

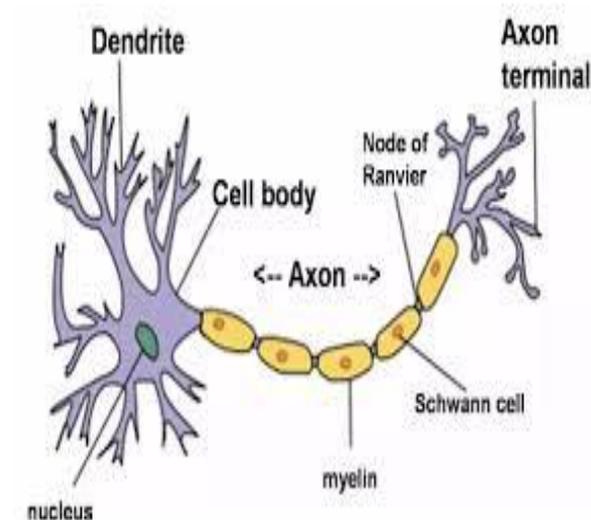
CNS  
Spinal cord& Brain stem  
LAB 1

**DR. Heba Hassan Abd Elgawad**

# The spinal cord

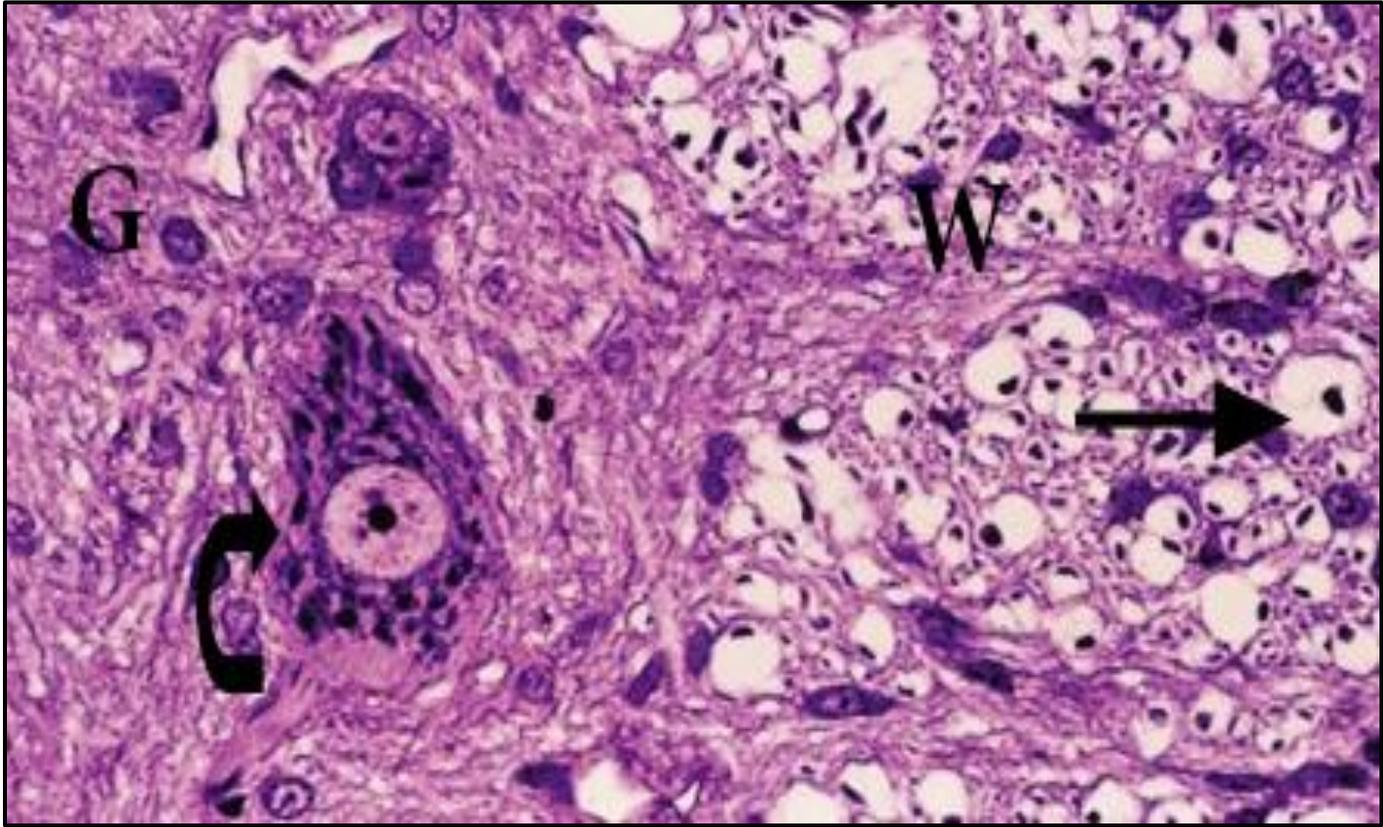
- Internal structure of the spinal cord:
- The spinal cord contains a central canal in the middle that is surrounded by central grey matter and outer white matter.

Grey matter	Bodies of nerve cells, dendrites, unmyelinated axons and neuroglia.
White matter	Many myelinated axons (form tracts which convey information into & out of CNS), few unmyelinated axons & neuroglia

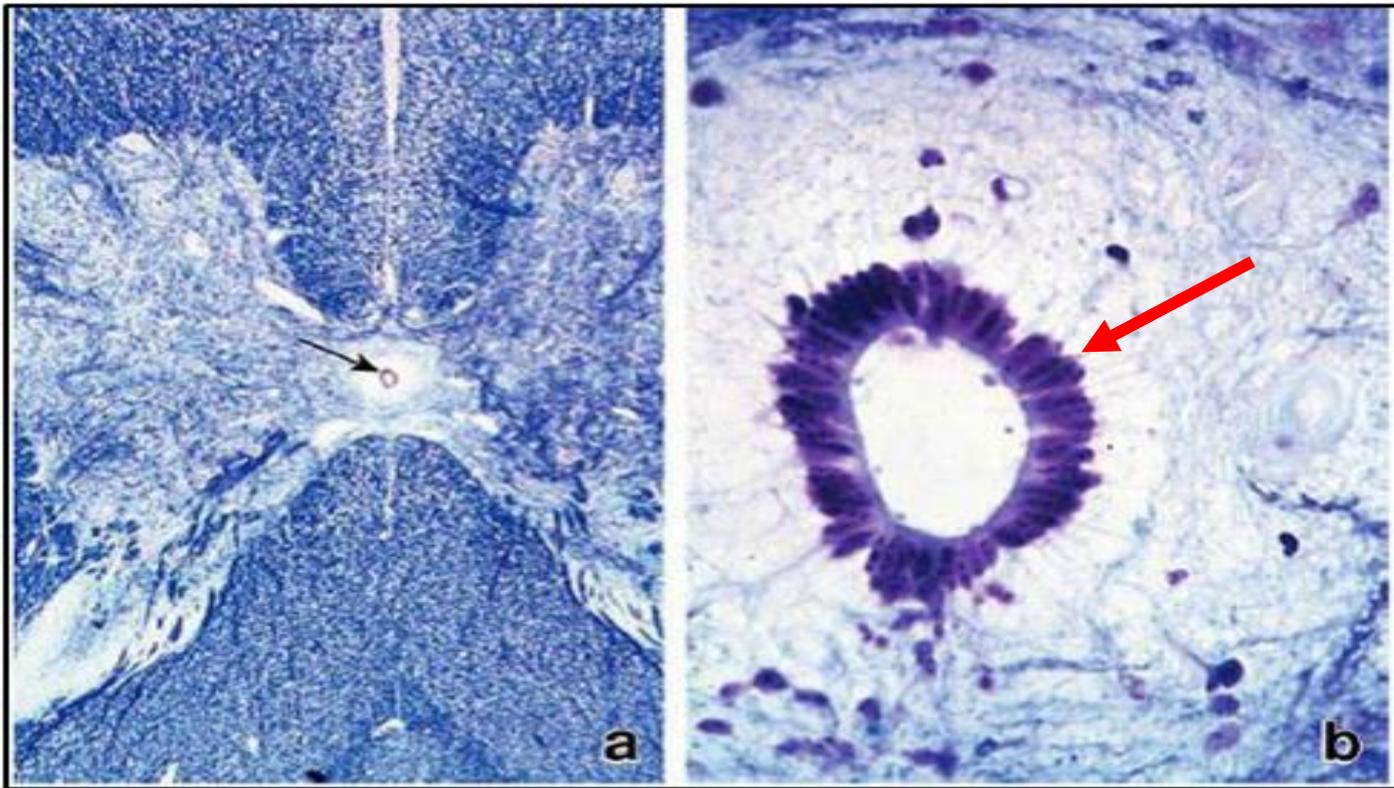


# The histological methods used in the study of the CNS:

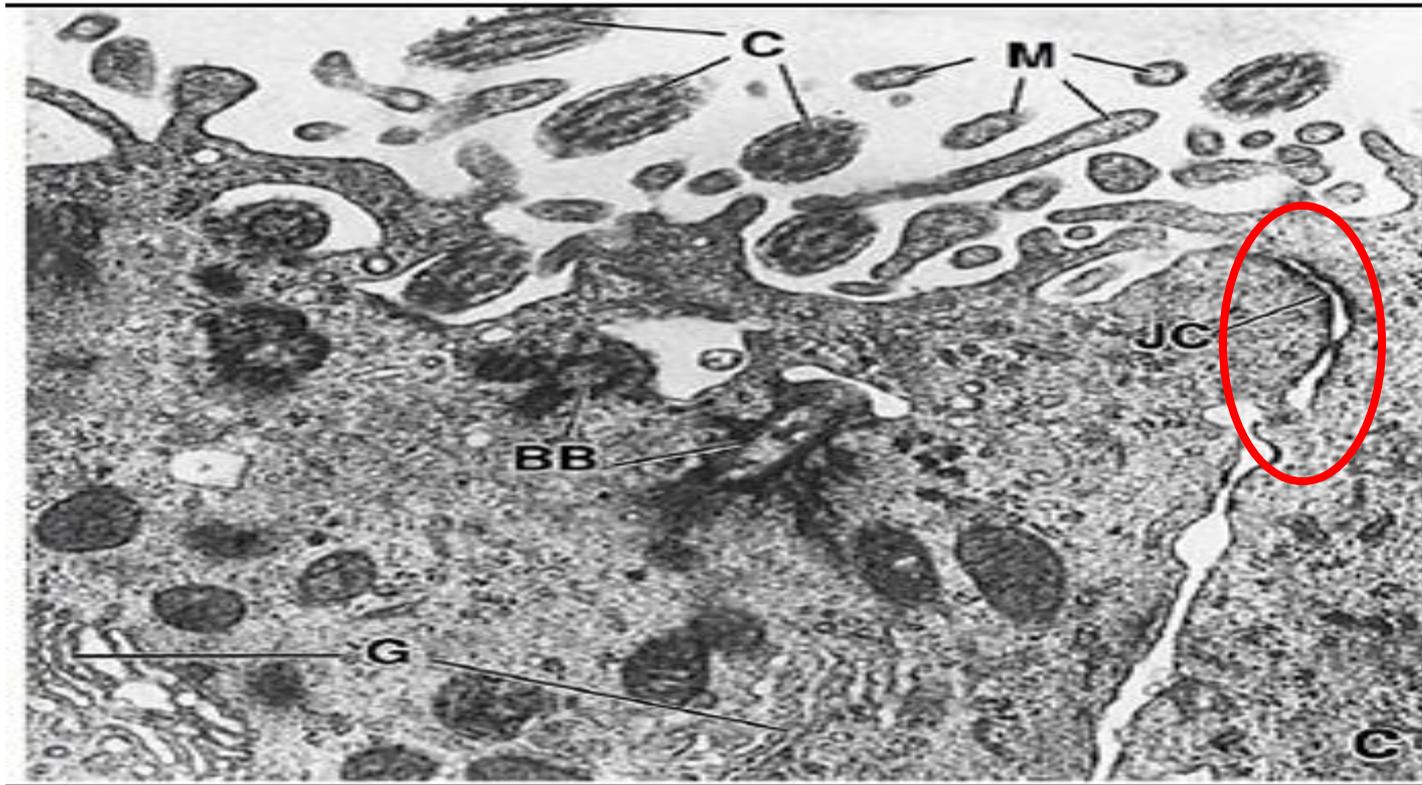
- Routine stains such as *H & E* (*myelin not stained*).
- Myelin methods (**osmic acid**): white matter stains strongly, the grey matter remaining unstained.
- Immunohistochemical techniques using **antibodies** against proteins
- *Heavy metal impregnation (silver)*



- Cross section of the grey (G) and white (W) matter of the spinal cord. Notice the neurons (curved arrow) of the grey matter and the myelinated nerve fibers (arrow) of the white matter.



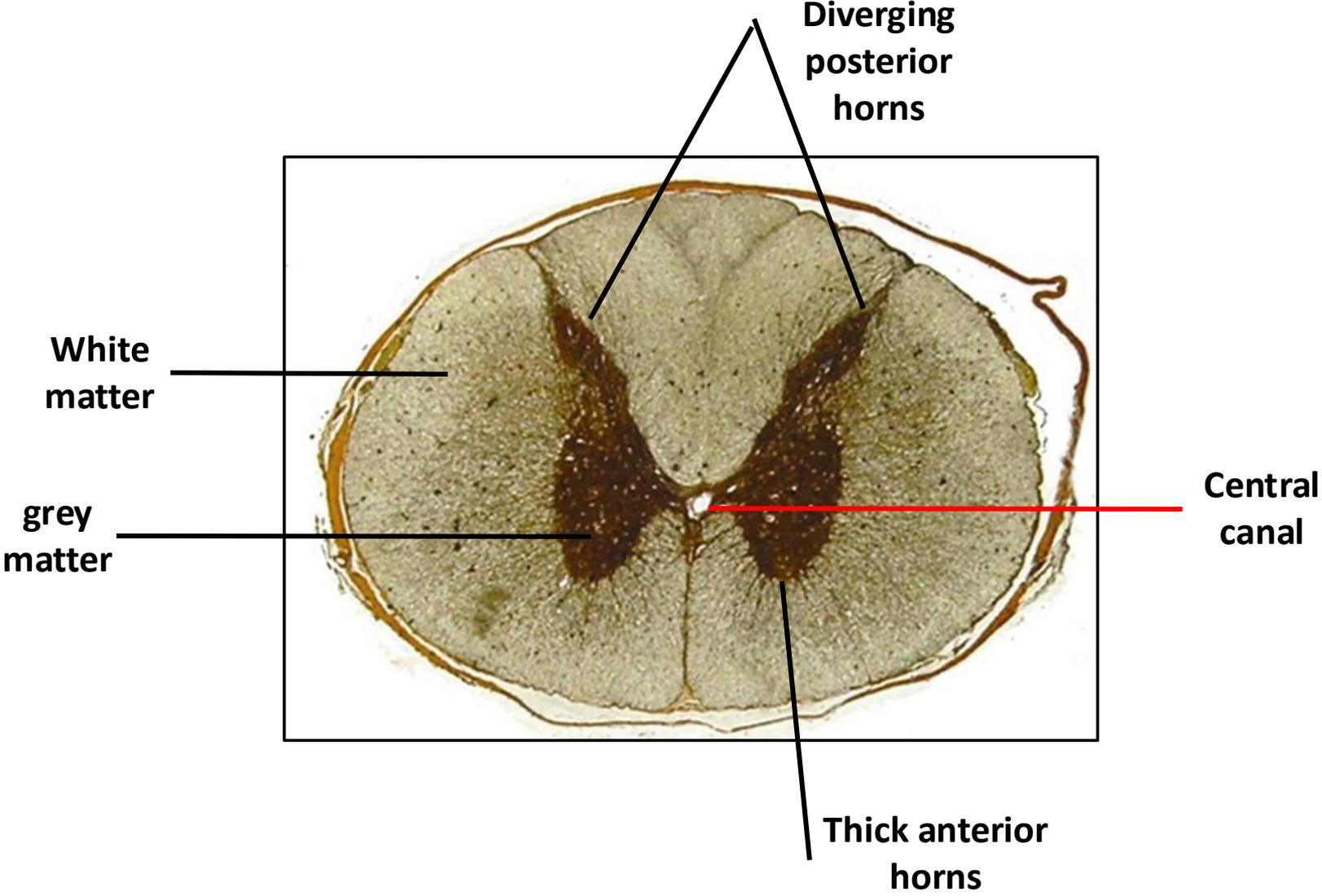
- Photomicrograph of the central region of the spinal cord stained with toluidine blue. The *arrow* points to the central canal.
- b) At higher magnification, ependymal cells, which line the central canal, consist of single layer of columnar cells.



- c) Electron micrograph shows portion of the apical region of two ependymal cells. They are joined by junctional complex (*JC*). The apical surface has cilia (*C*) and microvilli (*M*).

	Cervical	Thoracic	Lumbar
Shape	Oval	Round	Oval
Central canal	More anterior	Slight anterior	Central
Posterior horns	Thin & diverging	Thin & parallel	Thick & parallel
Anterior horns	Thick	Thin & parallel	Thick & parallel
Lateral horns	-----	Present	Present (L1-L3) only
White matter	Abundant	Large compared to grey matter	Very little compared to grey matter

# Spinal cord at cervical segment (silver stain)

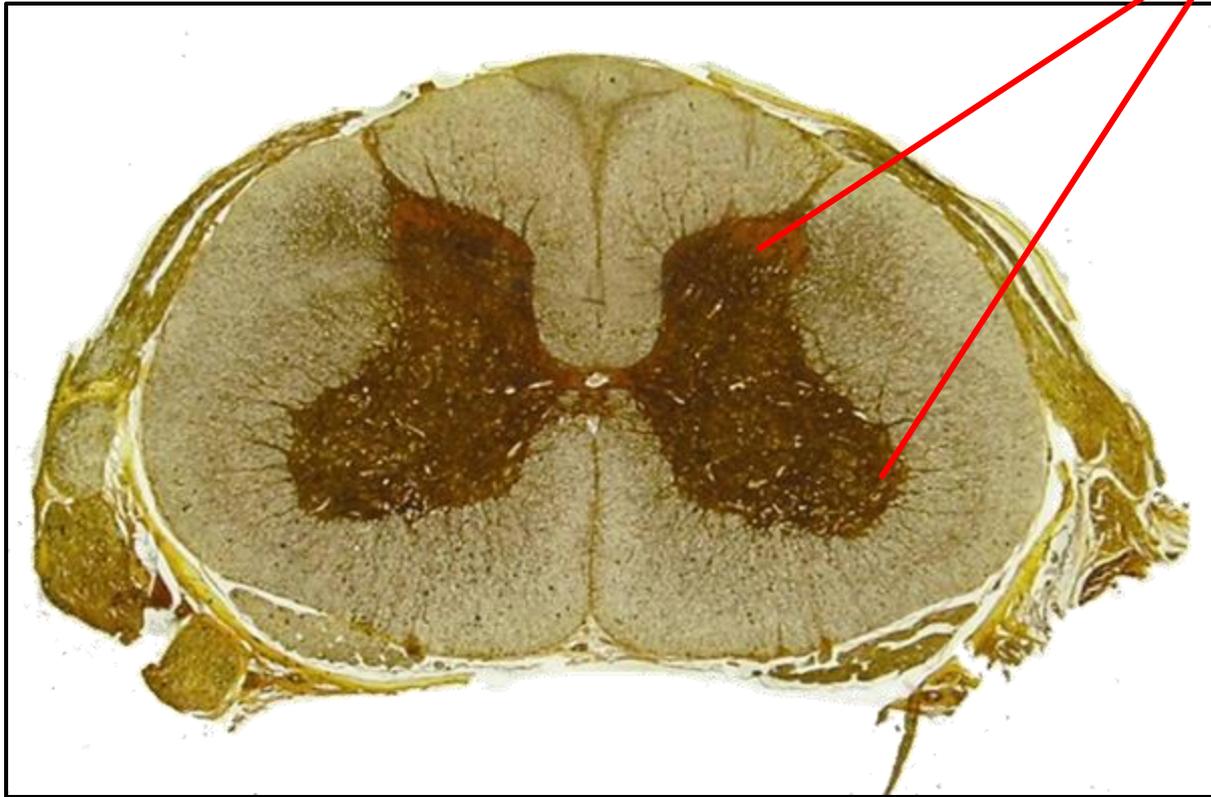


# Spinal cord at thoracic segment (silver stain)



**Thin parallel  
anterior &  
posterior horns**

# Spinal cord at lumbar segment (silver stain)



**Thick parallel  
anterior &  
posterior horns  
(boot shaped)**

Forebrain  
(cerebrum)

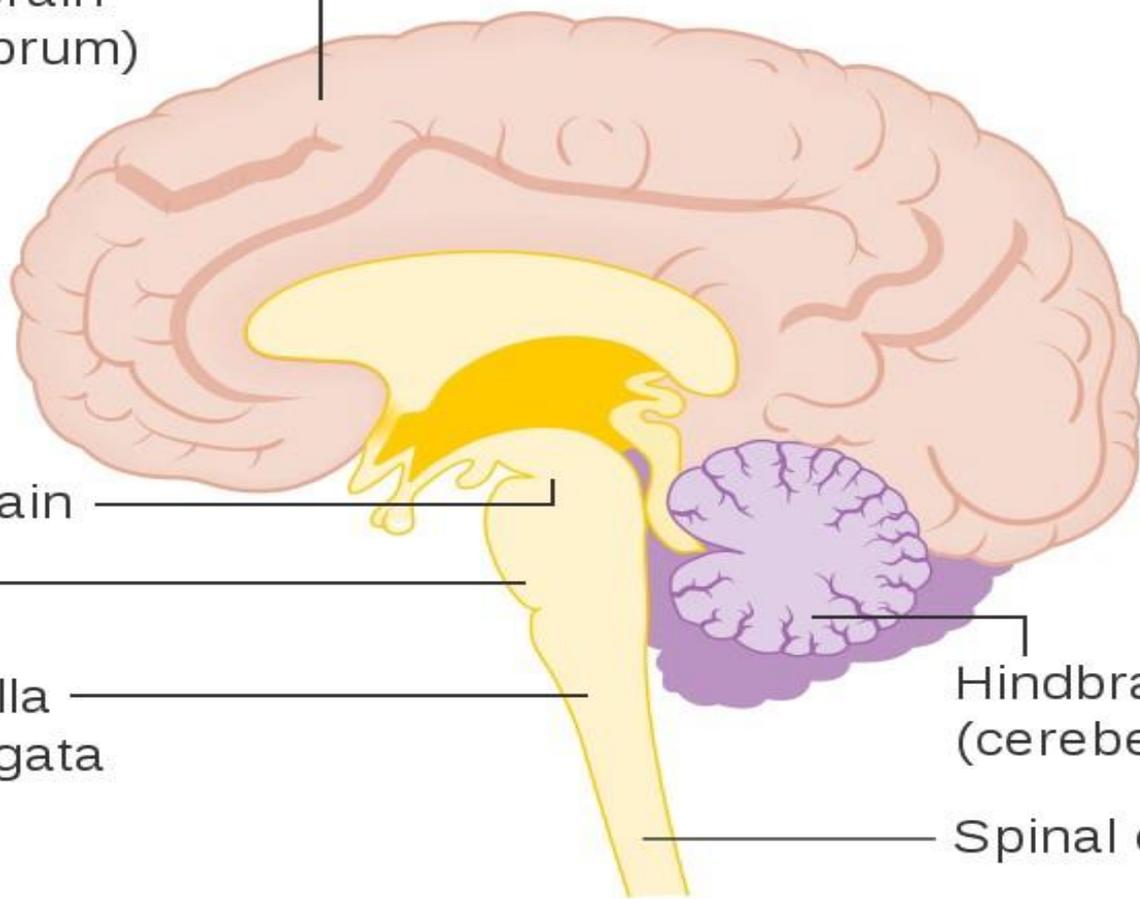
Midbrain

Pons

Medulla  
oblongata

Hindbrain  
(cerebellum)

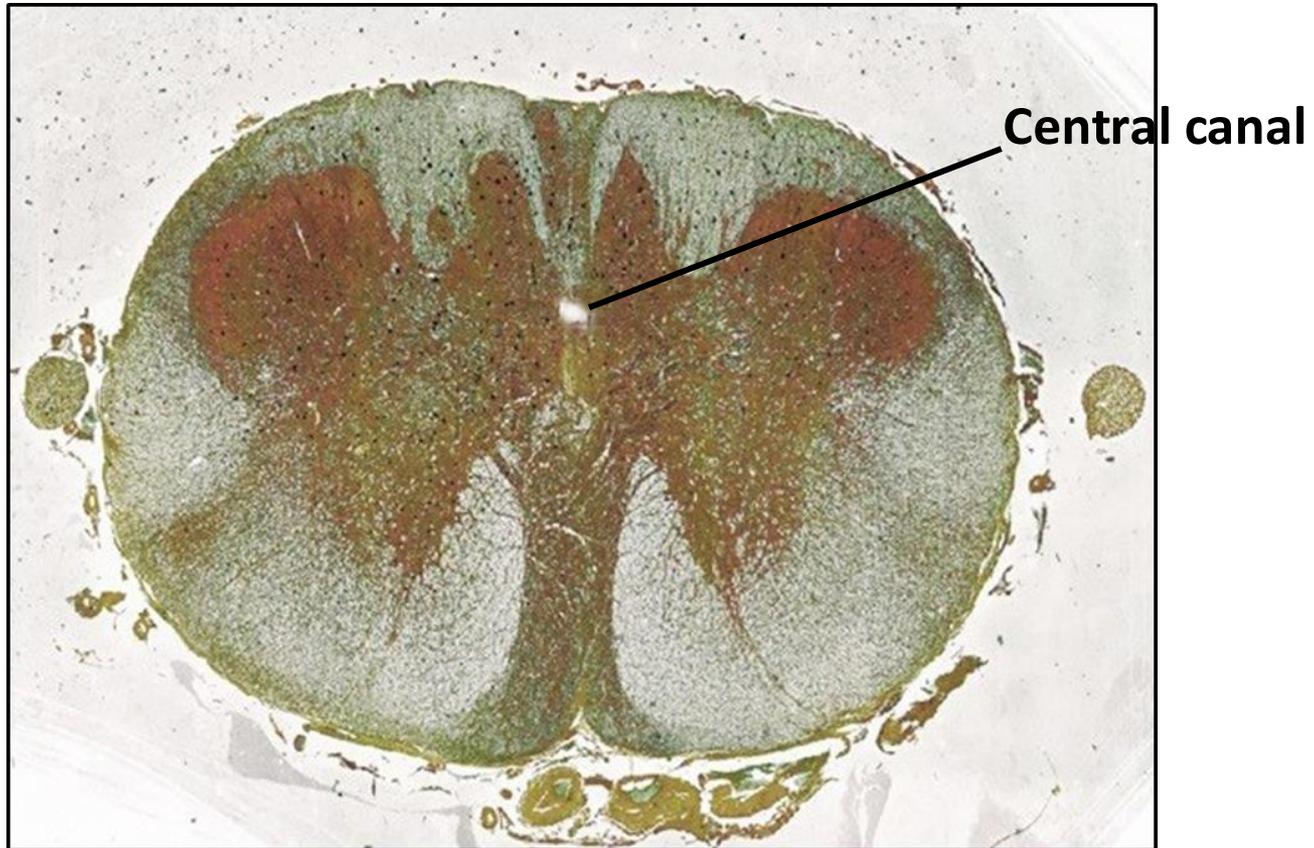
Spinal cord



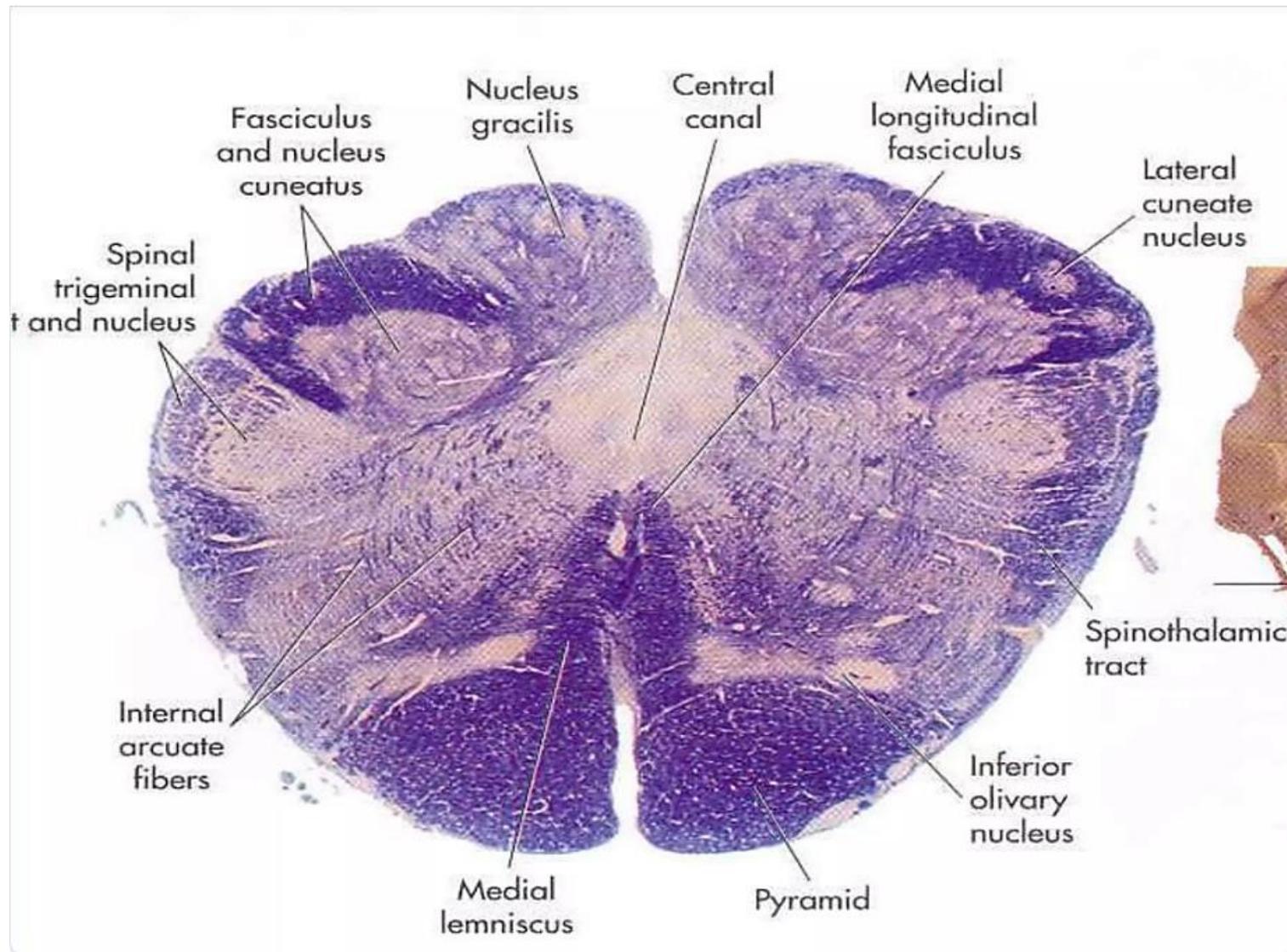
# Medulla oblongata

- Levels of the medulla oblongata:
- Closed medulla oblongata:
  - a- Lower part which contains motor (pyramidal) decussation
  - b- Upper part which contains sensory decussation
- Open medulla oblongata

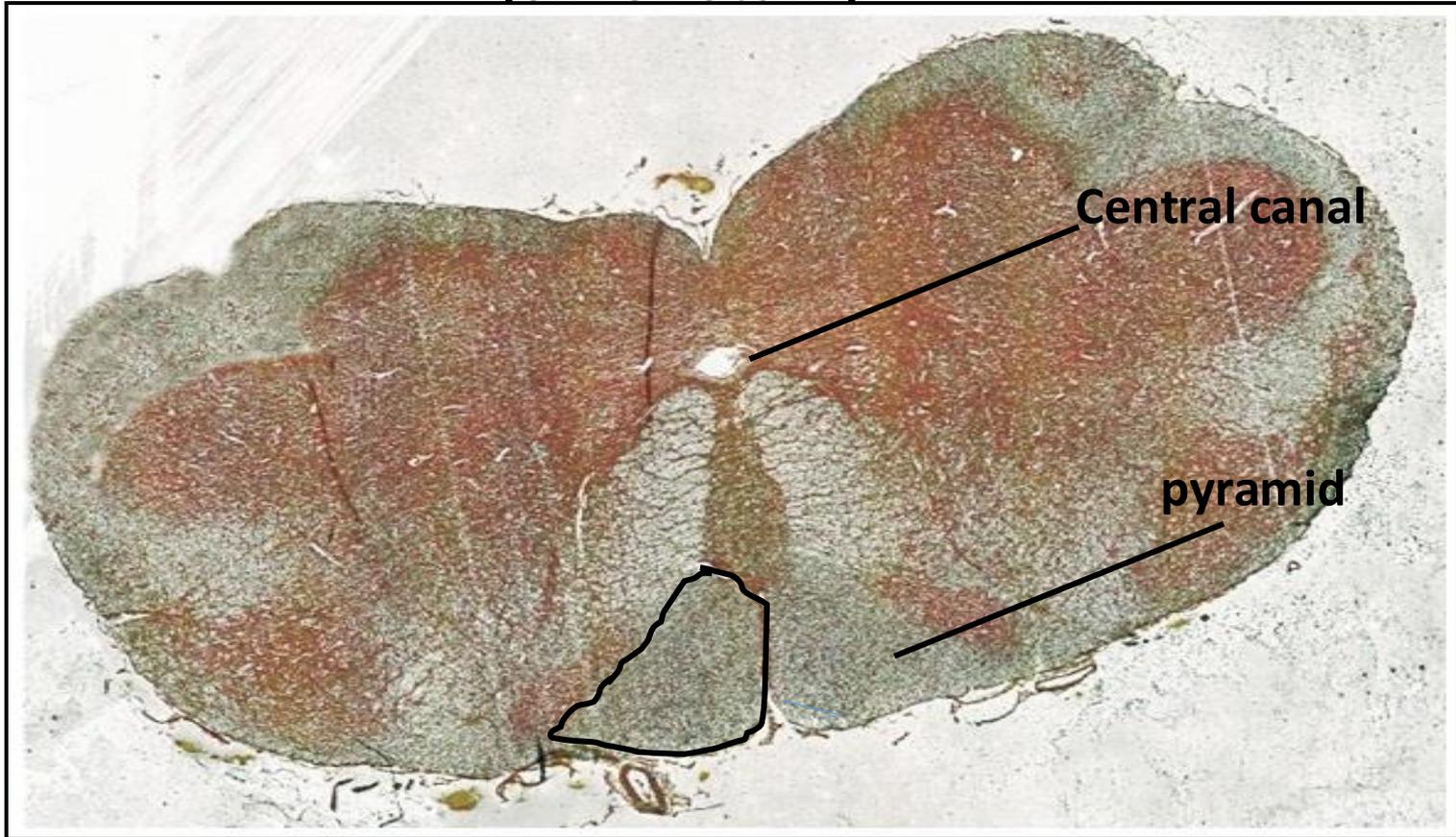
# Closed medulla oblongata (motor decussation) (silver stain)



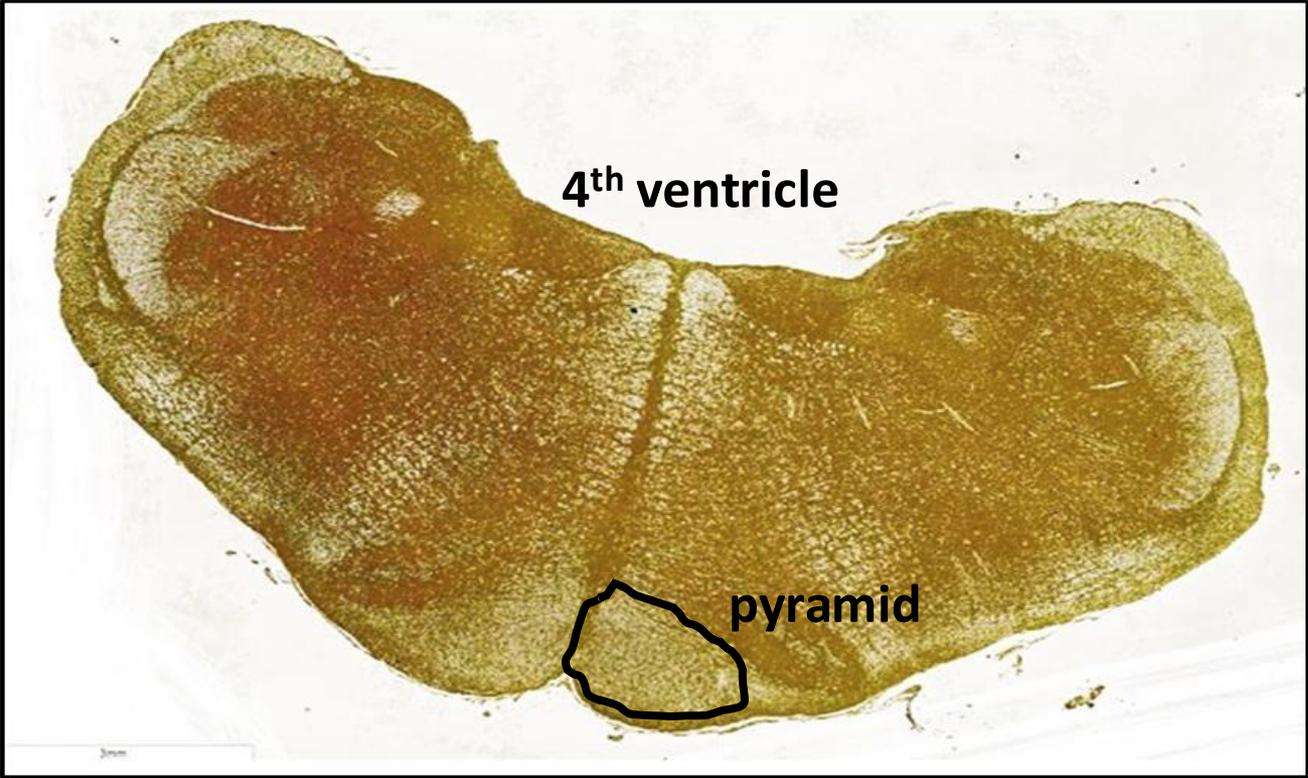
# Closed medulla oblongata (sensory decussation)



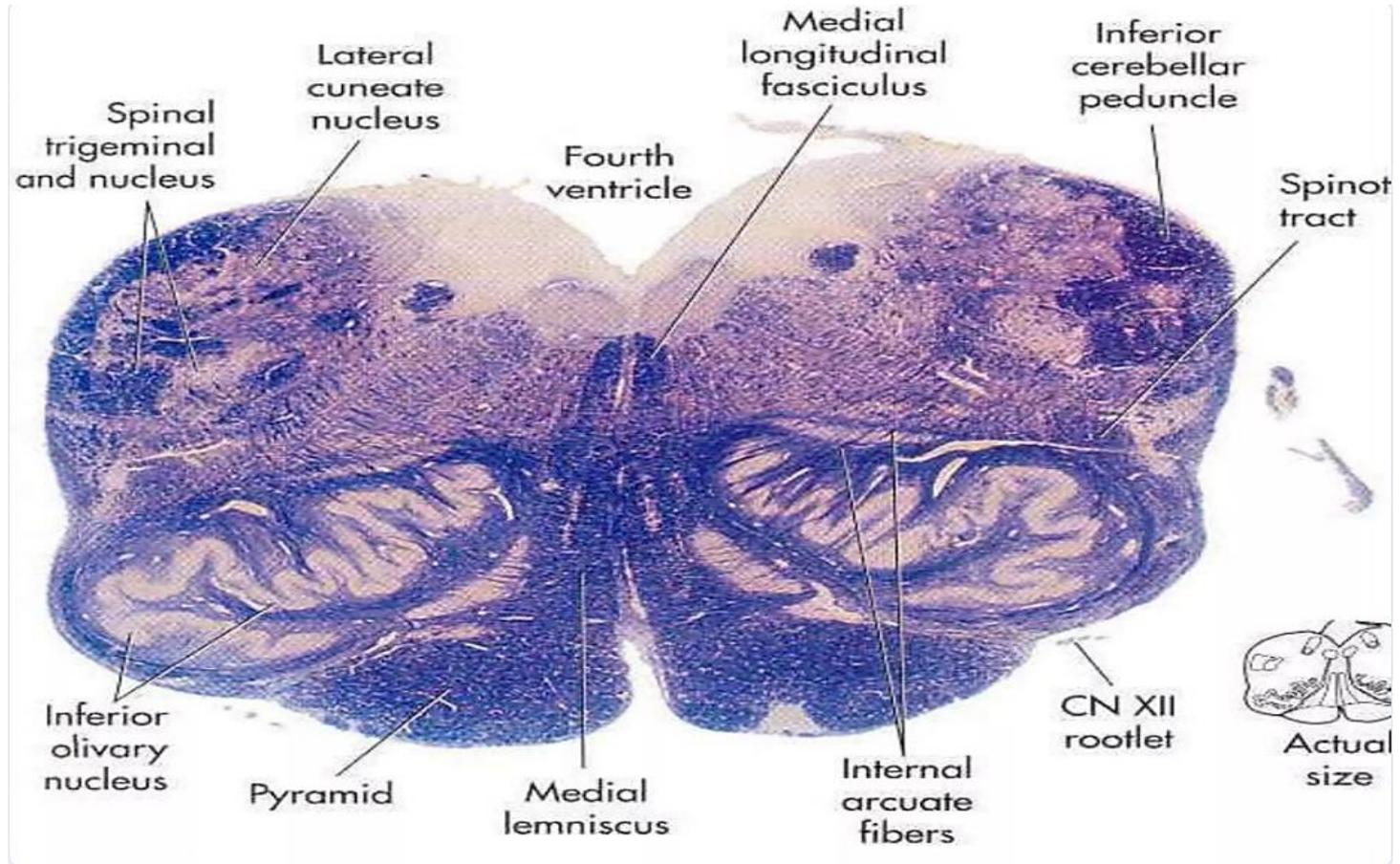
# Closed medulla oblongata (sensory decussation) (silver stain)



# Open medulla oblongata (silver stain)



# Open medulla oblongata



**THANK YOU**