SNS COLLEGE OF PHYSIOTHERAPY
COIMBATORE - 641035

COURSE NAME	**: BPT., Physiotherapy IV Year**
SUBJECT	**:PT in Neurology**
UNIT	**: 1**
TOPIC	**: Structure and Functions of Spinal cord**
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Spinal Cord Function Sequence

Spinal Cord Structure

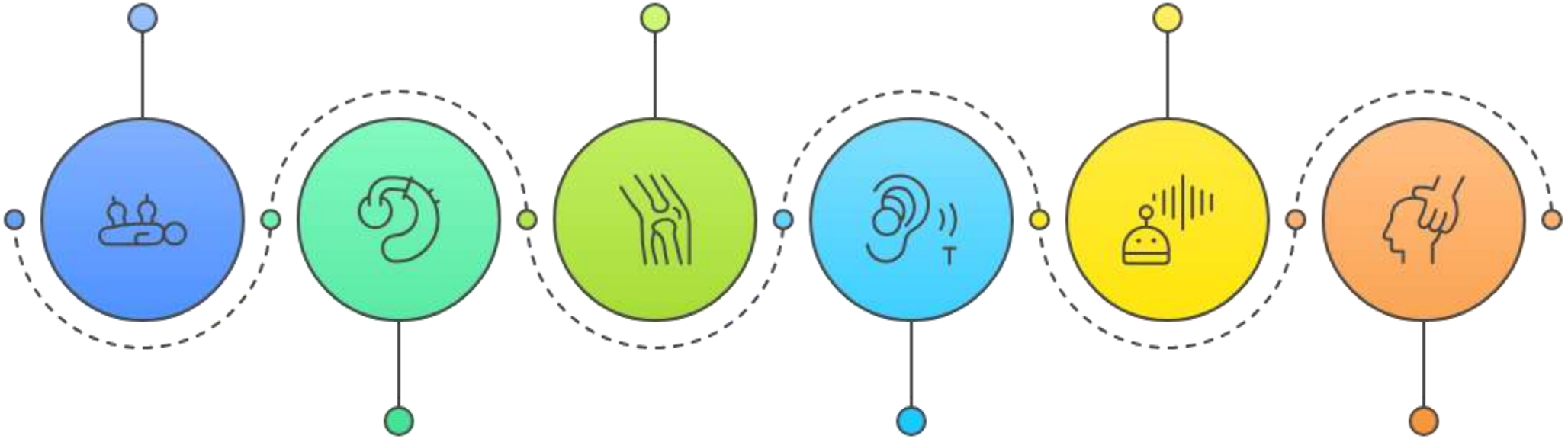
The spinal cord is a cylindrical structure.

Peripheral Nervous System Link

It serves as a link to the peripheral nervous system.

Motor Output

It enables the execution of motor commands.



Brainstem Connection

It connects to the medulla oblongata of the brainstem.

Sensory Input

It facilitates the transmission of sensory information.

Reflex Activity

It mediates reflex actions.

Spinal Cord Structure and Function

What is the spinal cord?

A long, cylindrical structure linking the brain and peripheral nervous system.

What does it do?

Facilitates sensory input, motor output, and reflex activity.

Why is it important for physiotherapists?

Understanding its structure and function is crucial for dealing with neurological conditions.

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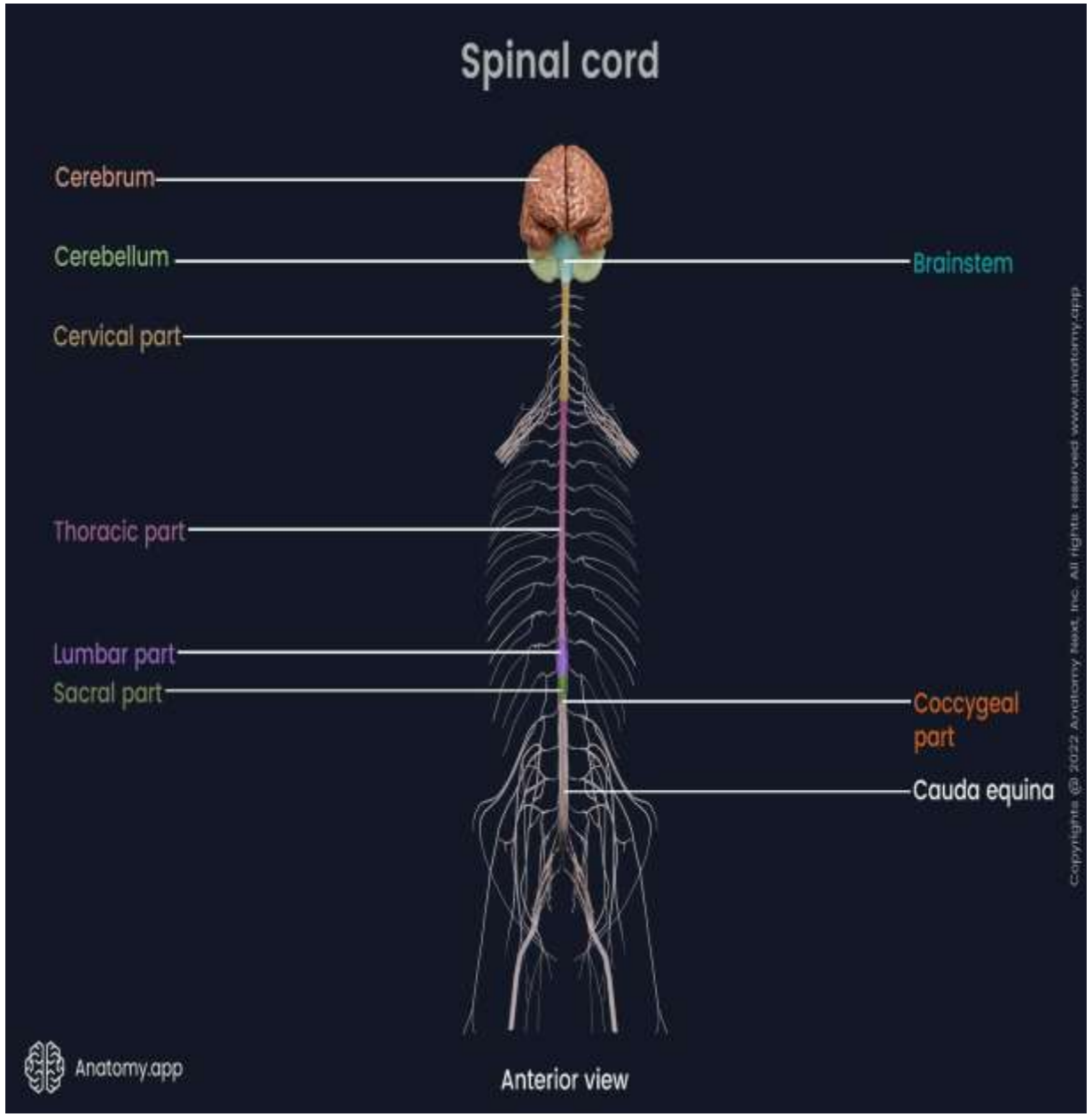
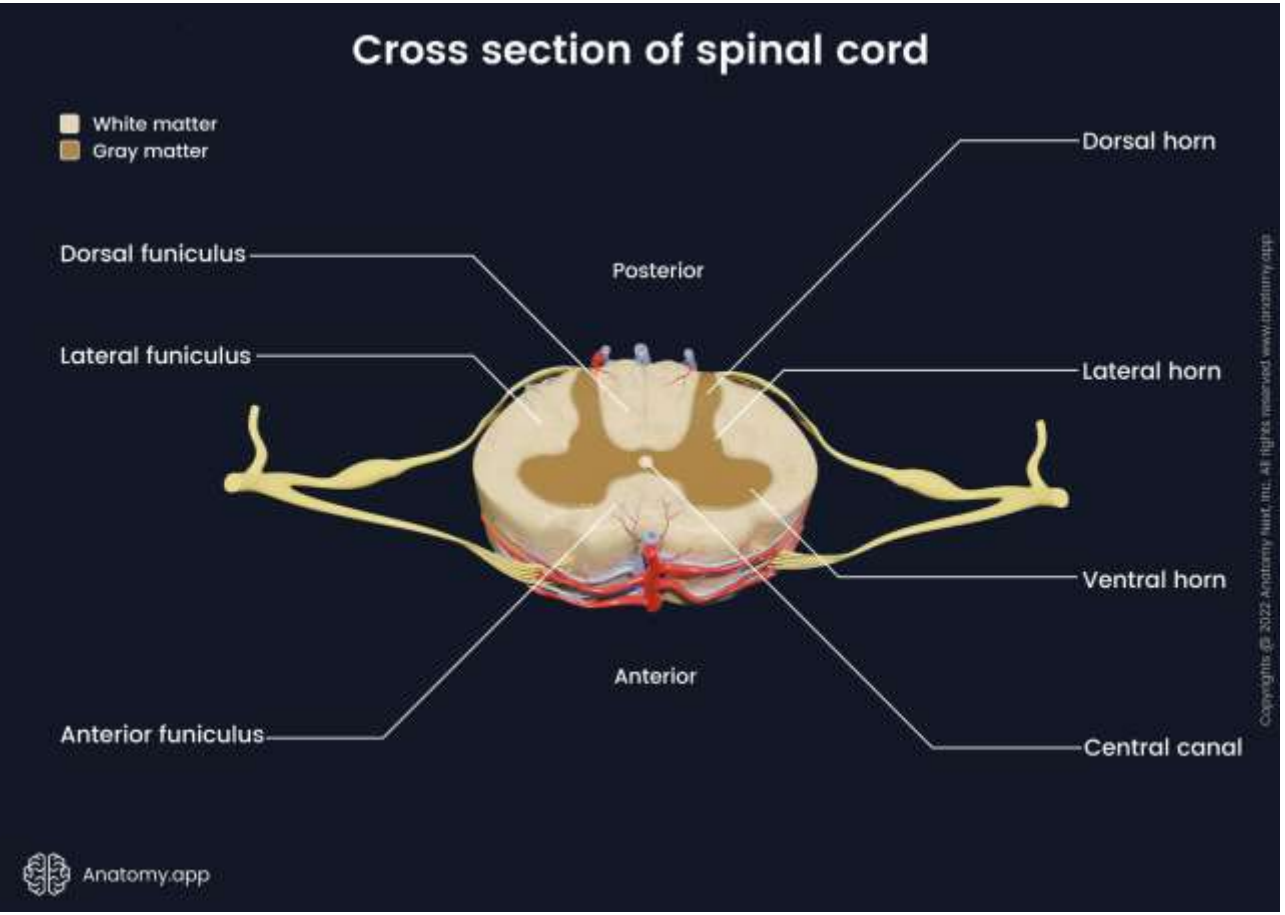




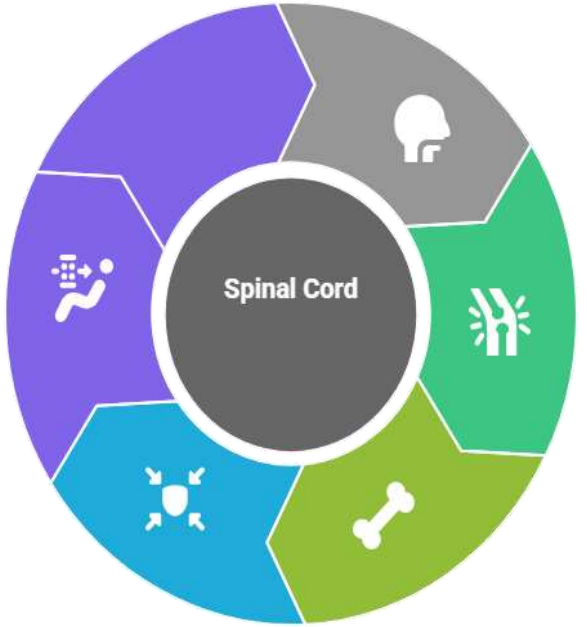
Spinal Cord Protection Cycle

Cushioned by CSF

Cerebrospinal fluid cushions and nourishes the spinal cord.

Enclosed by Meninges

The meninges provide an additional layer of protection.



Extends from Skull Base

The spinal cord originates at the foramen magnum.

Reaches L1-L2 Vertebrae

In adults, it ends at the L1-L2 vertebrae.

Protected by Vertebrae

The vertebral column shields the spinal cord.

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Meninges: Protecting the Brain

What are the meninges?

They are three protective membranes surrounding the brain: the dura mater, arachnoid mater, and pia mater.

What does the dura mater do?

It's the tough outermost layer, protecting against physical impacts.

What does the arachnoid mater do?

It's a web-like structure that cushions the brain.

What does the pia mater do?

It's the innermost layer, supplying the brain with nutrients.

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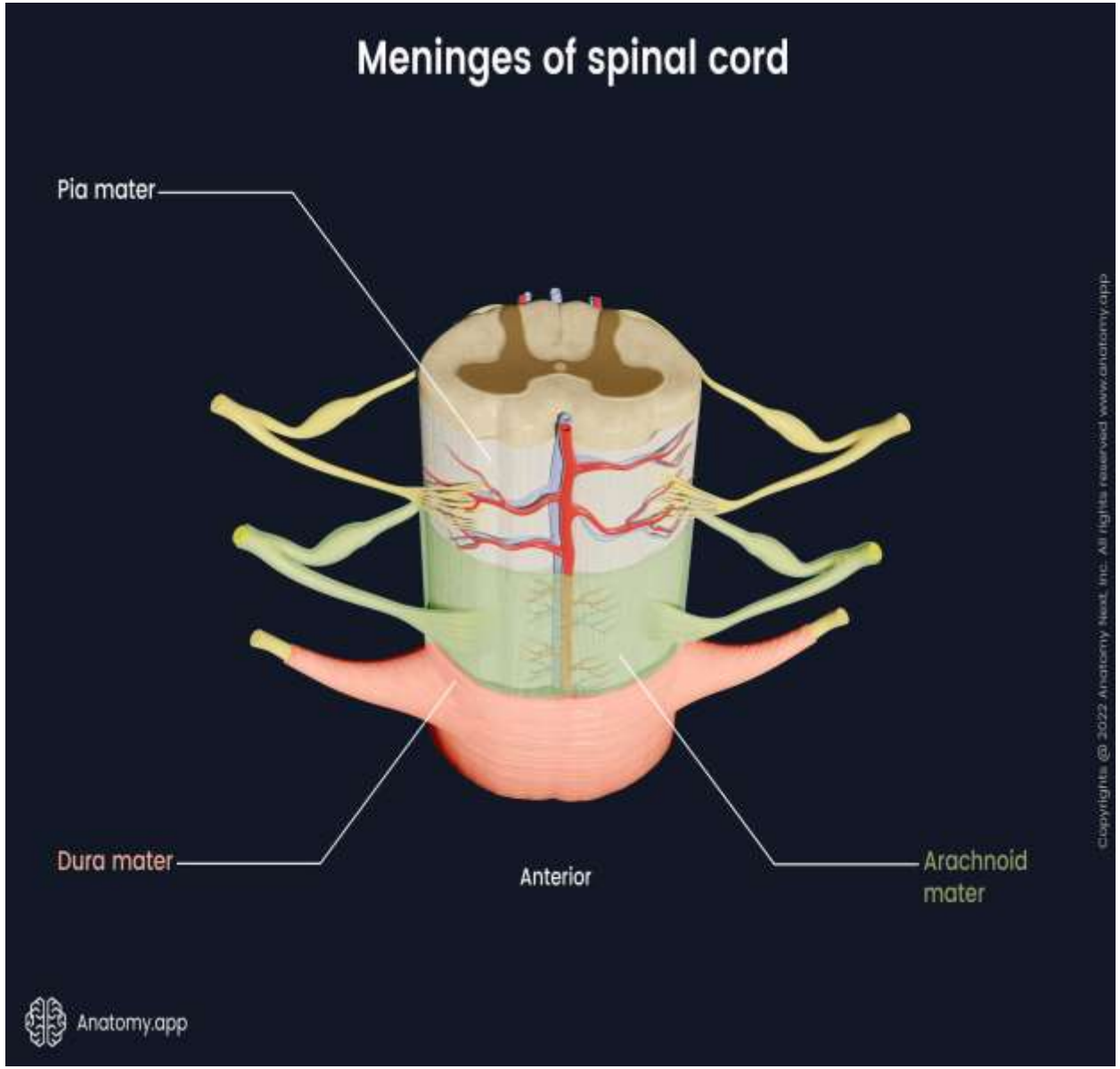
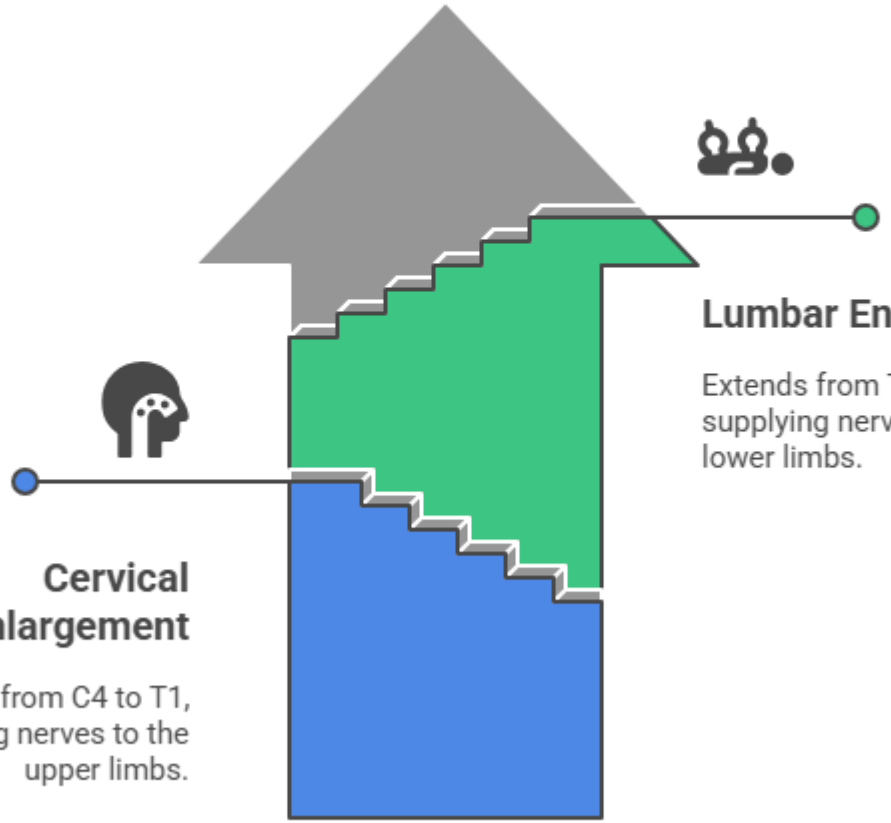


Spinal Cord Enlargements

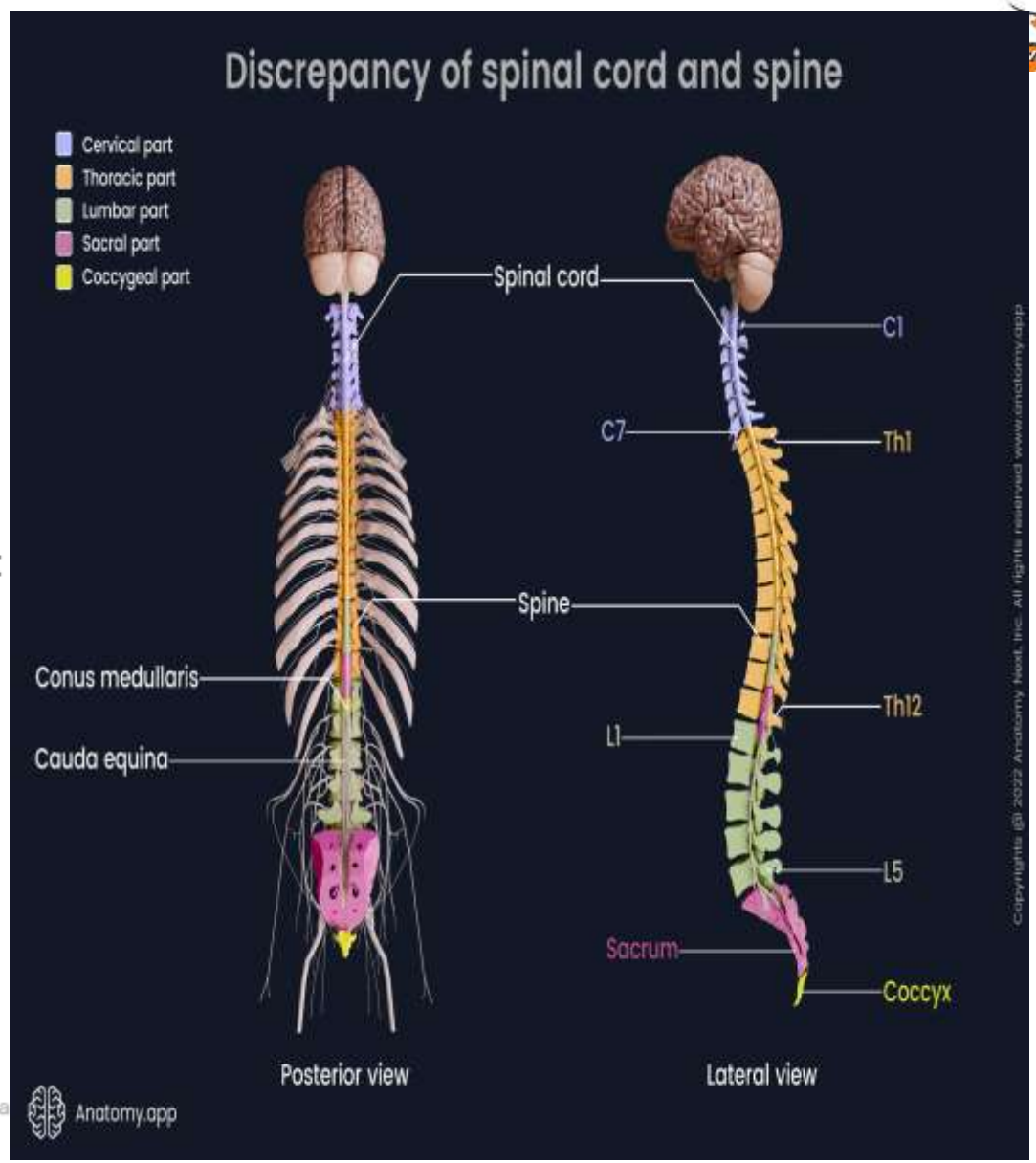


Lumbar Enlargement

Extends from T11 to L1, supplying nerves to the lower limbs.

Cervical Enlargement

Extends from C4 to T1, supplying nerves to the upper limbs.



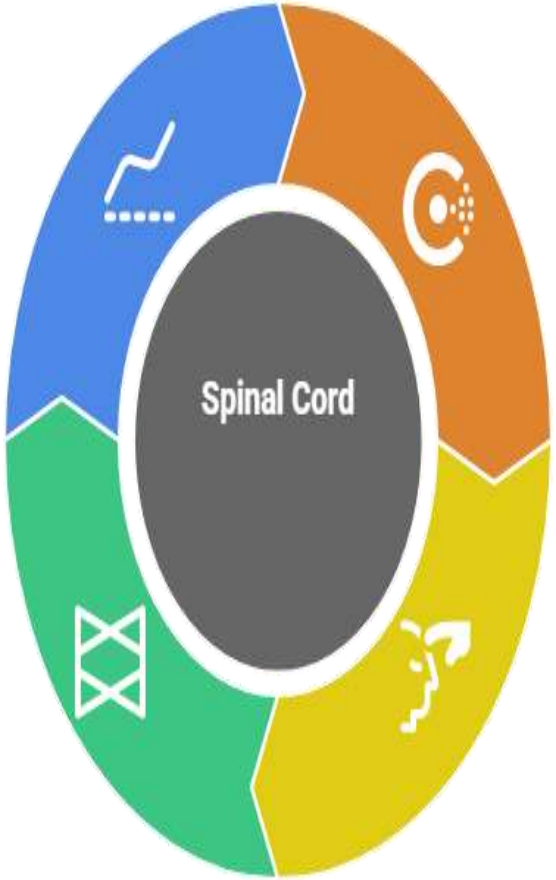
Spinal Cord Support Cycle

Longitudinal Support

Provides stability to the spinal cord

Coccyx

Tailbone providing anchor

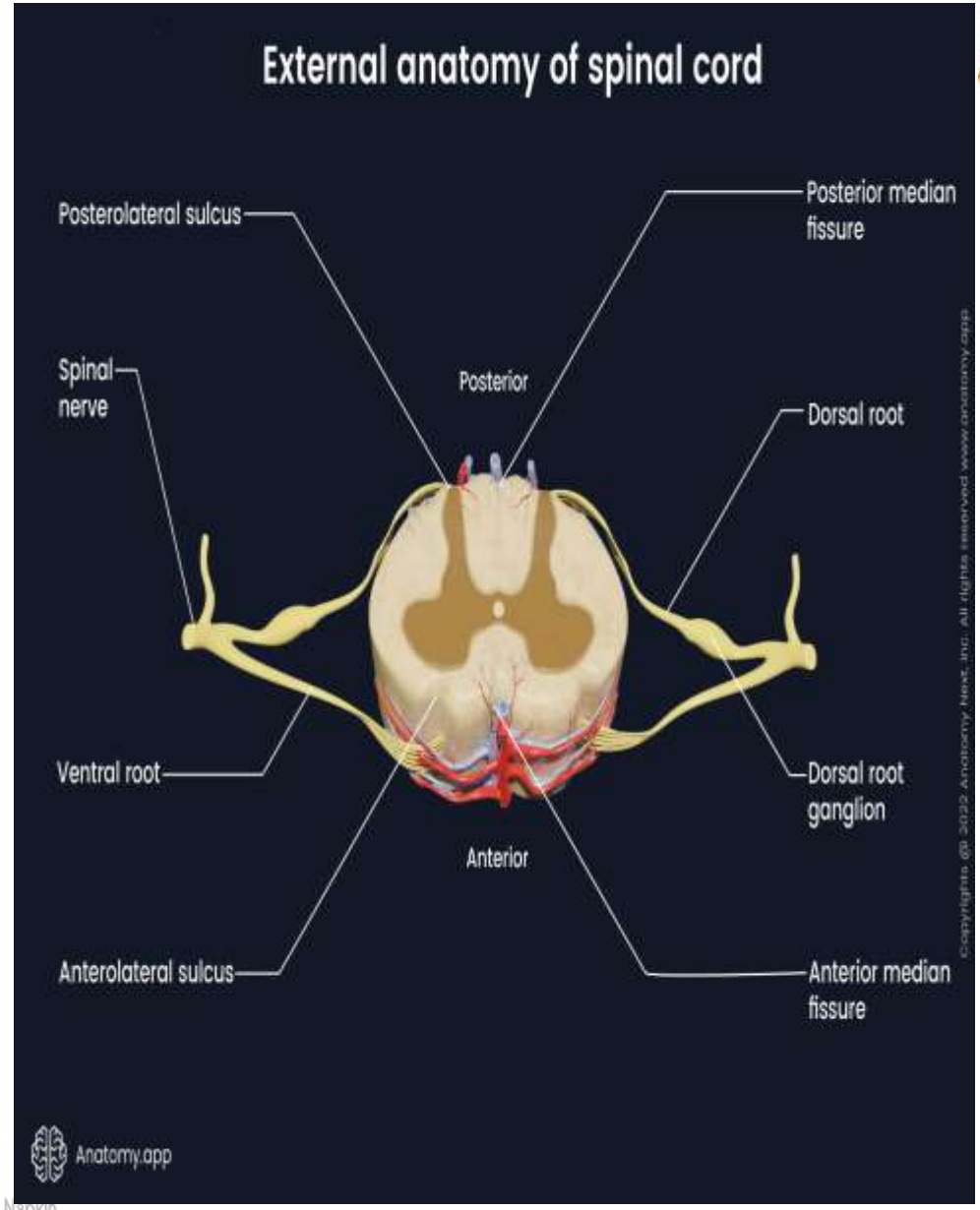


Conus Medullaris

Tapered end of the spinal cord

Filum Terminale

Thin strand of pia mater



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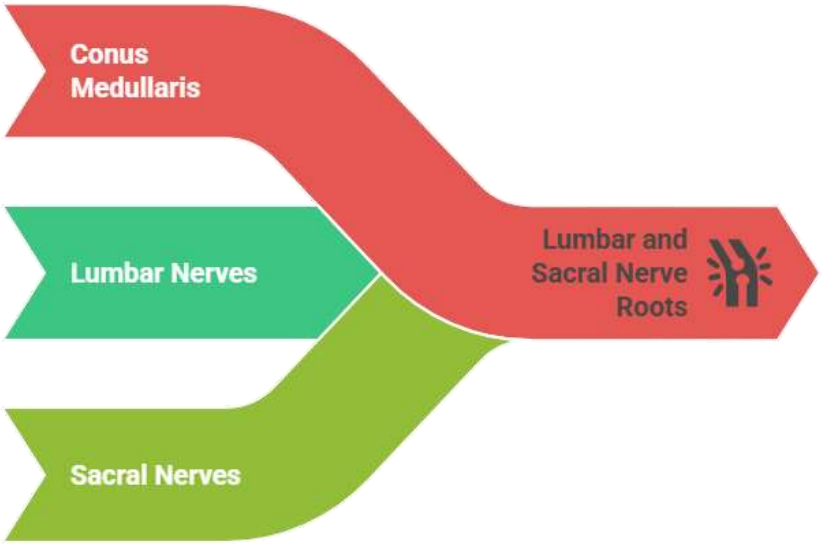
Anatomy of the Cauda Equina

1. Tapered end of the spinal cord.
2. Nerves originating from the lumbar region.
3. Nerves originating from the sacral region.



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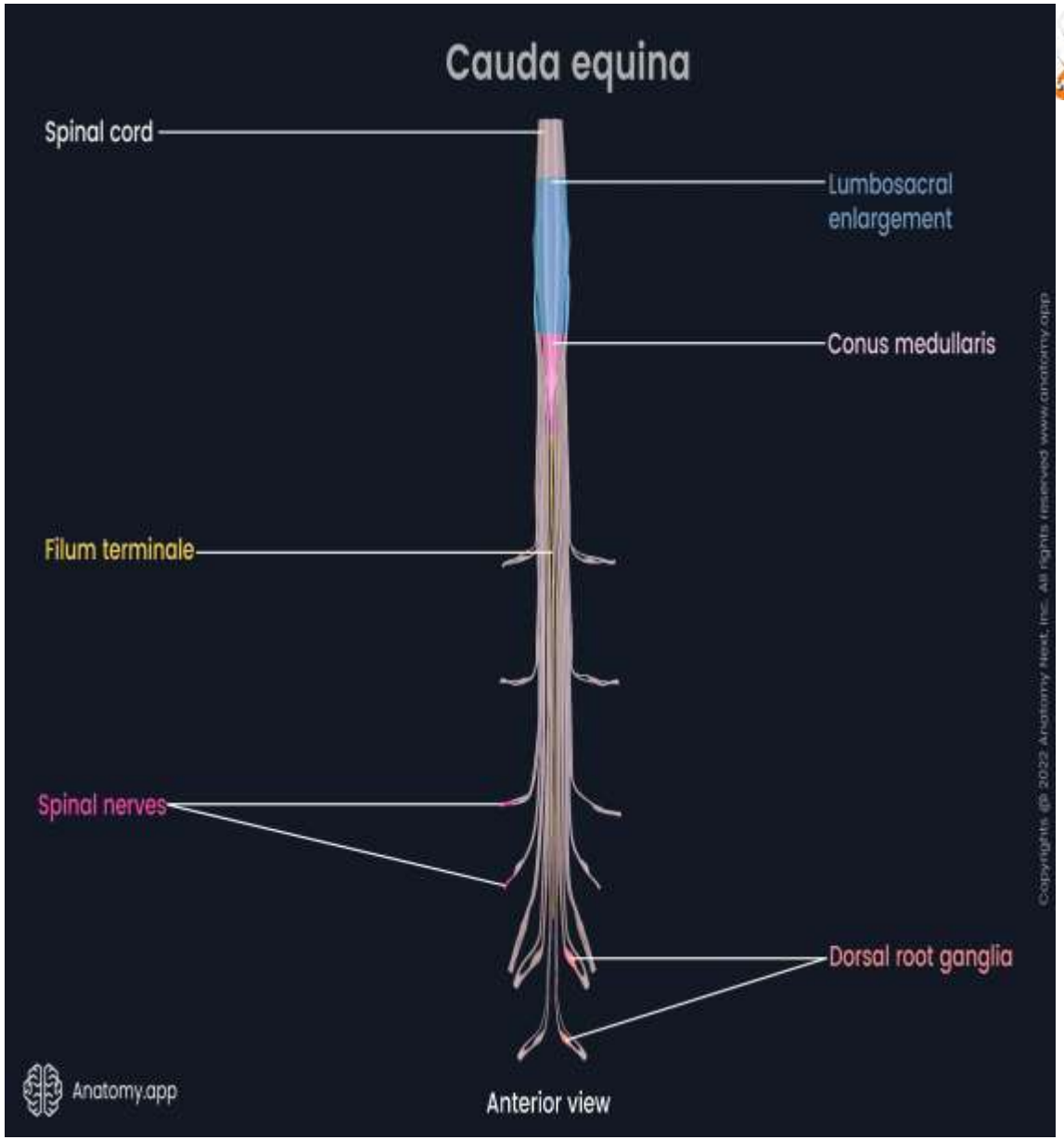
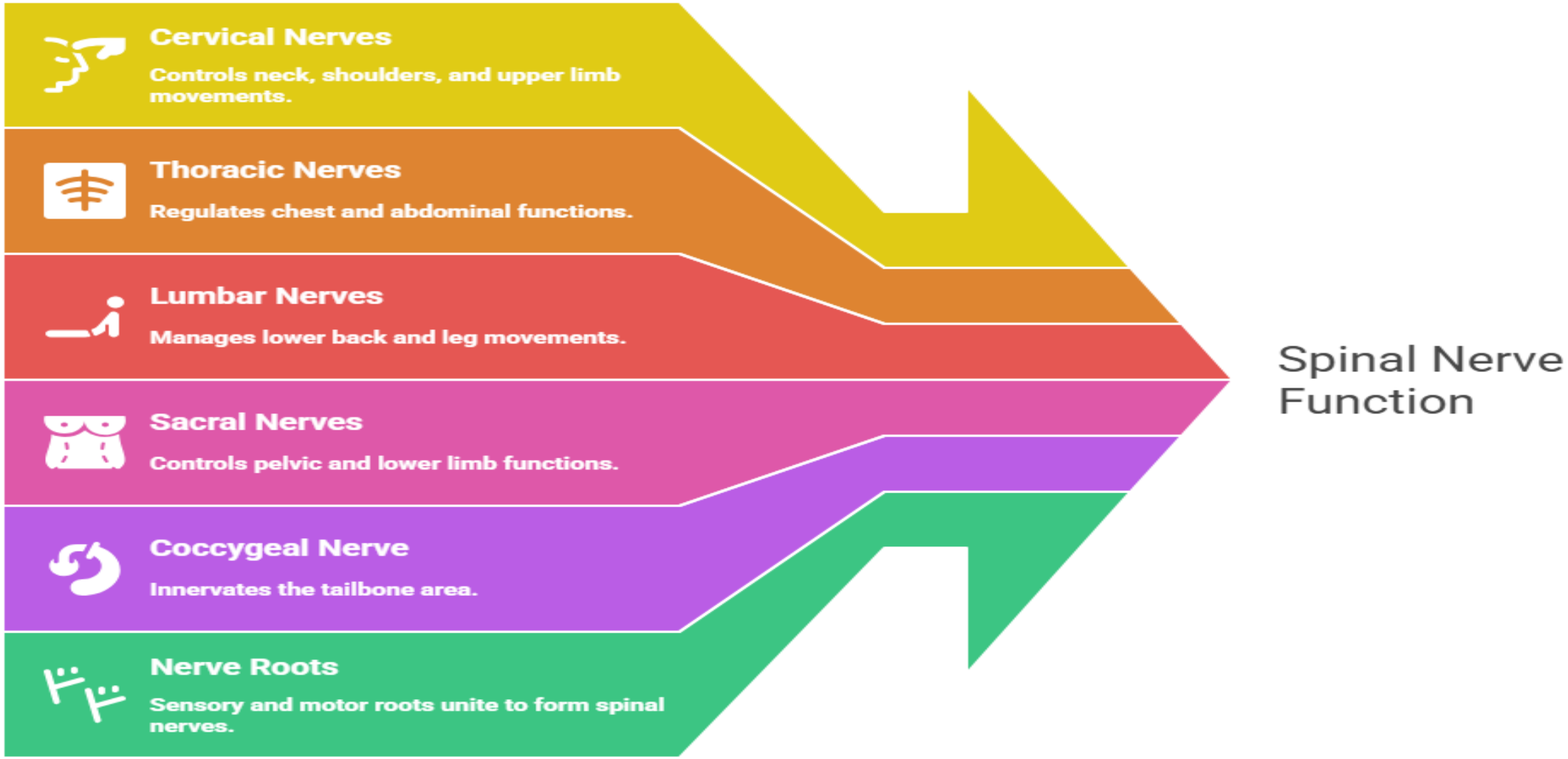
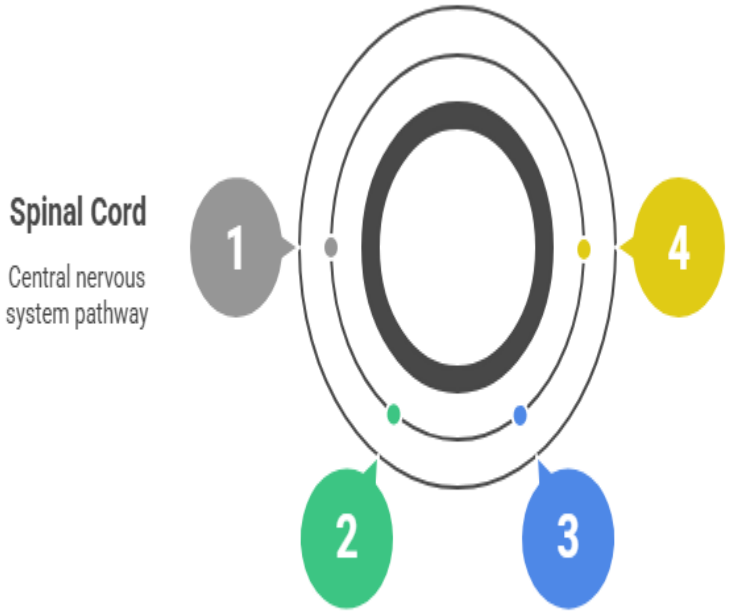
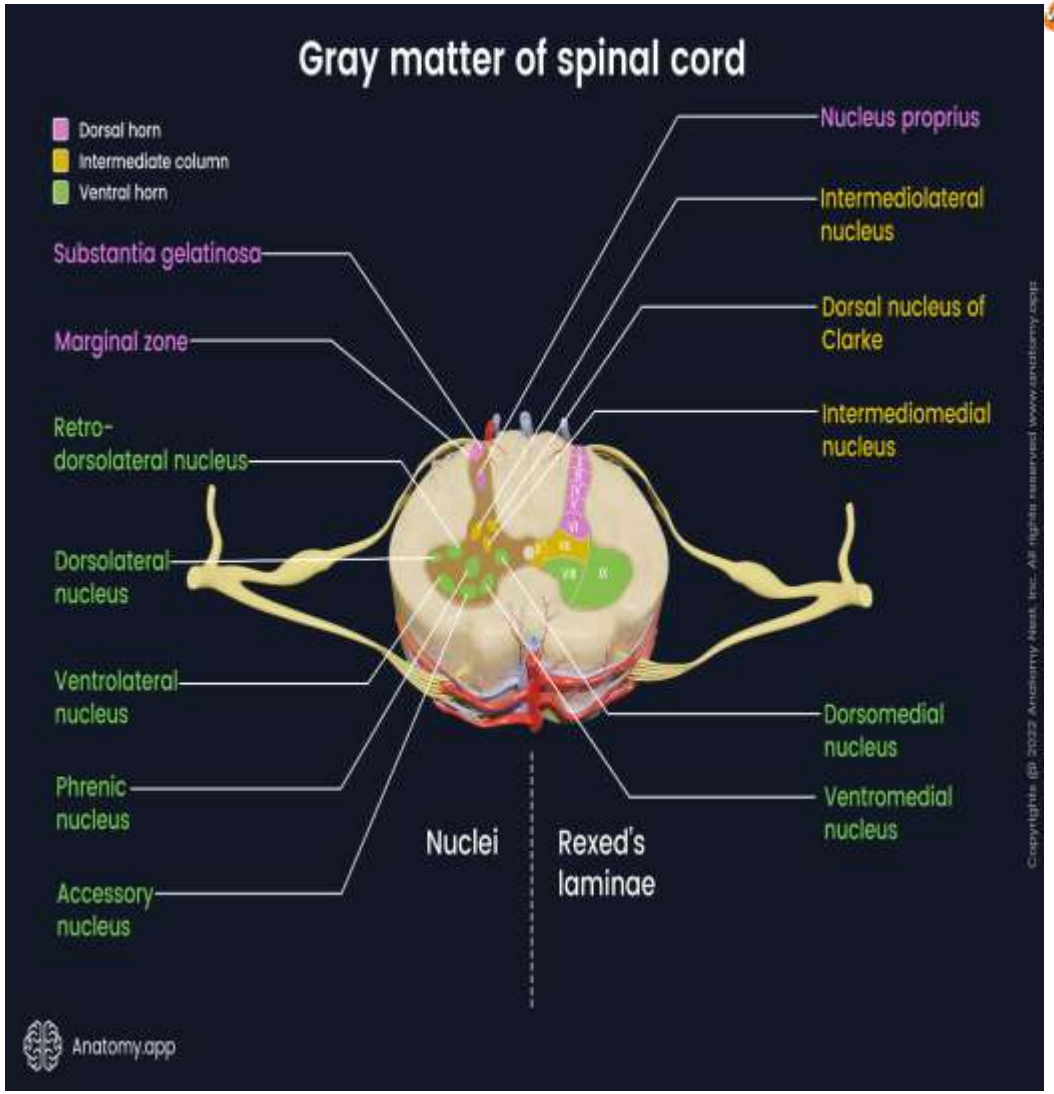


The Spinal Nerve Network



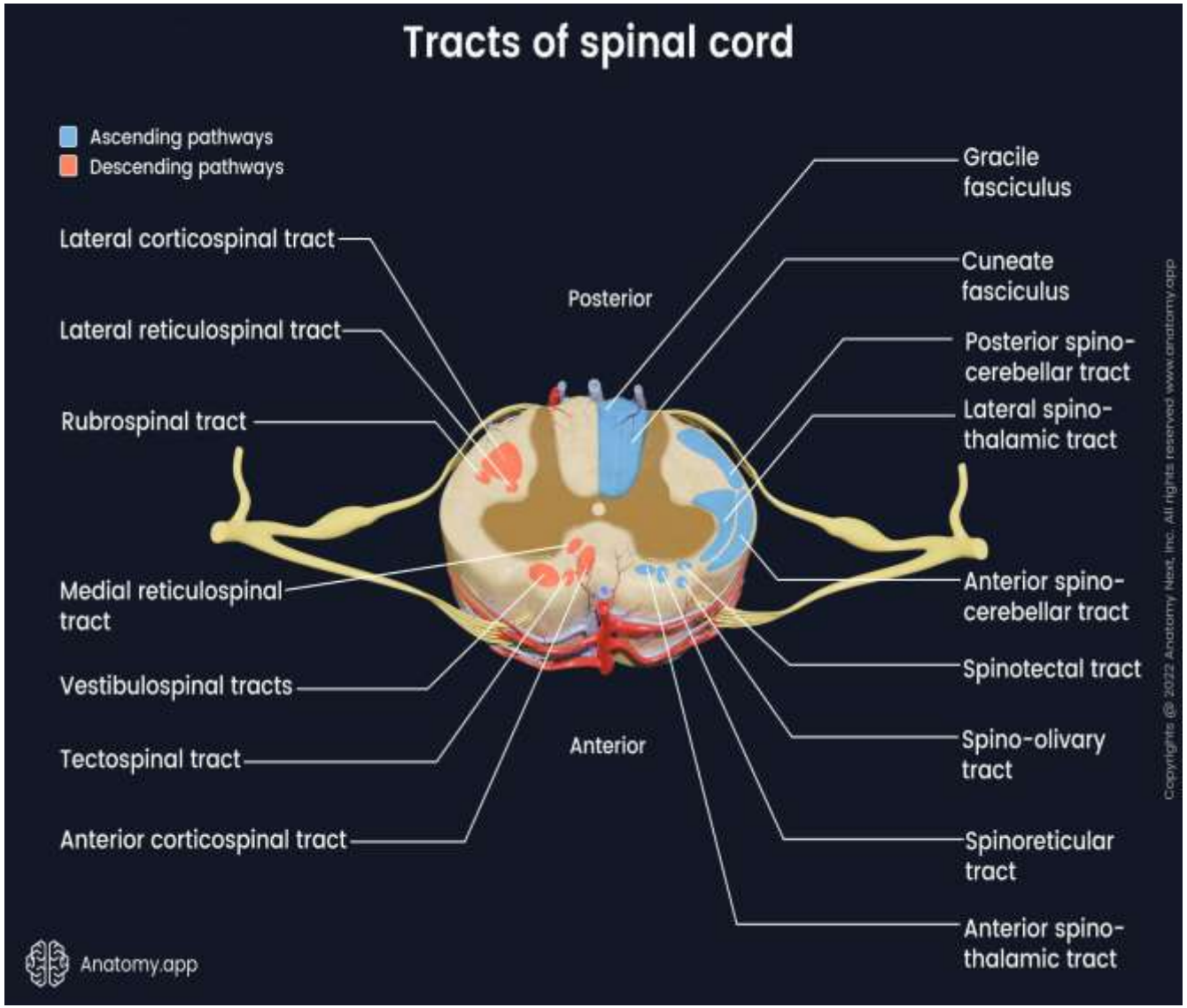
Spinal Cord Horns and Their Functions





Spinal Cord Columns

Characteristic	Tract Type	Primary Function	Example Tract
Dorsal Column	Ascending sensory	Touch, proprioception	None
Lateral Column	Ascending and descending	Motor control, pain	Corticospinal, spinothalamic
Ventral Column	Ascending and descending	Motor control	Anterior corticospinal



Functions of the Spinal Cord

A. Sensory Transmission

•Relays sensory information from the periphery to the brain via ascending tracts.

•Processes some sensory information at the spinal cord level (e.g., reflexes).

B. Motor Control

•Transmits motor commands from the brain to the muscles via descending tracts.

•Contains motor neurons that directly innervate skeletal muscles.

C. Reflexes

•Mediates spinal reflexes, which are rapid, involuntary responses to stimuli.

•Examples: stretch reflex, withdrawal reflex.

•Reflex arc: sensory receptor → sensory neuron → integration center (spinal cord) → motor neuron → effector (muscle).

D. Autonomic Functions

•Contains preganglionic sympathetic neurons in the lateral horns (T1-L2).

•Controls autonomic functions such as heart rate, blood pressure, and bowel/bladder function.

Steps to Effective Spinal Cord Injury Management

4 **Educate Patients**

Provide patients and families with essential information about spinal cord injuries.

3 **Manage Complications**

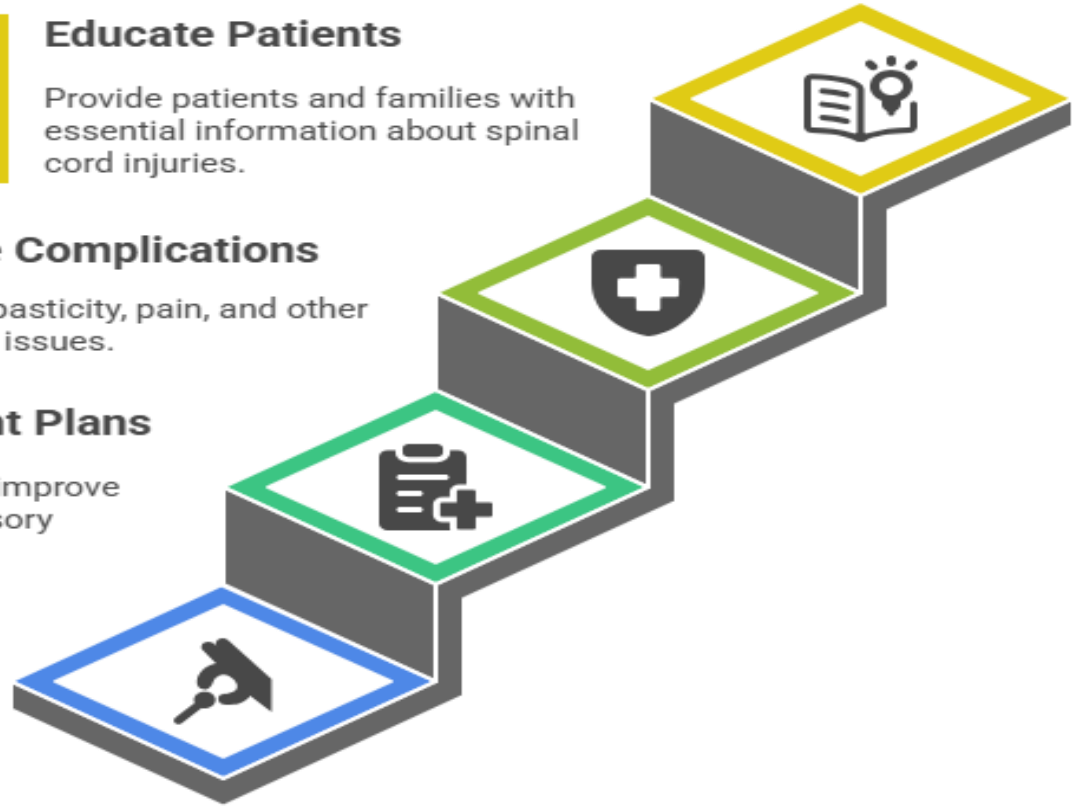
Address spasticity, pain, and other secondary issues.

2 **Develop Treatment Plans**

Create tailored plans to improve motor function and sensory awareness.

1 **Identify Damage**

Determine the level and extent of spinal cord injury.



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In-class Assessment

"Where Is the Cord Compromised?"

CASE SCENARIO (Handout / Slide)

A 35-year-old male was brought after a road traffic accident. On examination, the following findings were noted:

Loss of pain and temperature sensation below the level of the umbilicus

Preserved light touch and proprioception

Weakness of both lower limbs

Increased muscle tone and exaggerated deep tendon reflexes

Bladder involvement after 24 hours.

MRI suggests an **incomplete spinal cord lesion**

HBS-STYLE GUIDED DISCUSSION QUESTIONS

Q1. Problem Identification (2 marks)

Is this an **upper motor neuron or lower motor neuron** lesion?

Which **basic function of the spinal cord** is primarily affected?

(Students must justify using signs, not definitions.)

Q2. Structural Analysis (3 marks)

Based on the sensory findings:

Which **tract(s)** are most likely damaged?

Which tract is **spared**, and how do you know?

(Focus: structure–function correlation)

Q3. Lesion Localization Decision (2 marks)

Is this more likely a **complete or incomplete spinal cord lesion**?

Name the **probable syndrome** (if any) and justify.

Q4. Physiotherapy Decision-Making (3 marks)

As a neuro-physiotherapist:

Which **spinal cord functions** guide your rehabilitation plan?

Mention **two immediate physiotherapy priorities**.

How does knowledge of **ascending and descending tracts** influe treatment?