

# **CENTRAL NERVOUS SYSTEM**

## **The Spinal Cord Meninges & Blood Supply**

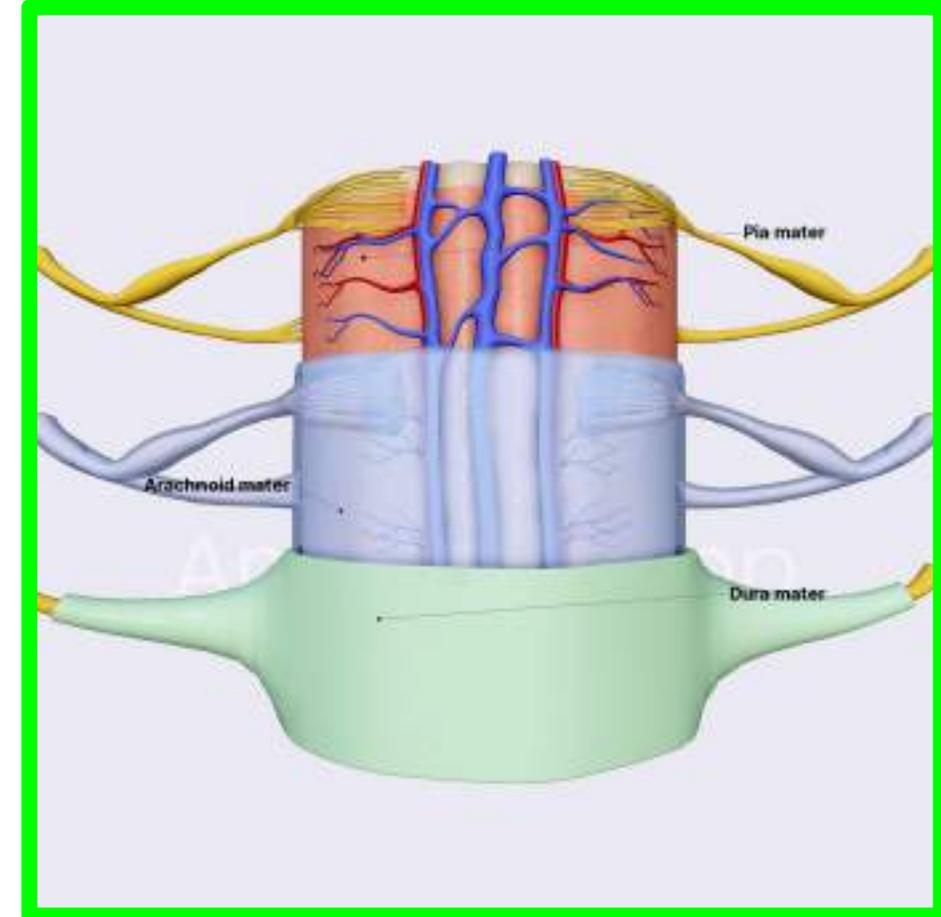
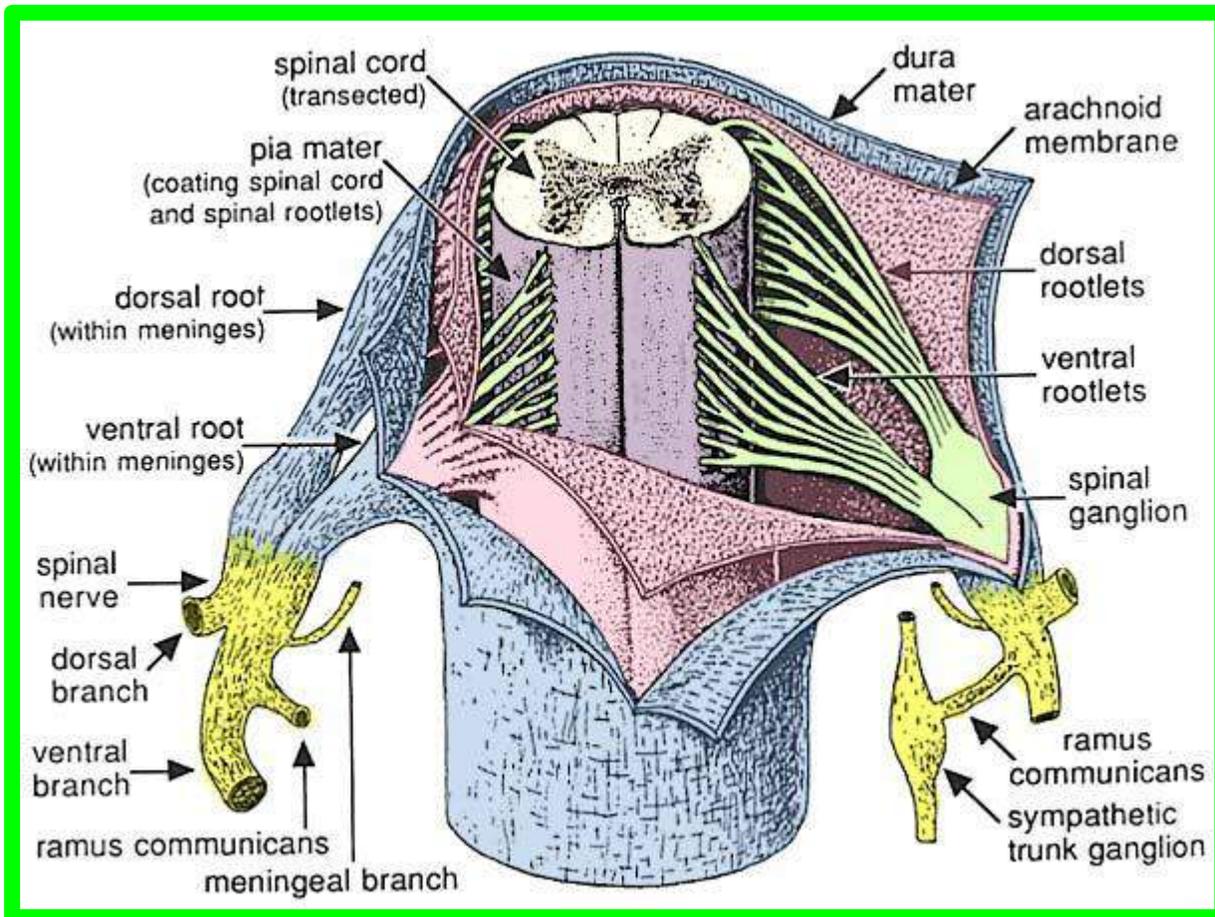
**Dr. Aiman Qais Afar**  
**Surgical Anatomist**

**College of Medicine / University of Mutah**

**Wednesday 10 December 2025**

# • Meninges

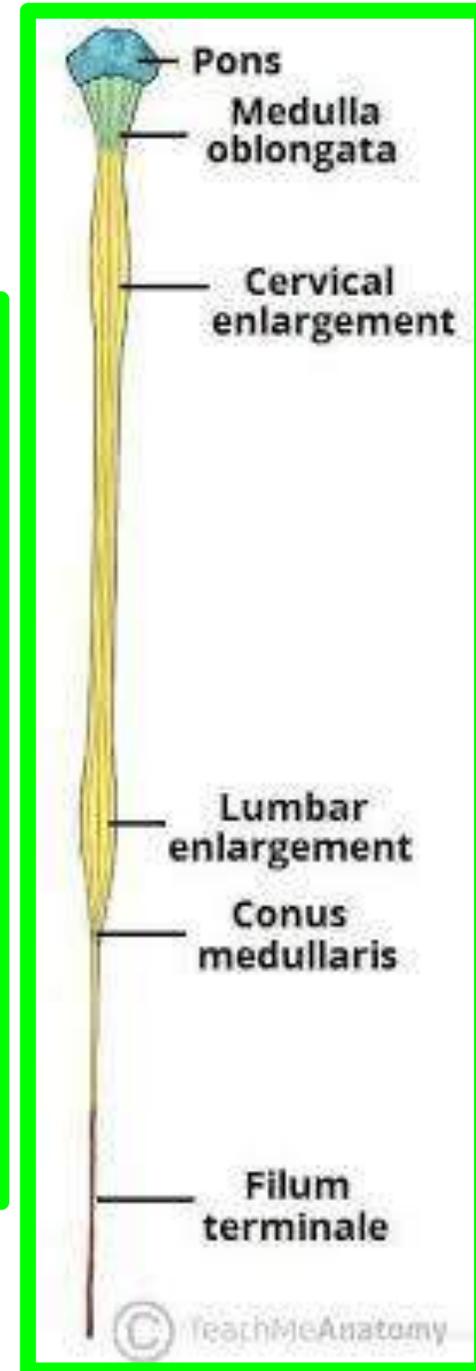
- ✓ Meninges provide a protection of the central nervous system.
- ✓ The spinal cord is surrounded by **3 membranes** which are continues with those of the brain **at the foramen magnum,**



# • Meninges

## 1. Pia Mater

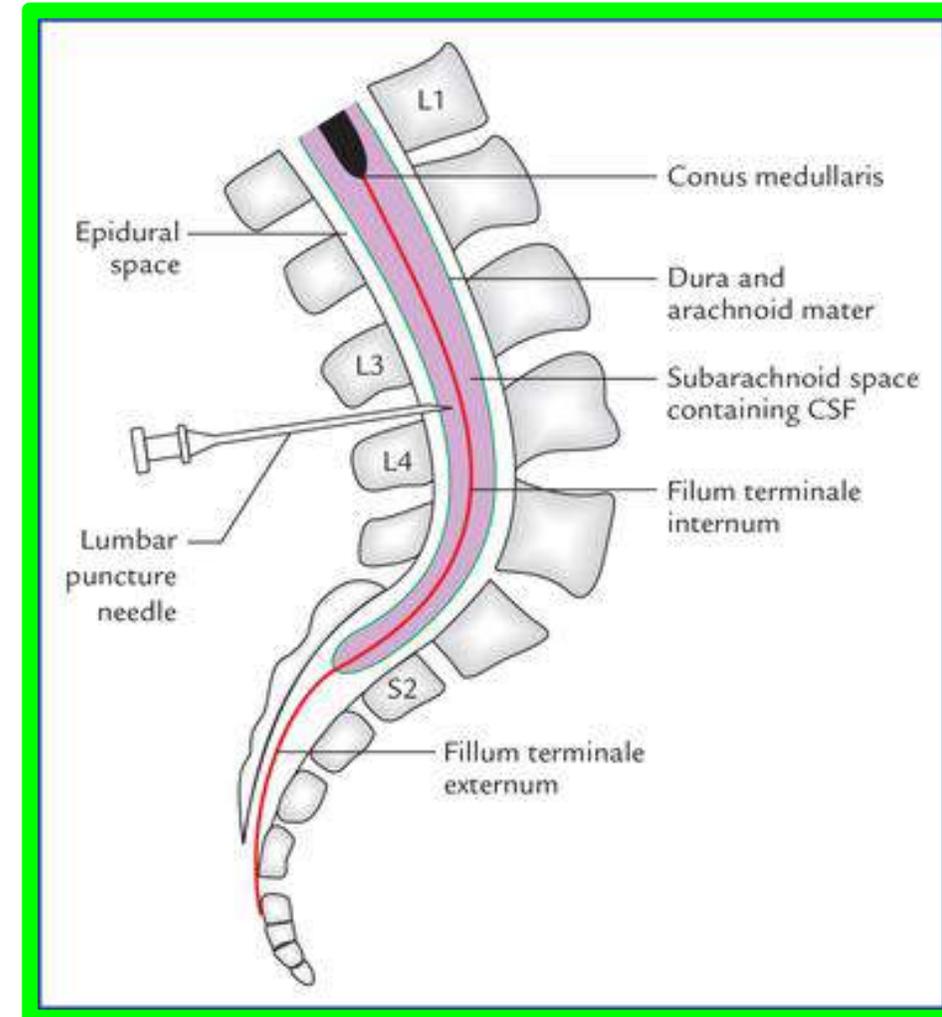
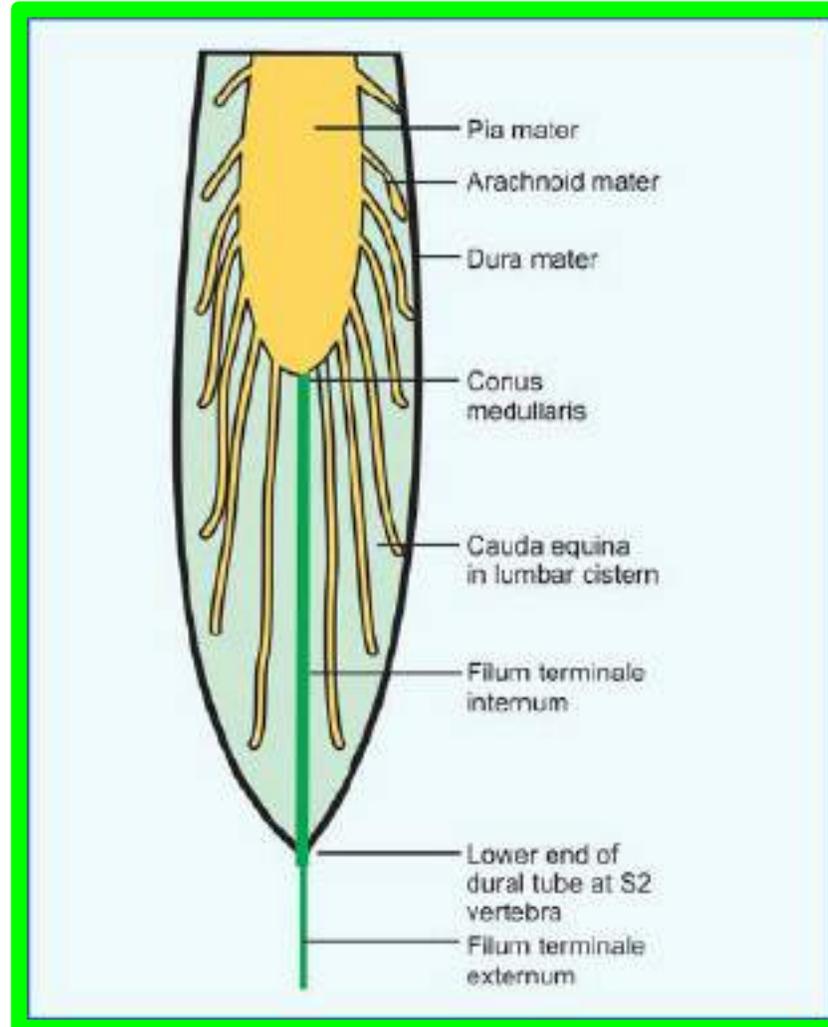
- ❖ It is the innermost vascular sheath which is closely adherent to the spinal cord.
- ❖ Termination; at the lower end of the cord, **the pia mater is prolonged to form the filum terminale** which extends down with **the cauda equine**.



# • Meninges

## 1. Pia Mater

- ❖ The **filum terminale** pierces the lower end of the arachnoid and dural mater and extends down to attached to the back of the **2nd piece of the coccyx**.



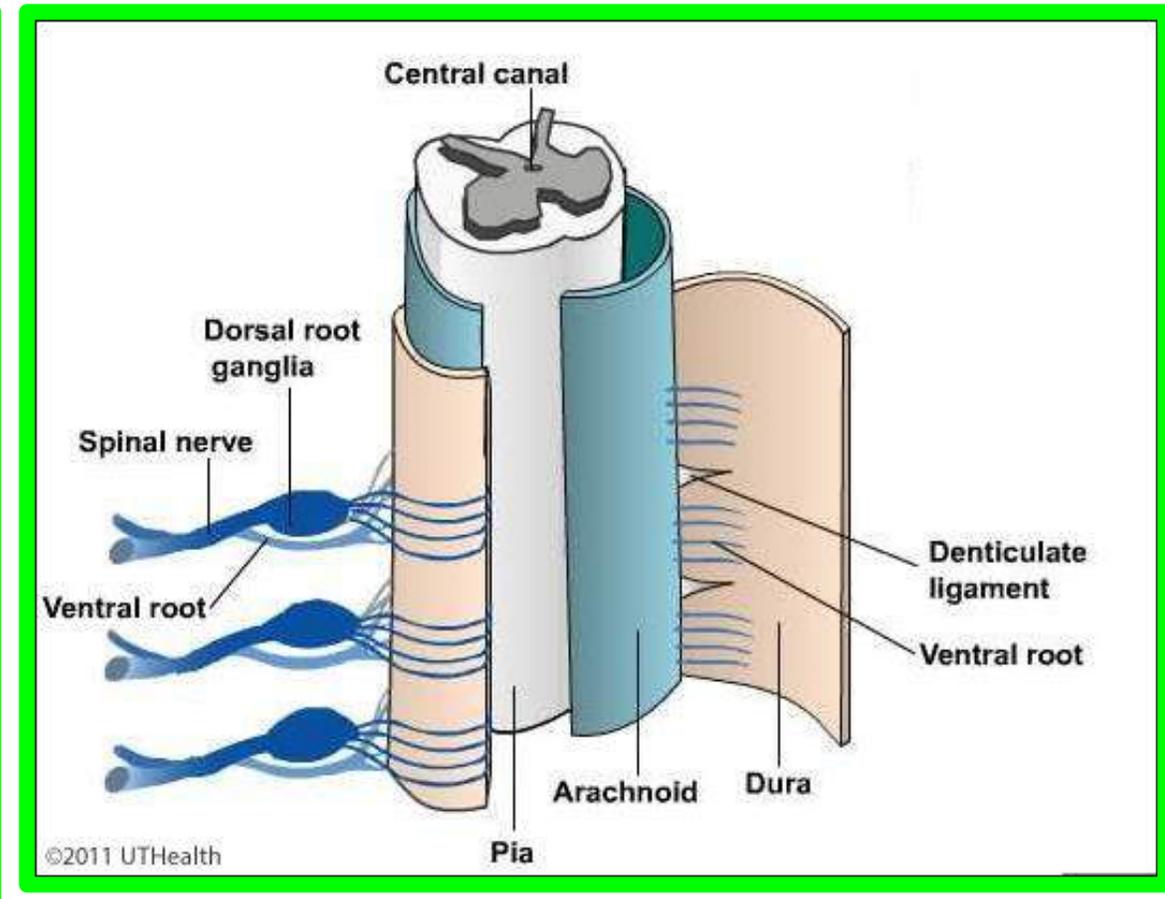
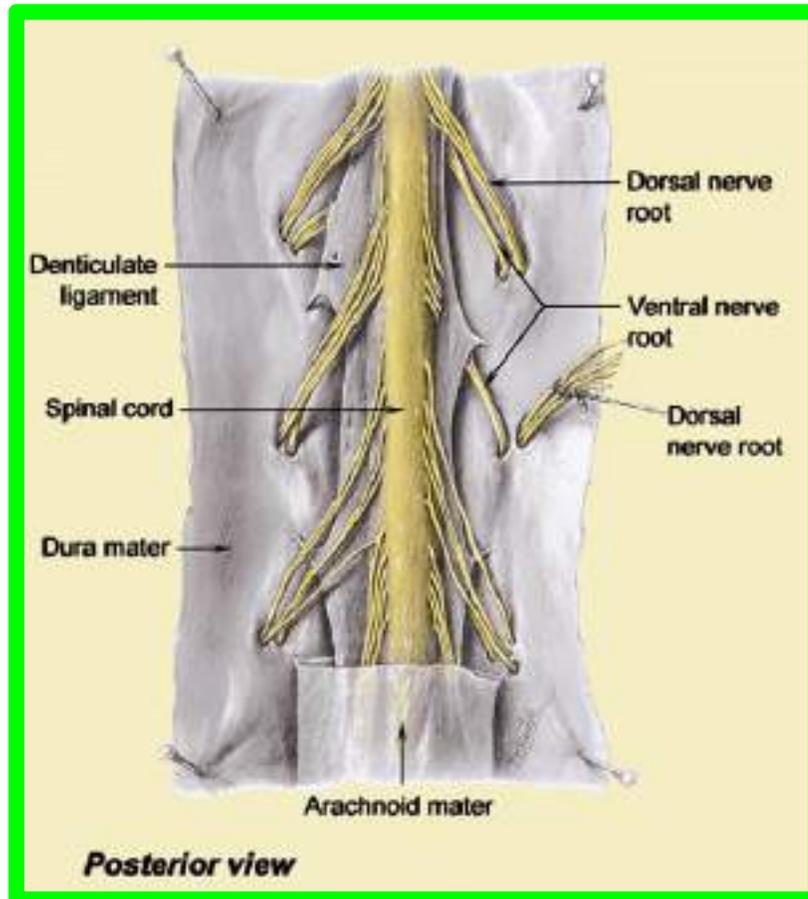
# • Meninges

## 1- Pia Mater

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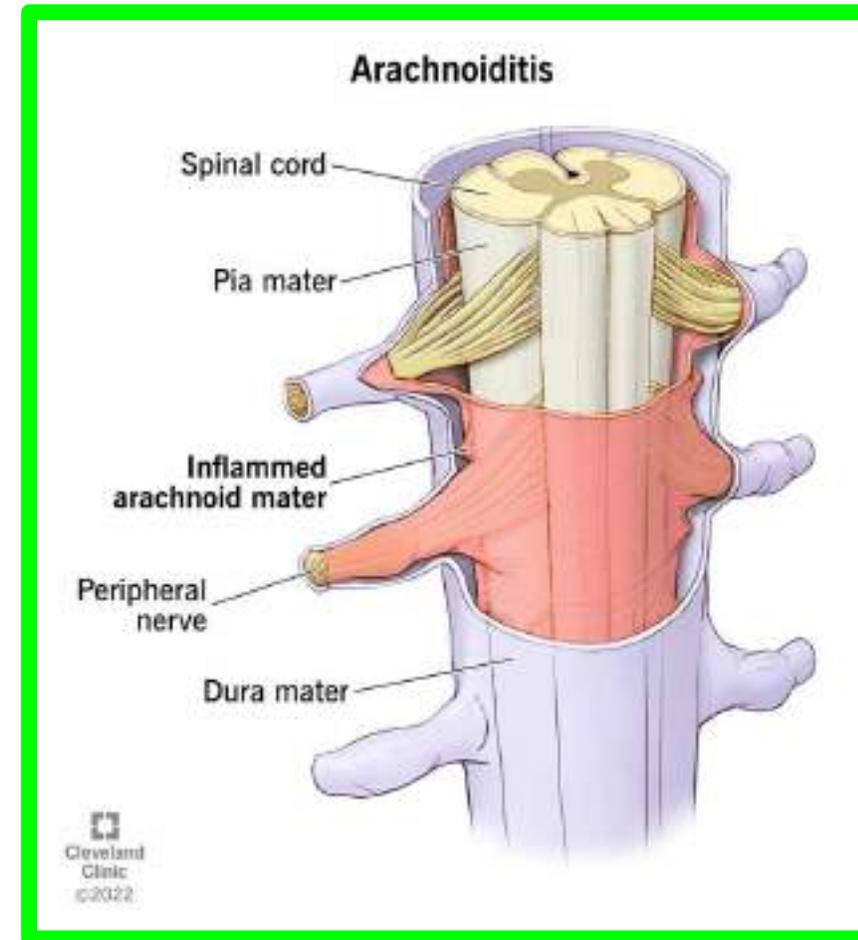
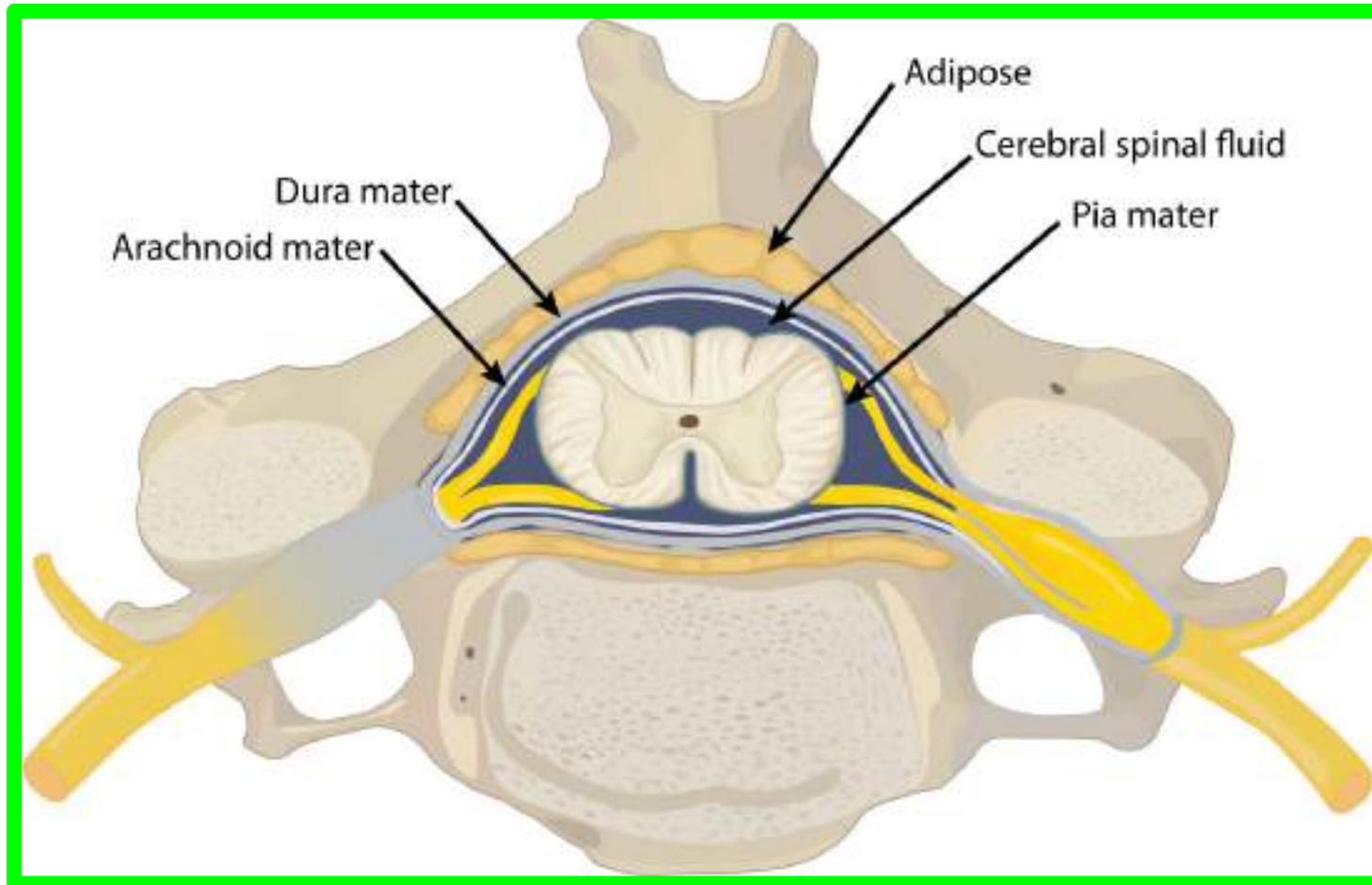
- ❖ A serrated band of pia mater springs from each side called **denticulate ligaments**.
- ❖ These teeth like processes pierce the arachnoid mater and fixed to the dura mater.



# • Meninges

## 2. Arachnoid Mater

- ❖ It is the thin and transparent membrane; it lines the inner aspect of the dura mater.
- ❖ It extends down to the level of the **S2 vertebra**.



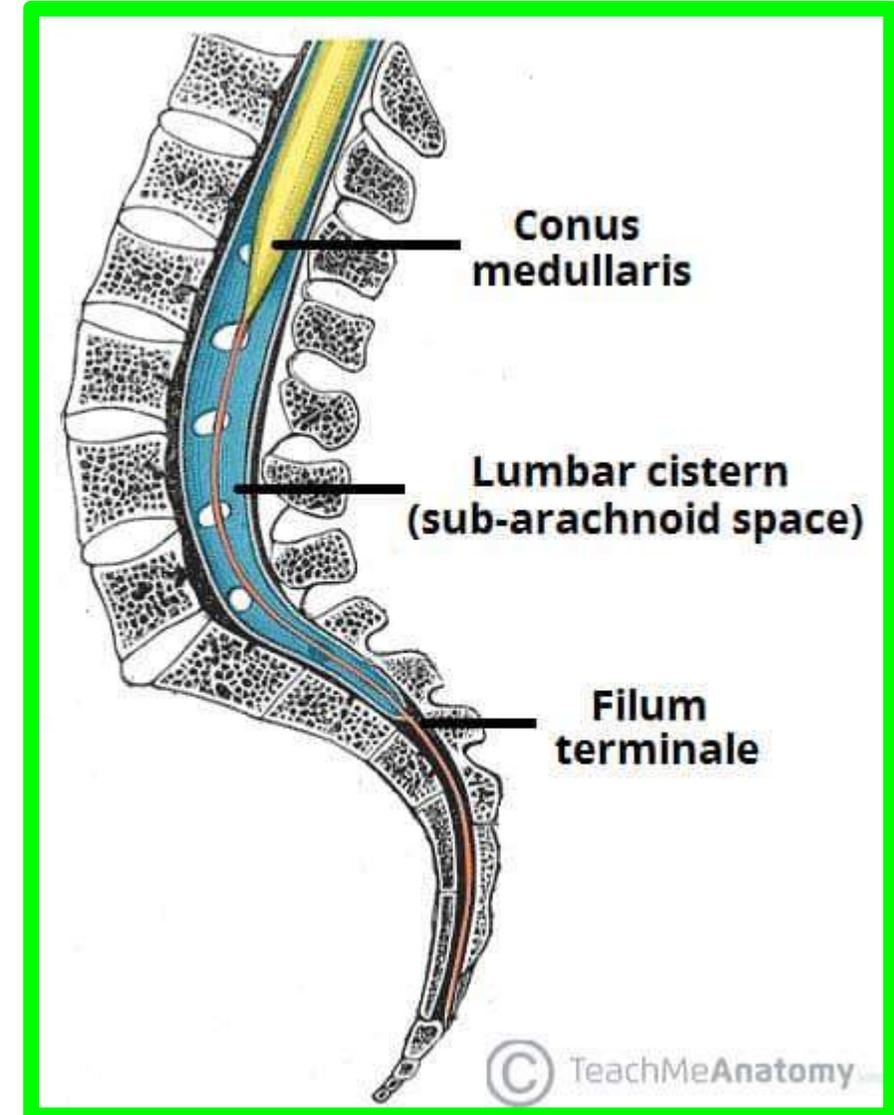
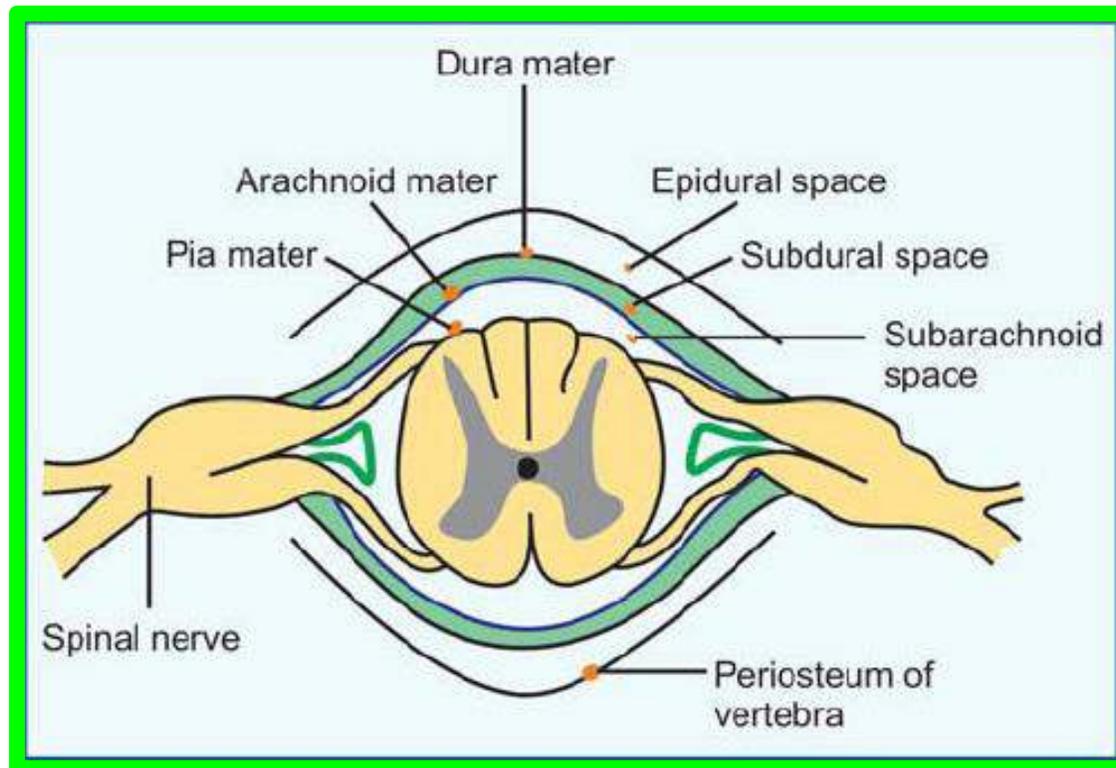
# • Meninges

## 2. Arachnoid Mater

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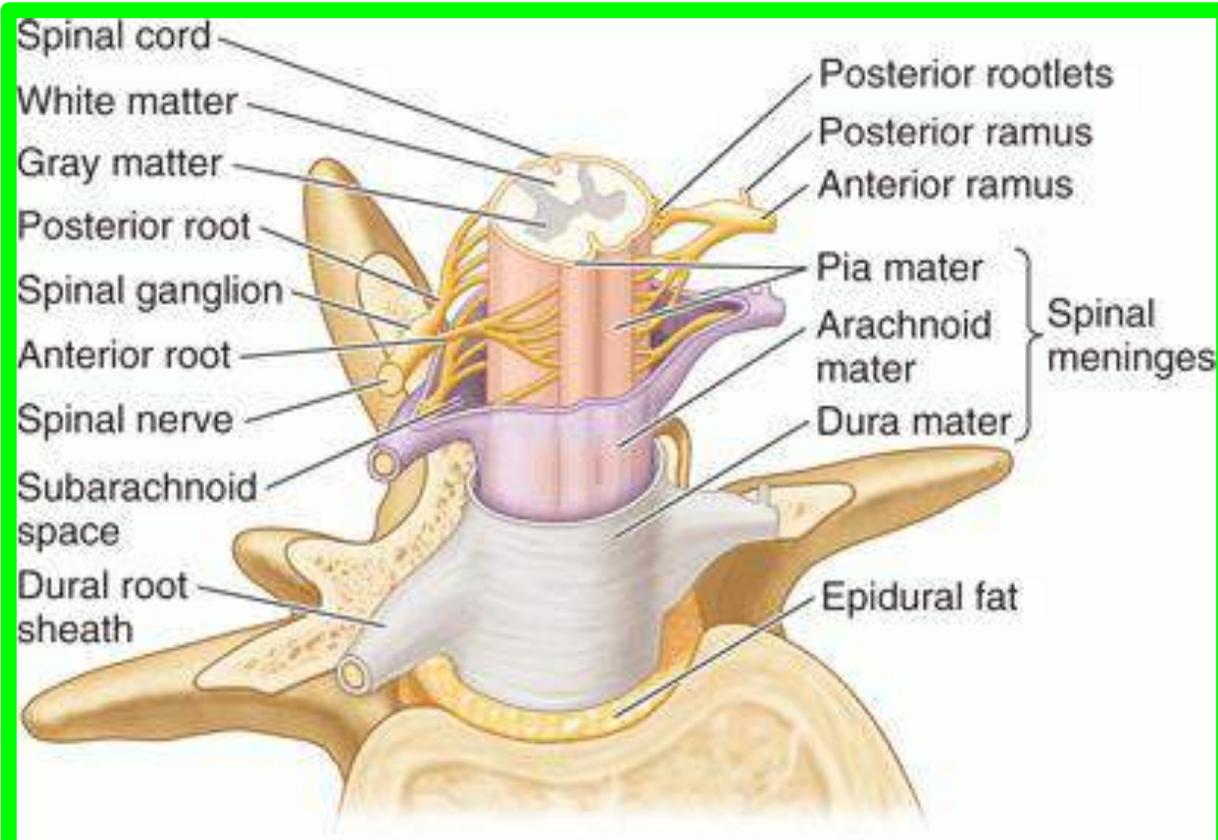
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- ❖ It is separated from the pia mater by **subarachnoid space** that contains;
1. Cerebrospinal fluid (CSF).
  2. Blood vessels of the spinal cord.
  3. Roots of the spinal nerves.
  4. Network of the fibrous tissue.

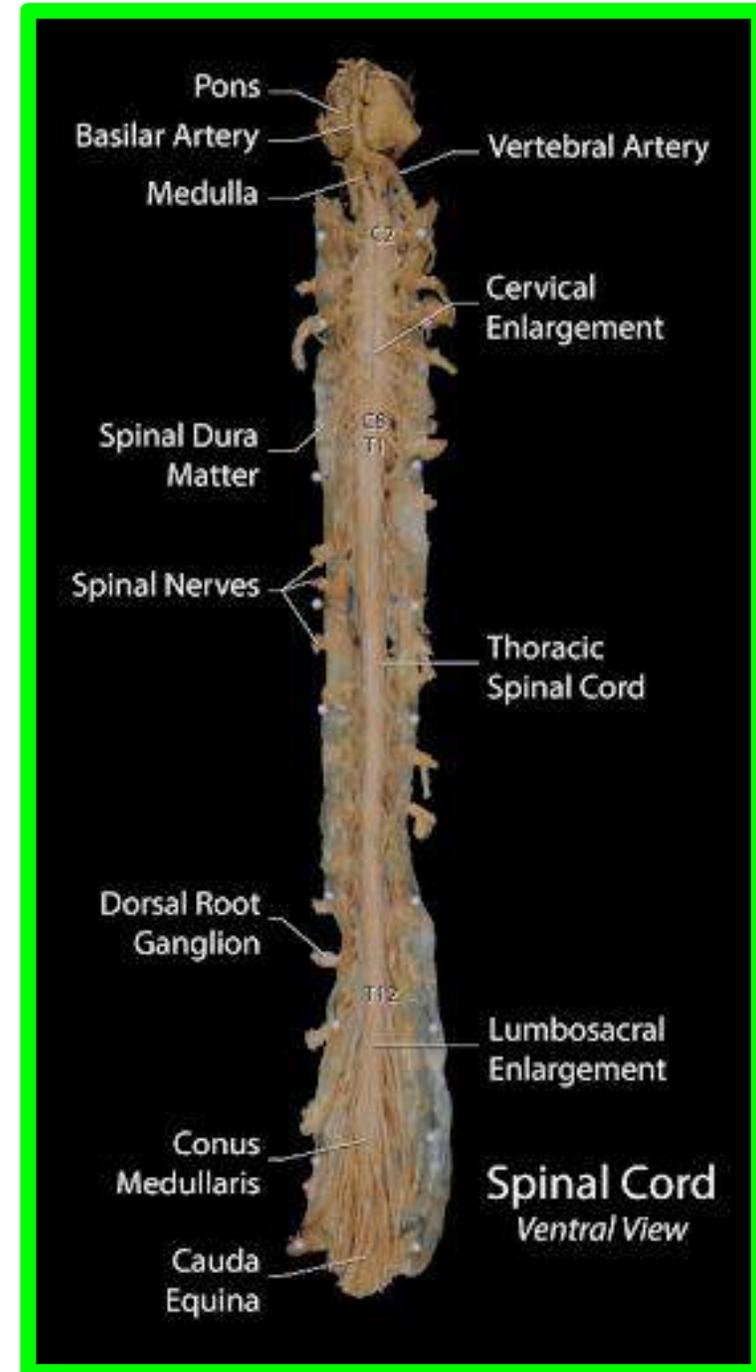


# • Meninges 3. Dura Mater

- ❖ It is the outermost tough layer.
- ❖ It ends at **S2 vertebra** and extends tubular sheath around the nerve roots and spinal nerves till the intervertebral foramen.



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# • Meninges

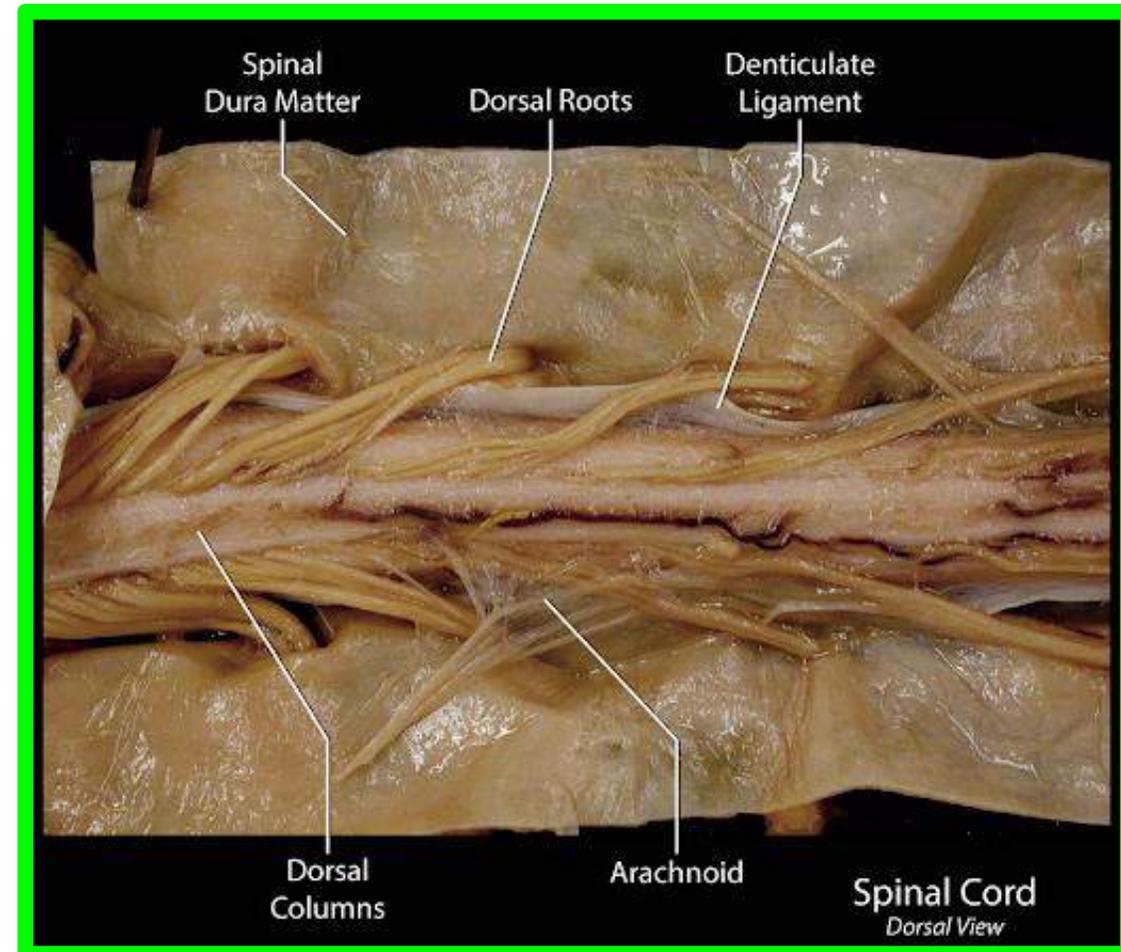
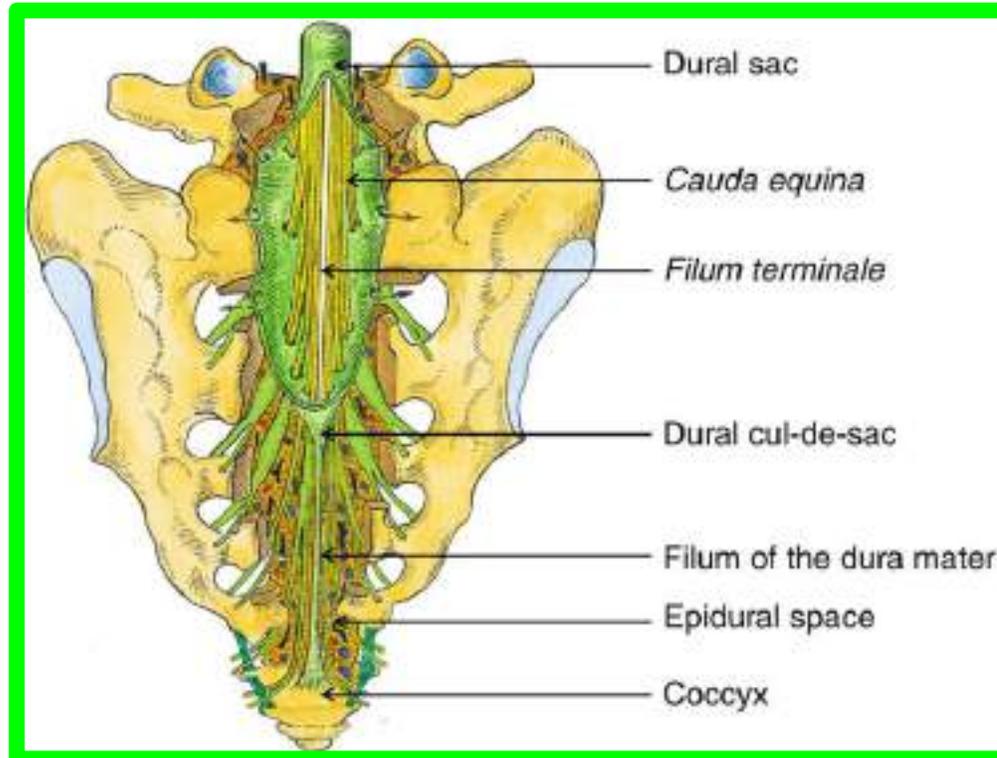
## 3. Dura Mater

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❖ it is attached to:

- The margin of the foramen magnum.
- The margin of the intervertebral foramen.
- The back of the body of S2.
- The posterior longitudinal ligament.

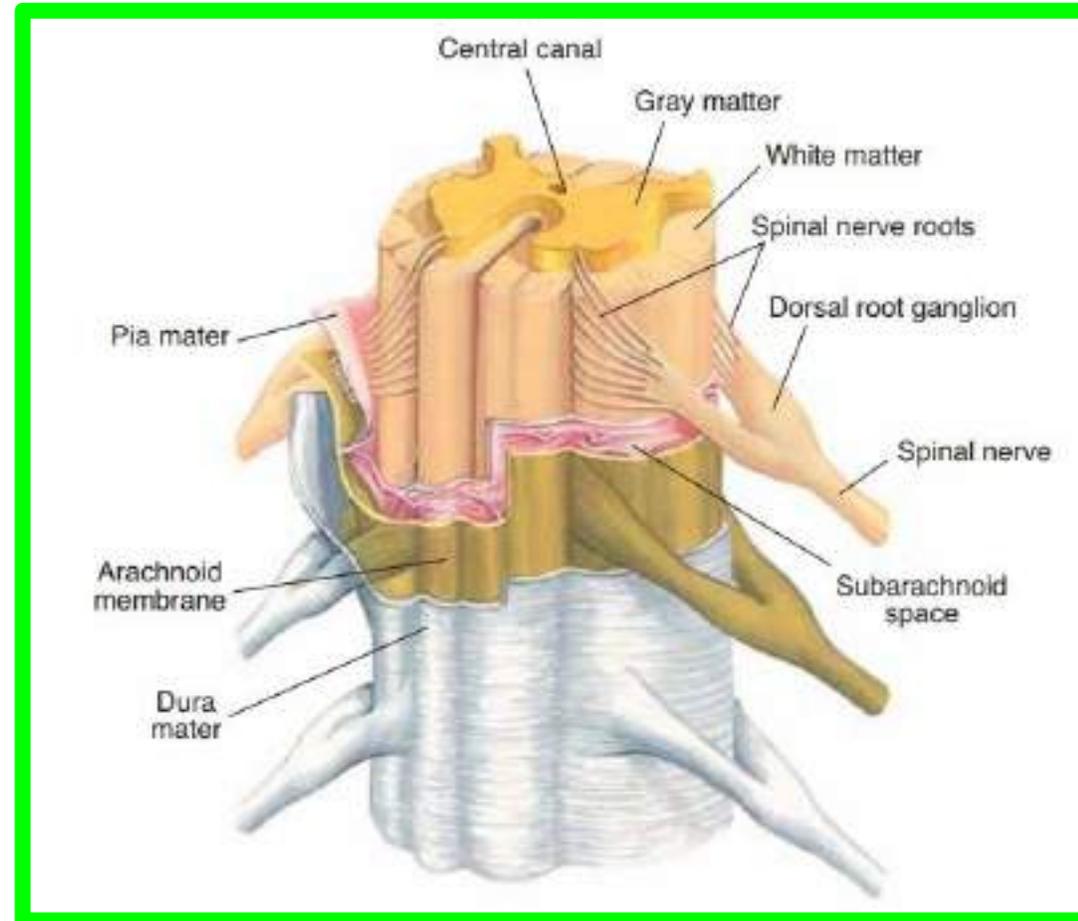
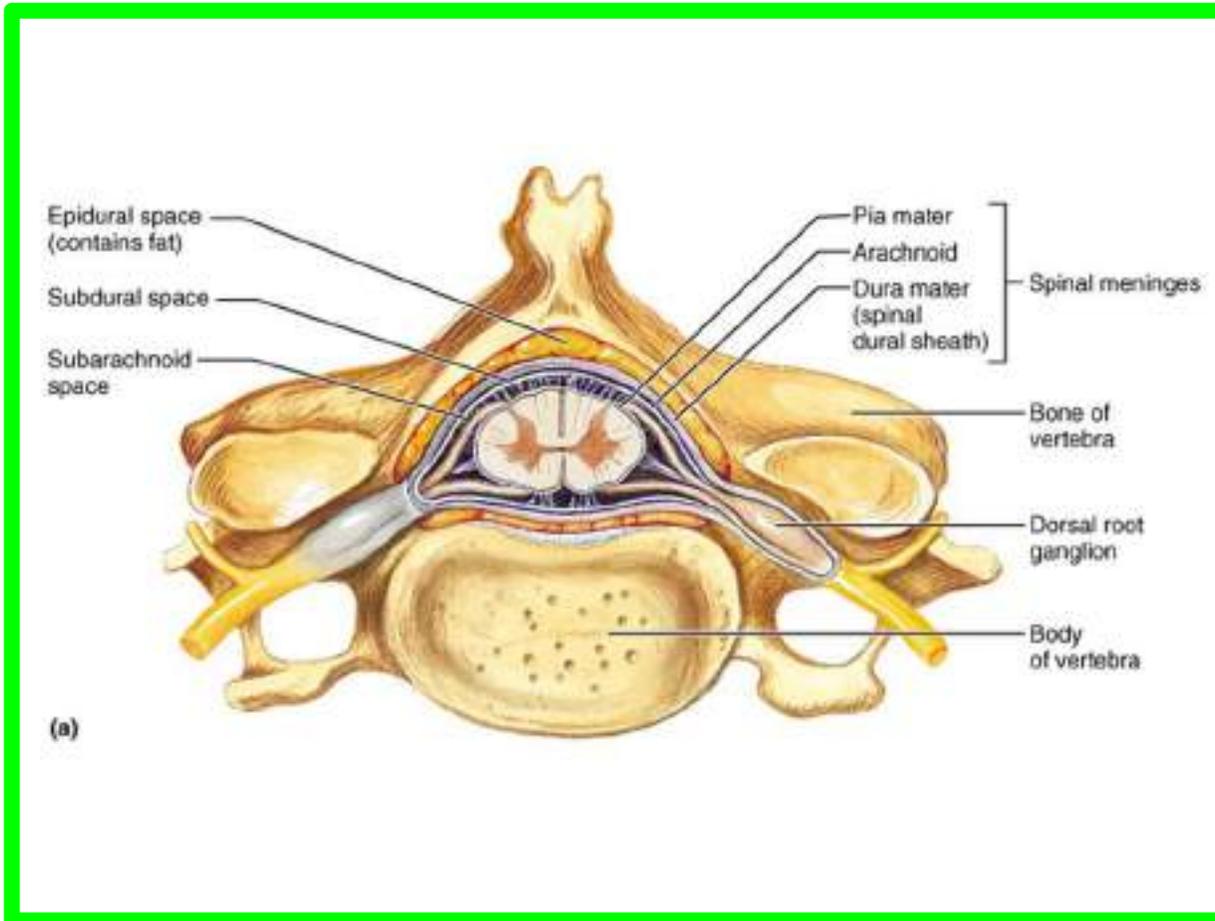


# \*\* Meningeal spaces of the spinal cord

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1. **Subarachnoid space:** between the arachnoid and pia mater.
  2. **Subdural space:** between the dura and arachnoid mater.
- ✓ It contains a small amount of serous fluid to moisten the surfaces.

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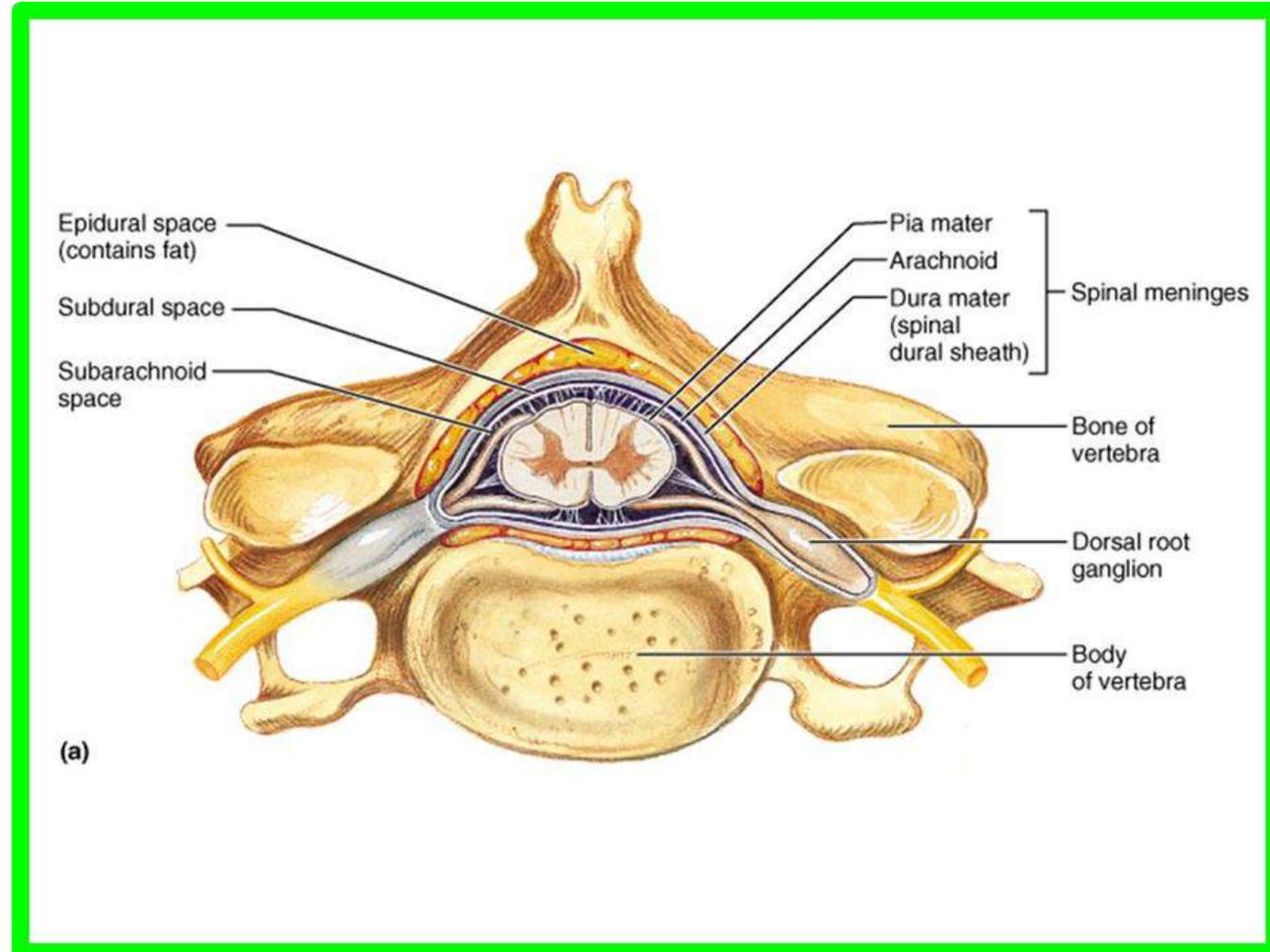
## \*\* Meningeal spaces of the spinal cord

3. **Epidural space:** between the dura and the vertebral periosteum.

✓ It contains:

a. Loose areolar tissue

b. **Internal vertebral venous plexus**



# • Meninges

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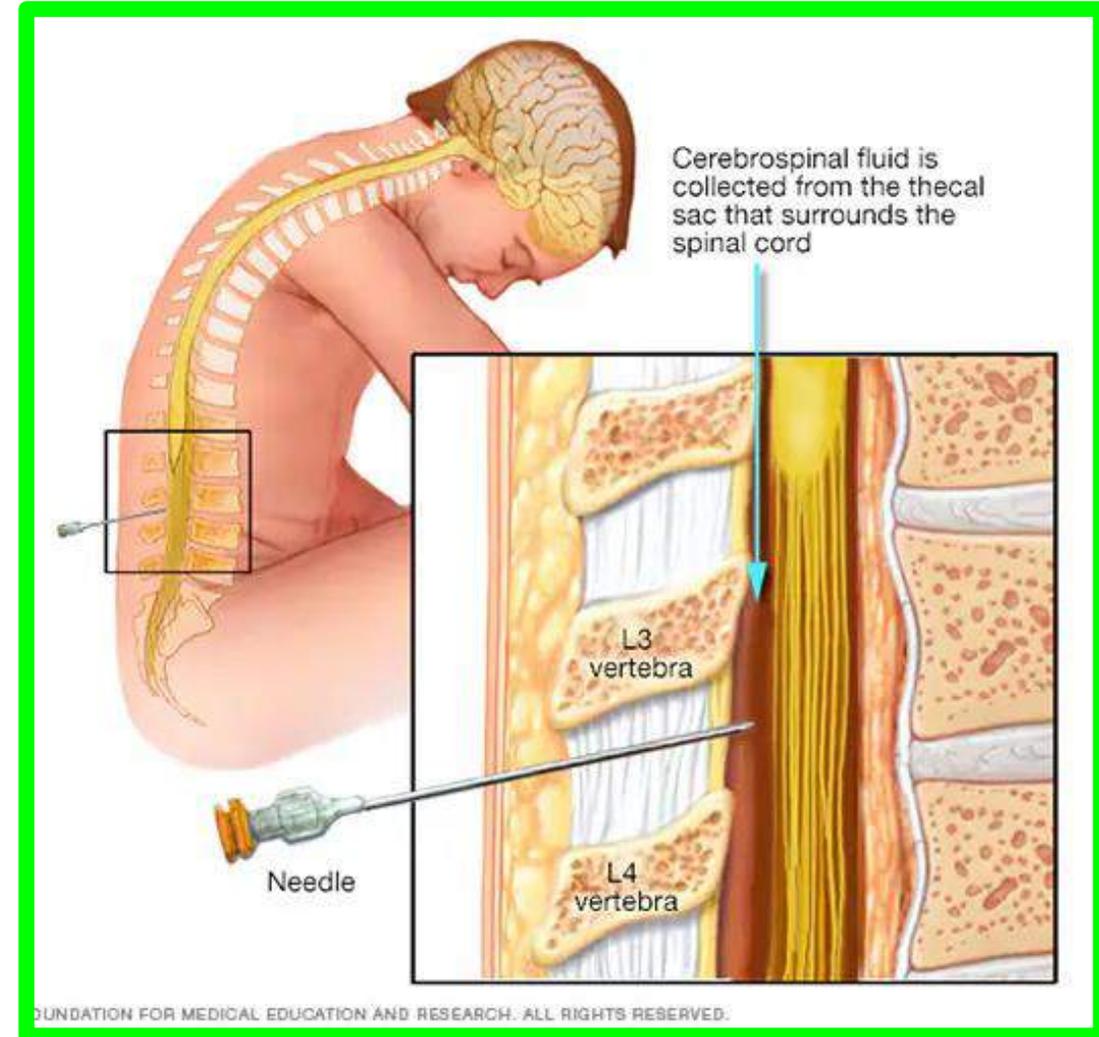
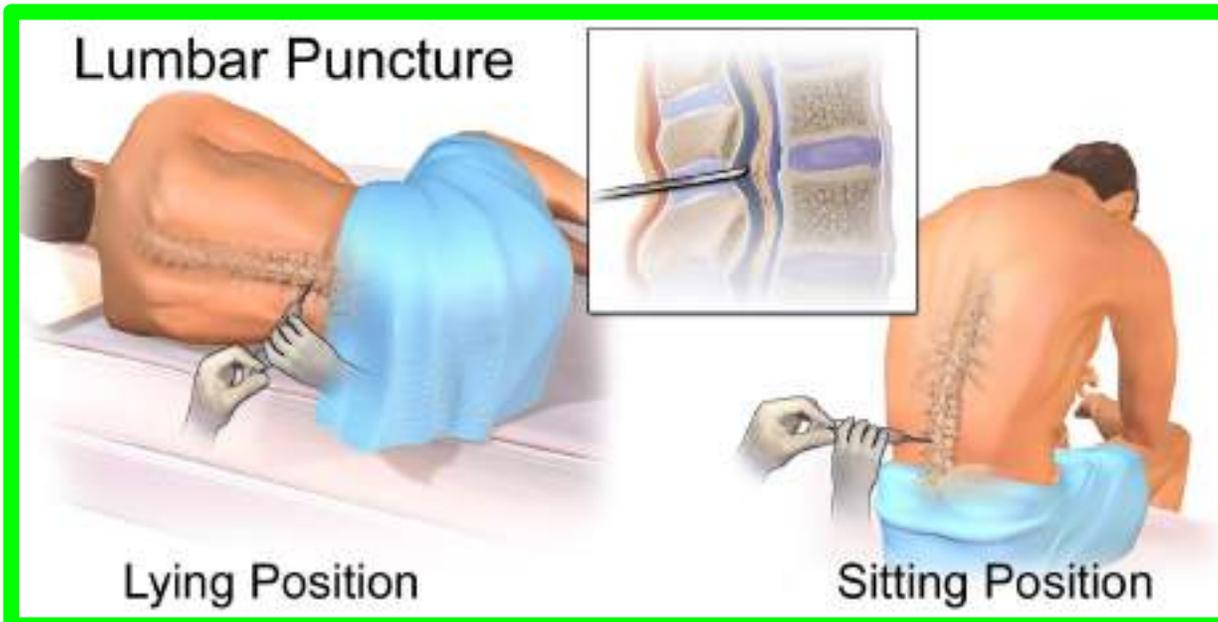
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❖ **Lumbar puncture** is done at the intervertebral disc of **L3/L4** or **L4/L5** to avoid injury of the spinal cord.

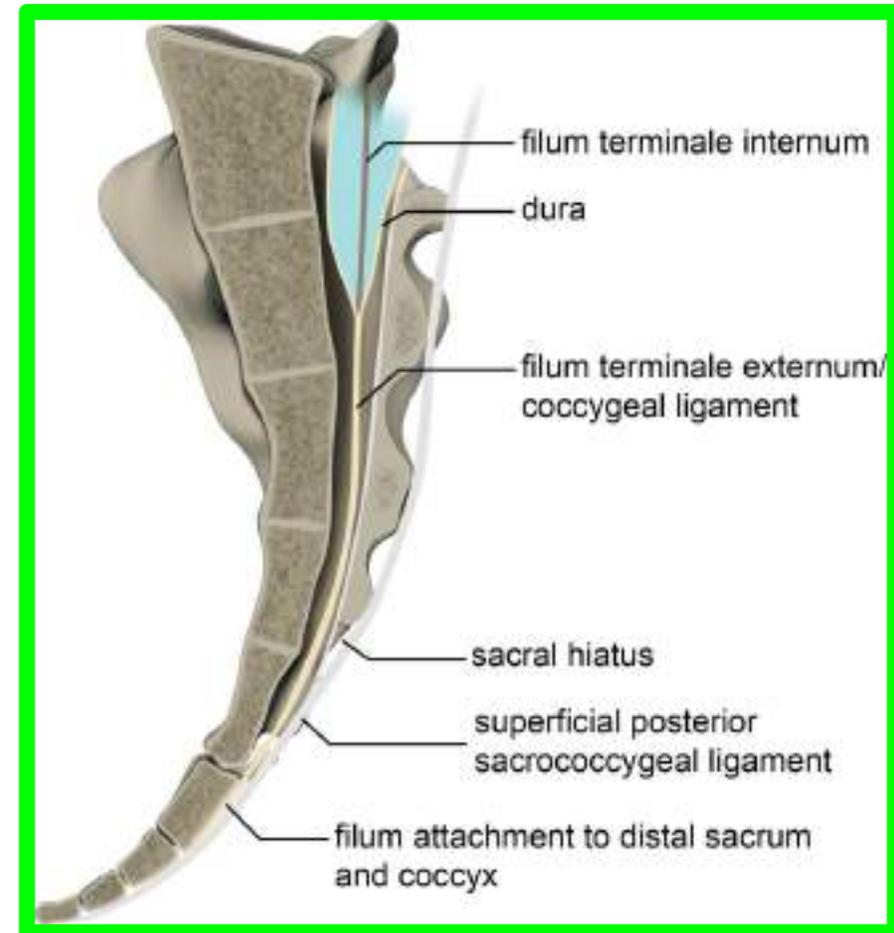
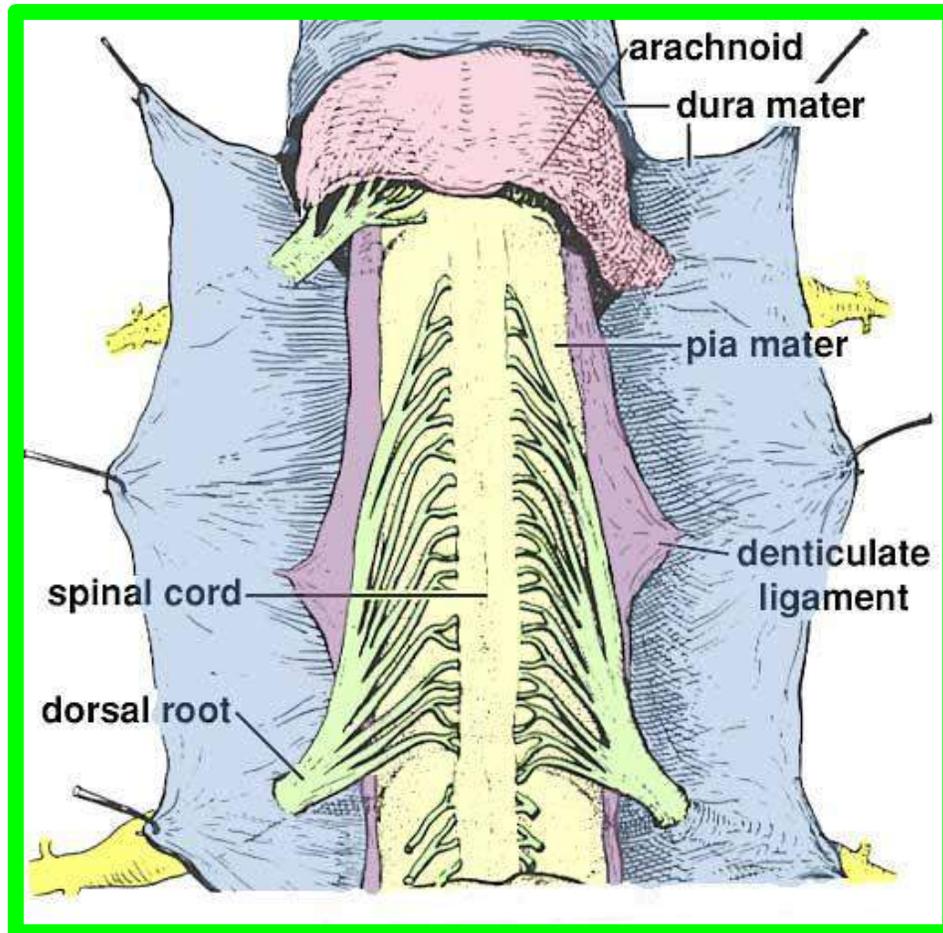
❖ It is done for:

1. Injections of drugs or anesthesia.
2. Diagnosis of certain diseases.
3. Relief of high intracranial pressure.



## \*\* Factors which Fix of the spinal cord

1. Attachment of **the filum terminale** to the back of the coccyx.
2. Attachment of **the denticulate ligaments** to the dura mater.



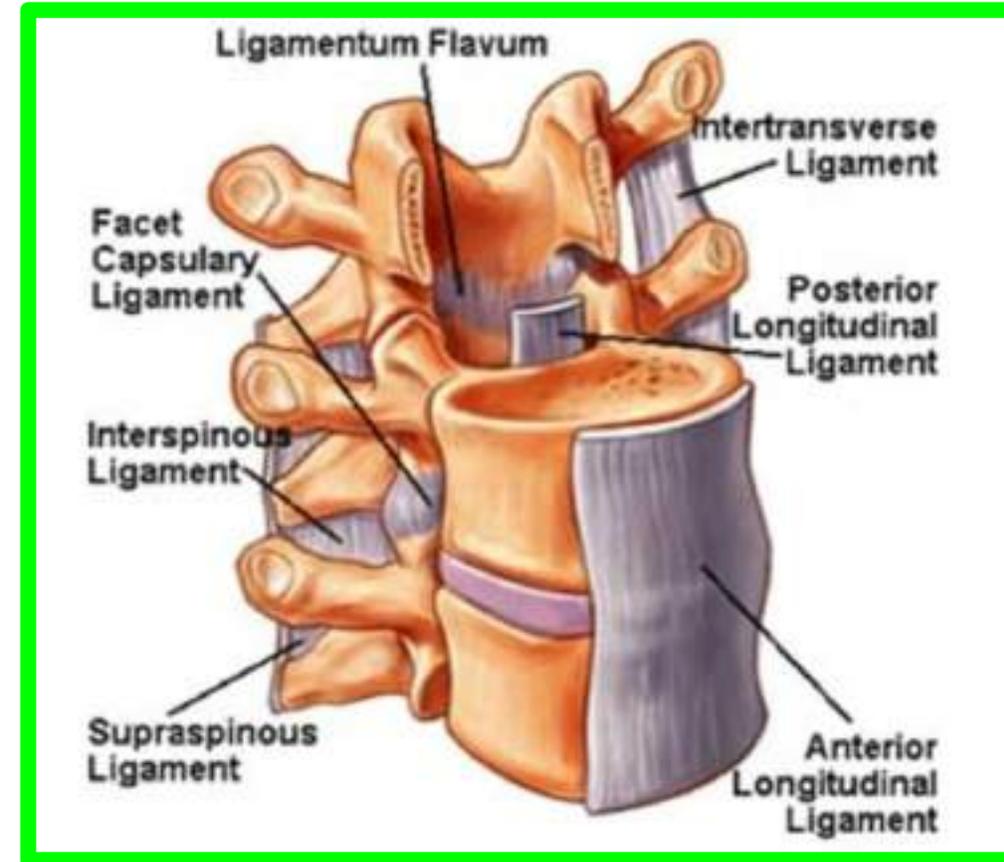
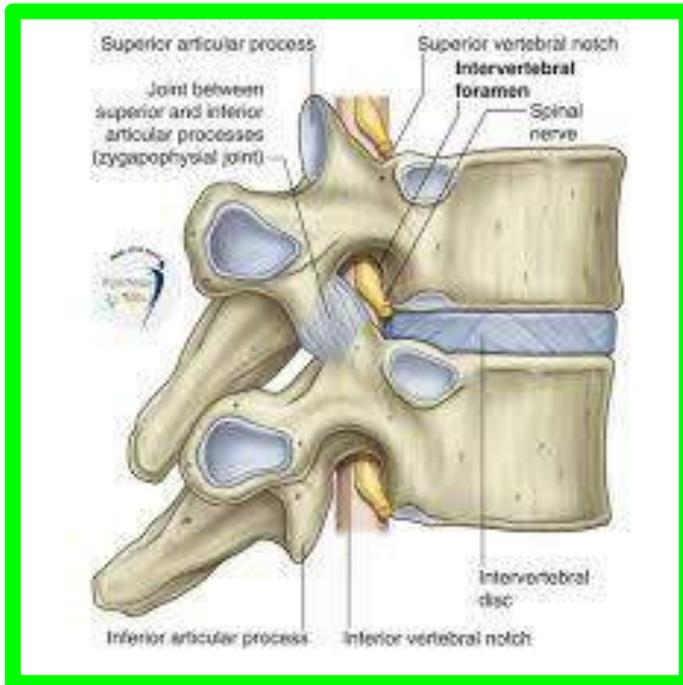
# • Meninges

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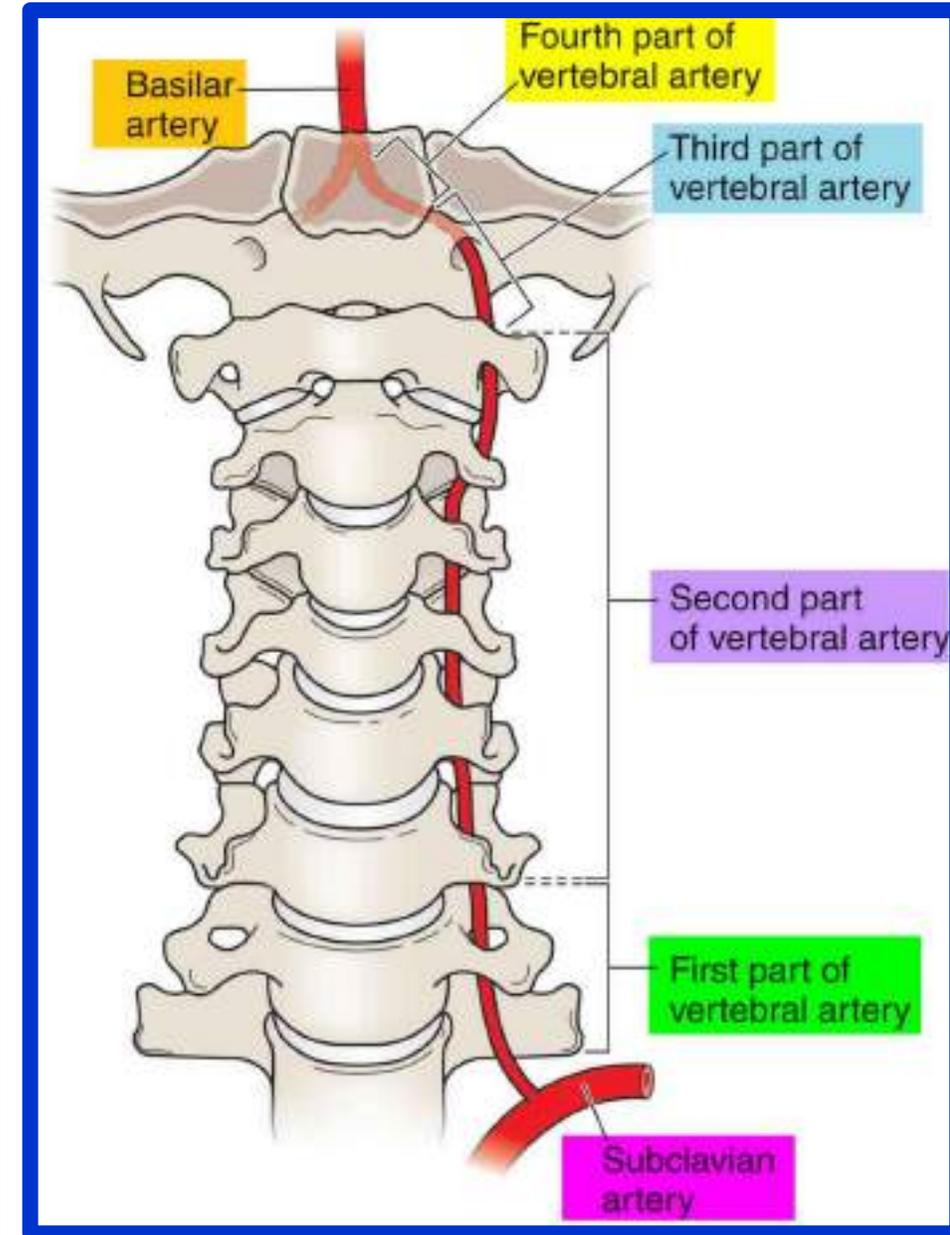
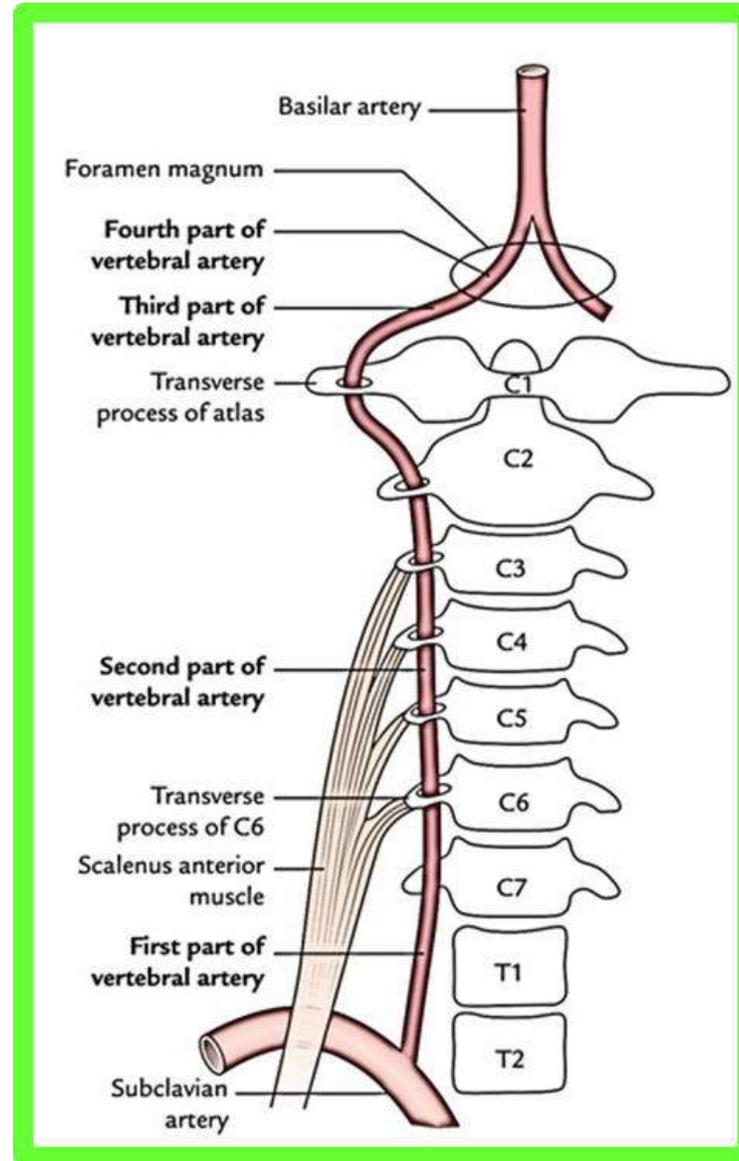
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## \*\* Factors which Fix of the spinal cord

3. Attachment of the dura mater to the following;
  - a. The margin of **the foramen magnum**.
  - b. The margin of **the intervertebral foramen**.
  - c. The back of the **body of S2**.
  - d. The **posterior longitudinal ligament**.



# VERTEBRAL ARTERY

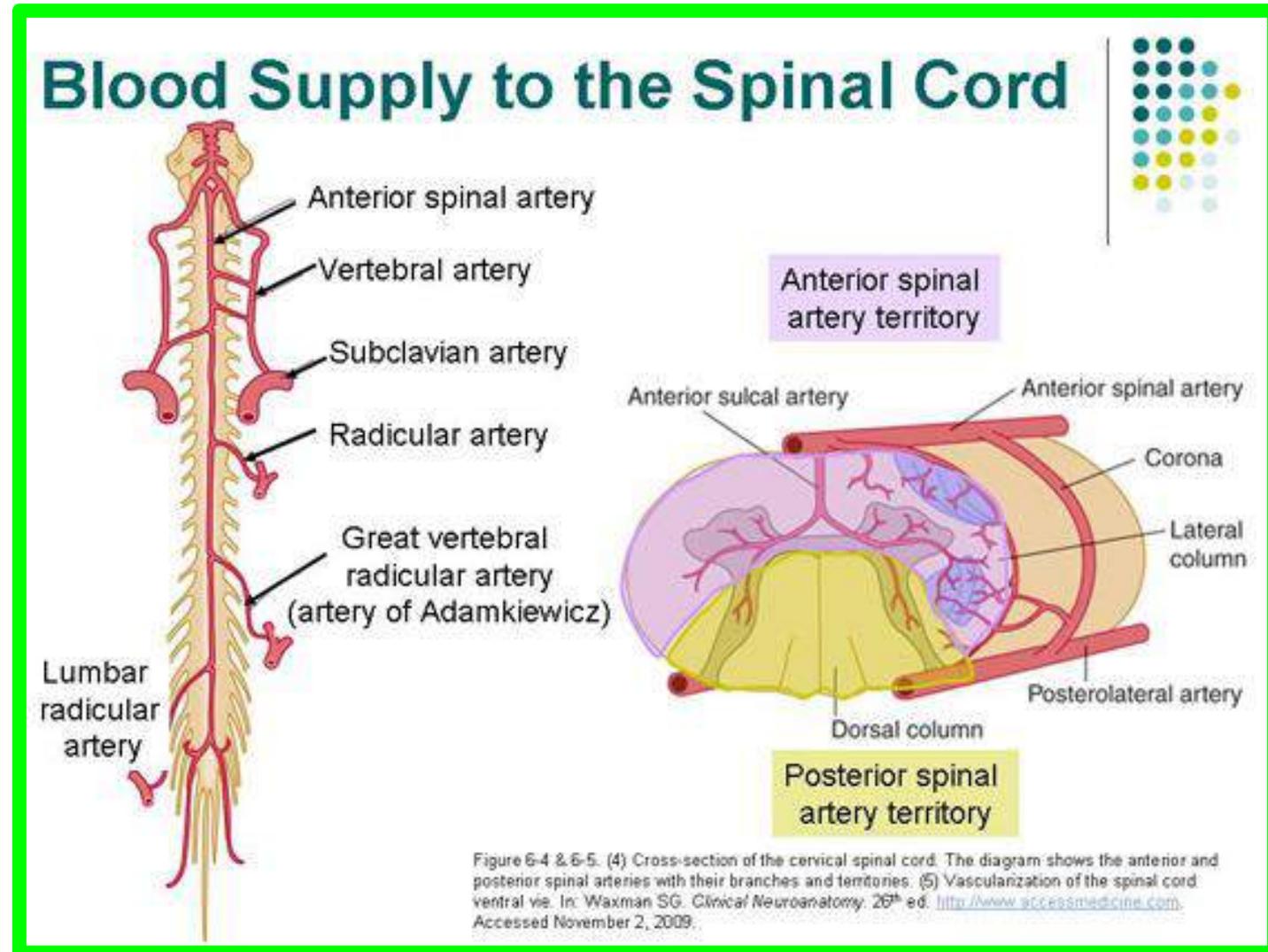


# □ Blood supply of the Spinal Cord

## \*\* Arterial supply

### 1. Anterior spinal artery:

- ✓ It is branch of the 4<sup>th</sup> part of vertebral artery on each side.
- ✓ They descend through the foramen magnum and unit together to form a single anterior spinal artery
- ✓ This single artery descends in front of the anterior median fissure of the spinal cord.
- ✓ It supplies the anterior 2/3 of the spinal cord.

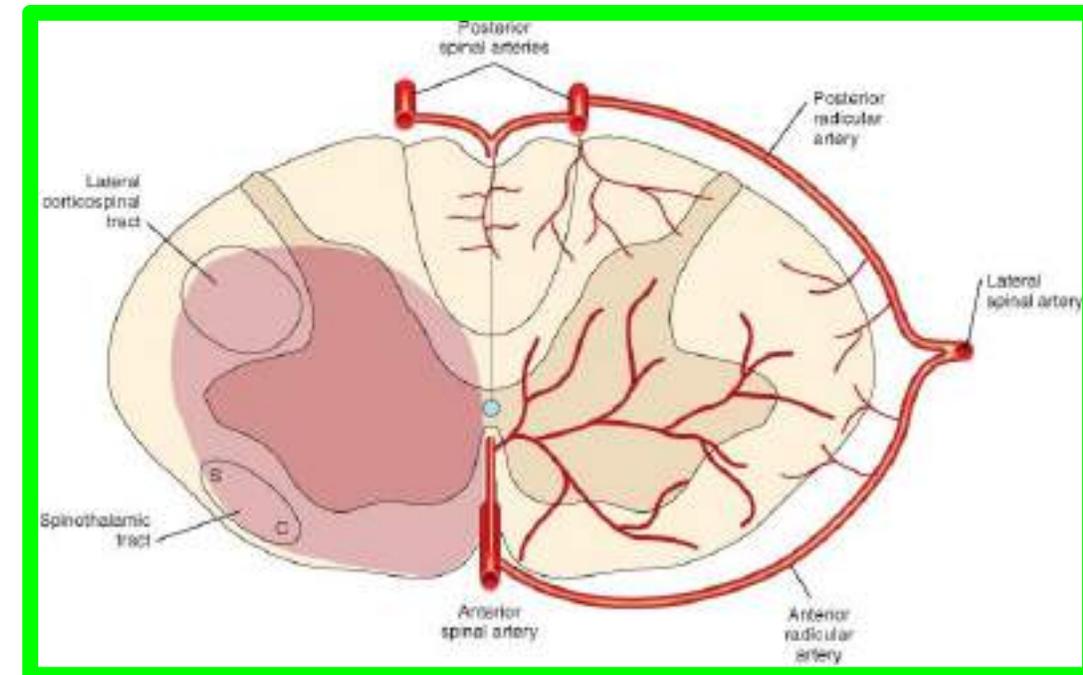
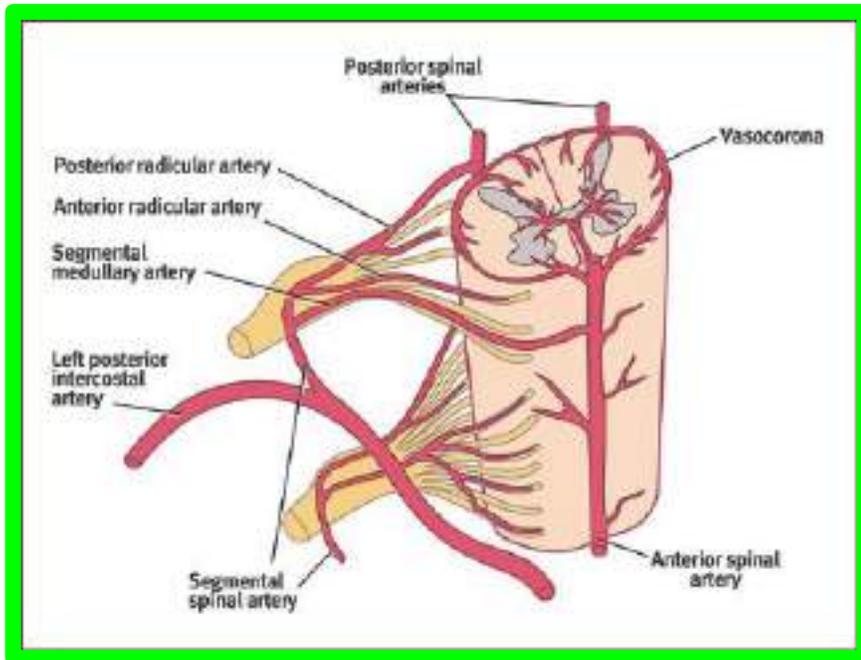


# □ Blood supply of the Spinal Cord

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## 2. Posterior spinal arteries:

- ✓ It is a branch of the 4<sup>th</sup> part of vertebral artery on each side.
- ✓ They descend through the foramen magnum and then each artery divides into two longitudinal branches which descend in front and behind the dorsal roots of the spinal nerves.
- ✓ It supplies the posterior 1/3 of the spinal cord.





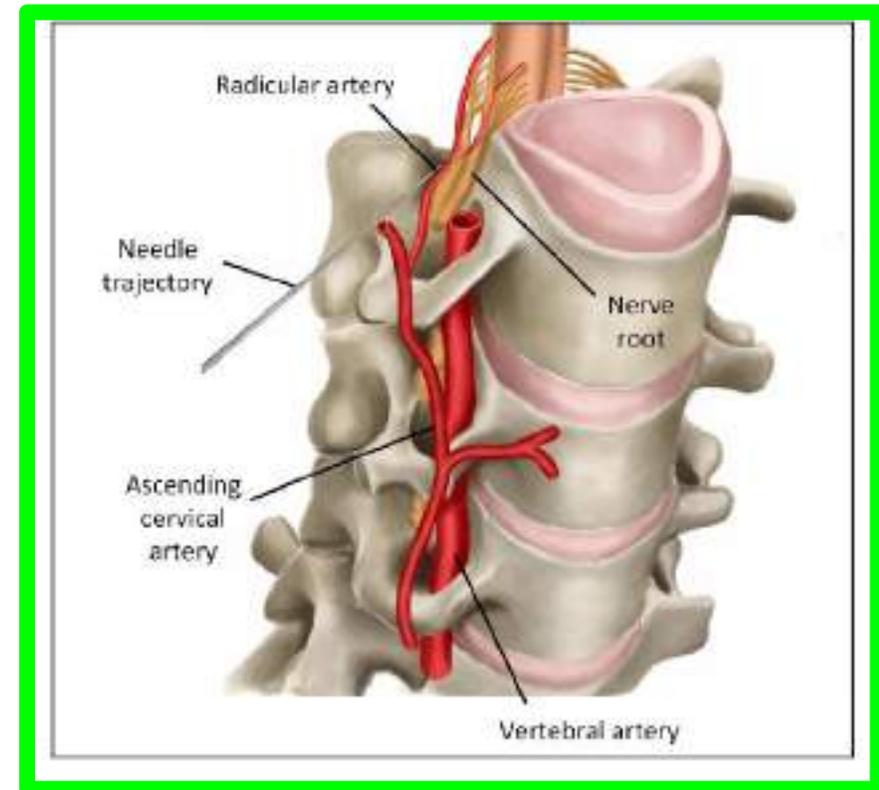
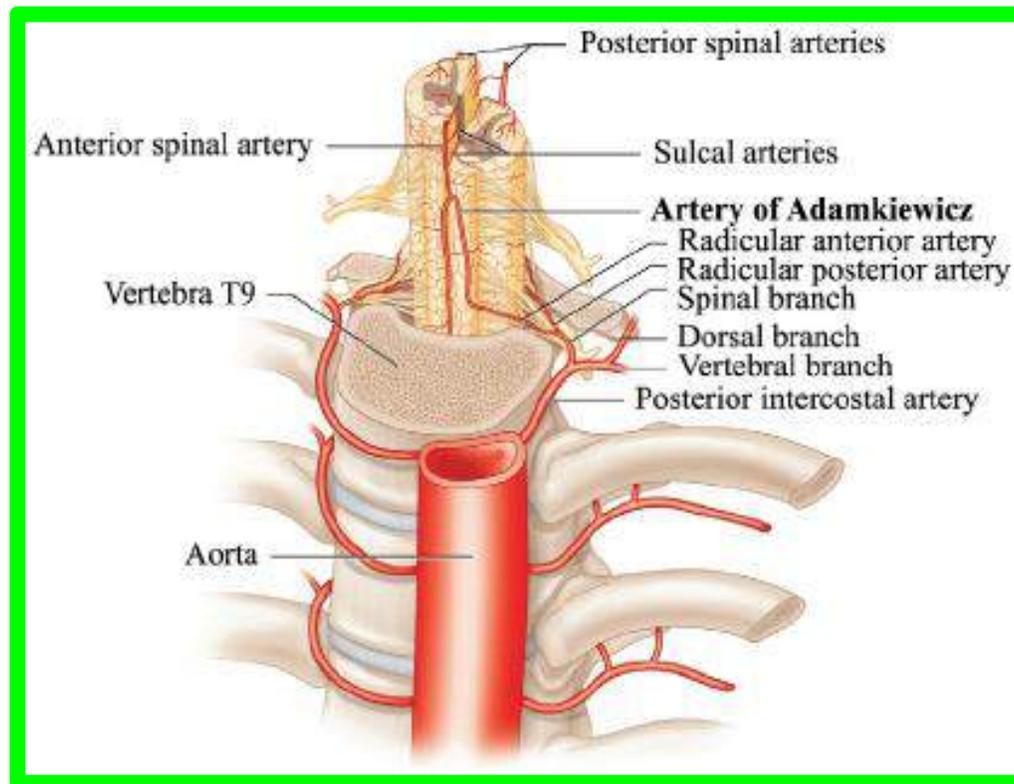
# □ Blood supply of the Spinal Cord

## 3. Radicular arteries:

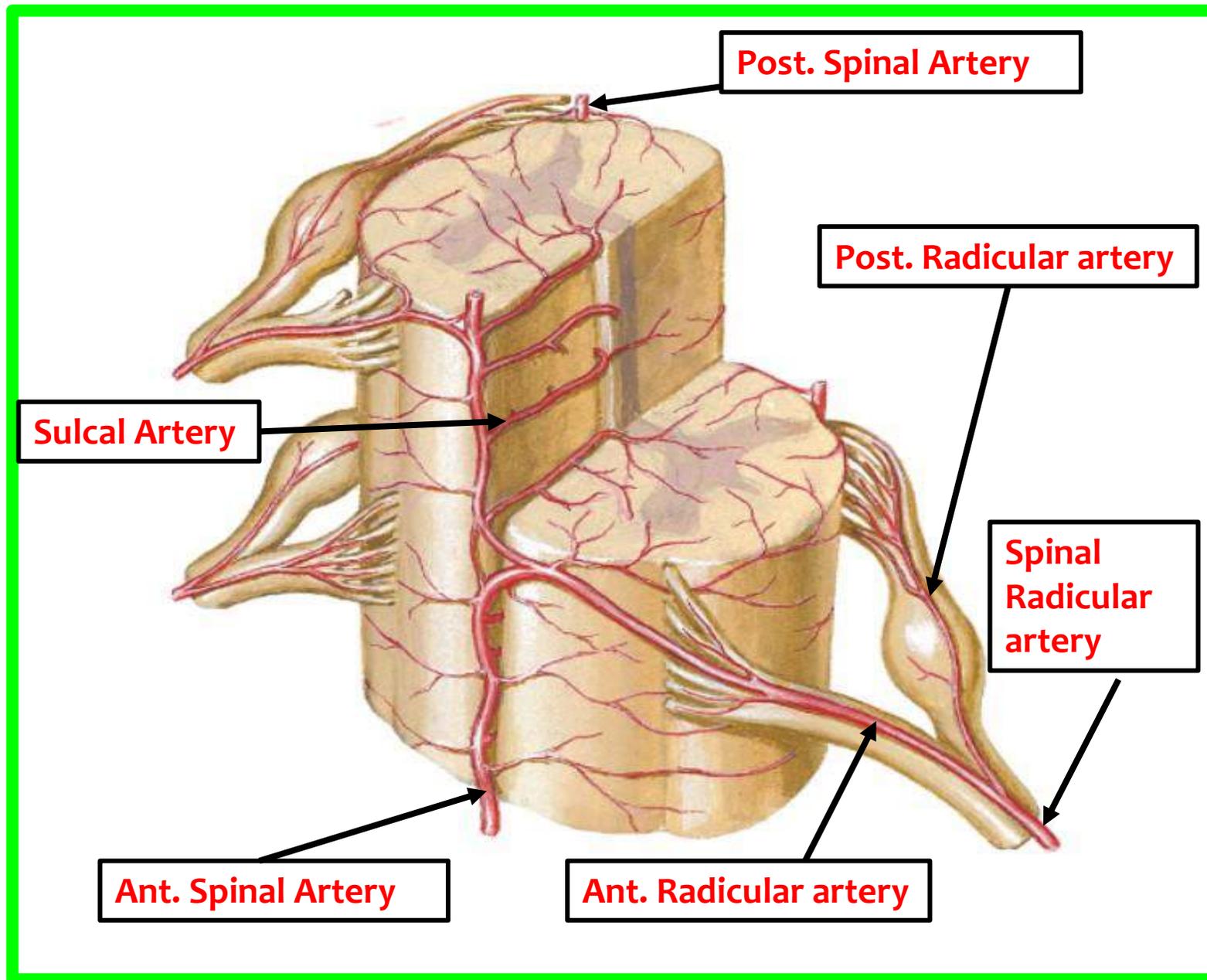
✓ They enter the vertebral canal through **the intervertebral foramina**.

**A. In the cervical region, from the 2<sup>nd</sup> part of vertebral artery and ascending cervical artery (from inferior thyroid artery).**

**B. In the thoracic region, from the posterior intercostal and subcostal arteries.**

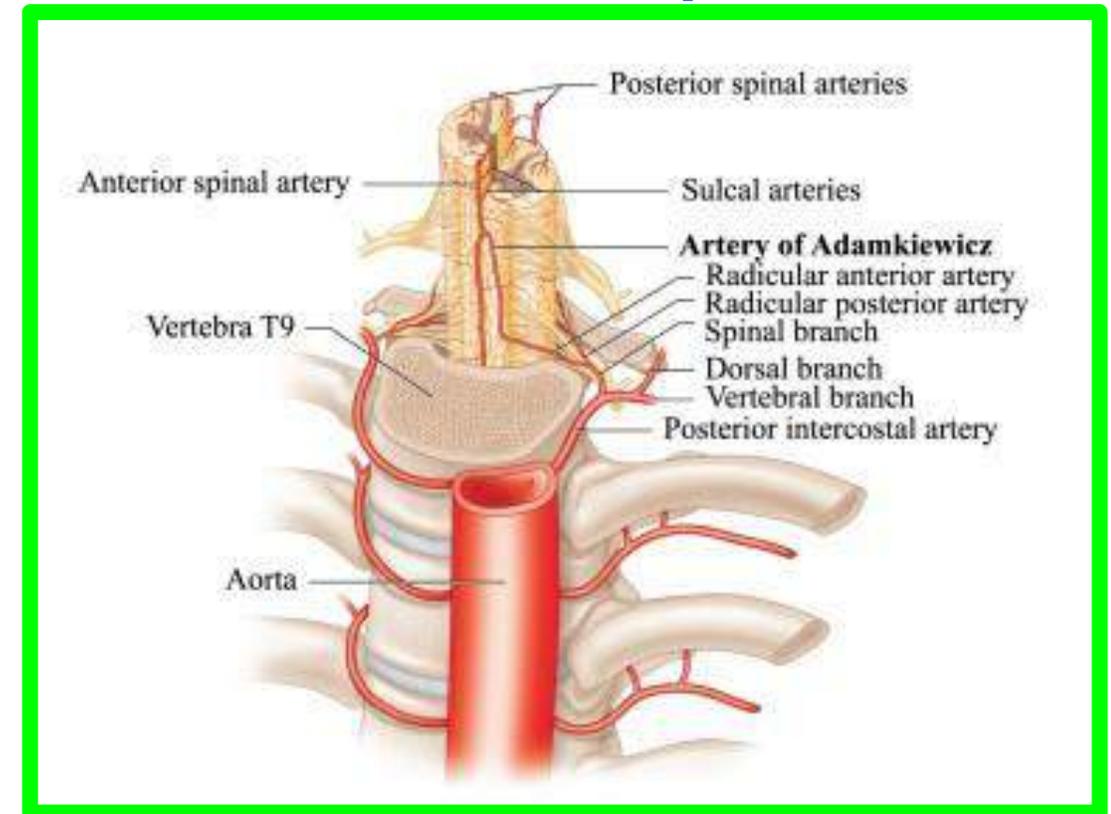
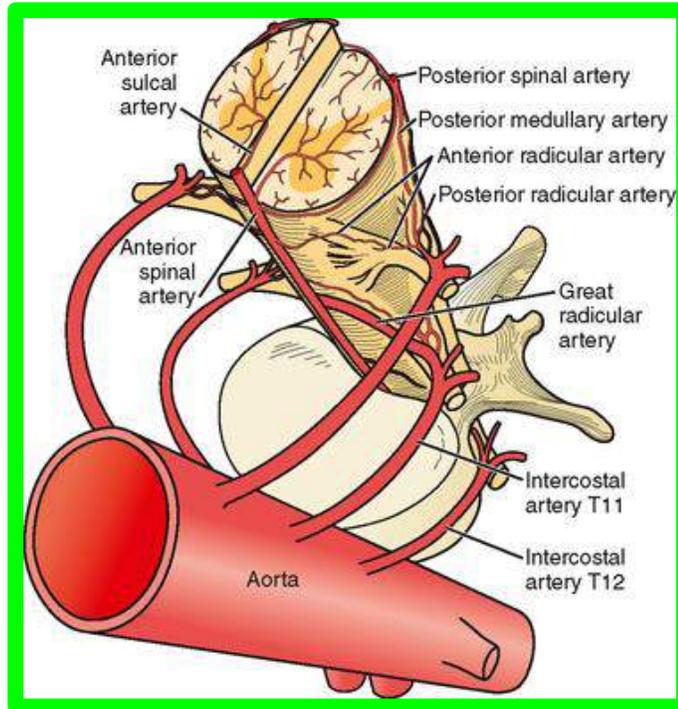






## ❑ Blood supply of the Spinal Cord

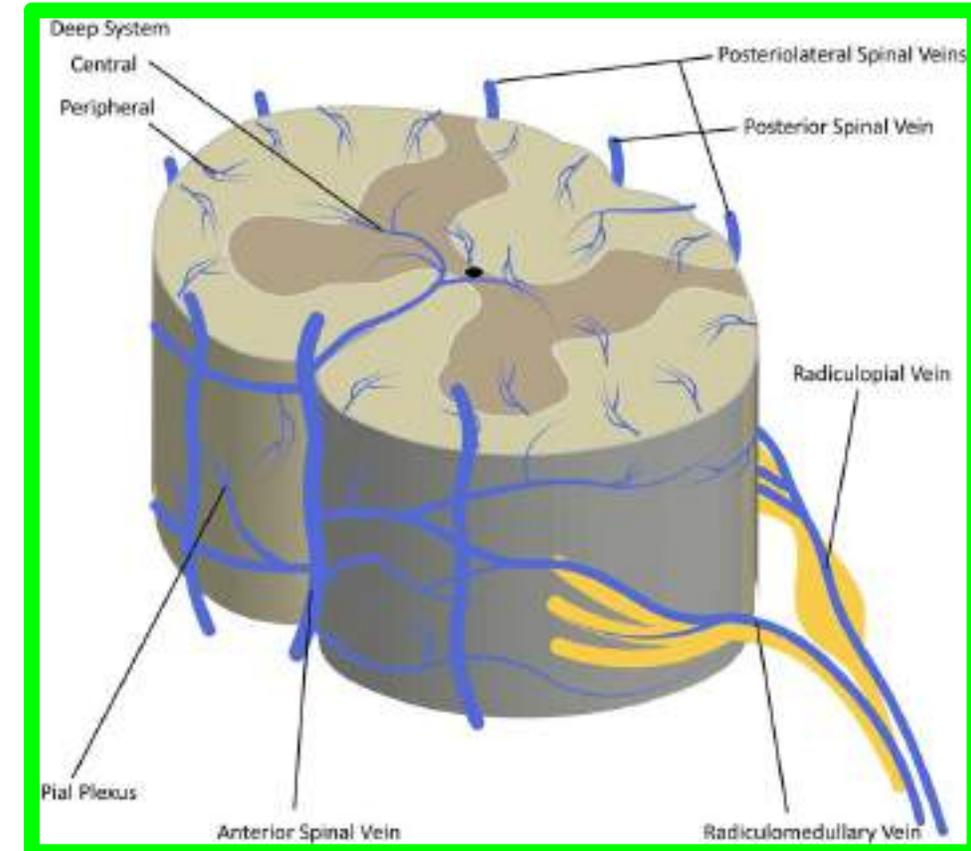
- ✓ **Arteria Radicularis magna: (Artery of Adamkiewicz)** it arise from **lower left posterior intercostal (T9-T11), subcostal or upper lumbar arteries.**
- ✓ It is the main source of arterial blood to the **lower 2/3 of the spinal cord (thoracolumbar segments)**



- ✓ Enters the spinal canal via the intervertebral foramen (often **L2-L3**) feeding the **anterior spinal artery.**

# \*\* VENOUS DRAINAGE OF THE SPINAL CORD

- ✓ There are **6 main longitudinal veins** which run along the spinal cord.
- ✓ These veins have definite positions in relation to the cord. They are:
  1. One vein in the **anterior median fissure**.
  2. One vein in the **posterior median sulcus**.

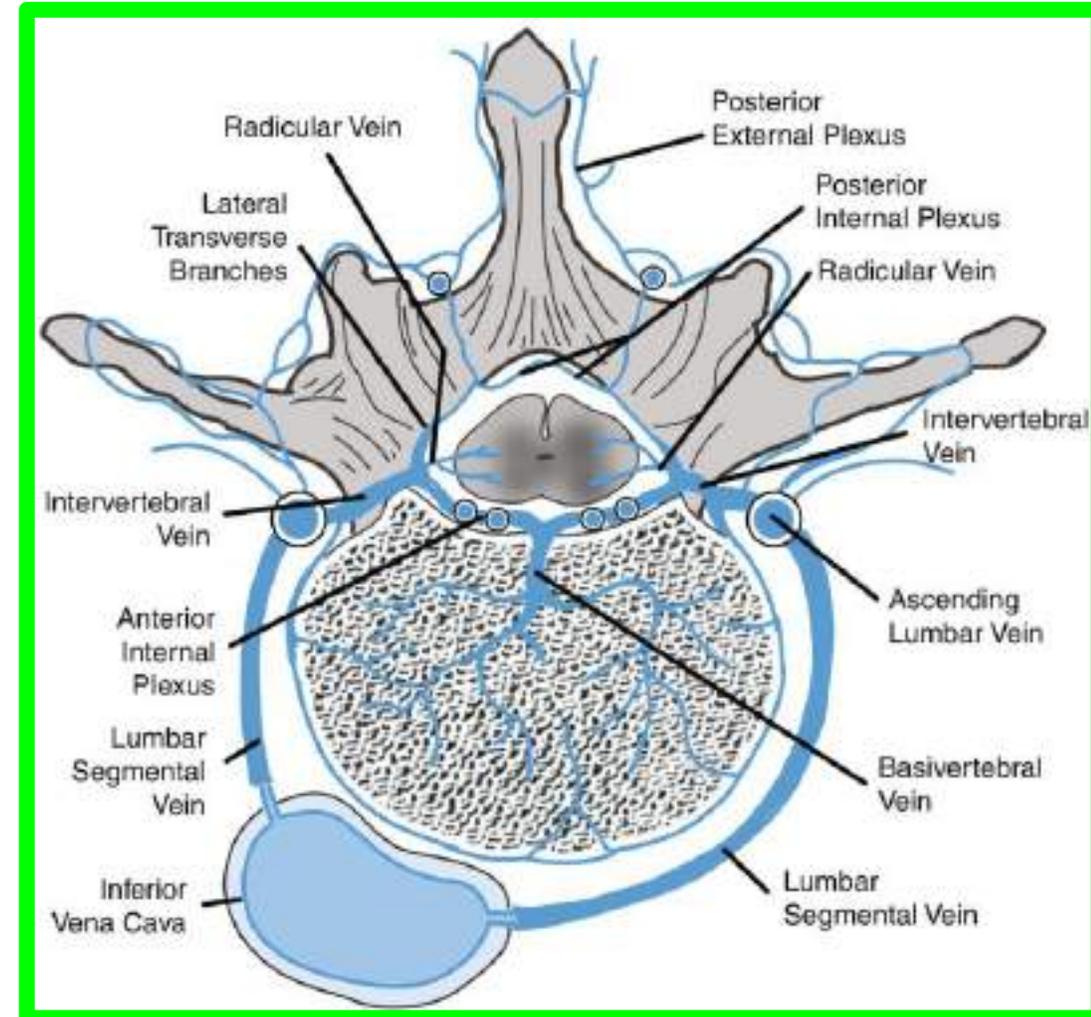
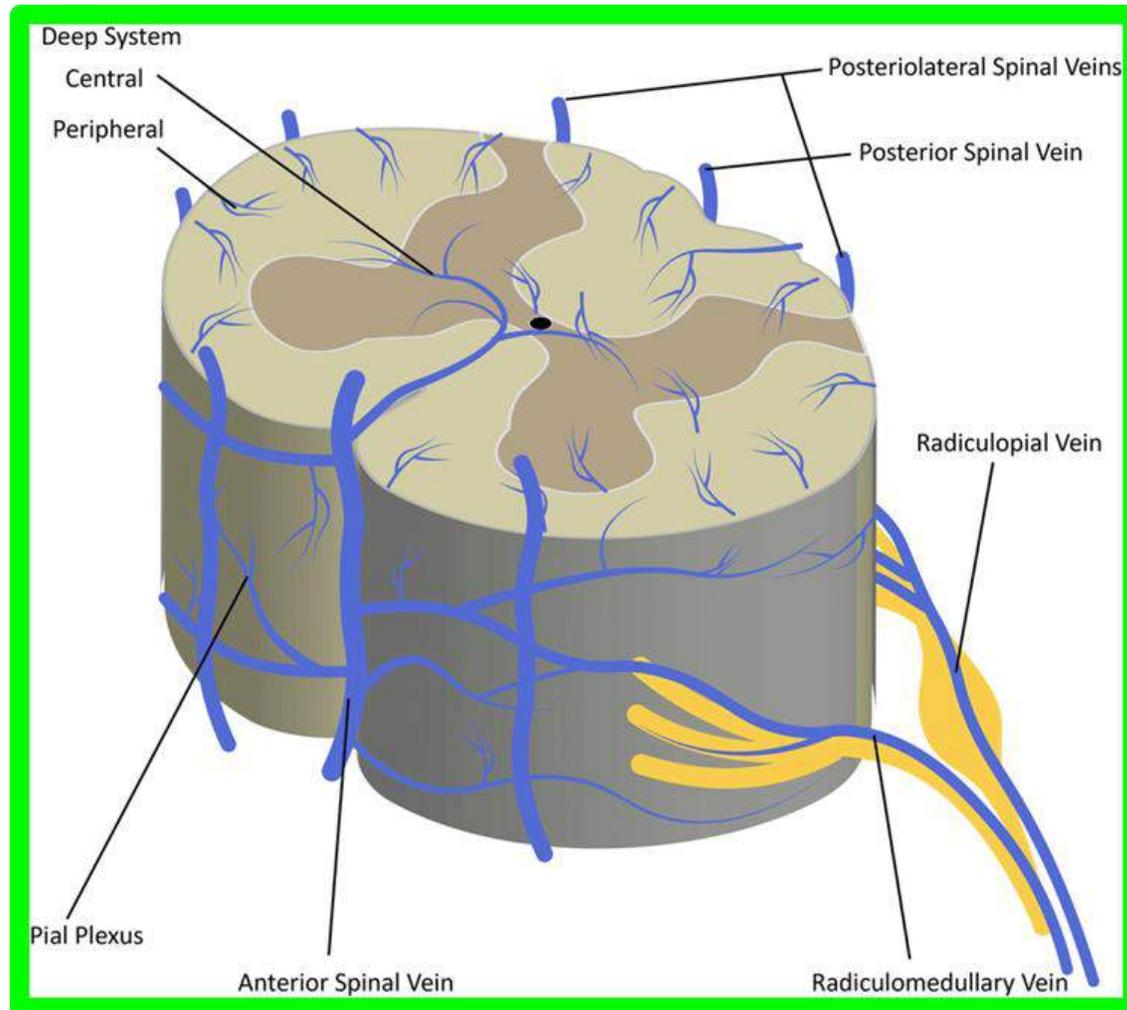


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# \*\* VENOUS DRAINAGE OF THE SPINAL CORD

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3. Two veins, one behind each **ventral root of the spinal nerve**.
4. Two veins, one behind each **dorsal root of the spinal nerve**.



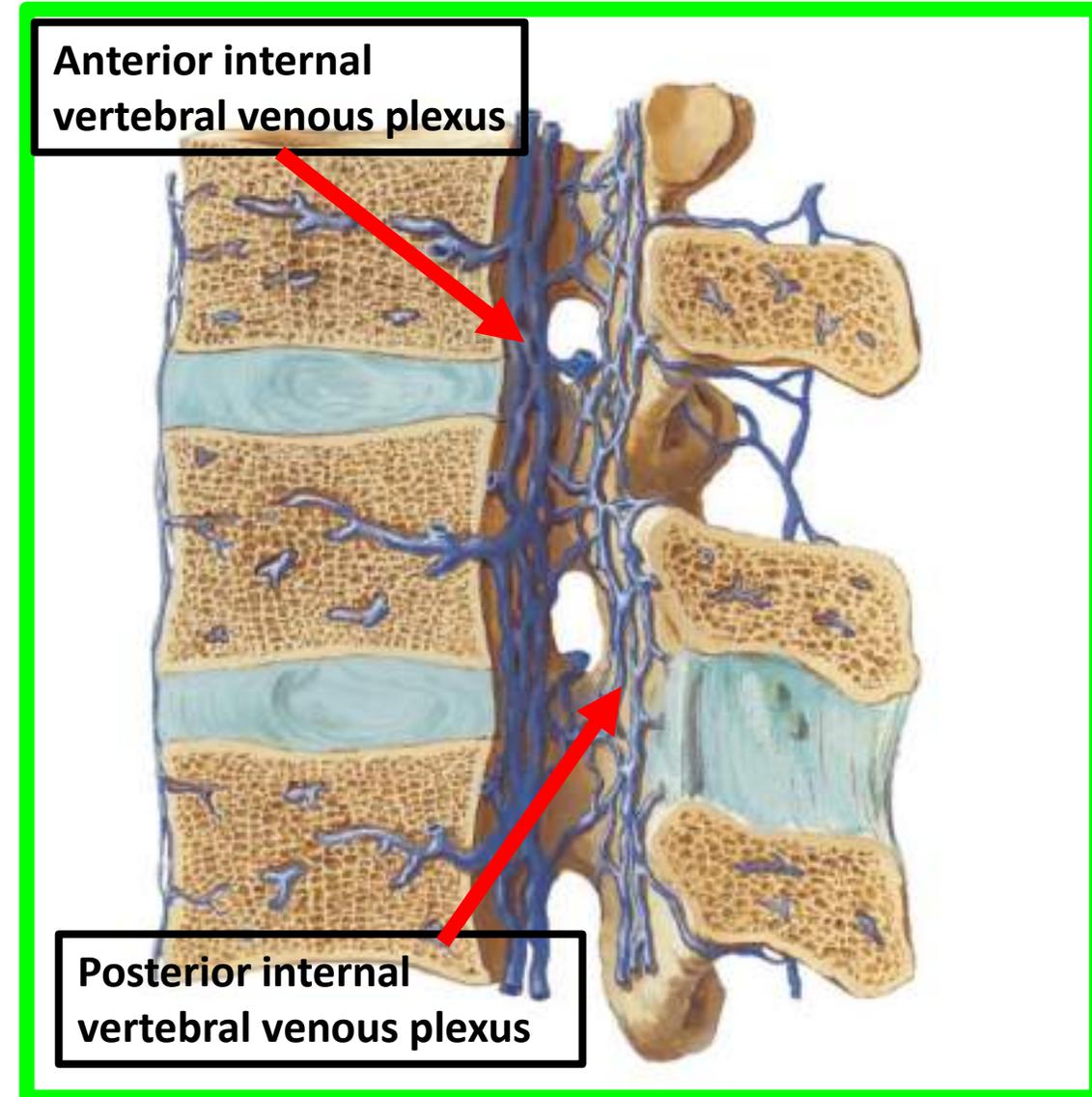
# \*\* VENOUS DRAINAGE OF THE SPINAL CORD

✓ The 6 longitudinal spinal veins anastomose freely with each other around the spinal cord.

✓ They drain as follow;

1. **Superiorly**, they communicate with the **dural venous sinuses**.

2. **Laterally**, they open into the **internal vertebral venous plexus** which is drained by intervertebral veins that emerge from the intervertebral foramina to;



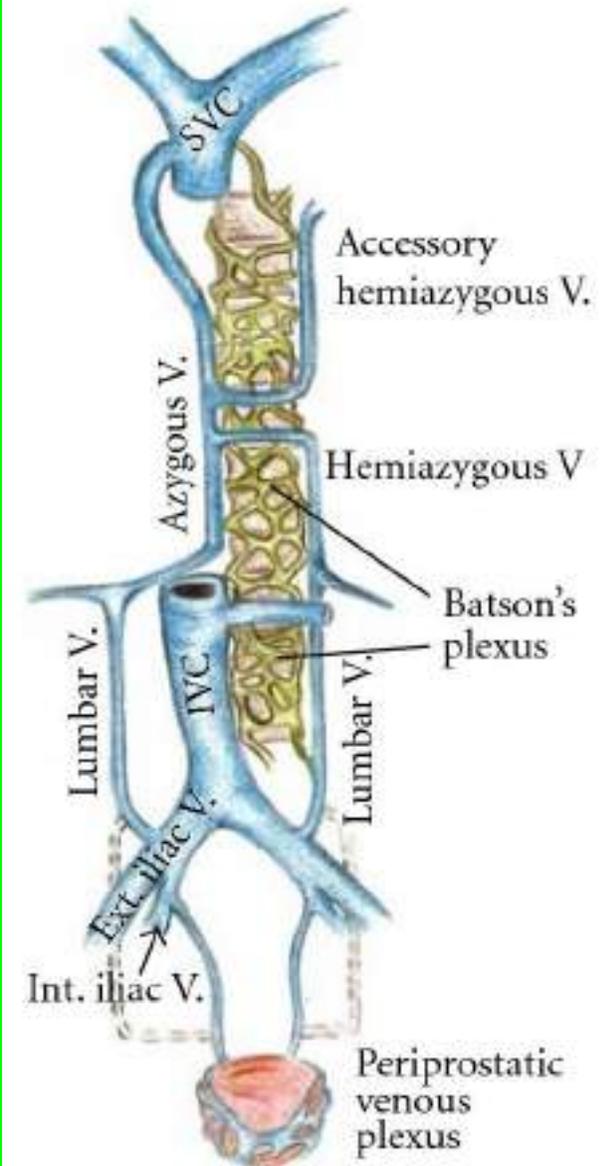
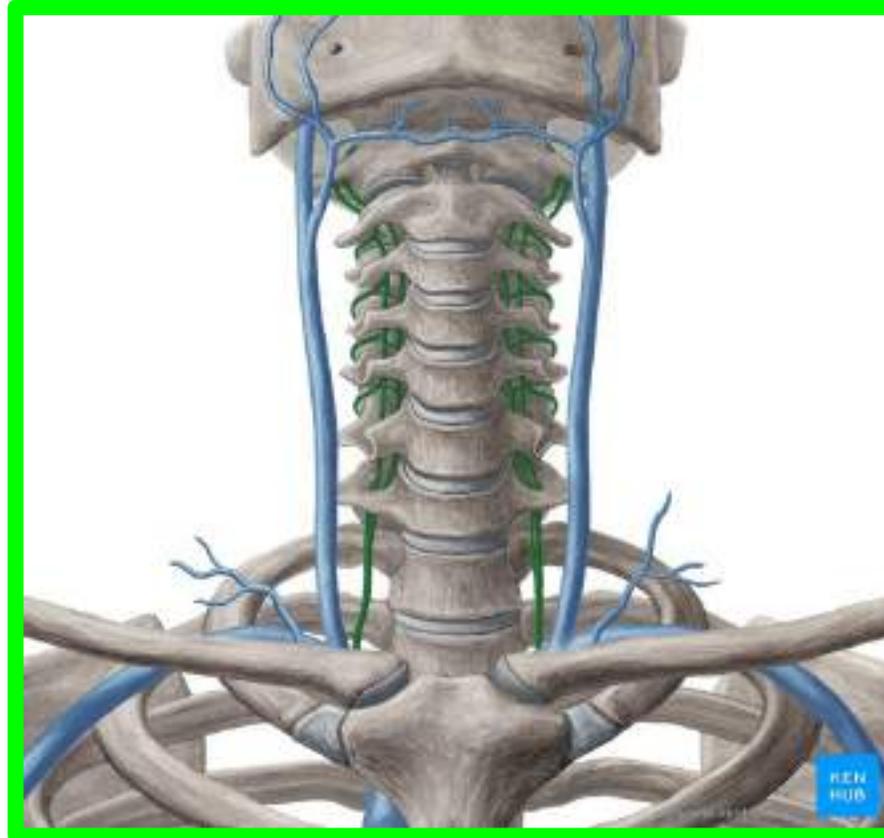
# \*\* VENOUS DRAINAGE OF THE SPINAL CORD

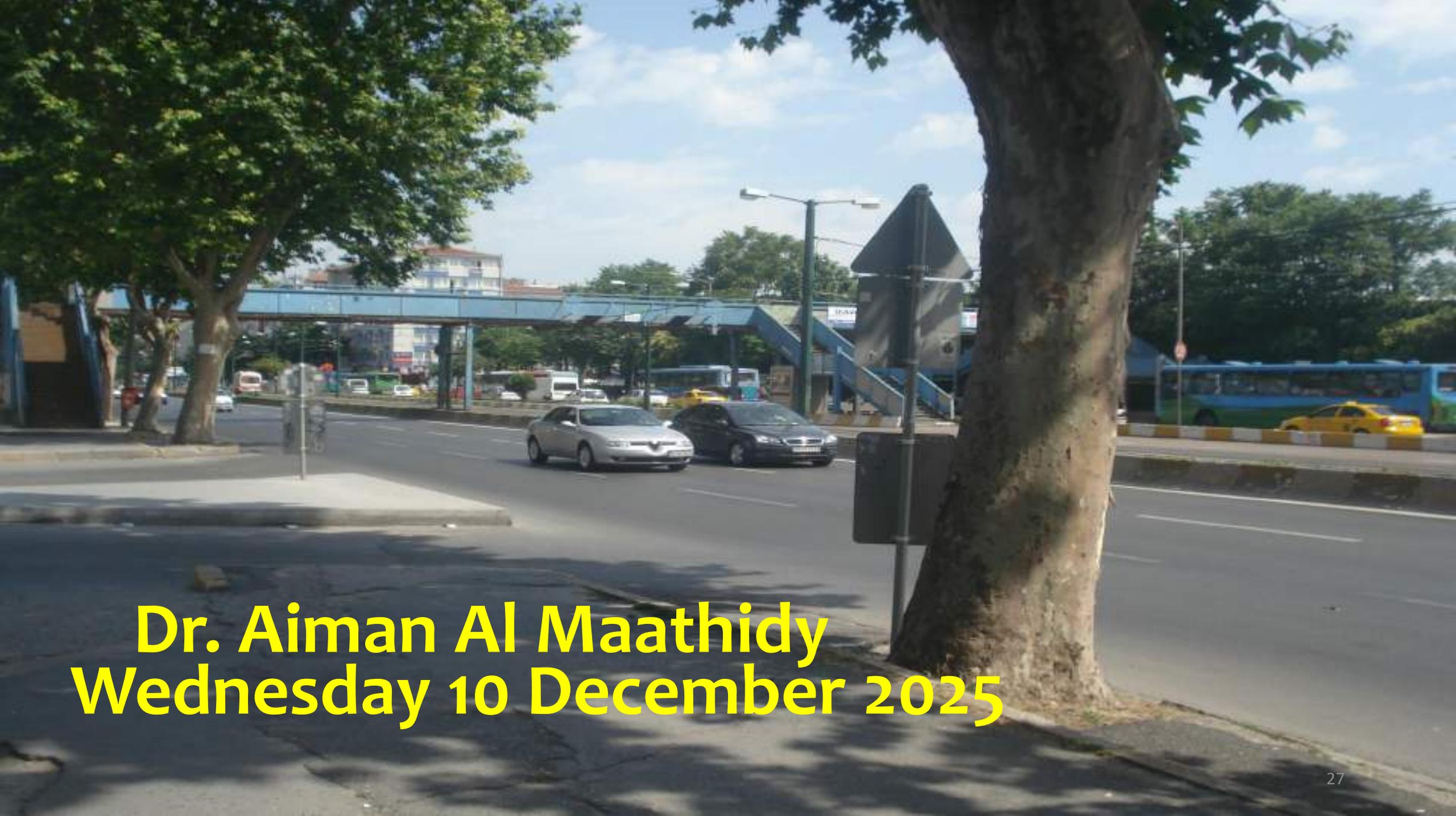
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- The vertebral veins (in the neck).
- The posterior intercostal veins (in the thorax).
- The lumbar veins (in the abdomen).
- The lateral sacral veins (in the pelvis).

**N.B,** the internal vertebral venous plexus communicates SVC with the IVC.



A wide-angle photograph of a city street. In the foreground, a large, mature tree with a thick trunk stands on the right side of the frame. The street is paved and has a median. In the middle ground, a blue pedestrian bridge with a glass railing spans across the road. Below the bridge, several cars are driving, including a silver sedan and a dark car. In the background, there are more trees, buildings, and a blue bus. The sky is blue with some light clouds.

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