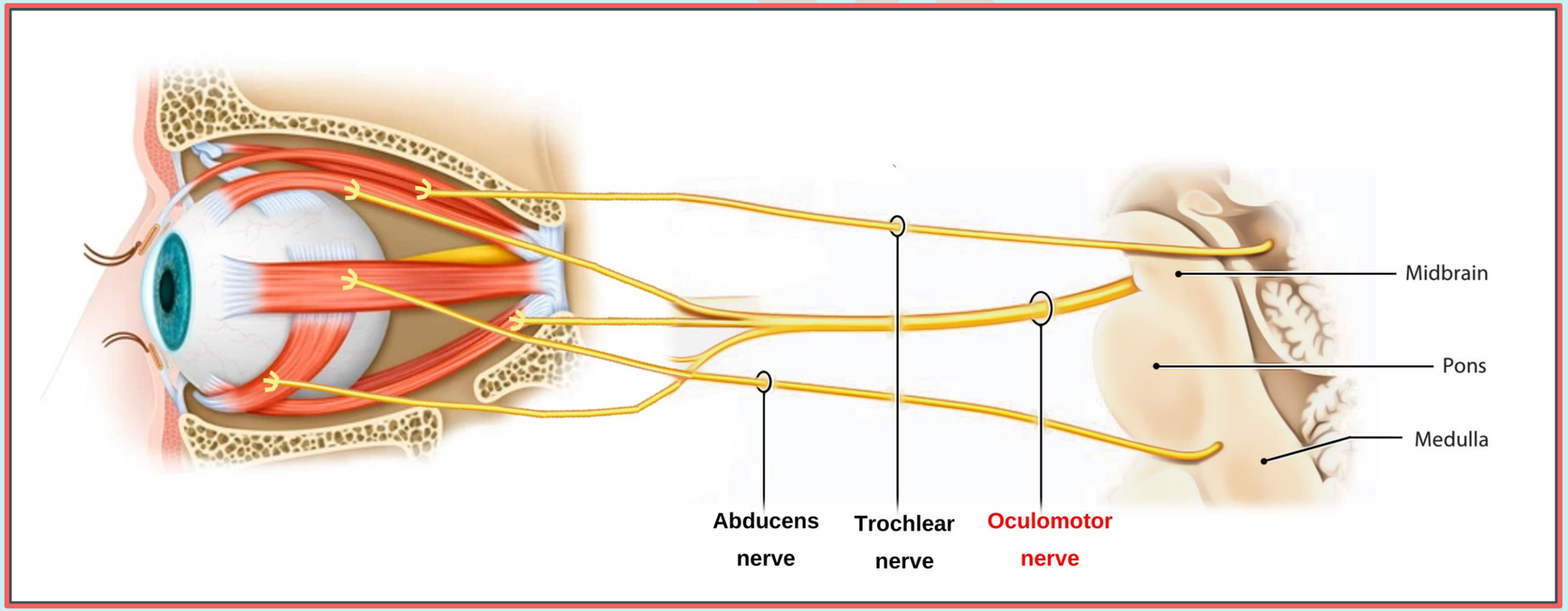
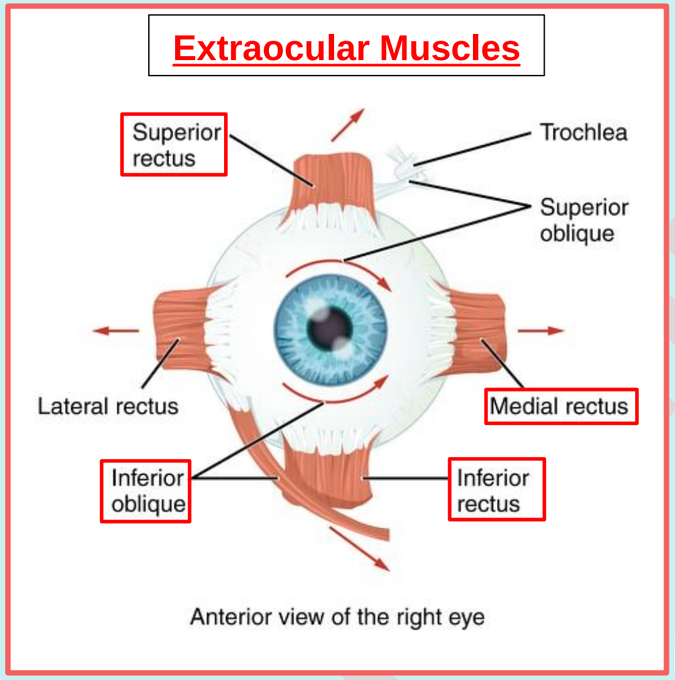
3. Oculomotor Nerve

Type	• Motor Nerve.
Course	• Originates from the midbrain, then enters the orbital cavity to supply most of the extraocular muscles (muscles of the eye).
Function	• Controls eye movements by supplying: Superior rectus (moves eye upward), Inferior rectus (moves eye downward), Medial rectus (moves eye medially), Inferior oblique (moves eye upward and laterally)





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Cranial Nerves

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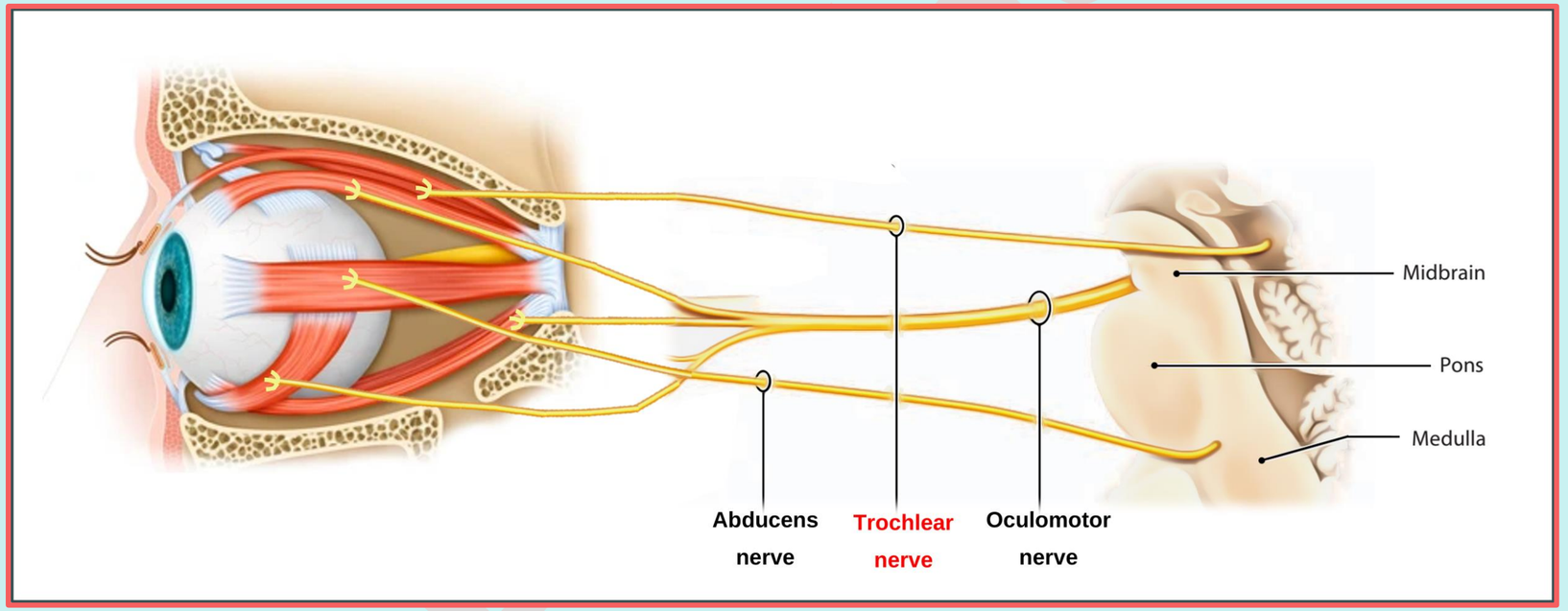
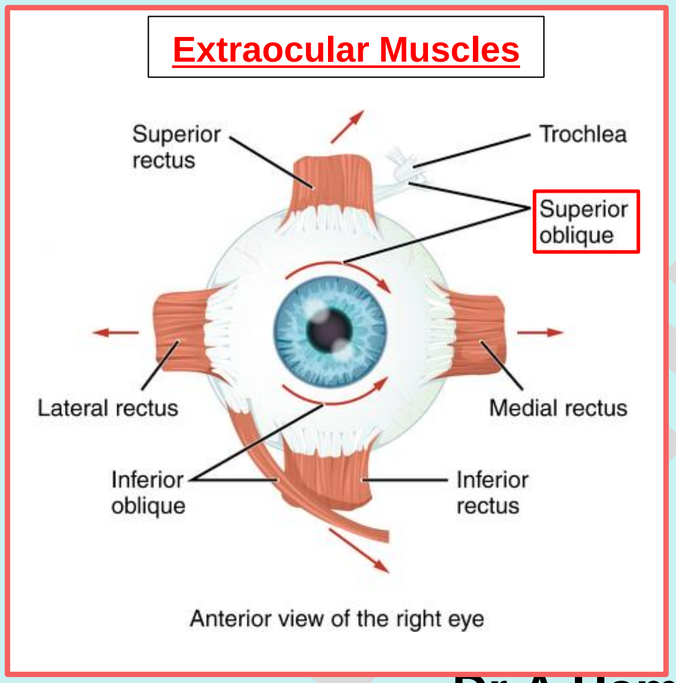
4. Trochlear Nerve

Type	• Motor Nerve.
Course	• Originates from the midbrain, then enters the orbital cavity to supply the superior oblique muscle.
Function	• Controls eye movement by supplying the Superior oblique muscle (moves the eye downward and laterally).





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Cranial Nerves

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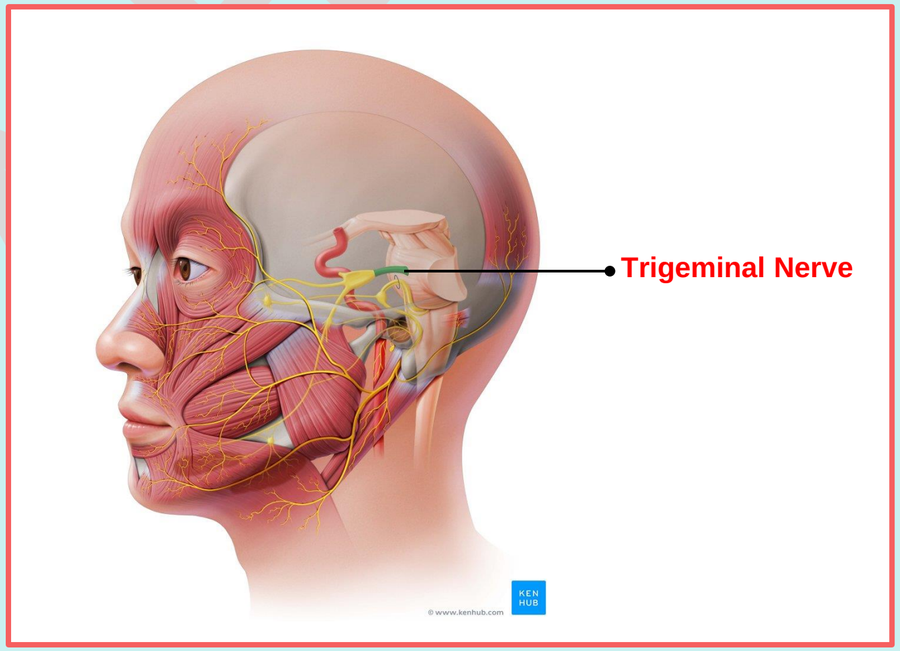
5. Trigeminal Nerve

Type	• Mixed nerve (motor and sensory).
Course	• Originates from the pons and divides into 3 branches: V1 (ophthalmic), V2 (maxillary), and V3 (mandibular). • These branches exit the cranial cavity to supply the head and face
Function	• Carries sensory information from the head and face. • Provide motor supply to the muscles of mastication.



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Cranial Nerves

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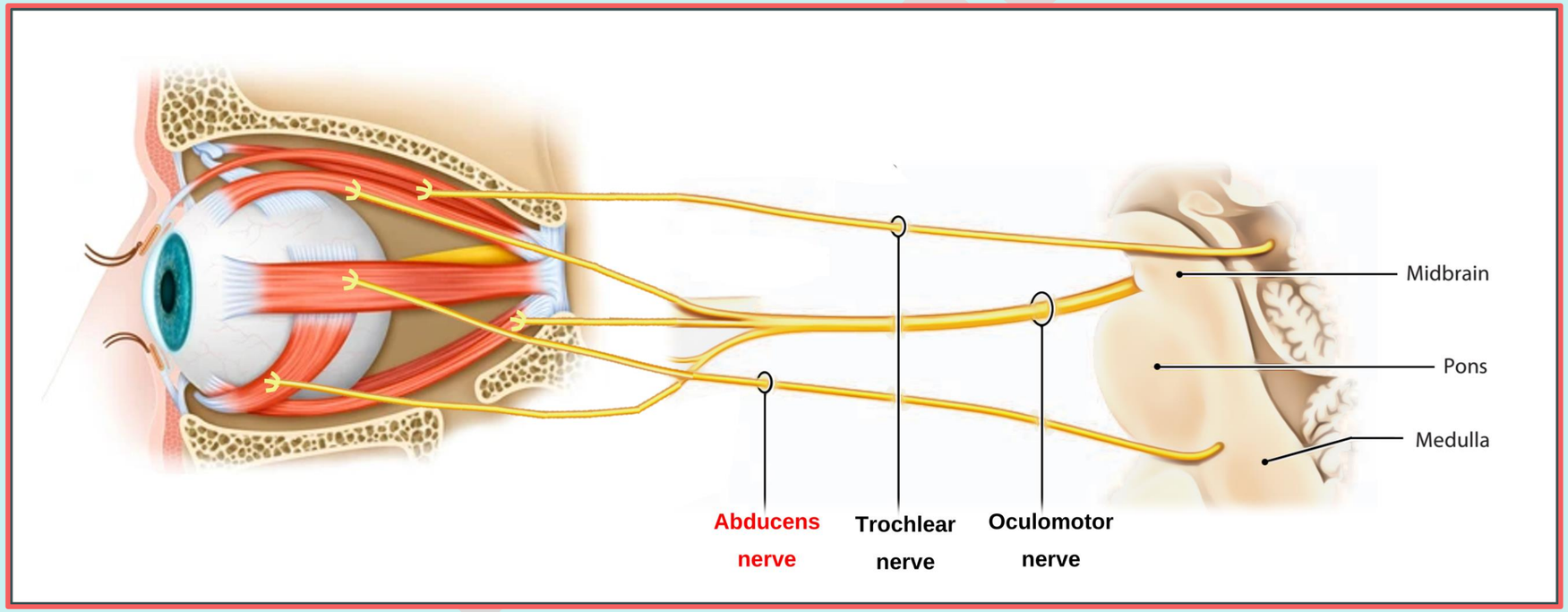
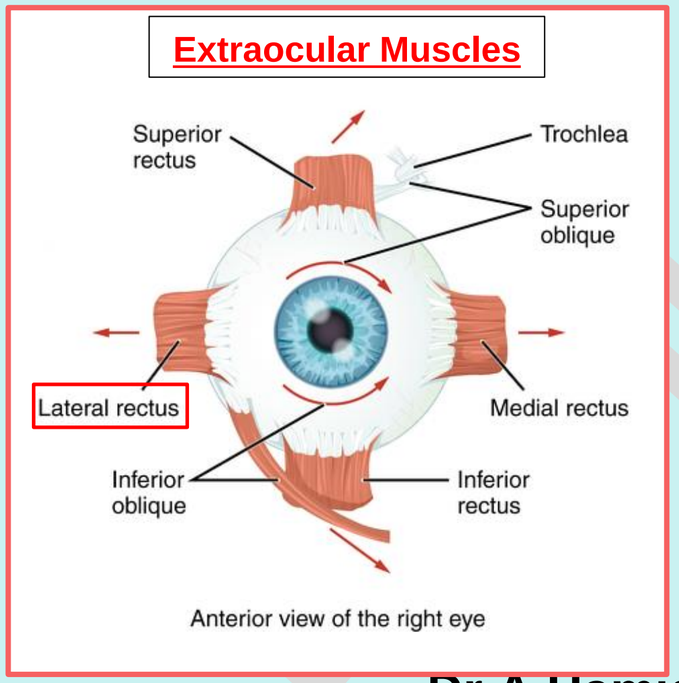
6. Abducens Nerve

Type	• Motor Nerve.
Course	• Originates from the pontomedullary junction, then enters the orbital cavity to supply the lateral rectus muscle.
Function	• Controls eye movement by supplying the lateral rectus muscle (moves the eye laterally).





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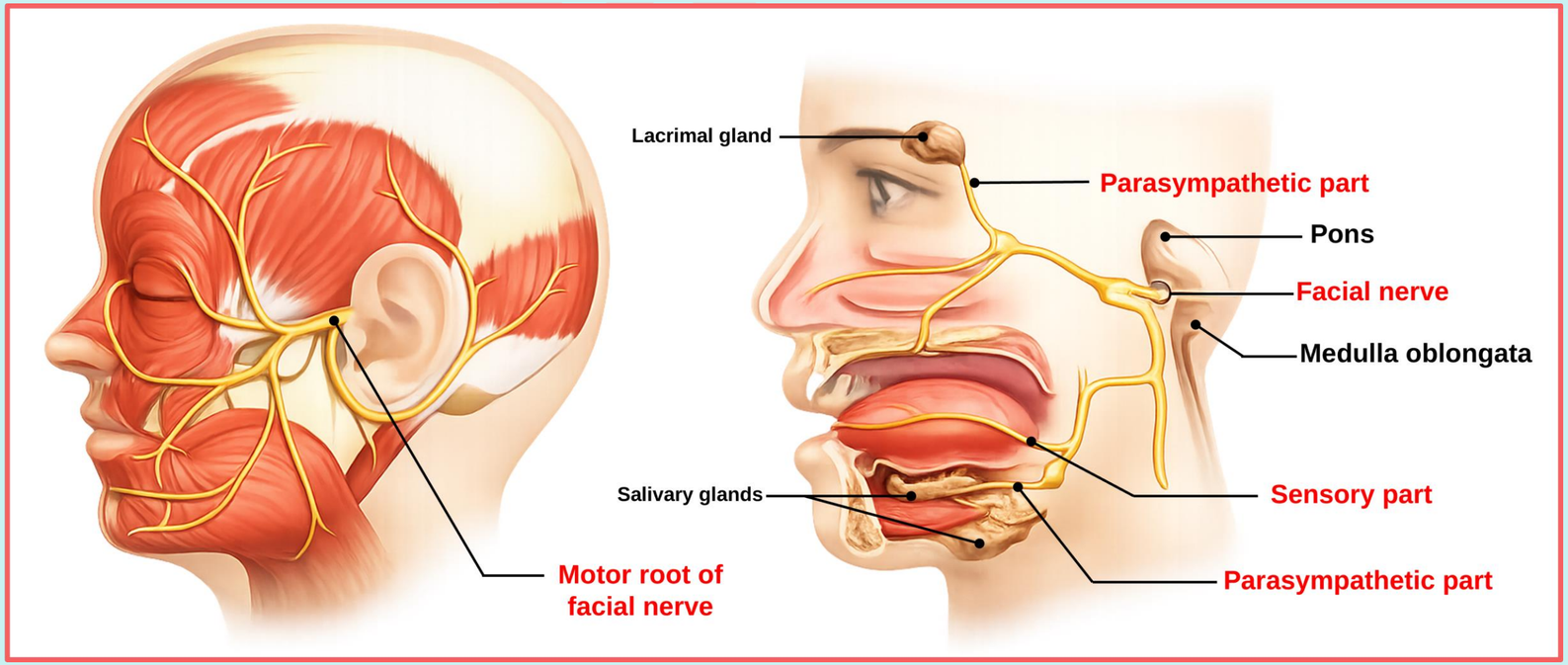
Cranial Nerves

7. Facial Nerve

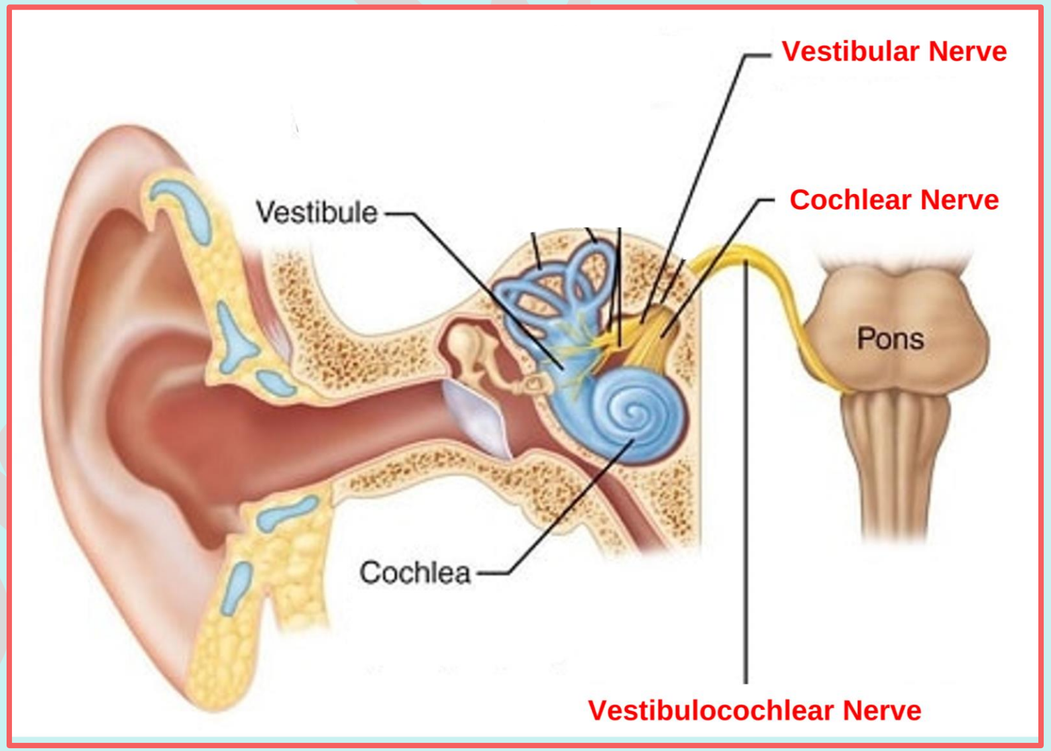
Type	• Mixed nerve (motor and sensory)
Course	• Originates from the pontomedullary junction, exits the cranial cavity, and ends in the face.
Function	• Carries taste sensations from the anterior two-thirds of the tongue. • Provides motor supply to the muscles of facial expression. • Provides parasympathetic supply to the submandibular and sublingual glands, and lacrimal gland.



Cranial Nerves

8. Vestibulocochlear Nerve

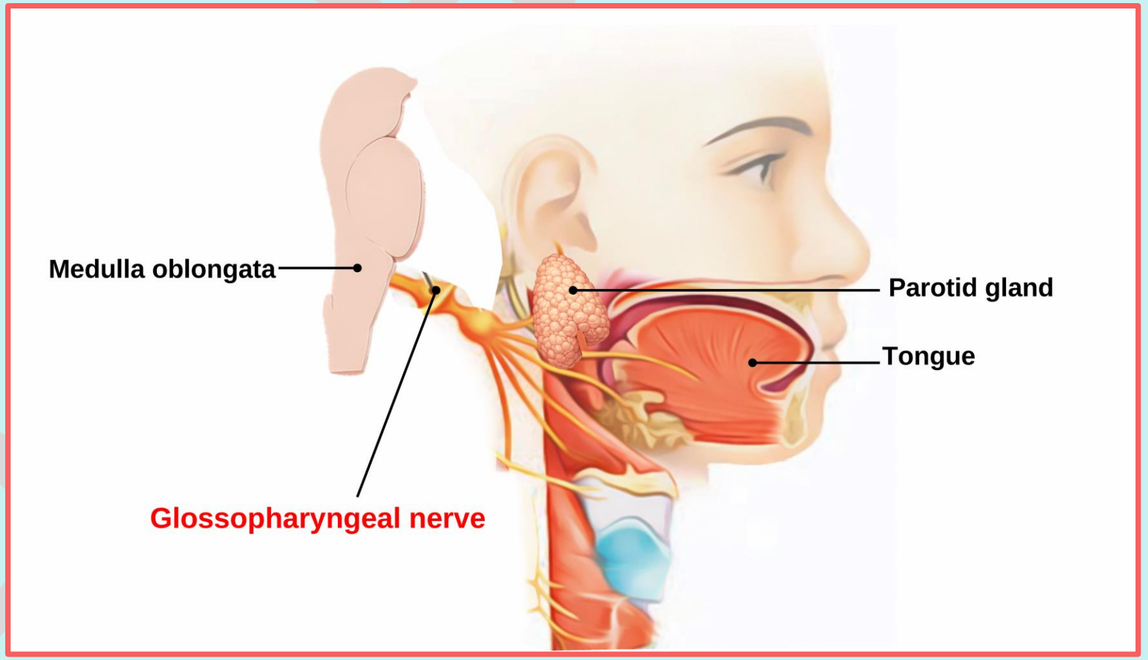
Type	• Sensory Nerve.
Course	• Arises from the cochlea and vestibular apparatus of the inner ear, then enters the cranial cavity to terminate at the pontomedullary junction.
Function	• Responsible for hearing (cochlear part) and balance (vestibular part).



Cranial Nerves

9. Glossopharyngeal Nerve

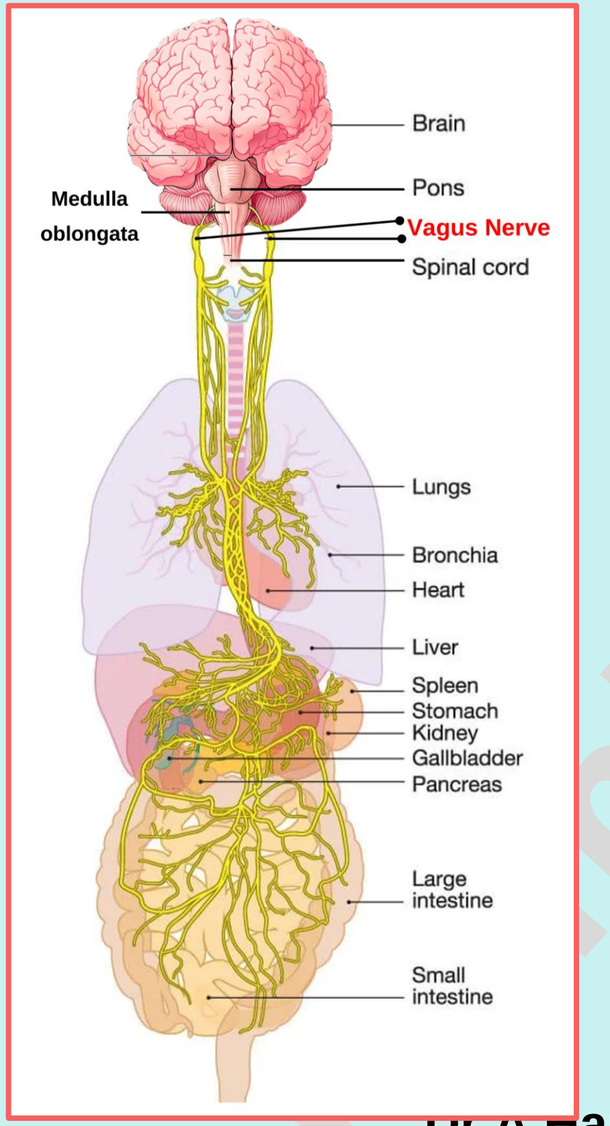
Type	• Mixed nerve (motor and sensory)
Course	• Originates from the medulla oblongata and ends in the tongue and pharynx.
Function	• Carries taste sensations from the posterior one-third of the tongue. • Provides motor supply to a muscle of the pharynx (~~stylopharyngeus muscle~~) that assists in swallowing • Provides parasympathetic supply to the parotid gland.



Cranial Nerves

10. Vagus Nerve

Type	• Mixed nerve (motor and sensory).
Course	• Originates from the medulla oblongata, exits the cranial cavity, and travels through the neck to the thorax and abdomen.
Function	• Carries sensory information from the larynx and gastrointestinal tract. • Provides motor supply to the muscles of the larynx (voice). • Provides motor supply to the muscles of the pharynx (swallowing), ~~except the stylopharyngeus~~. • Provides parasympathetic supply to thoracic (heart and lungs) and abdominal viscera.



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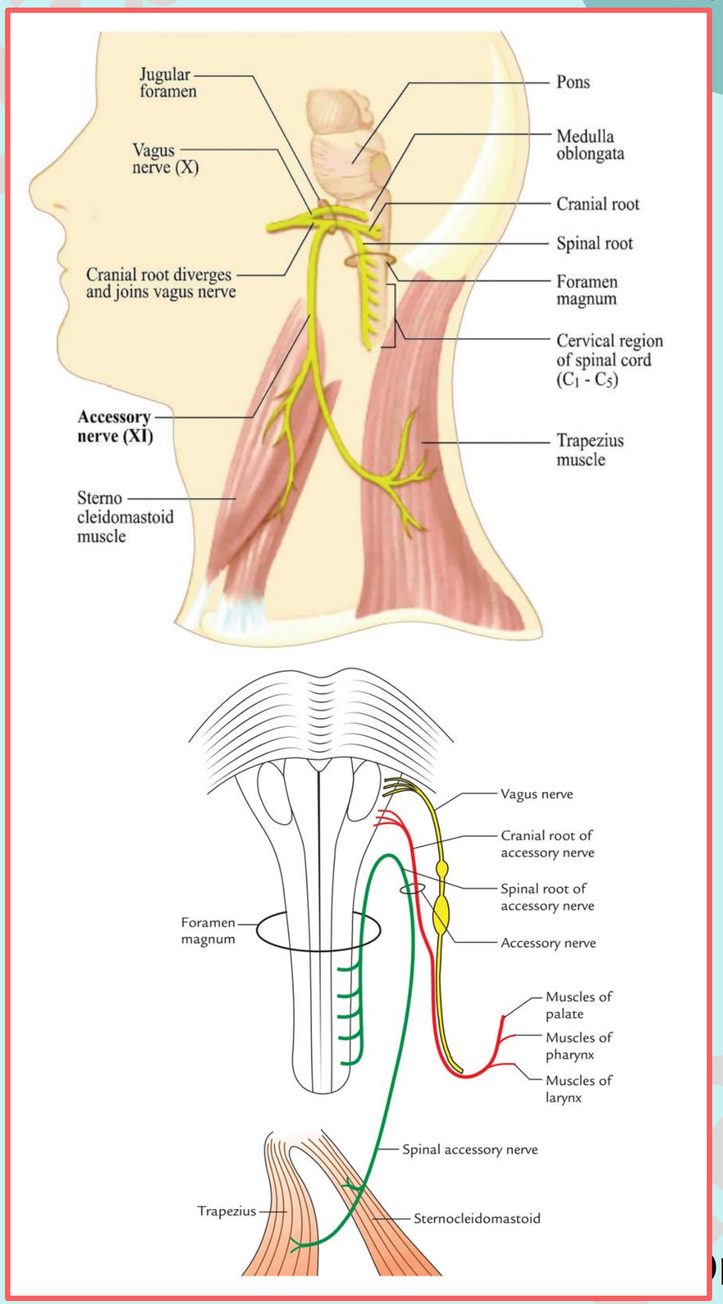
Cranial Nerves

Gross lecture10

11. Accessory Nerve

Type	• Motor Nerve.
Course	• Consists of two roots: cranial and spinal. • The spinal root originates from the spinal cord (C1–C5) and ascends through the foramen magnum to enter the cranial cavity. • The cranial root originates from the medulla oblongata. • Within the cranial cavity, the two roots briefly unite and then exit the skull together. • Shortly after, they separate: the cranial root joins the vagus nerve, while the spinal root continues independently as the accessory nerve.
Function	• The spinal root supplies the sternocleidomastoid and trapezius muscles. • The cranial root joins the vagus nerve and is distributed to muscles of the palate, pharynx, and larynx.



Cranial Nerves

12. Hypoglossal Nerve

Type	• Motor Nerve
Course	• Originates from the medulla oblongata, exits the cranial cavity, and ends in the muscles of the tongue.
Function	• Controls tongue movements.