CENTRAL NERVOUS SYSTEM

The Spinal Cord
Meninges & Blood Supply

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Thursday 12 December 2024

• Meninges

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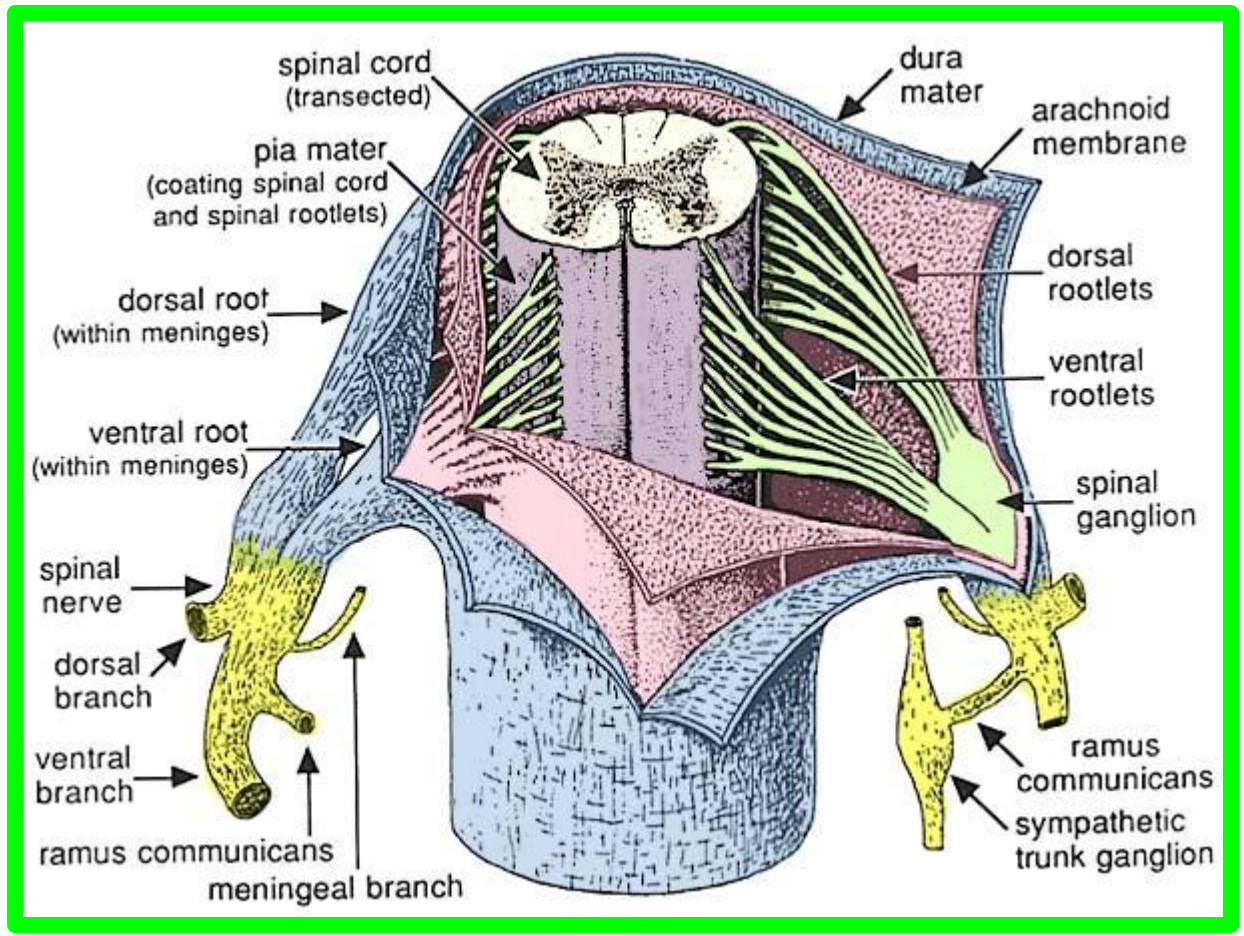
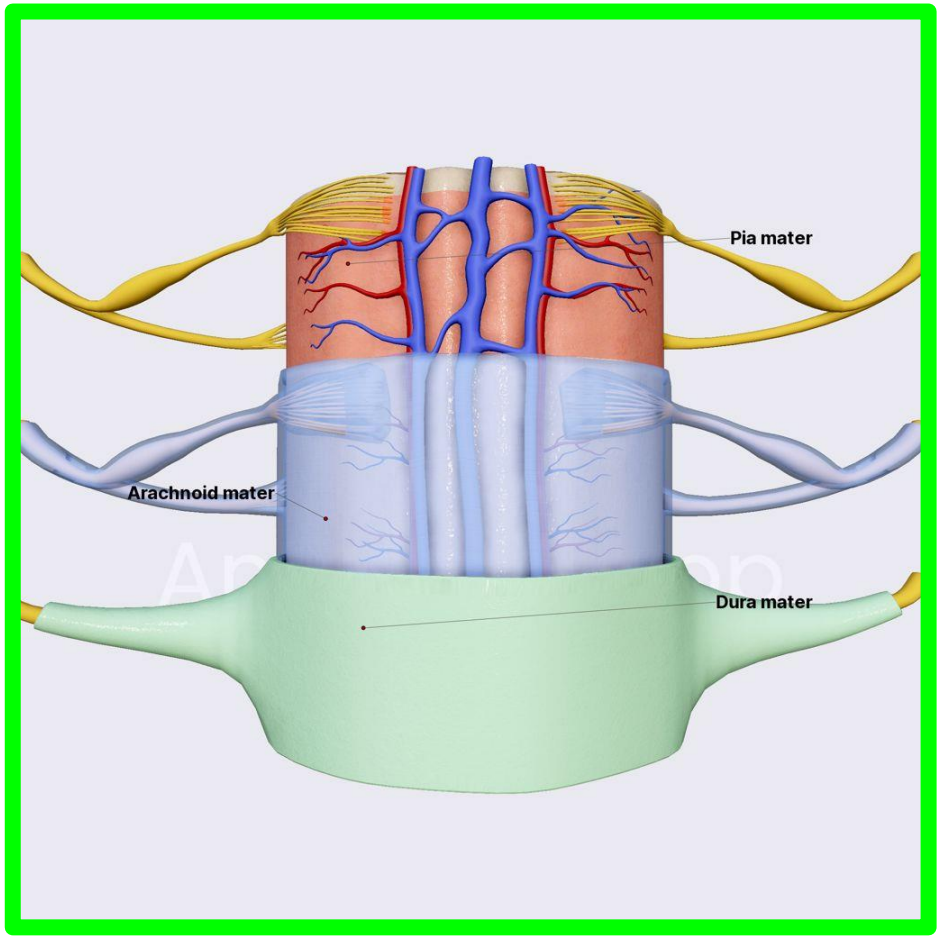
- ✓ Meninges provide a protection of the central nervous system.
- ✓ The spinal cord is surrounded by 3 membranes which are continues with those of the brain at the foramen magnum,



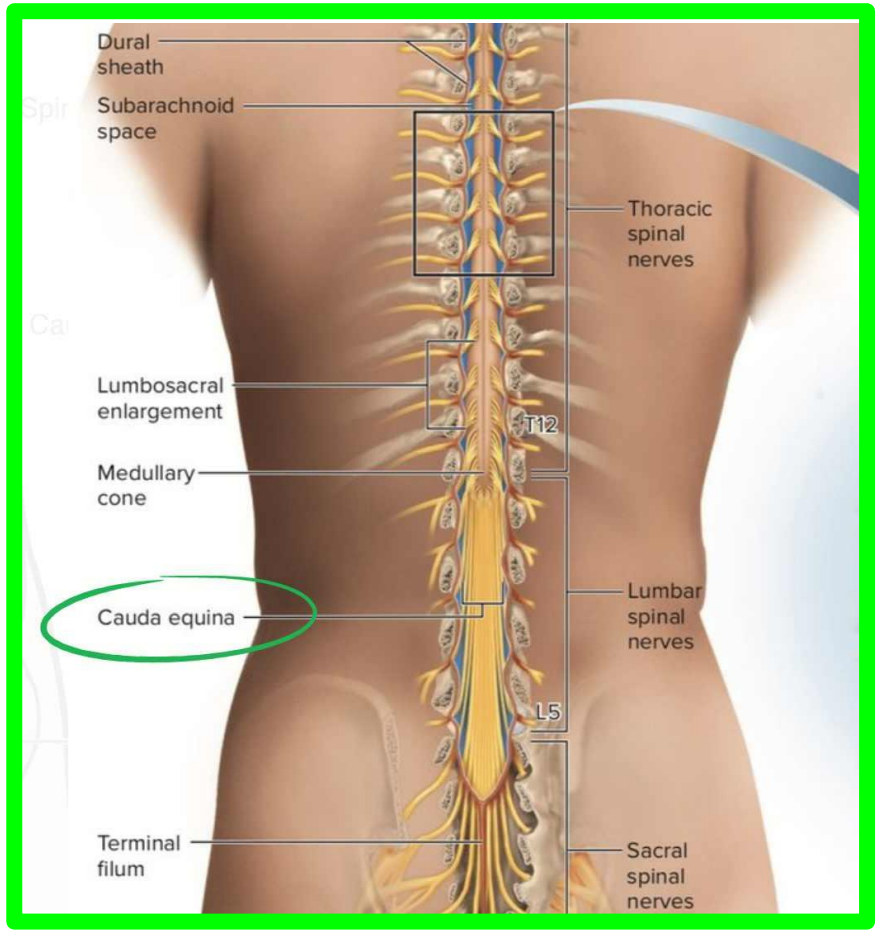


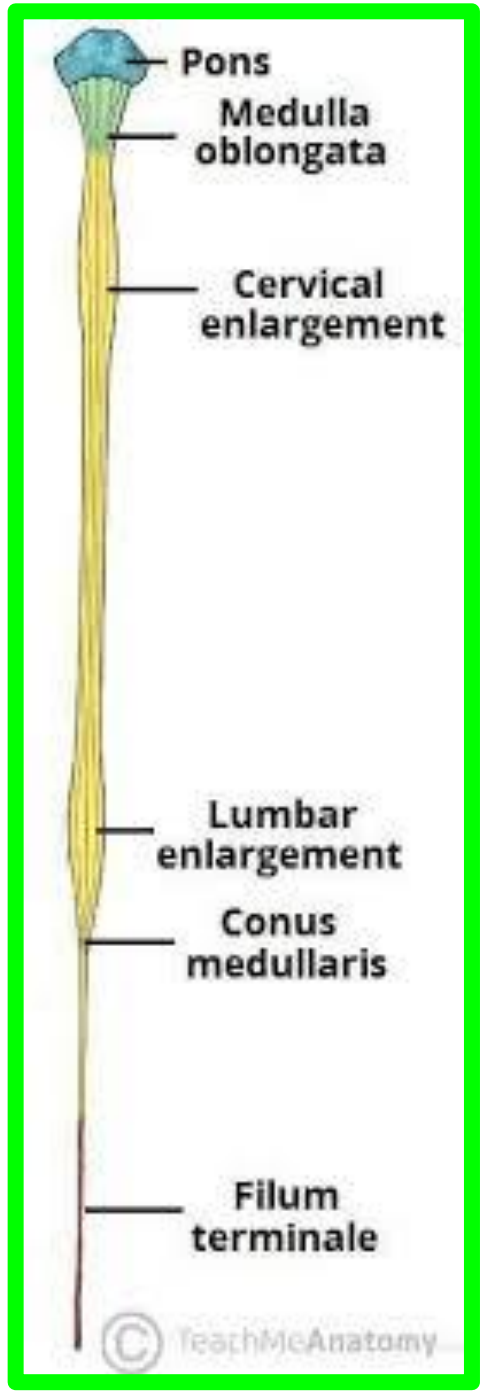
• Meninges

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.

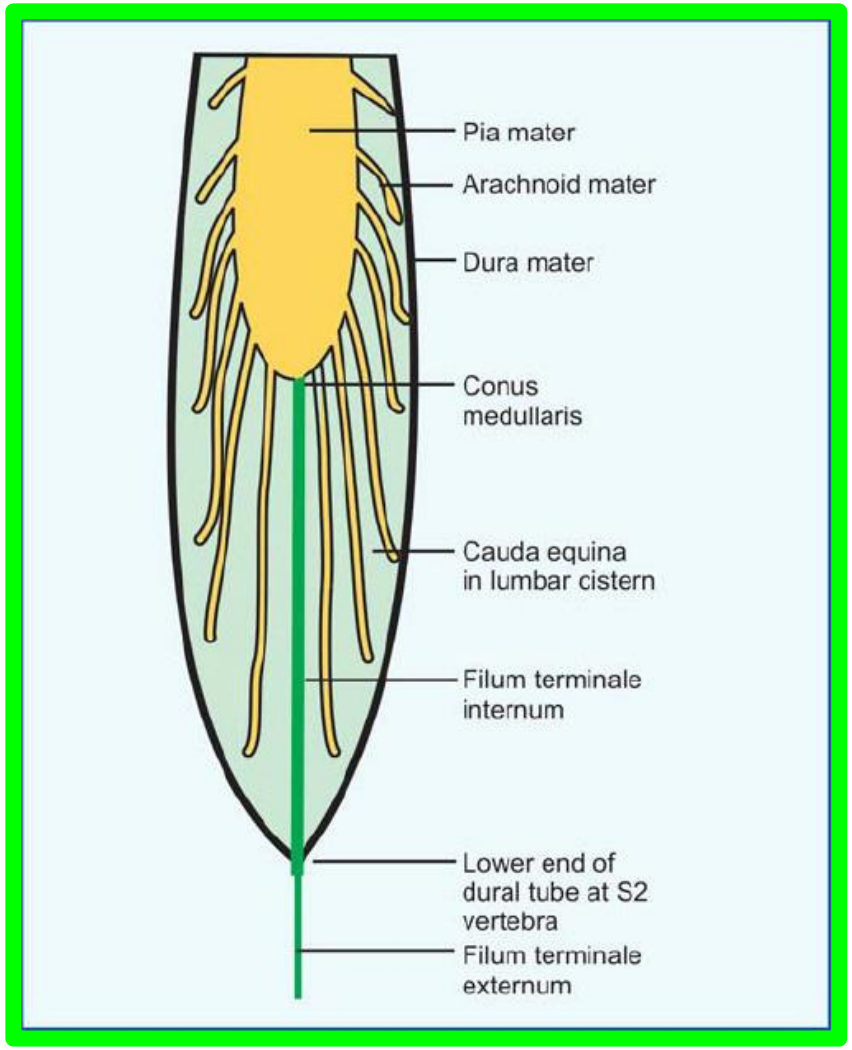


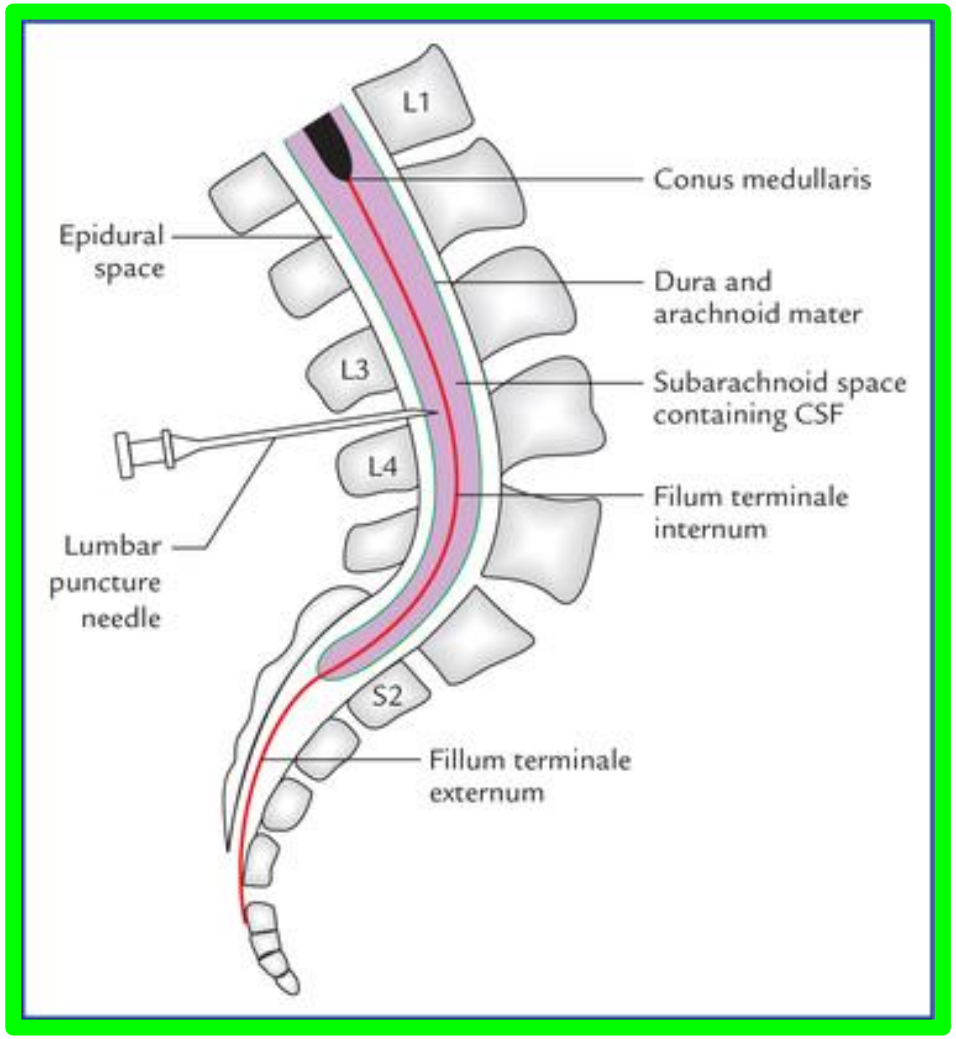


• Meninges

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.**





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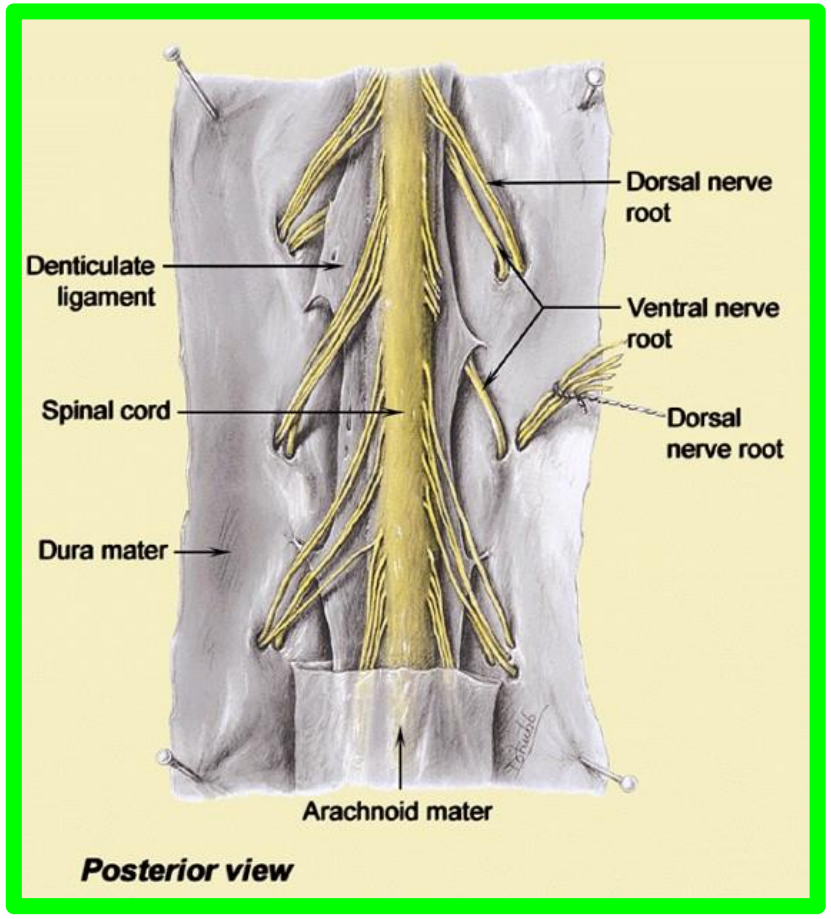
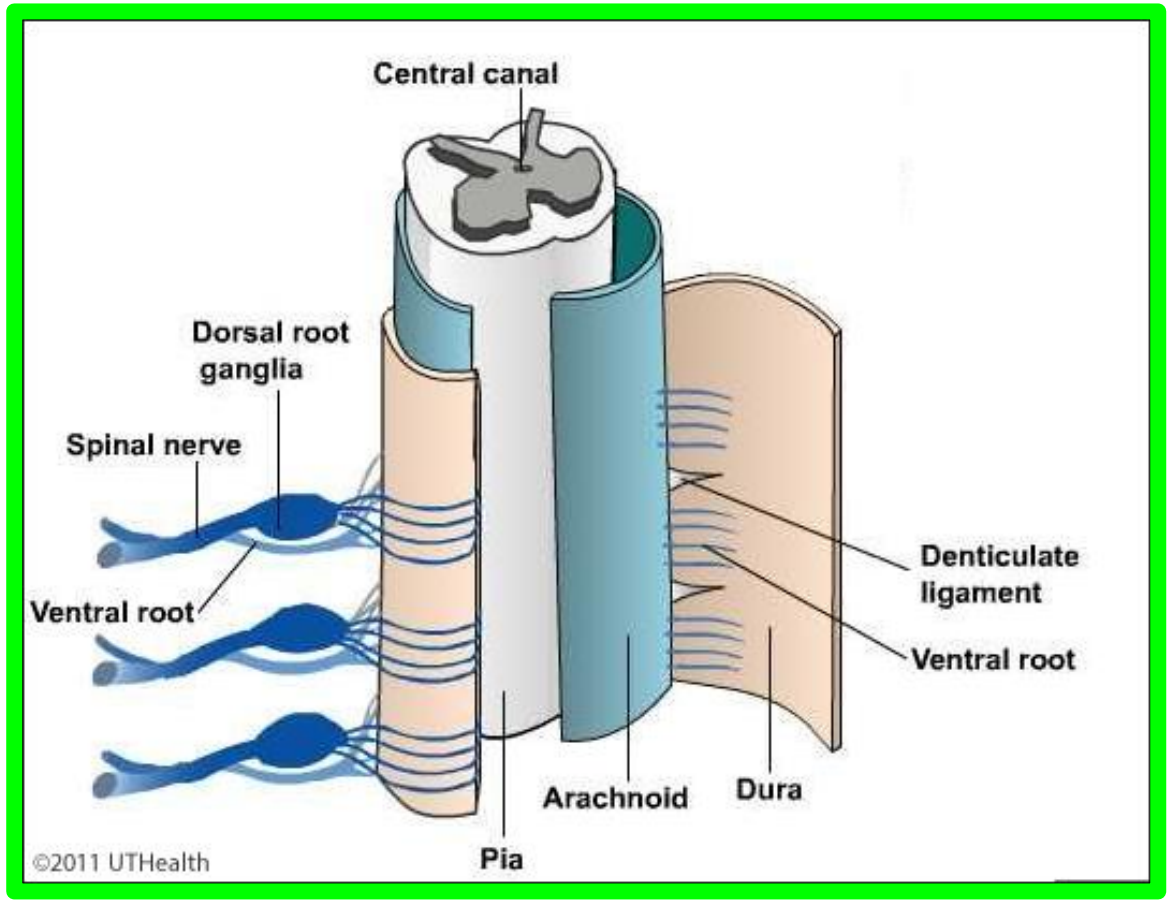
• Meninges

1- Pia Mater

- 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.

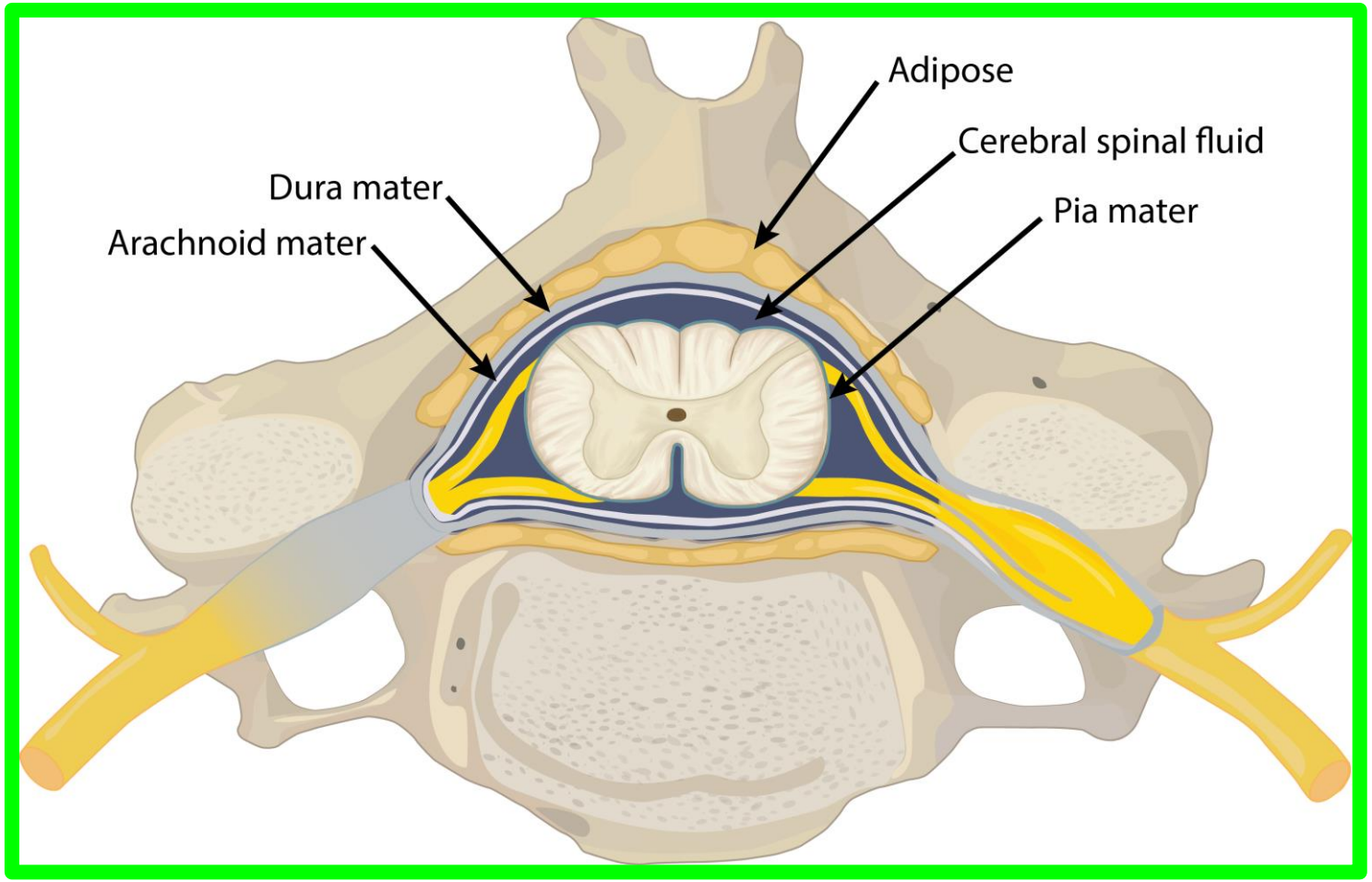


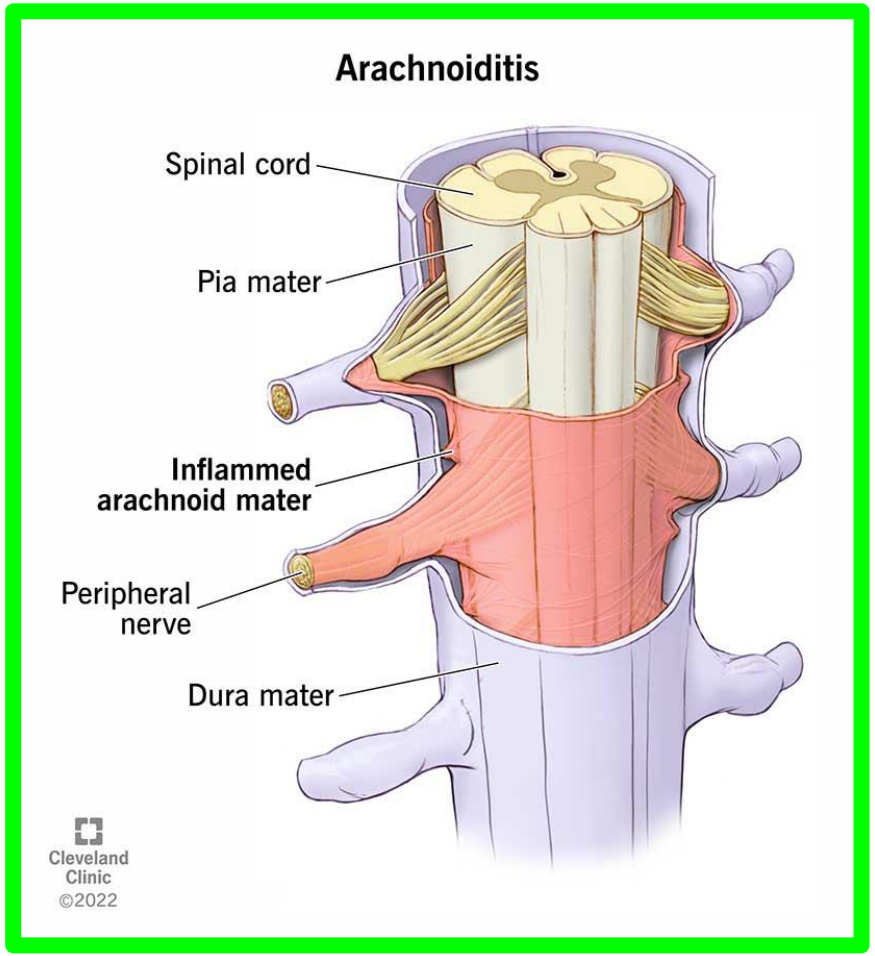


• Meninges

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.





2- Arachnoid Mater

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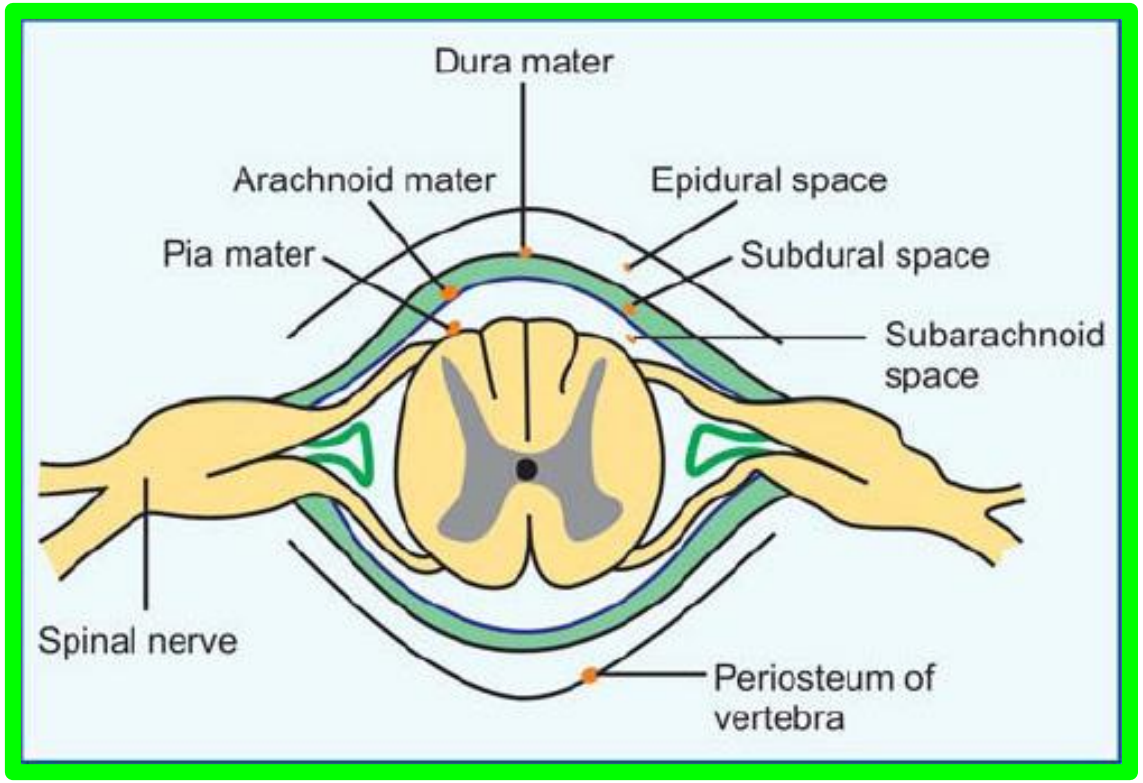
❖ It is separated from the pia mater by **subarachonoid space** that contains;

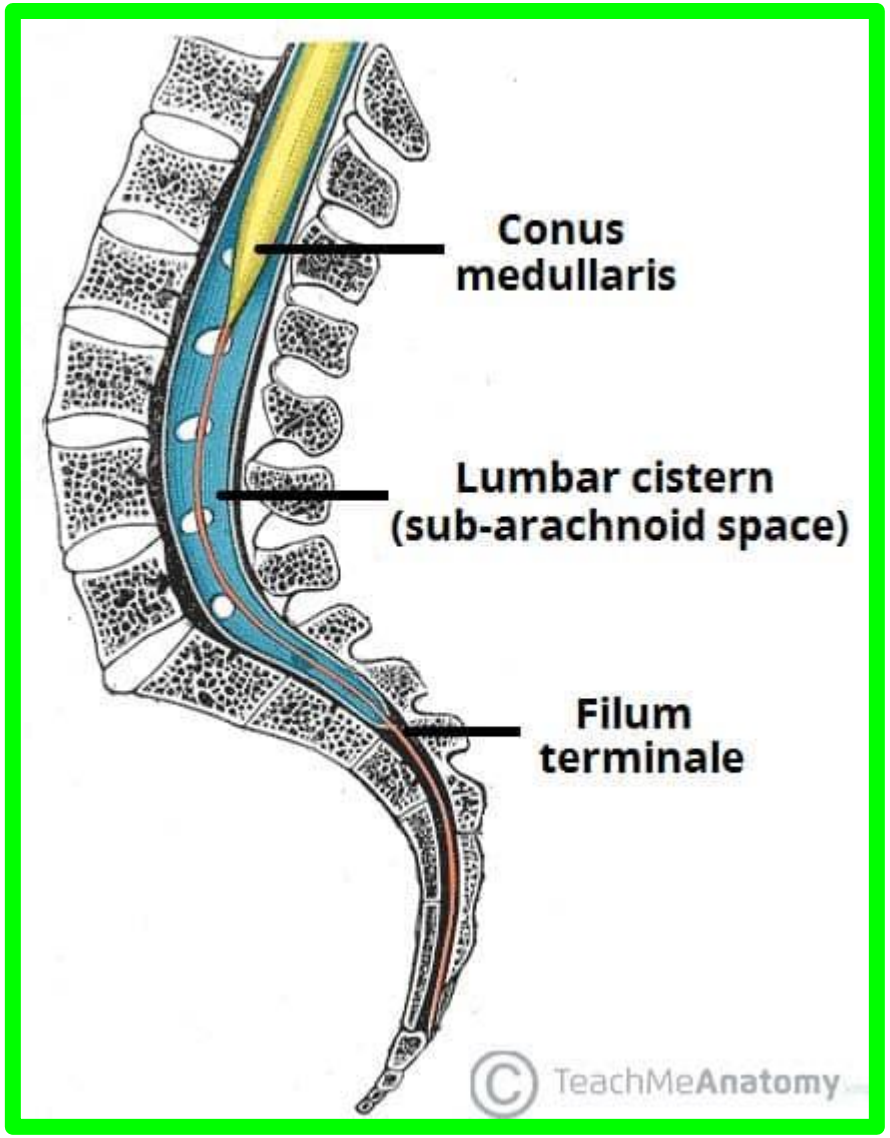
1- Cerebrospinal fluid (CSF).

2- Blood vessels of the spinal cord.

3- Roots of the spinal nerves.

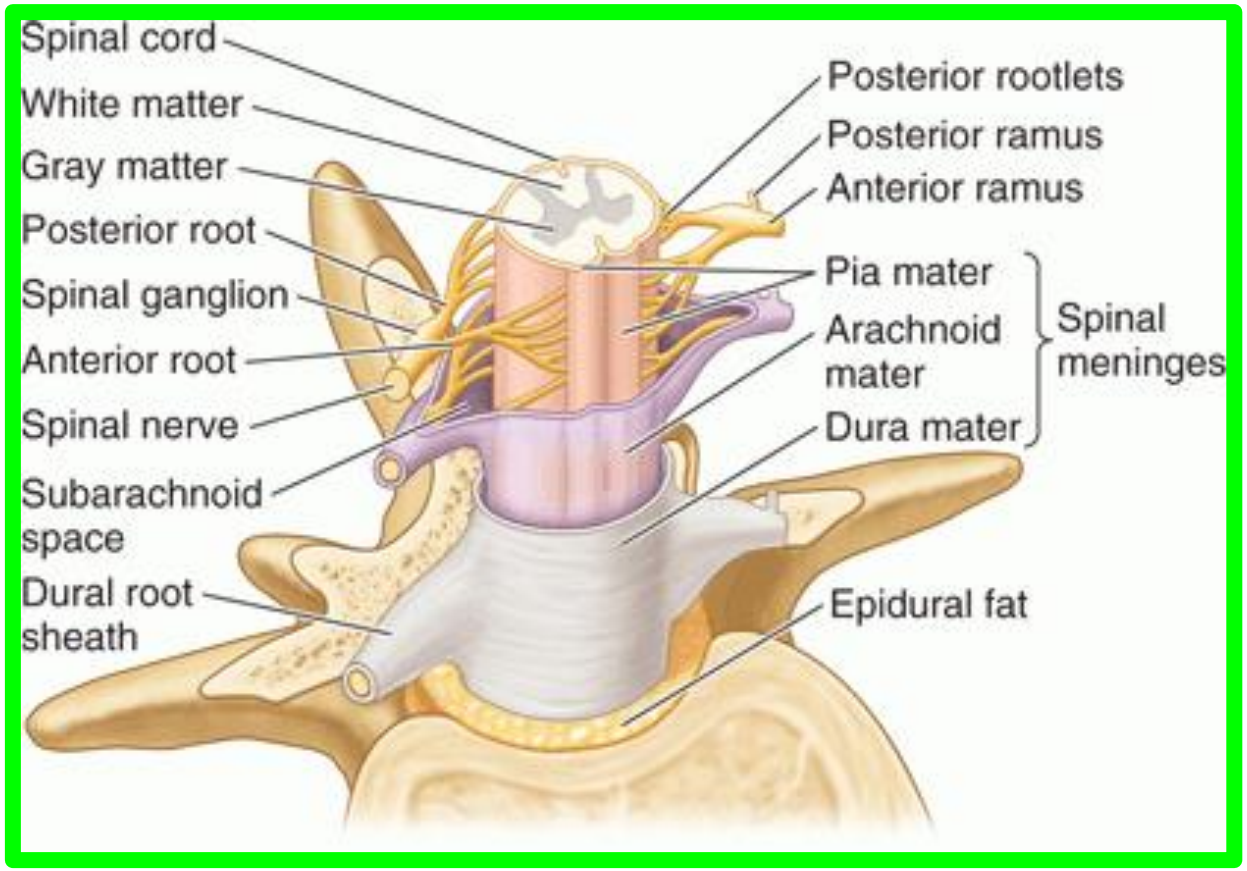
4- Network of the fibrous tissue.

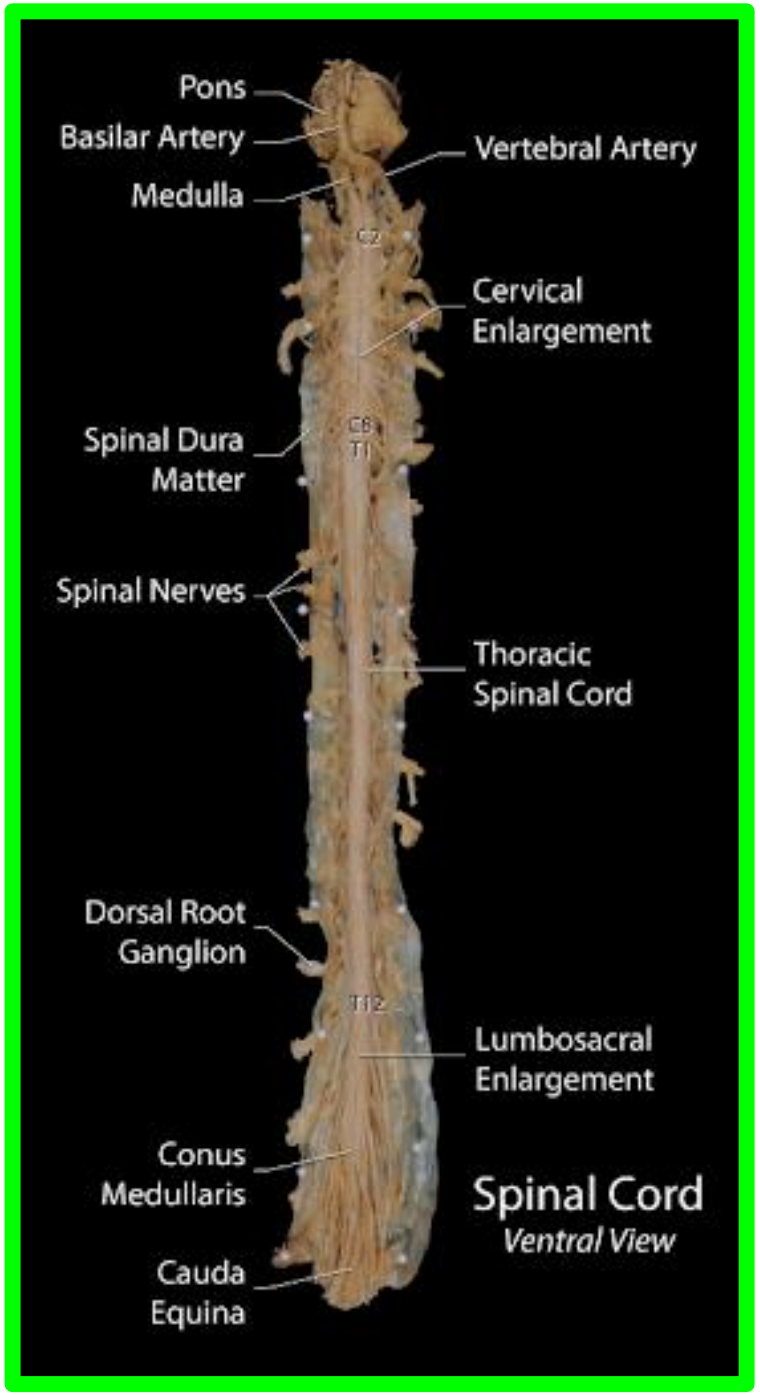




• Meninges 3- Dura Mater

- ❖ 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

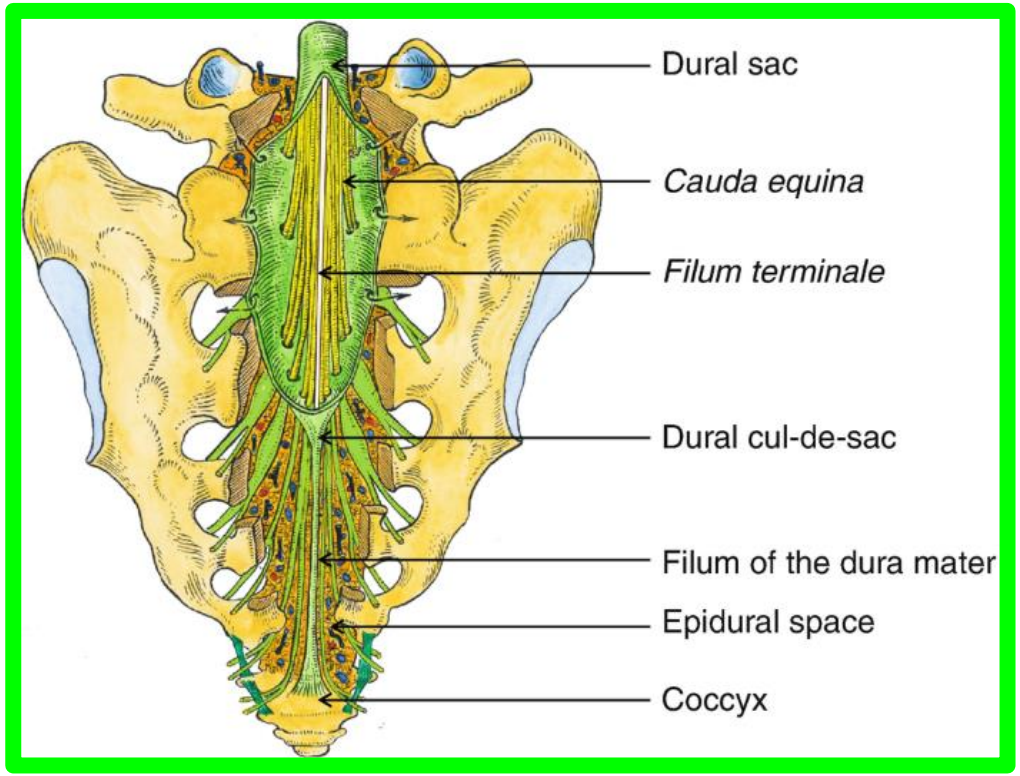
❖ It is attached to;

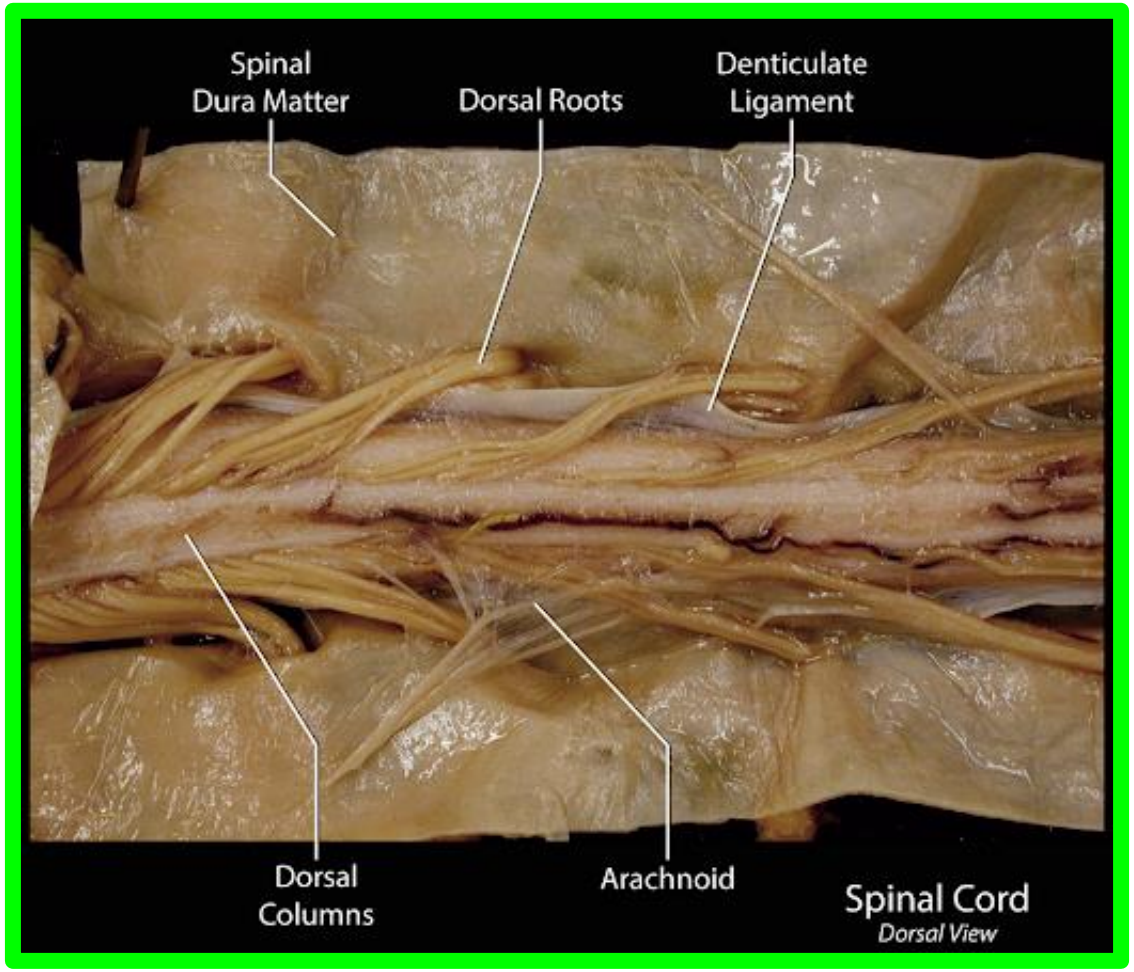
a- The margin of the foramen magnum.

b- The margin of the intervertebral foramen.

c- The back of S2.

d- The posterior longitudinal ligament





** Meningeal spaces of the spinal cord

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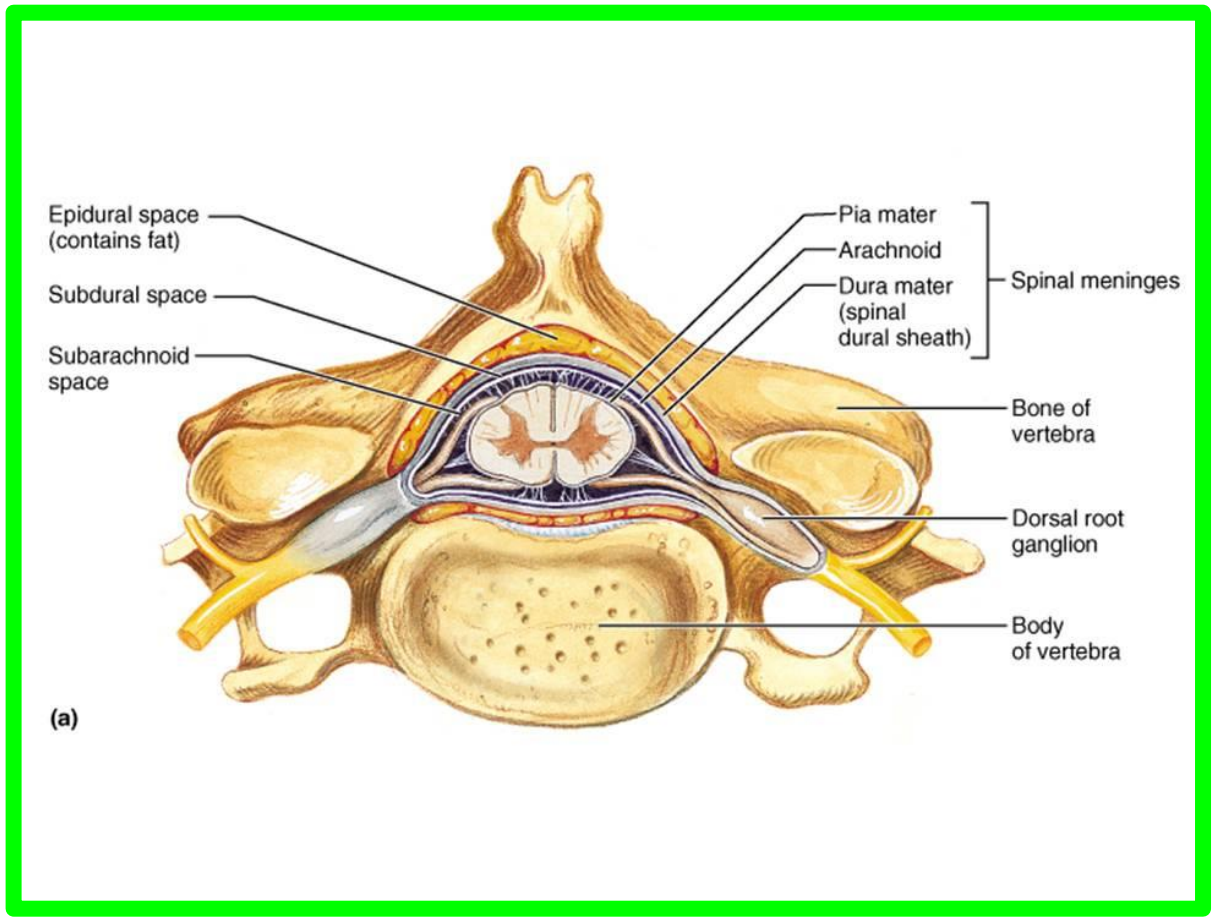
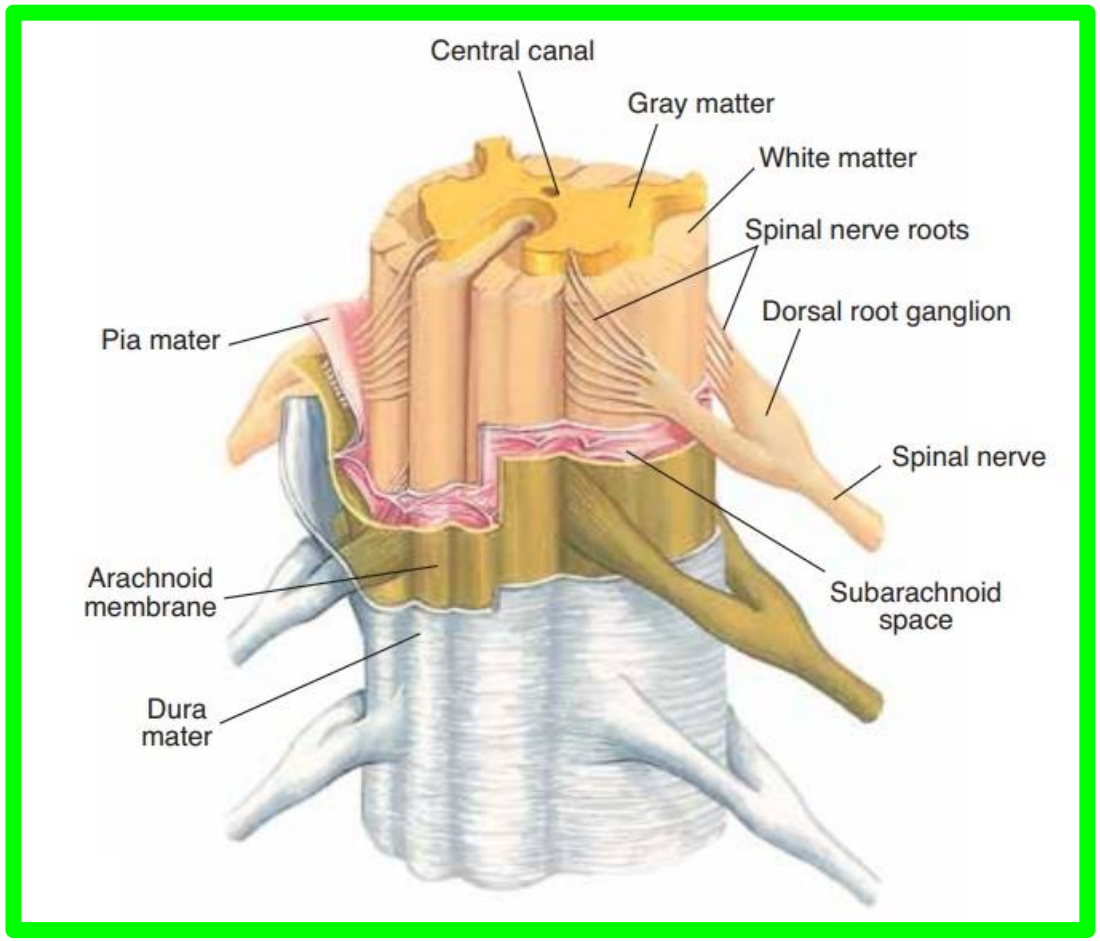
1- Subarachnoid space: between the arachnoid and pia mater.

2- Subdural space: between the dura and arachnoid mater.

✓ It contains a small amount of serous fluid to moisten the surfaces.





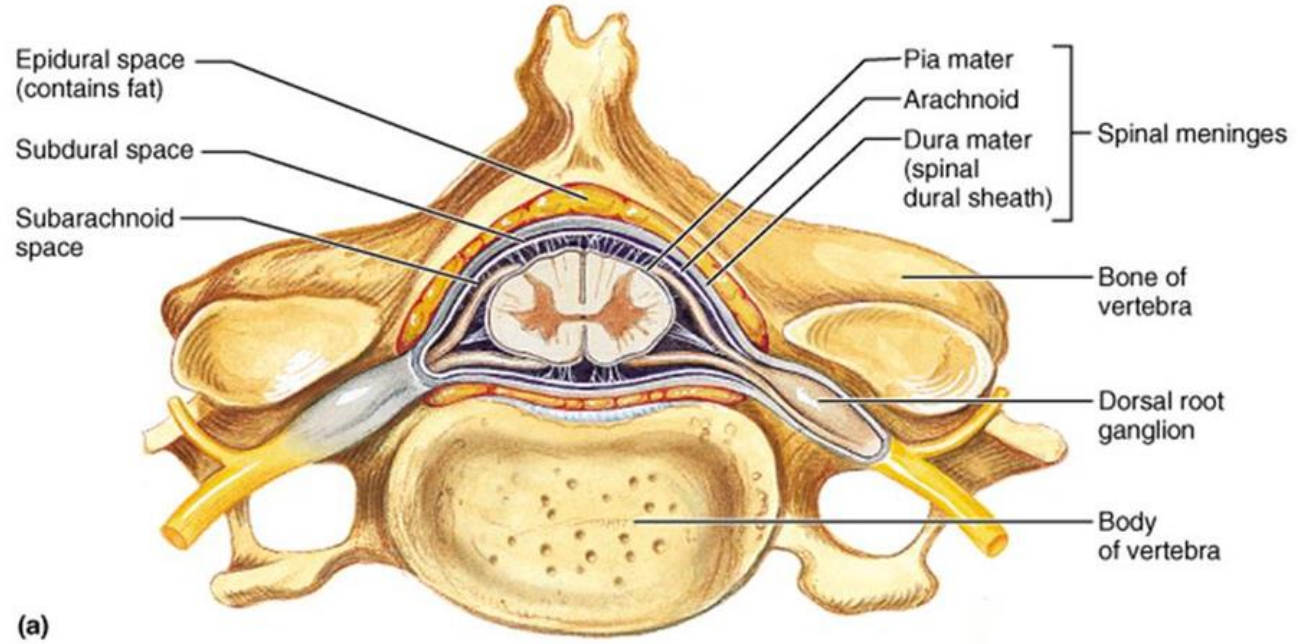
** Meningeal spaces of the spinal cord

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

✓ It contains

a- Loose areolar tissue.

b- Internal vertebral venous plexus



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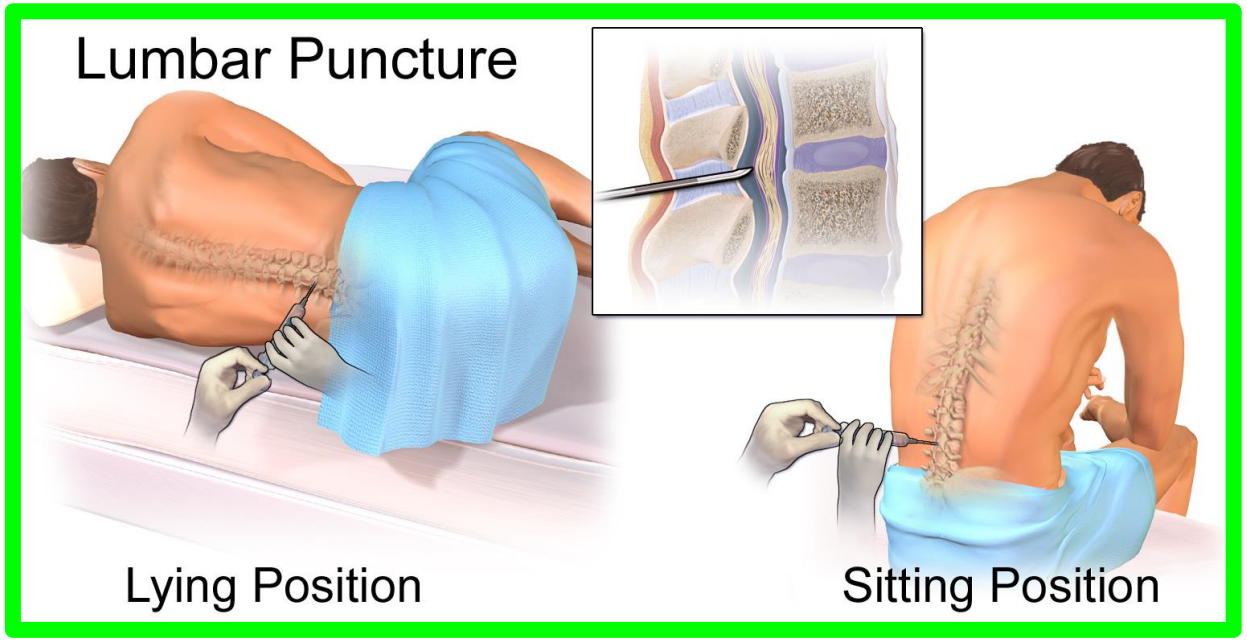
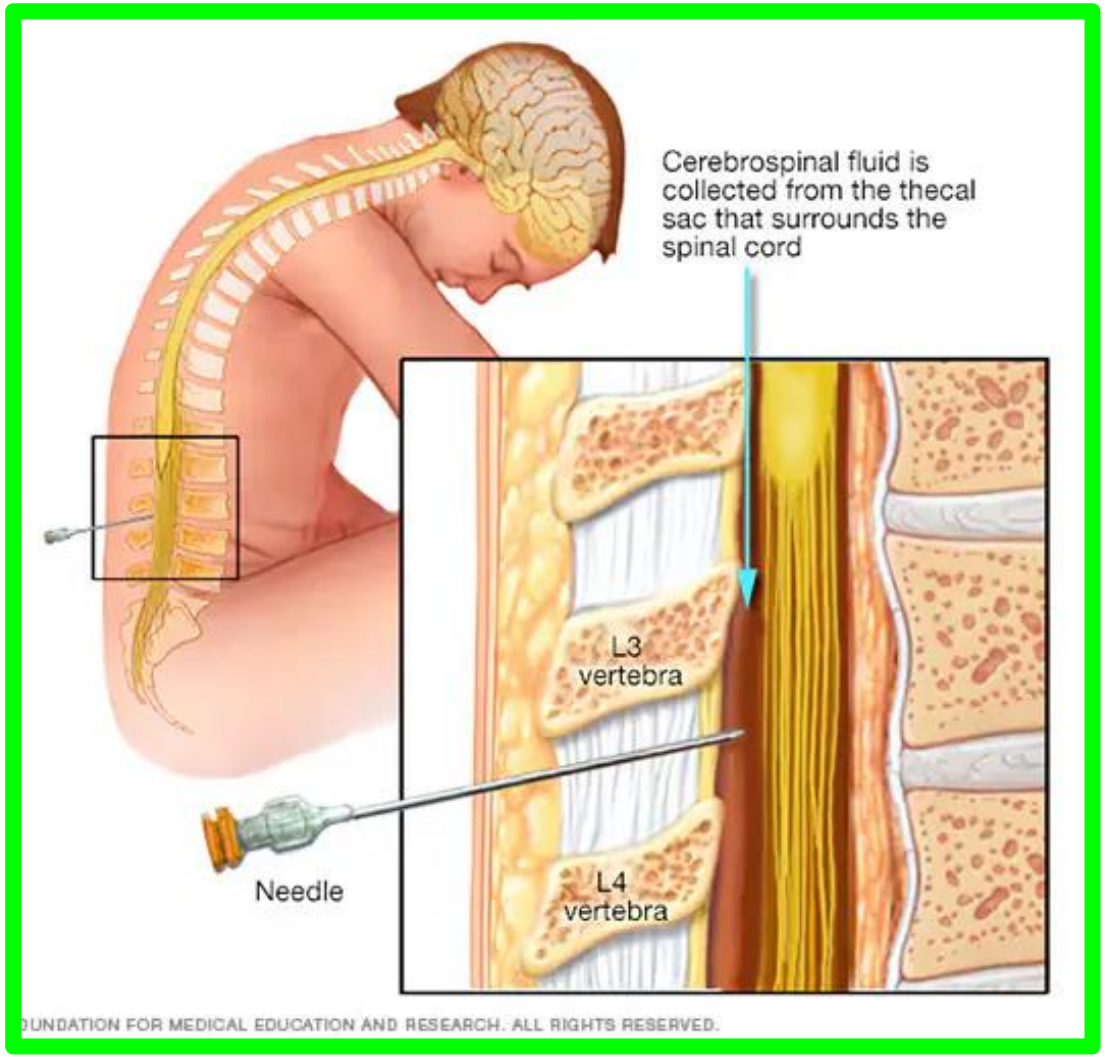
❖ **Lumbar puncture** is done at the intervertebral disc of L3/L4 or L4/L5 to avoid injury of the spinal cord.

❖ It is done for:

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

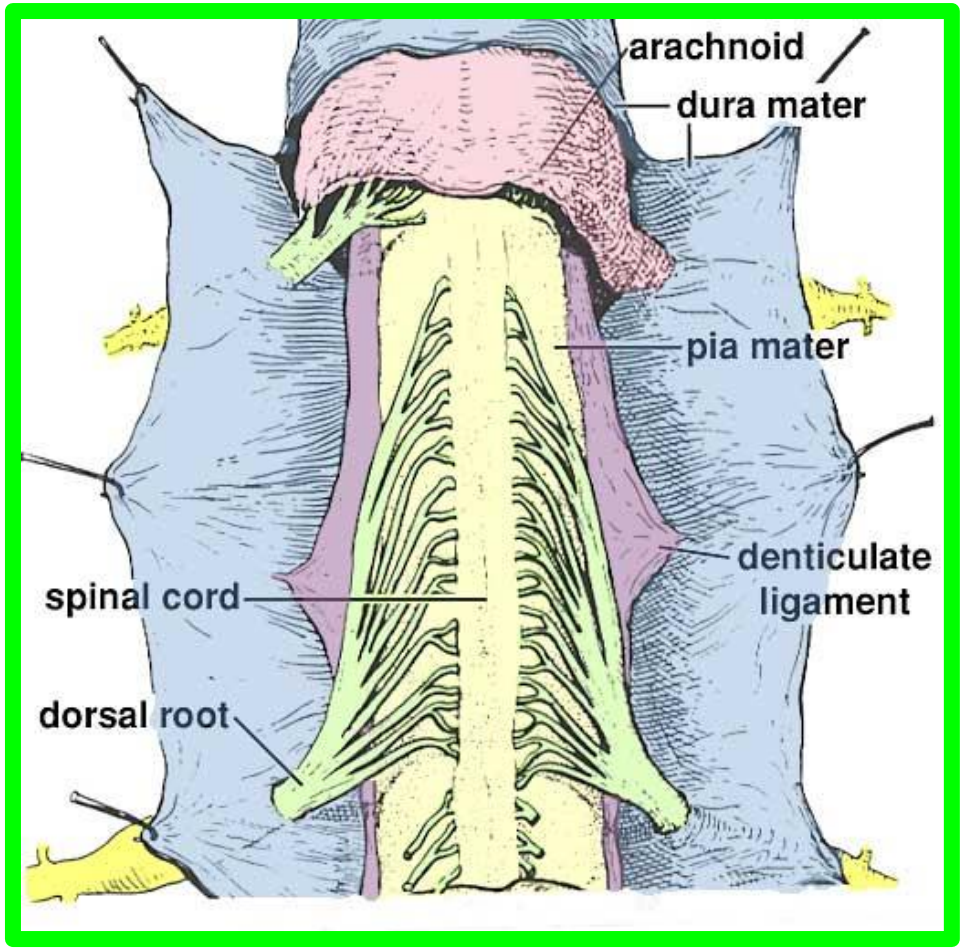


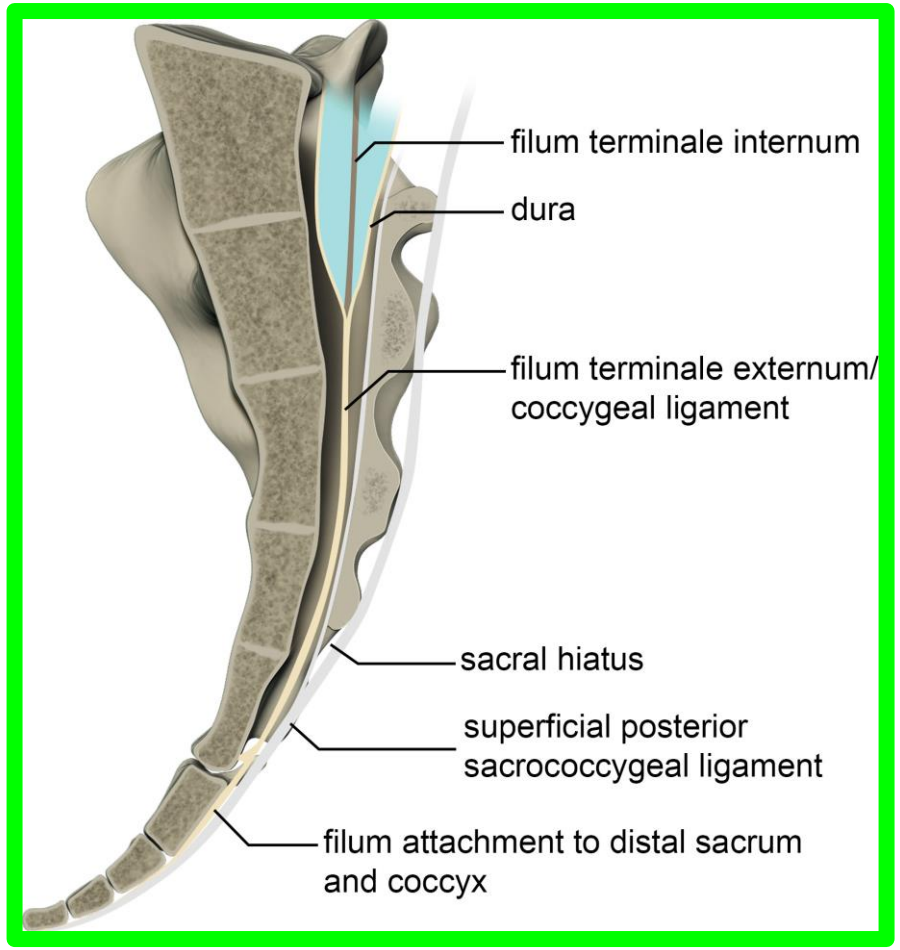


** Factors which Fix of the spinal cord

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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** Factors which Fix of the spinal cord

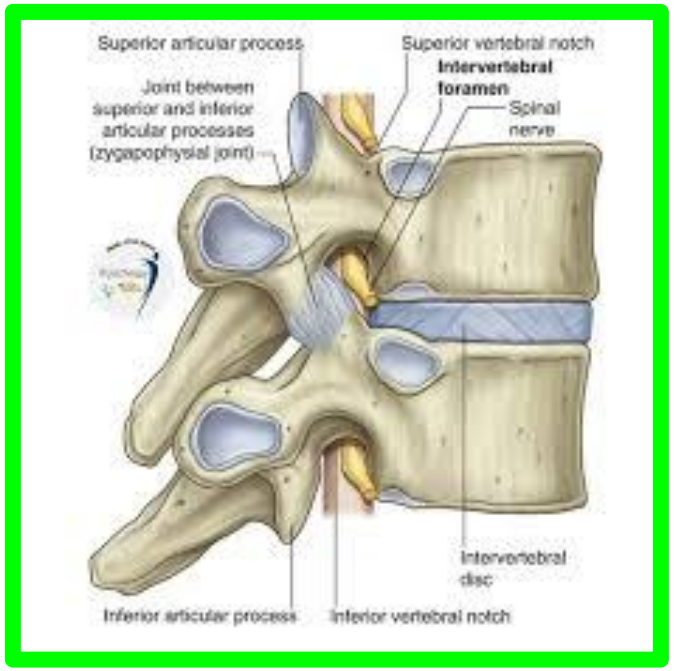
3- Attachment of the dura mater to the following;

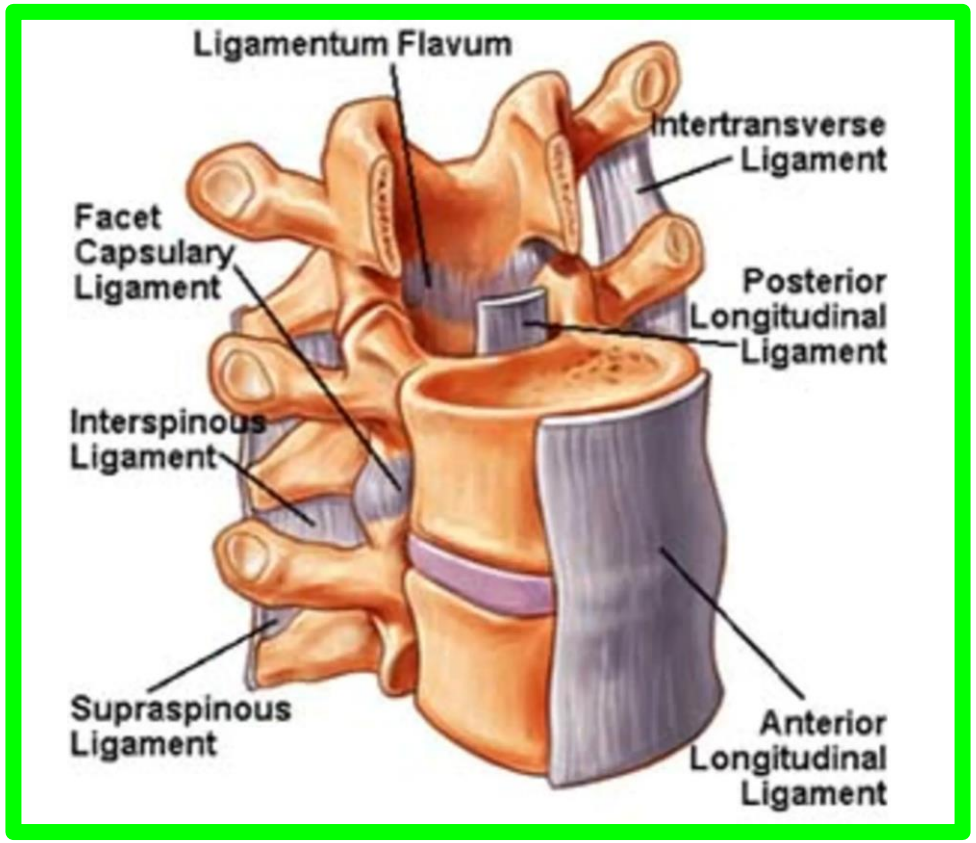
a- The margin of the foramen magnum.

b- The margin of the intervertebral foramen.

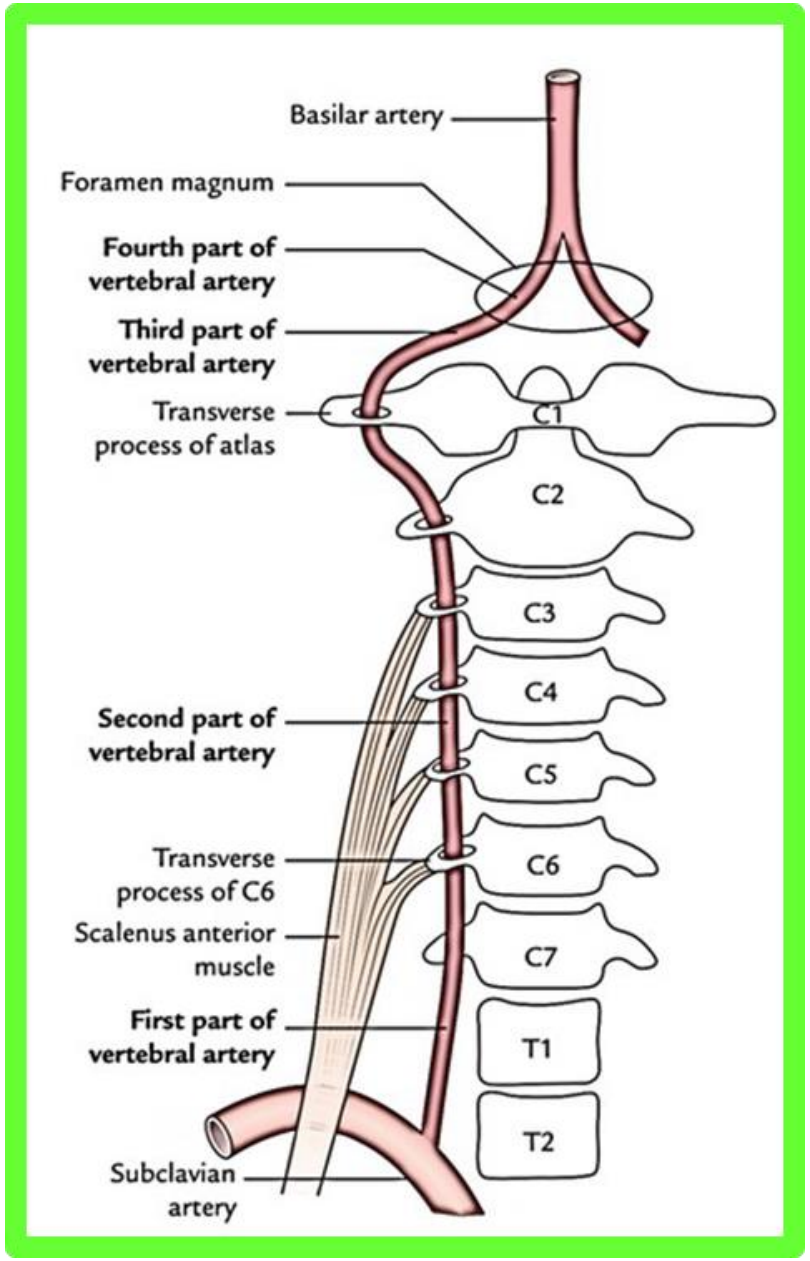
c- The back of the body of S2.

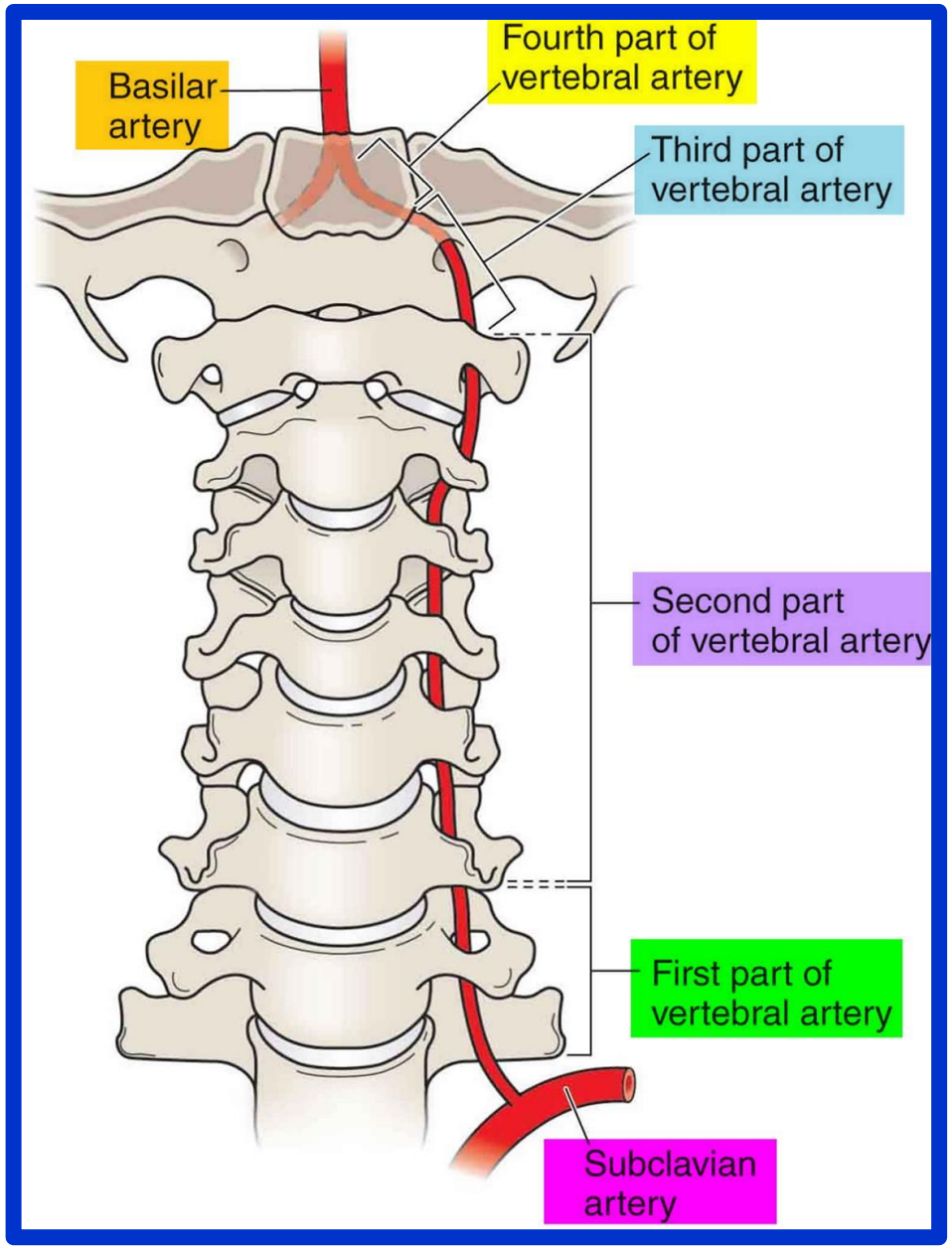
d- The posterior longitudinal ligament.





VERTEBRAL ARTERY



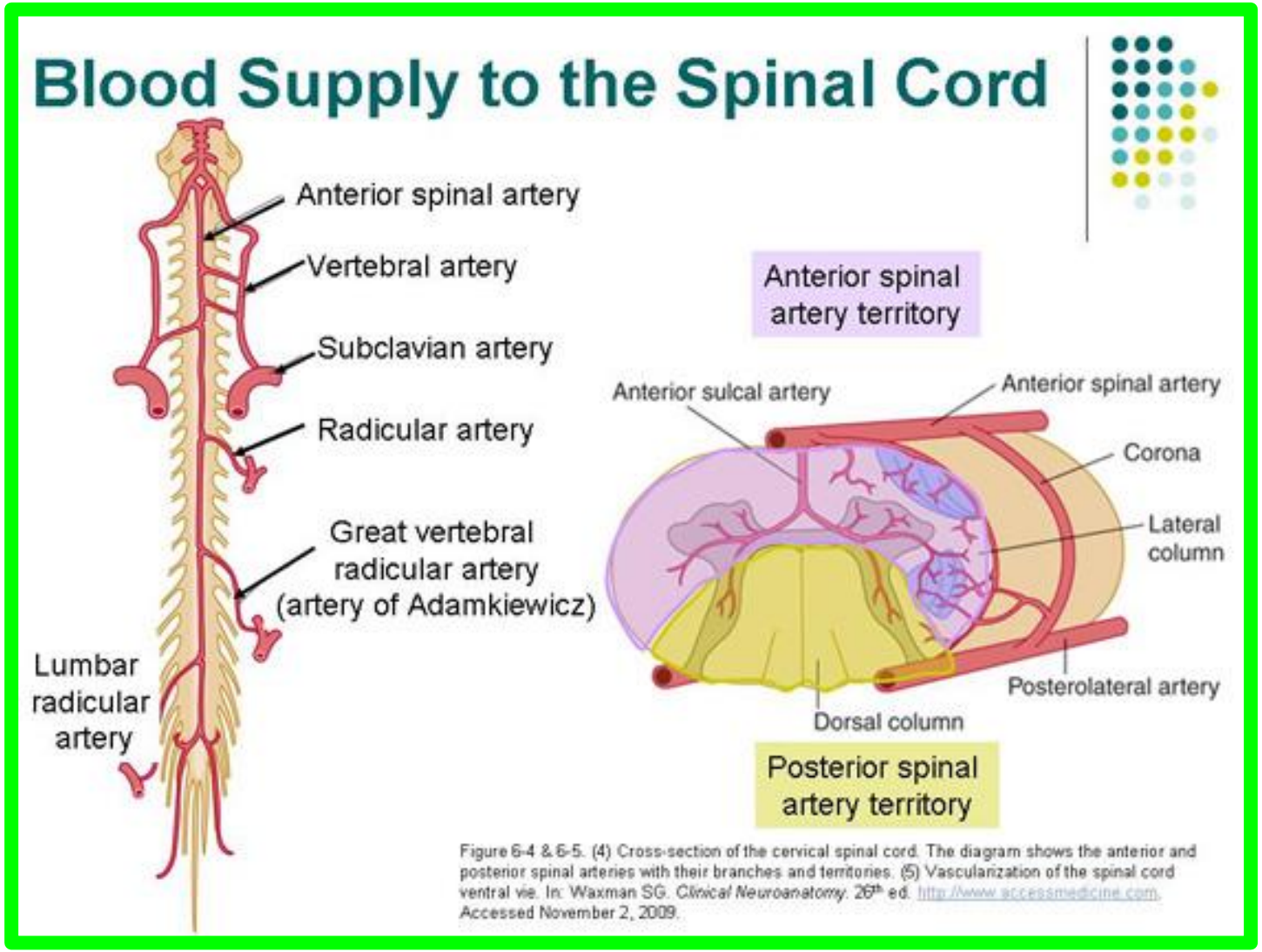


❑ Blood supply of the Spinal Cord

** Arterial supply

1- Anterior spinal artery:

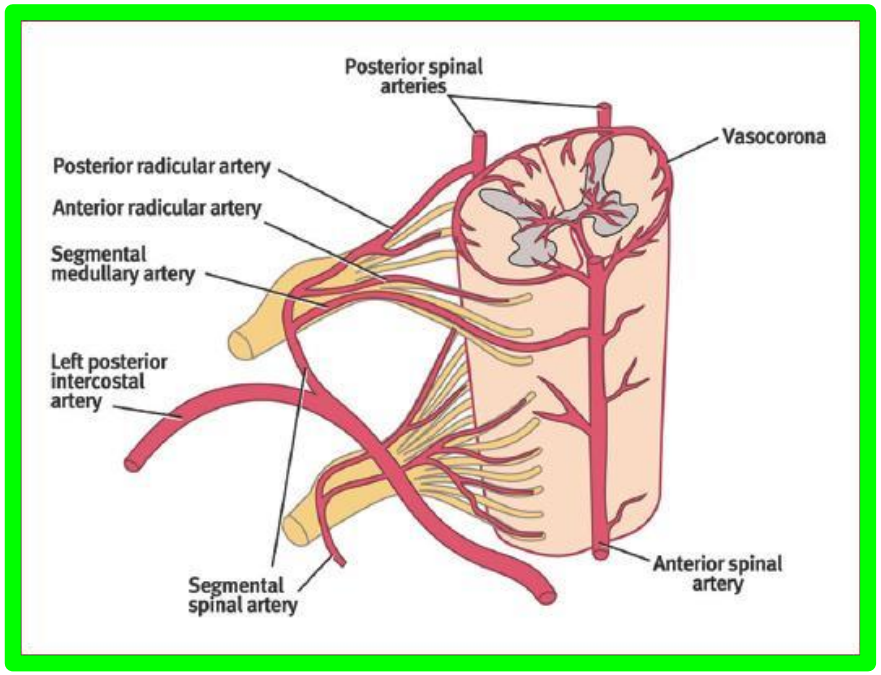
- ✓ It is branch of the 4th part of vertebral artery on each side.
- ✓ They descend through the foramen magnum and unit together to form a single anterior spinal artery
- ✓ This single artery descends in front of the anterior median fissure of the spinal cord.
- ✓ It supplies the anterior 2/3 of the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

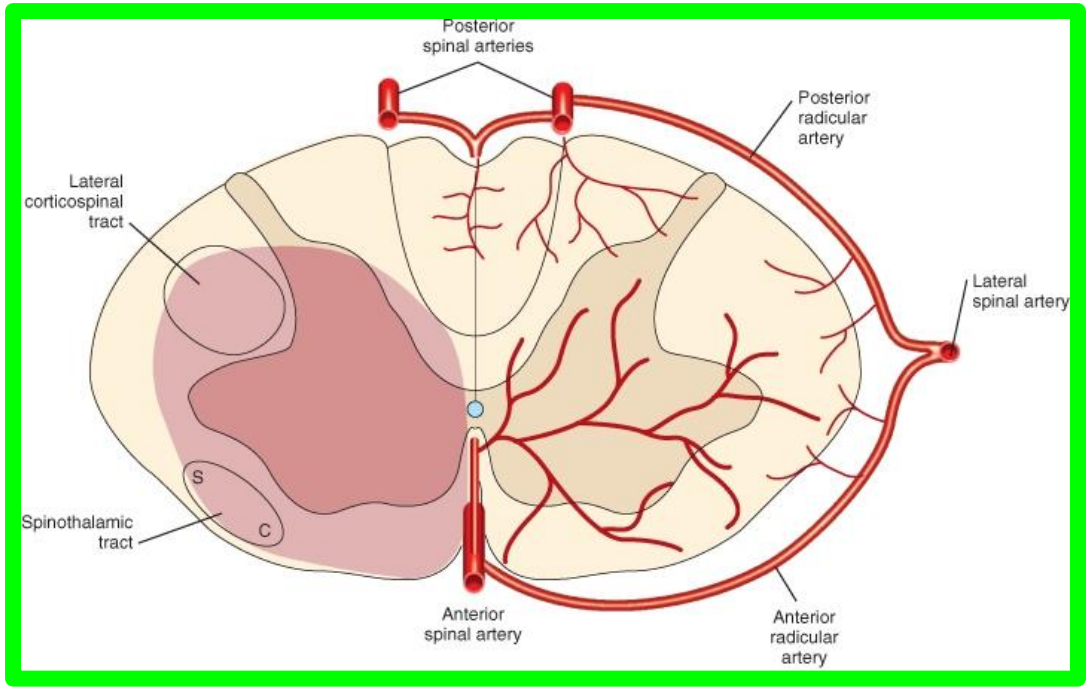


❑ Blood supply of the Spinal Cord

2- Posterior spinal arteries:

- ✓ It is a branch of the 4th 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

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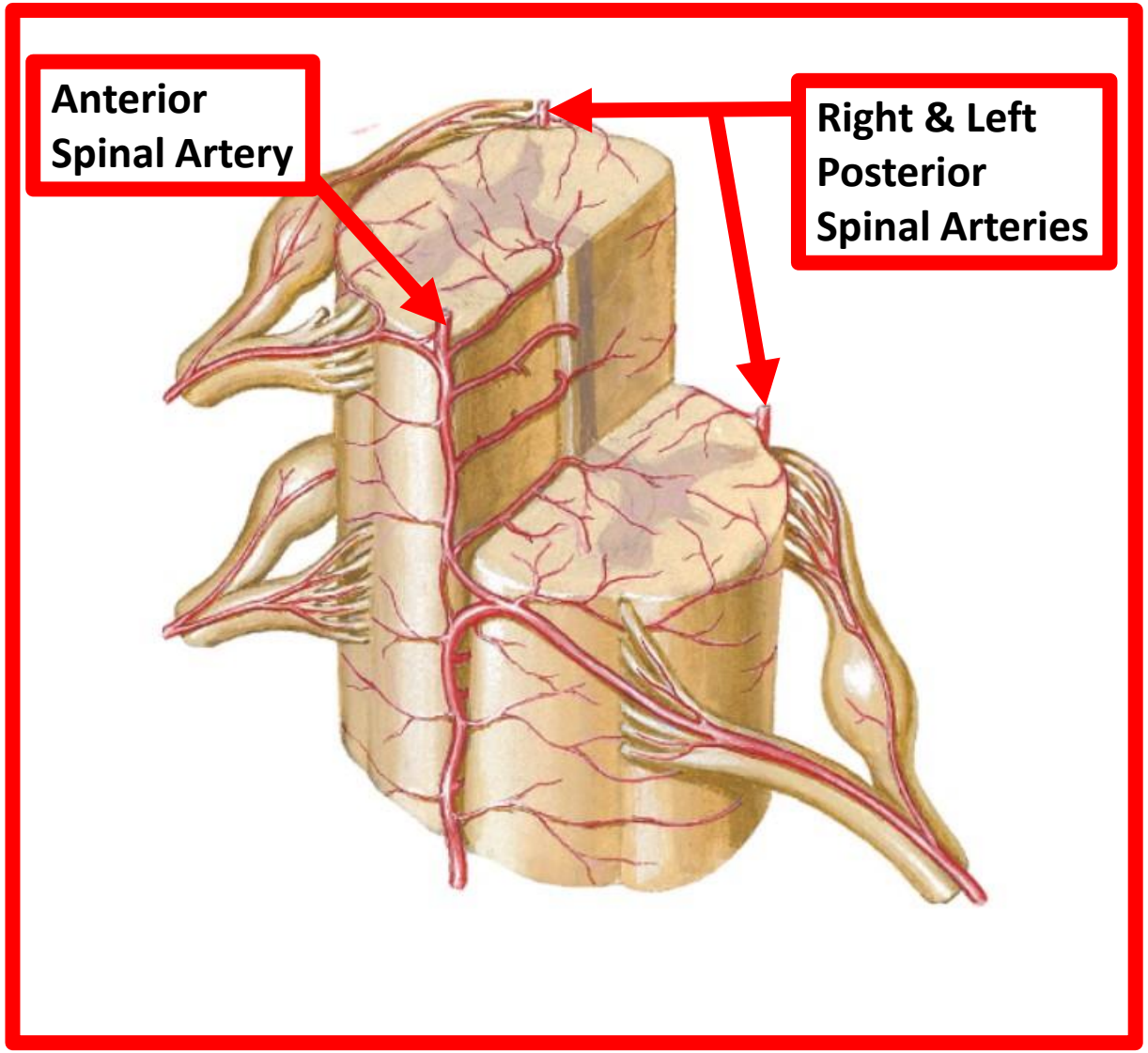

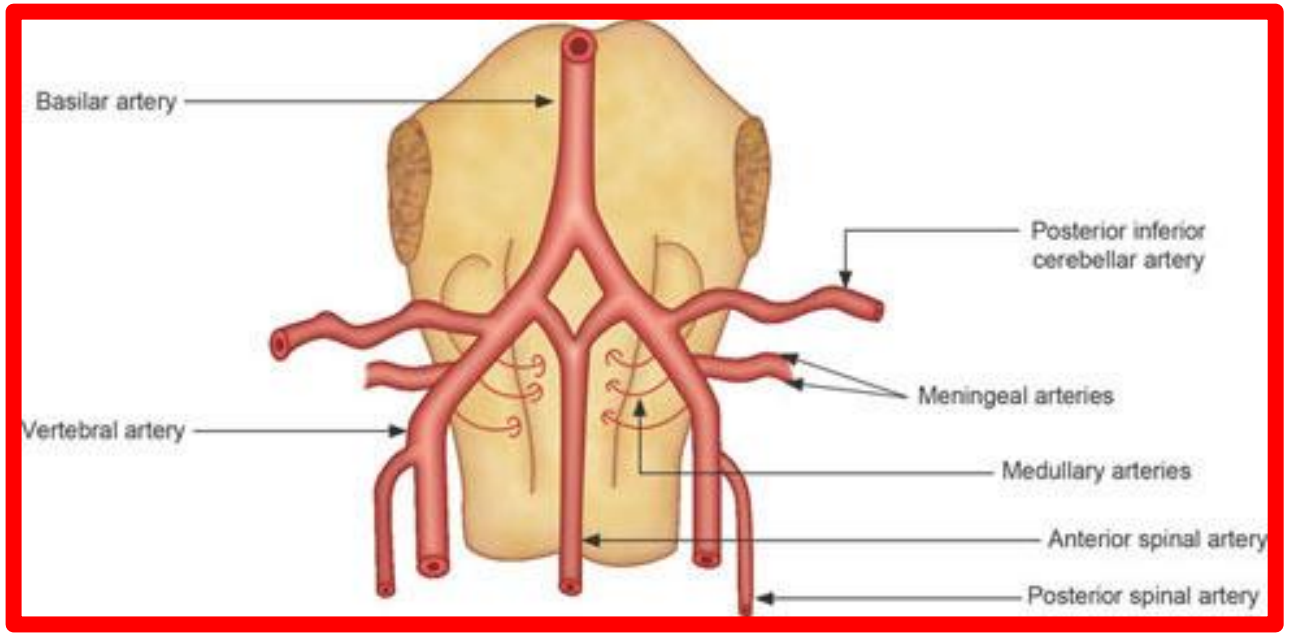

❑ Blood supply of the Spinal Cord

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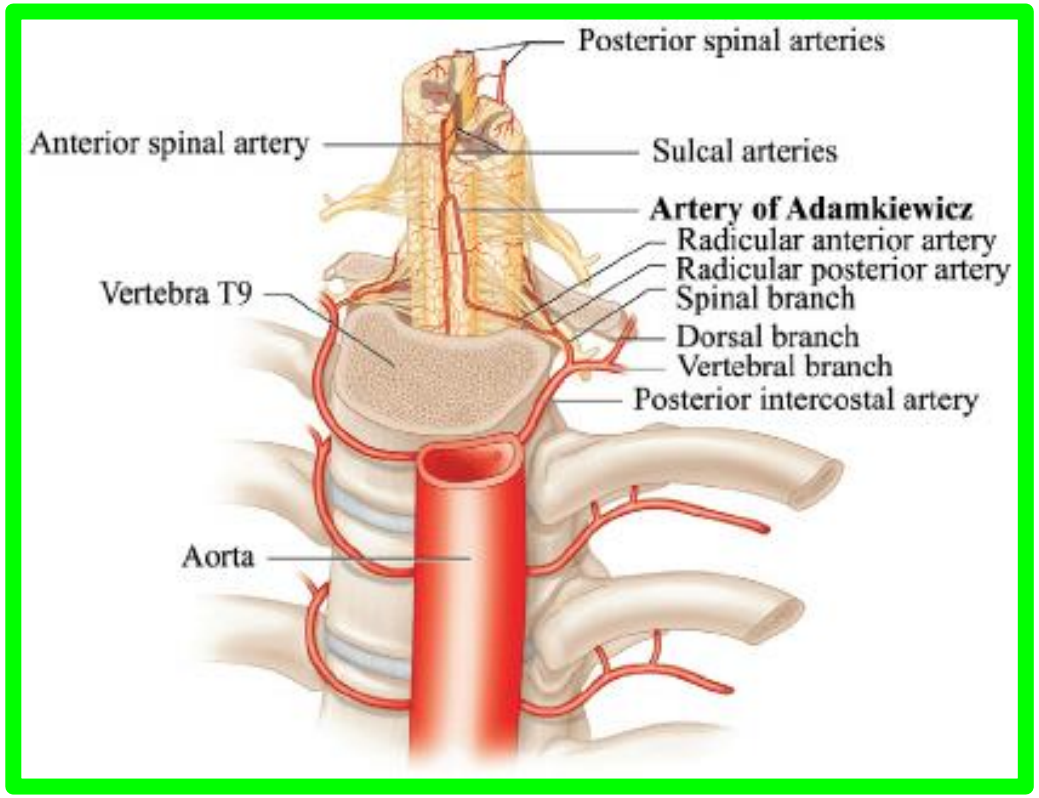
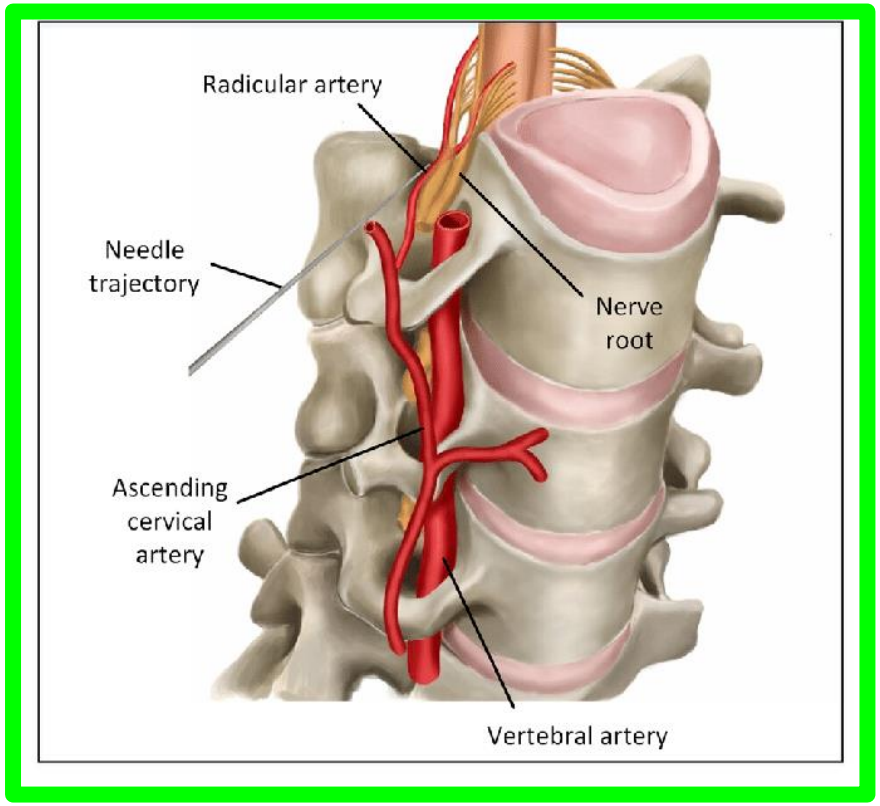
3. Radicular arteries:

✓ They enter the vertebral canal through the intervertebral foramina.

A. In the cervical region, from the 2nd 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

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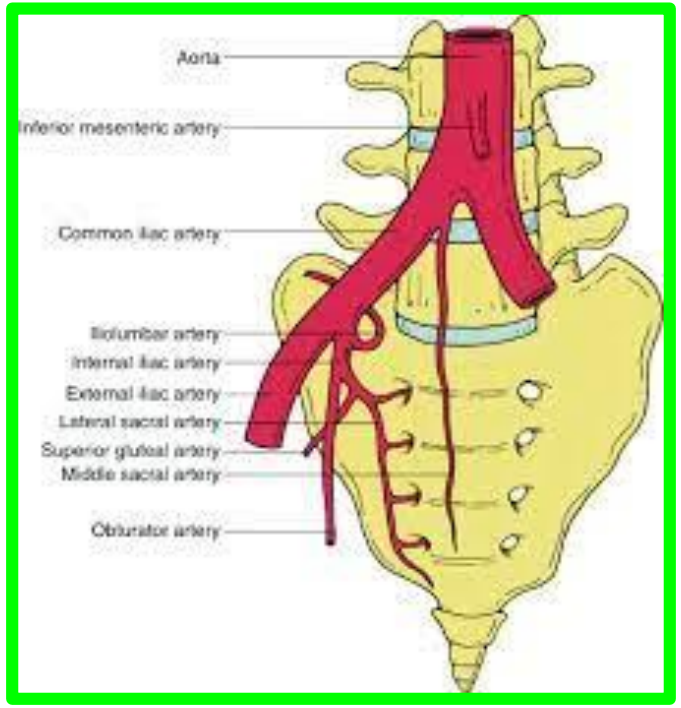
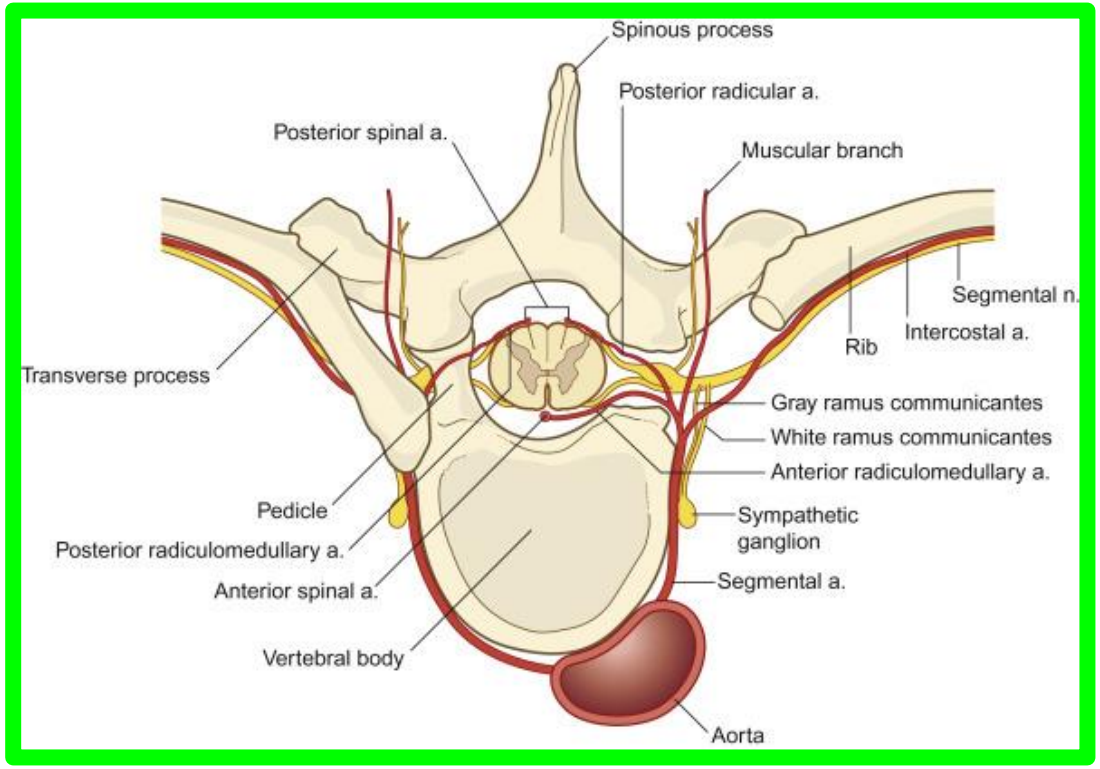
3. Radicular arteries:

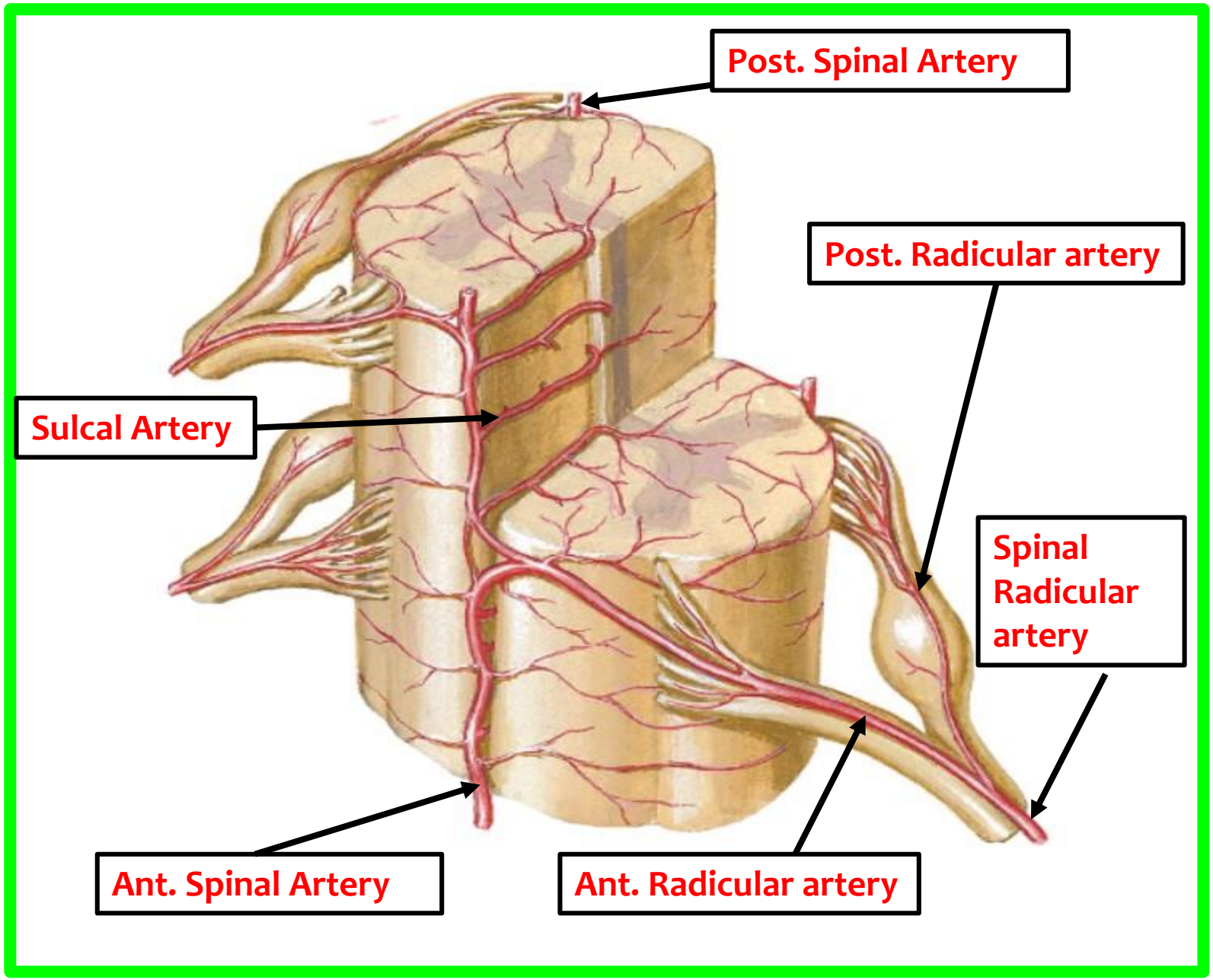
C. In the lumbar region, from the lumbar arteries.

D. In the sacral region, the lateral sacral arteries.

- **Each radicular artery divided into anterior and posterior branches that accompany the anterior and posterior roots of the spinal nerve to reach the spinal cord.**

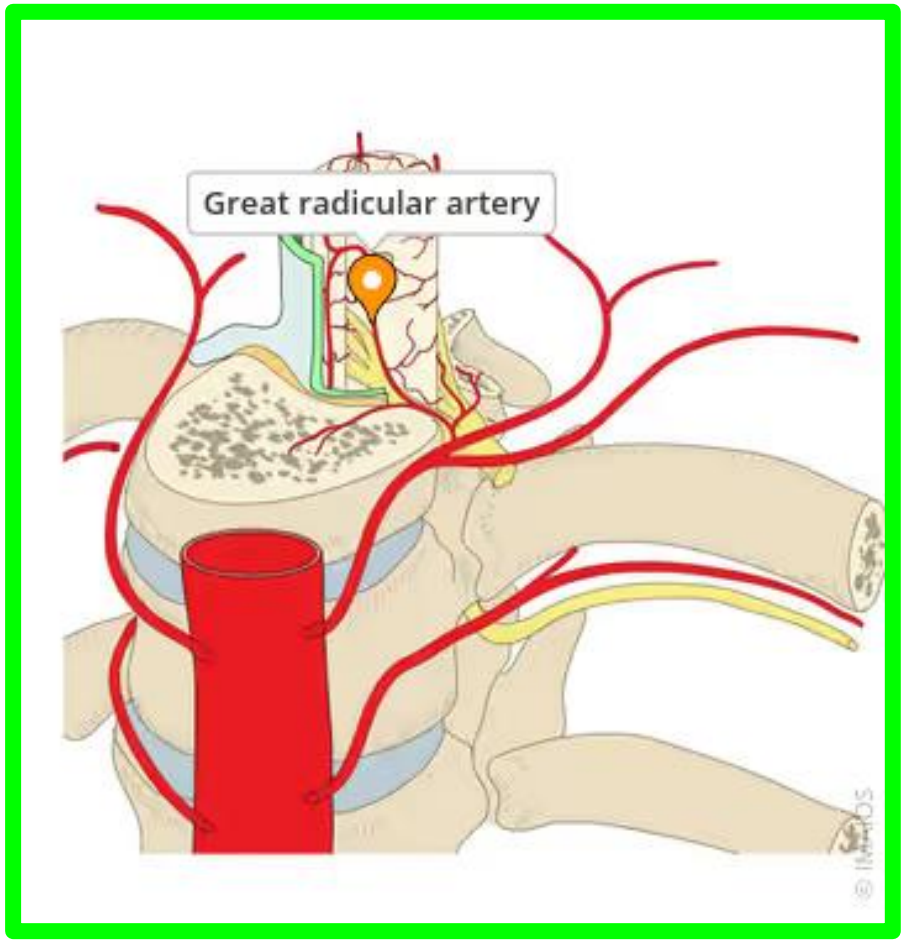


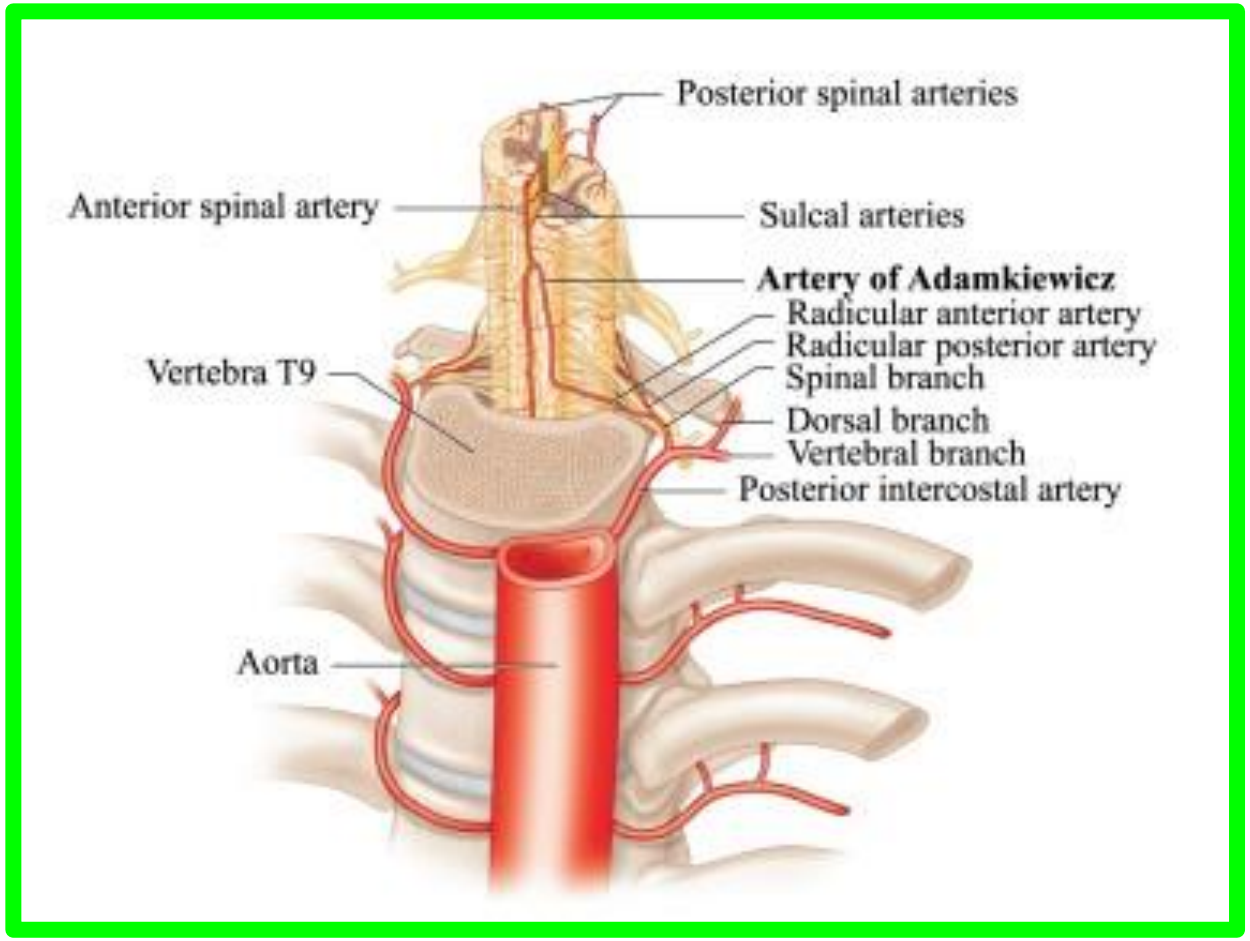



Post. Spinal Artery
Post. Radicular artery
Sulcal Artery
Spinal Radicular artery
Ant. Spinal Artery
Ant. Radicular artery

❑ Blood supply of the Spinal Cord

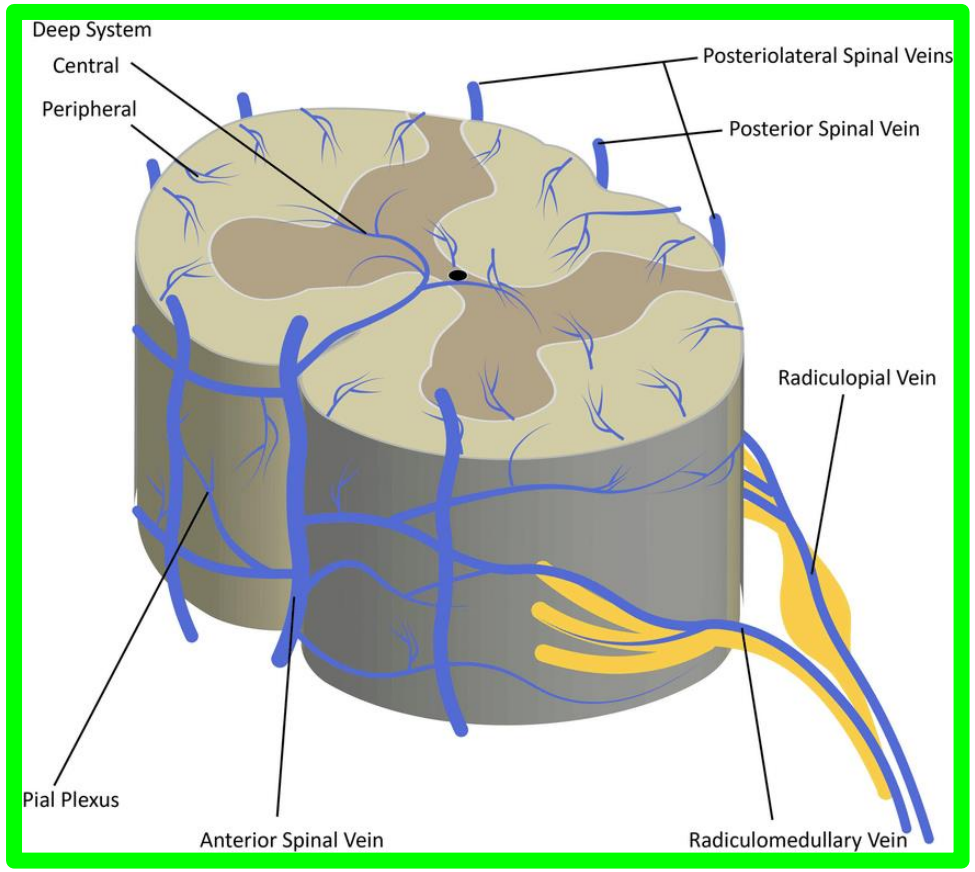
- ✓ **Arteria Radicularis magna: it arise from lower posterior intercostal, subcostal or upper lumbar arteries.**
- ✓ **It is the main source of arterial blood to the lower part of the spinal cord**





** 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.



** VENOUS DRAINAGE OF THE SPINAL CORD

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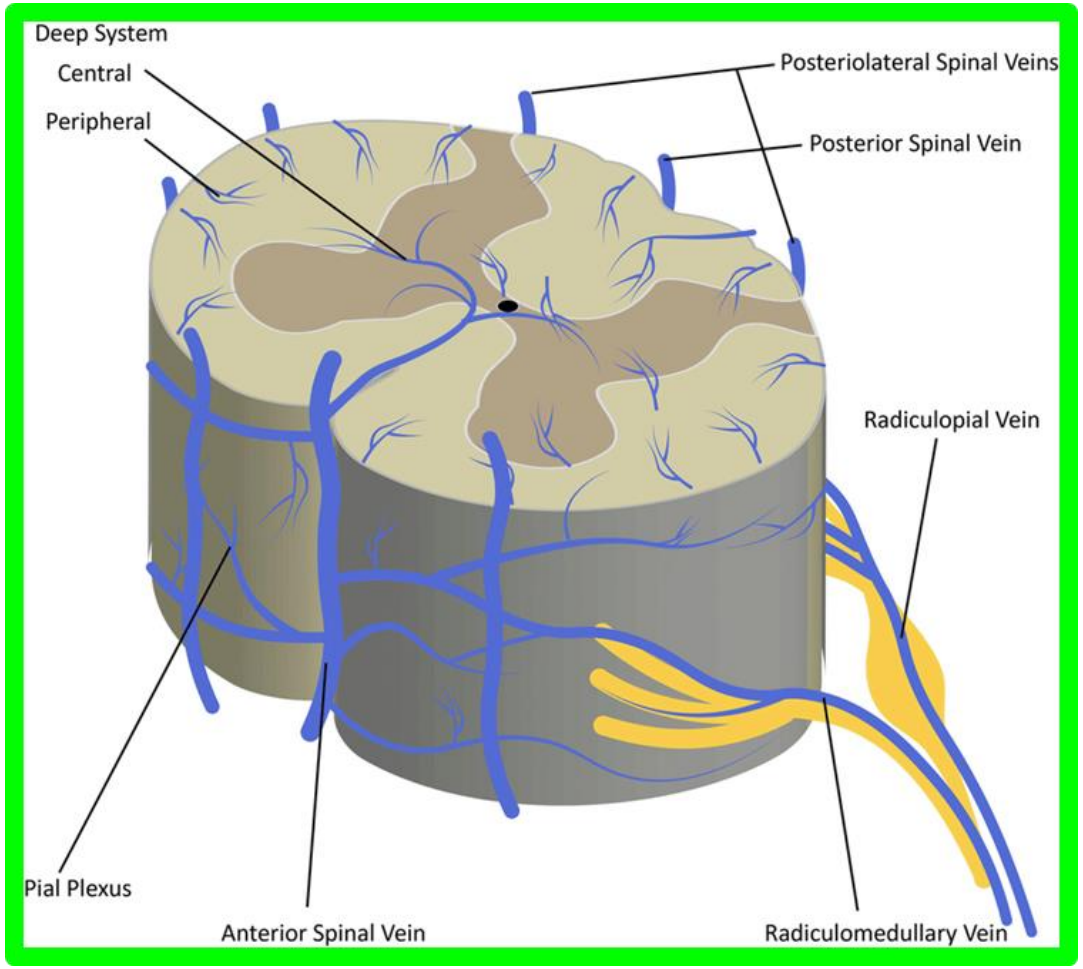
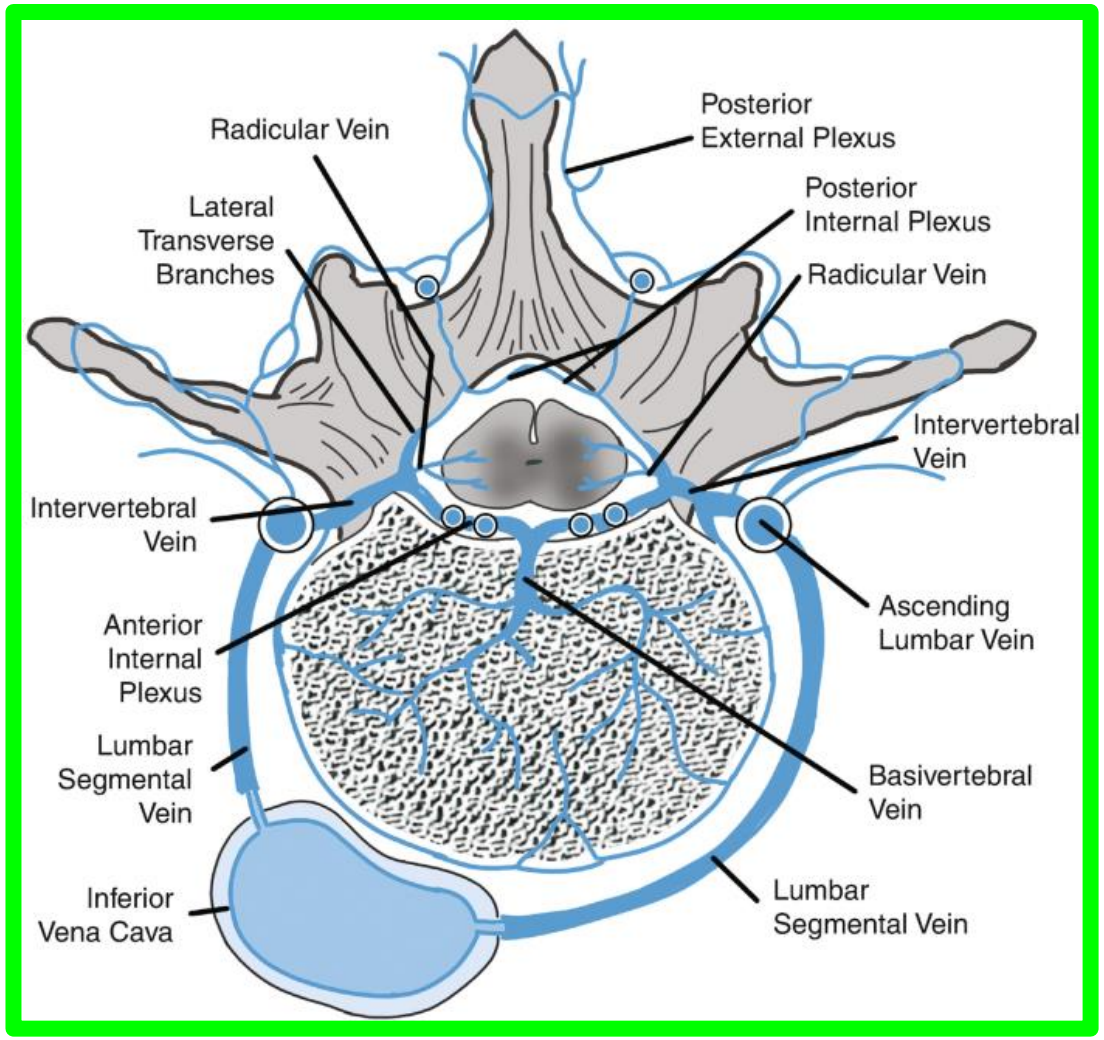
3- Two veins, one behind each ventral root of the spinal nerve.

4- Two veins, one behind each dorsal root of the spinal nerve.





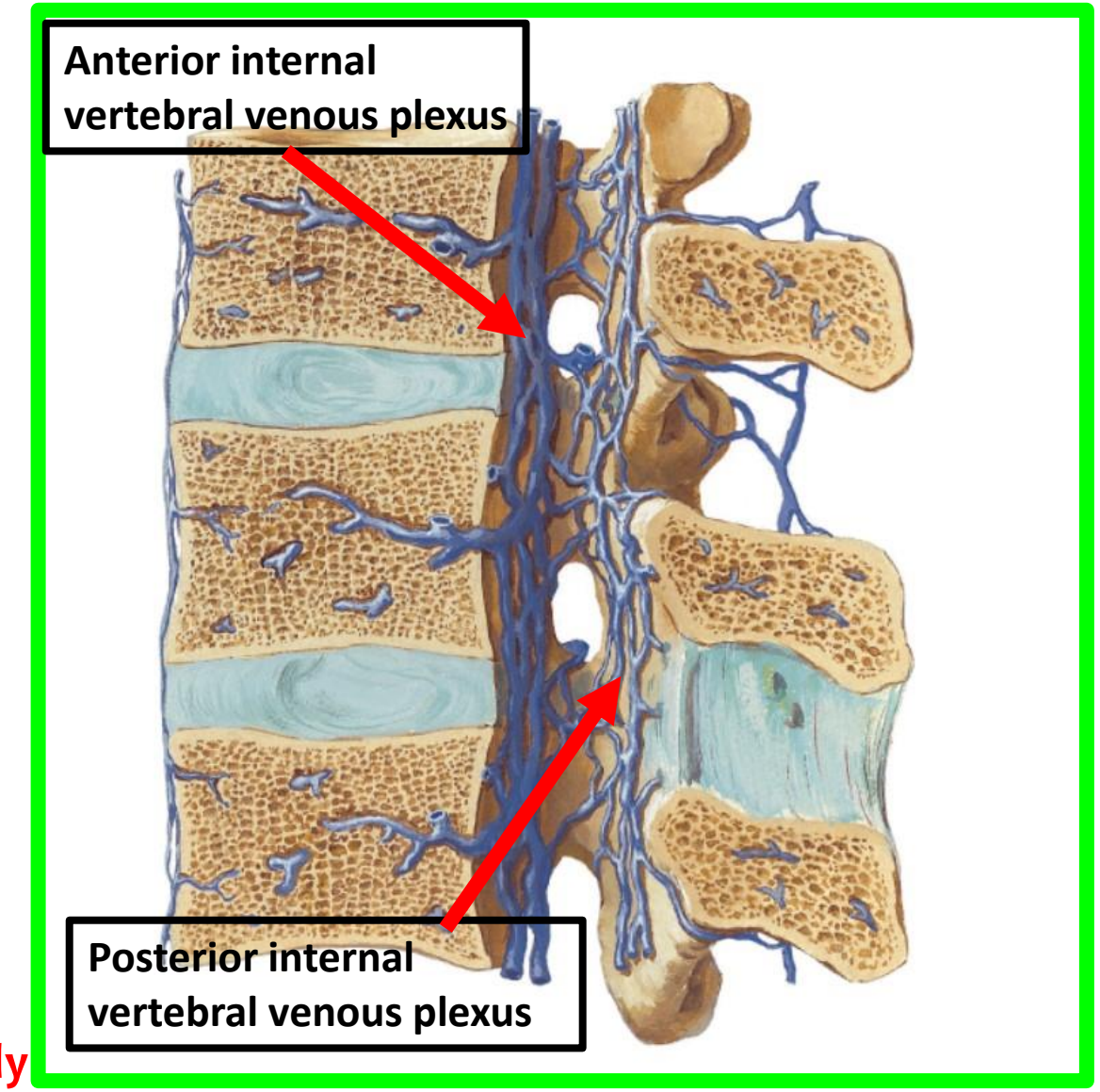
** VENOUS DRAINAGE OF THE SPINAL CORD

- ✓ 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.

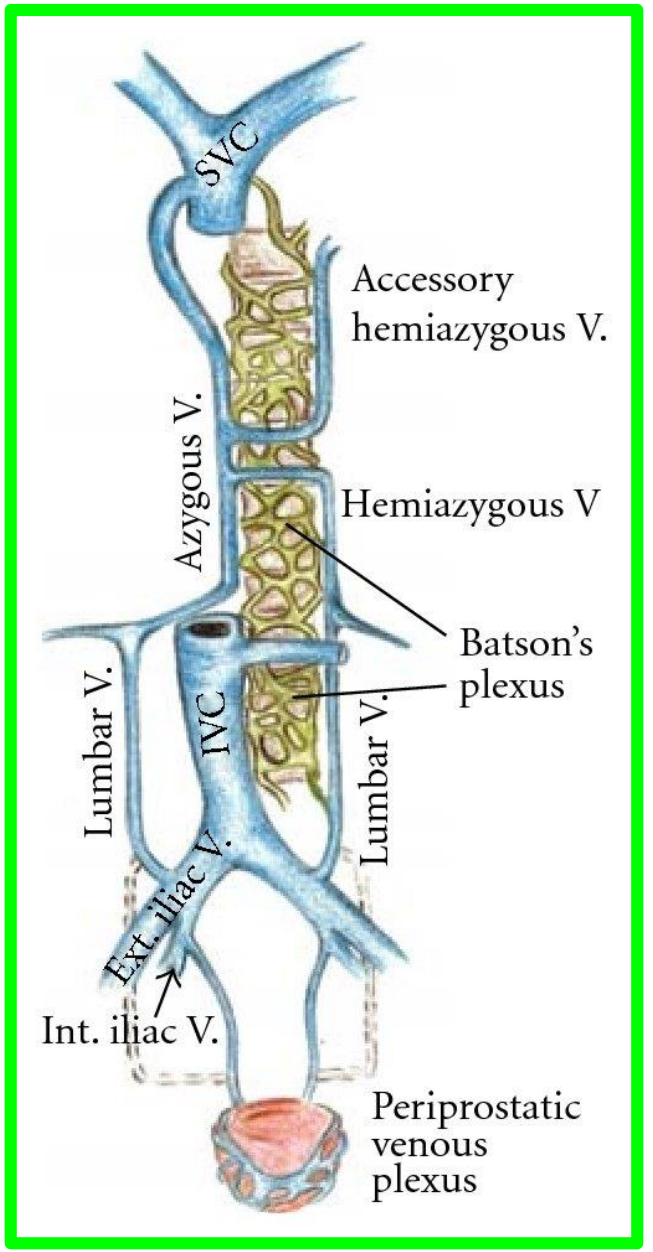
2- Laterally, they open into the internal vertebral venous plexus which is drained by intervertebral veins that emerge from the intervertebral foramina to;



** VENOUS DRAINAGE OF THE SPINAL CORD

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

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

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