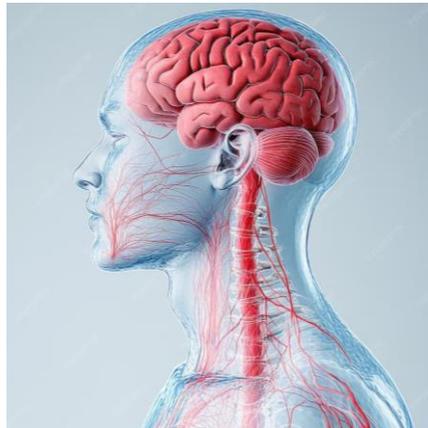


# Introduction to nervous system

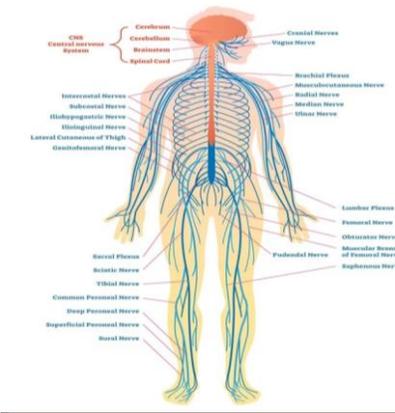
**Dr. Rasha Abdelaziz Abdellatif**

**Associate professor of human anatomy and Embryology – Mutah university**

# ANATOMIC ORGANIZATION OF THE NERVOUS SYSTEM



Central nervous system



Peripheral nervous system

# Central nervous system (C.N.S) :

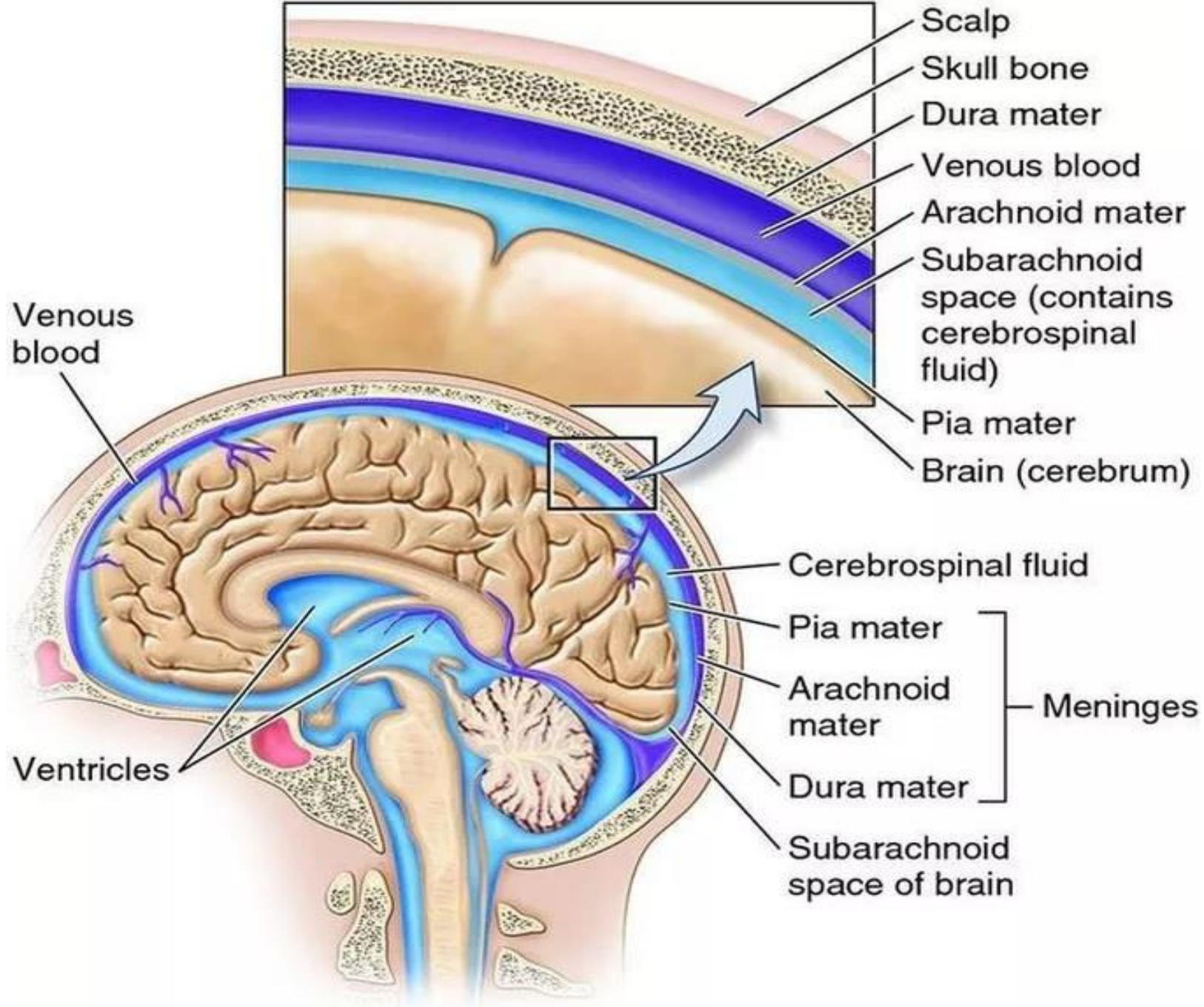
## 1- Brain:

Is represented by all the neural structures inside the skull cranial cavity and is surrounded by meninges.

## 2- Spinal cord:

is enclosed within a bony vertebral canal and is surrounded by three layers of meninges.

*Note:* the brain contains 4 connected cavities called ventricles filled with the cerebrospinal fluid.



# Brain is formed of the following structures from below upwards:

Brain stem: which includes:  
Medulla oblongata  
Pons  
Midbrain

Cerebellum: two cerebellar hemispheres separated by a central vermis

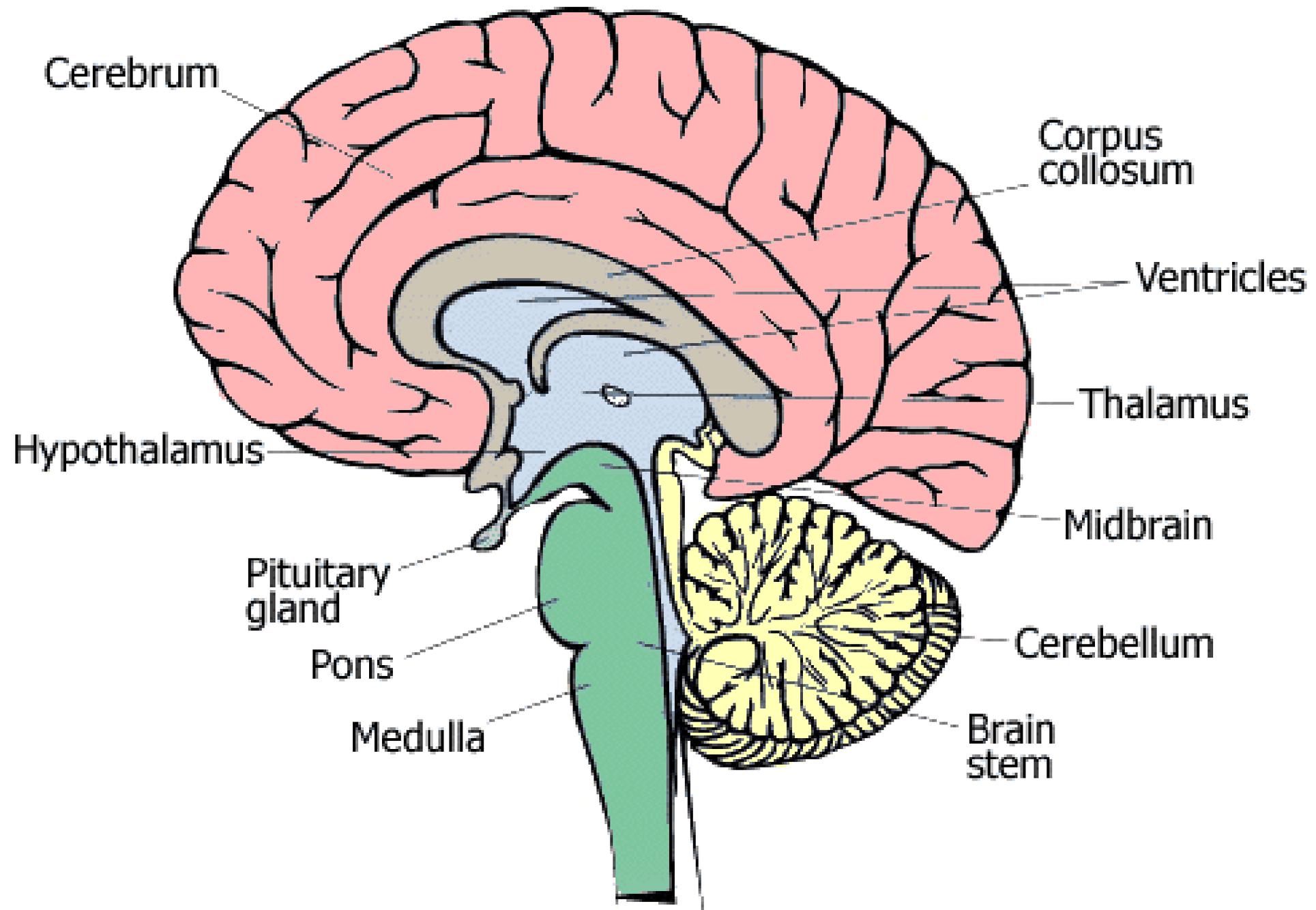
Diencephalon: which includes:

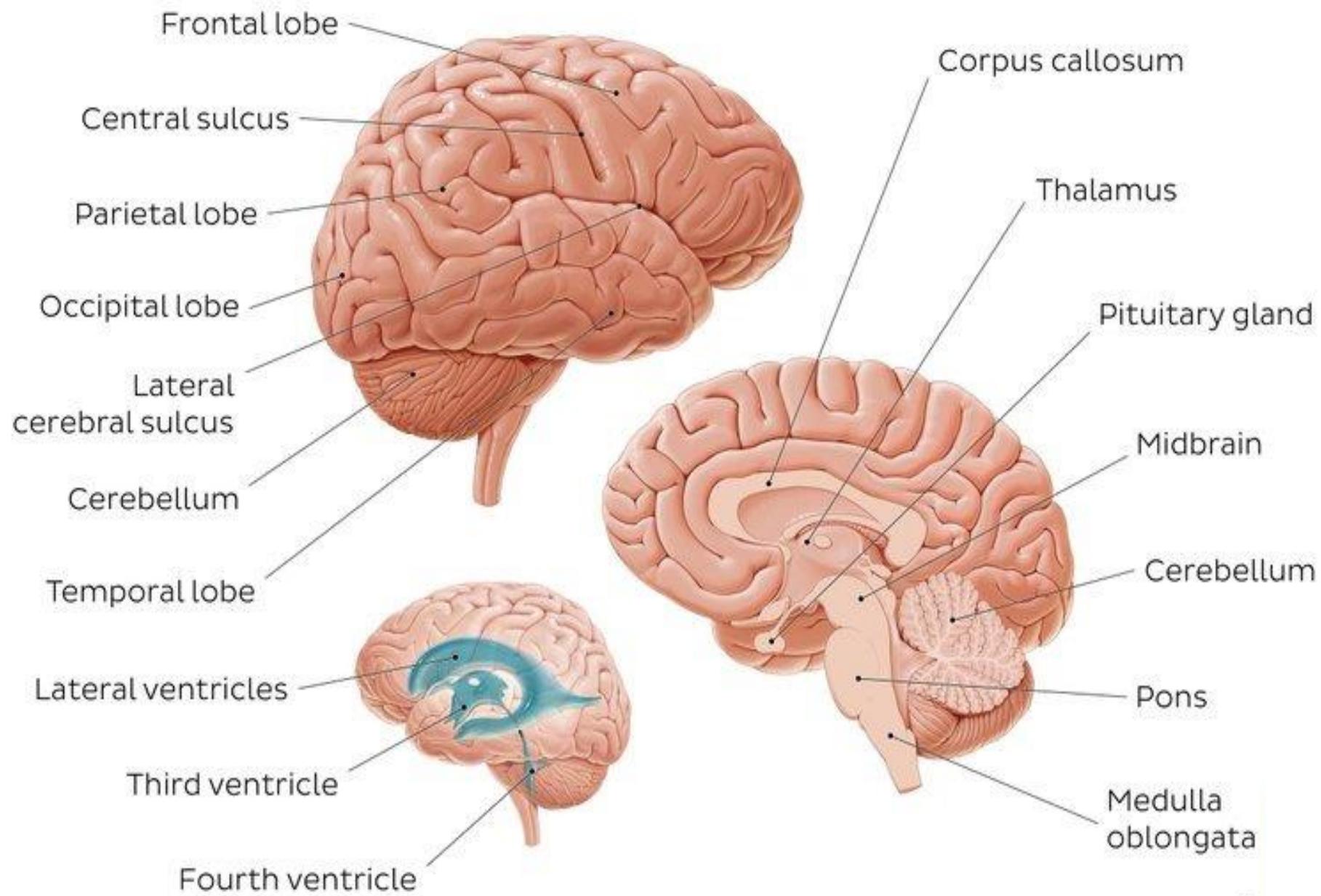
Thalamus  
Epithalamus  
Metathalamus  
Subthalamus  
Hypothalamus

**Cerebrum: two cerebral hemispheres**

Each cerebral hemisphere includes:

Cerebral cortex - Basal ganglia, - White matter





# Peripheral nervous system (P.N.S) :

- **Nerves:**

- A-Somatic:

- Spinal nerves (31 pairs): arise from the spinal cord.
    - Cranial nerves (12 pairs): arise from the brain.

- B- *Visceral* (autonomic):

- A pair of sympathetic chain.
    - Craniosacral parasympathetic nerve fibers.

- **Ganglia:**

- *Cerebrospinal ganglia*

- (Sensory):

- ✓ Dorsal root ganglia

- ✓ sensory ganglia of some cranial nerves.

- *Autonomic ganglia* (Motor): Sympathetic and parasympathetic.

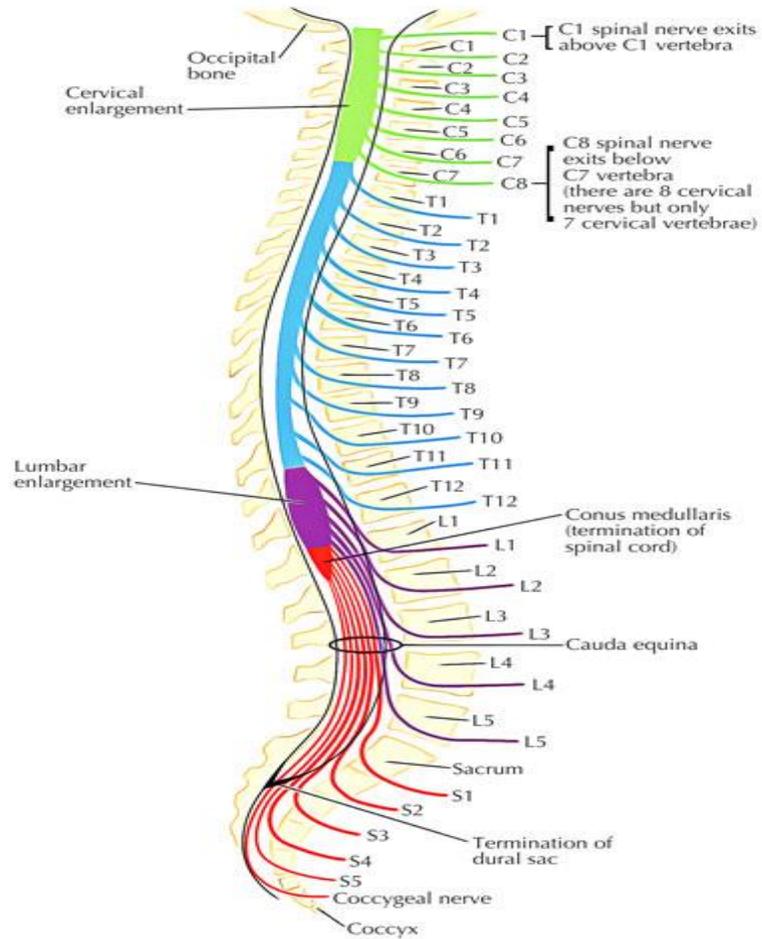
- **Nerve terminals :**

- a- Sensory (*Receptors*)

- b-Motor (*Effectors*)

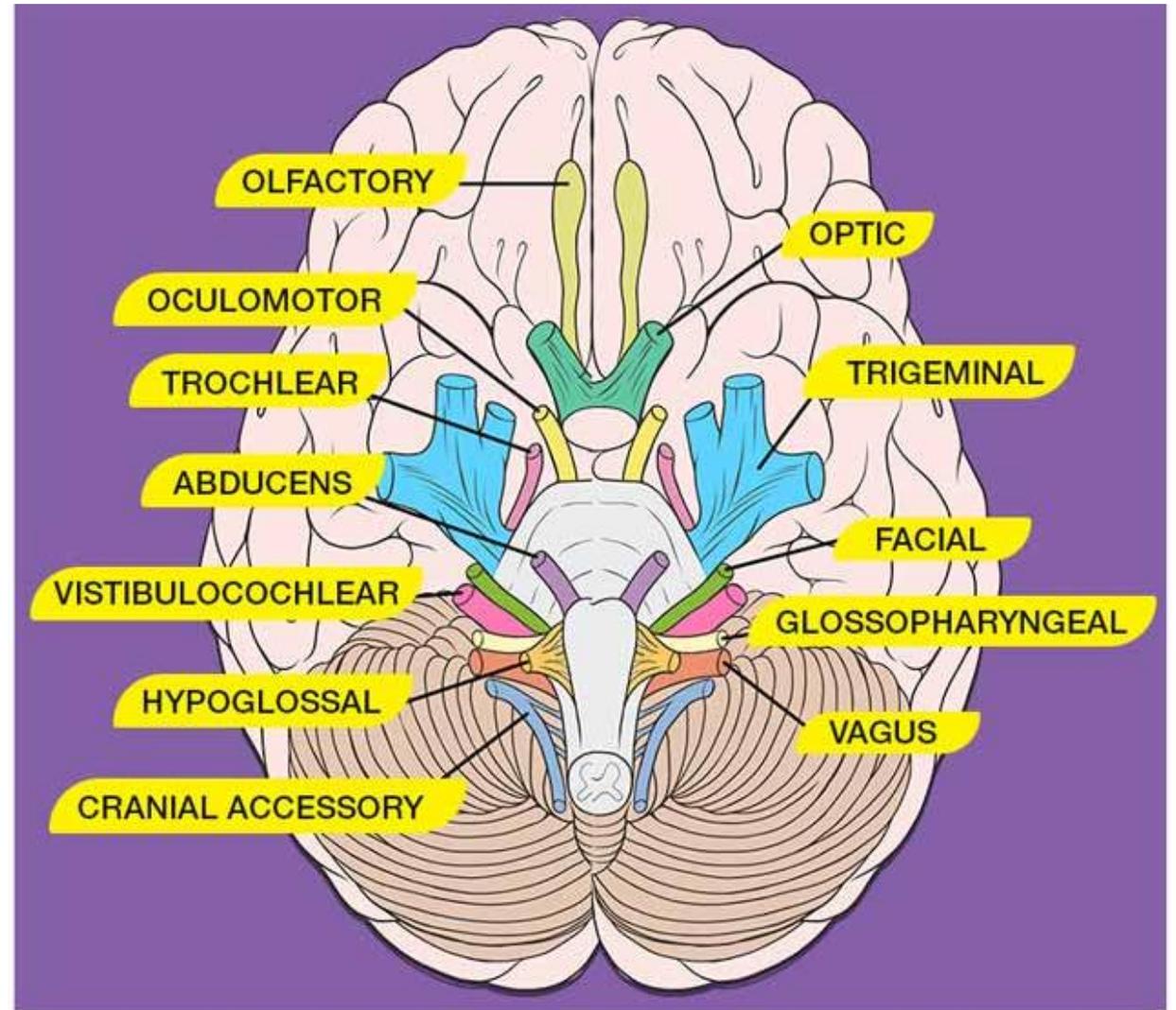
# Somatic Nerves

Spinal nerves 31 pairs



Cervical nerves  
Thoracic nerves  
Lumbar nerves  
Sacral and coccygeal nerves

Cranial nerves 12 pairs



# Visceral (Autonomic) Nerves

## Sympathetic

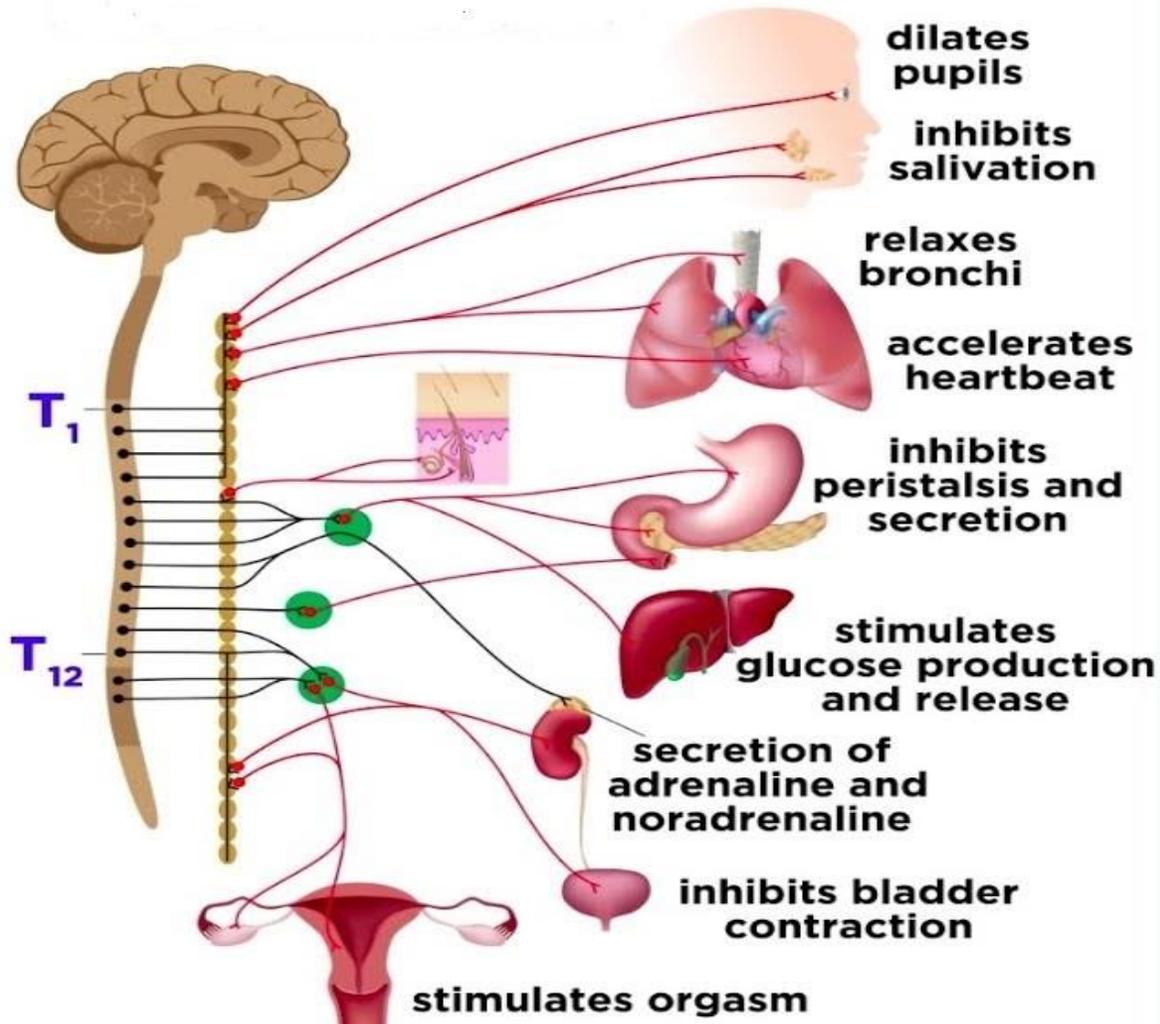
- Thoracolumbar
- Consists of fibers which accompany **all thoracic and 1,2,3 lumbar nerves.**
- They communicate with 2 sympathetic chains on either sides of vertebral column

## Parasympathetic

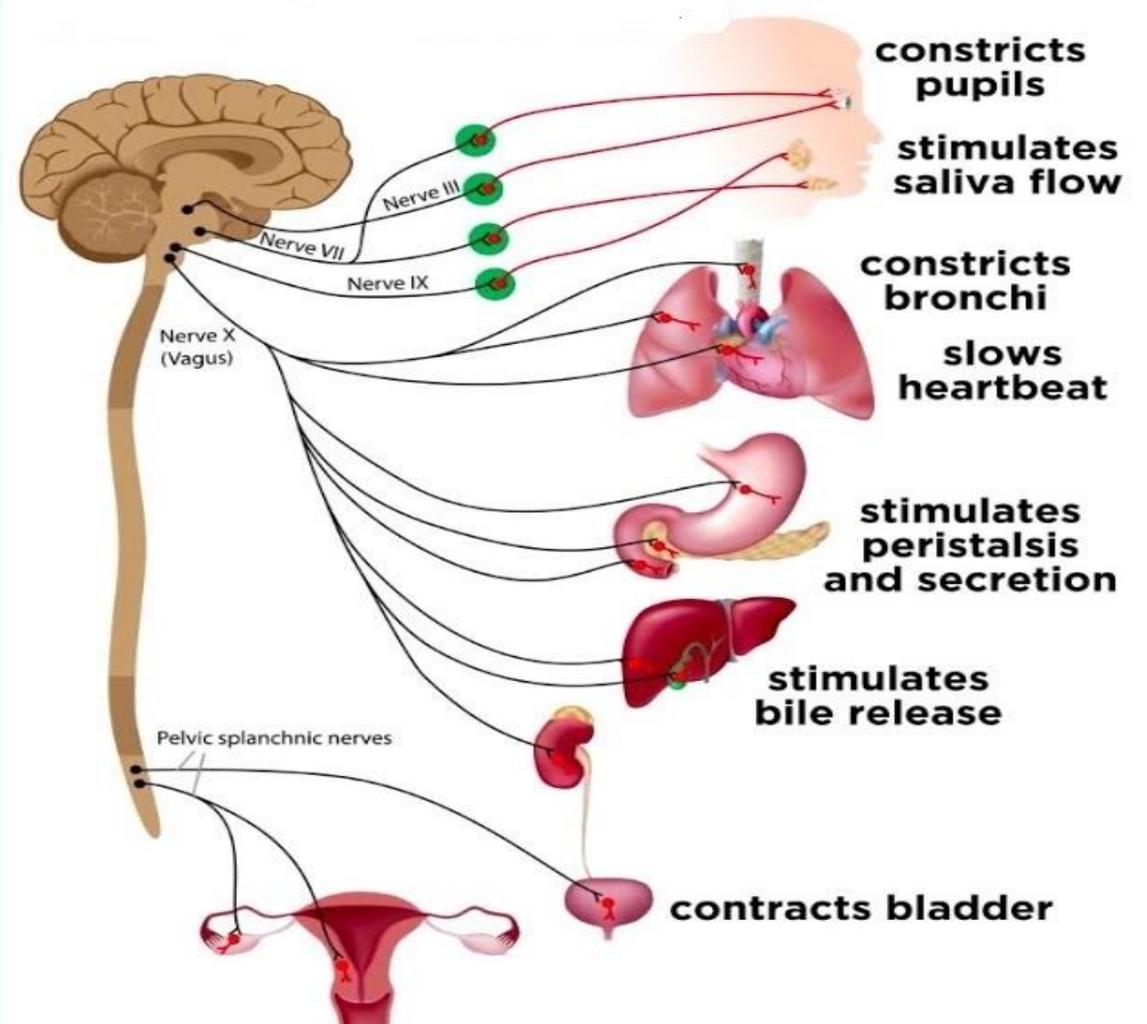
- Craniosacral
- Consists of fibers accompany **3,7,9,10 cranial nerves and 2,3,4 sacral nerves.**
- They have ganglia in the effector organs.

# Visceral (Autonomic) Nerves

## Sympathetic

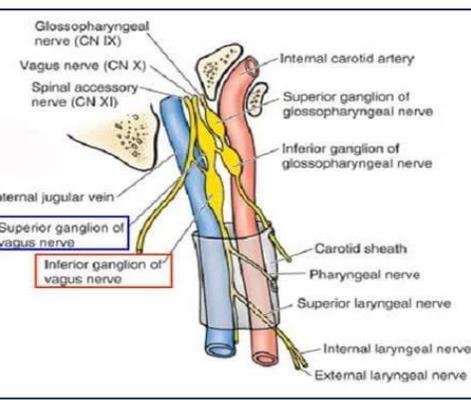
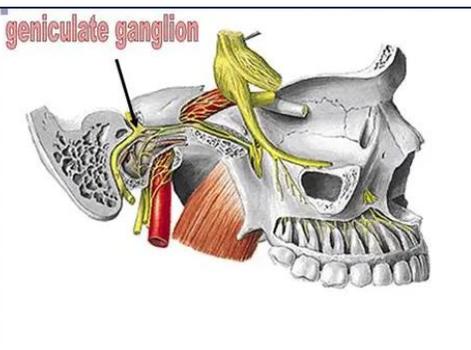
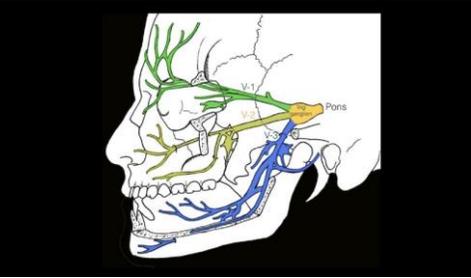
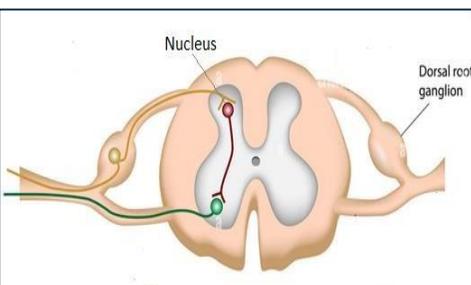


## Parasympathetic



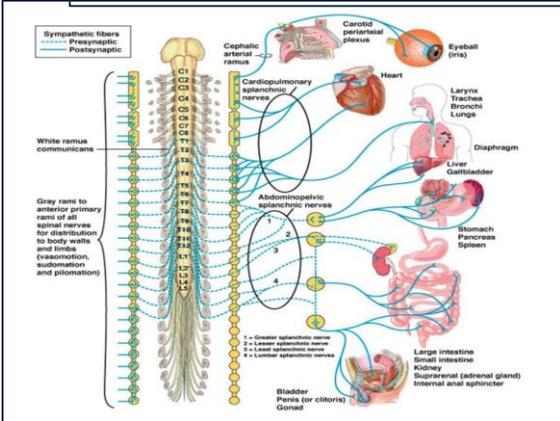
# Ganglia and Nuclei

- A group of nerve cell body lying very close to each other, works together to perform a same function called a **ganglion** or a **nucleus** according to many differences as follow:

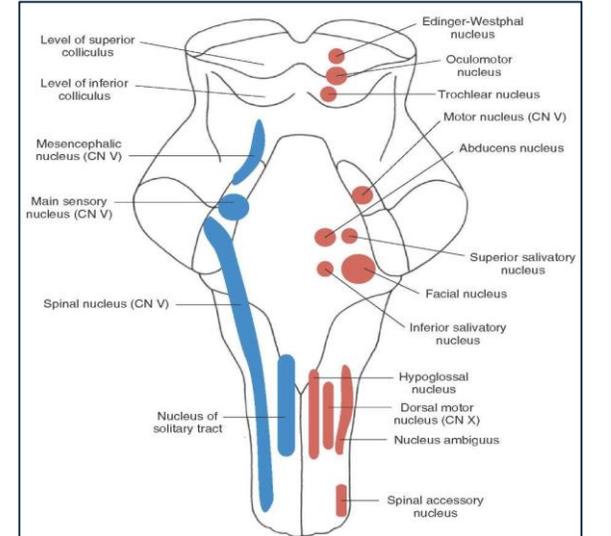
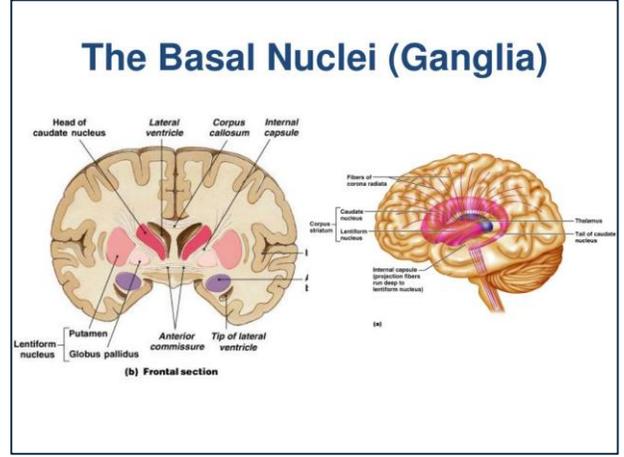
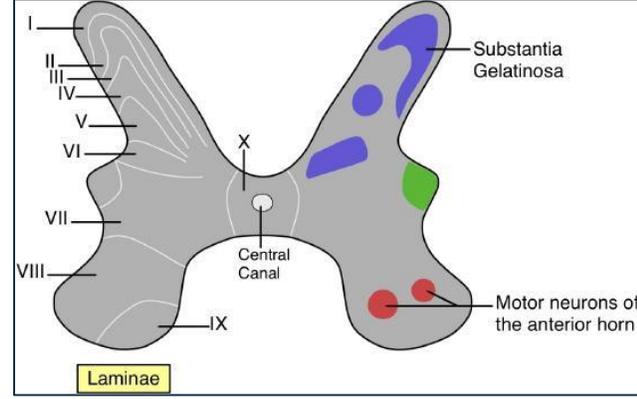
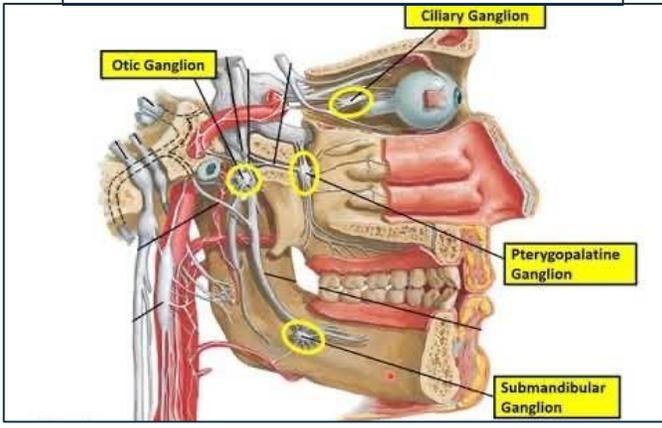


	<b>Ganglia</b>	<b>Nuclei</b>
<b>Location</b>	Peripheral nervous system (outside CNS)	Inside the grey matter of CNS
<b>Types</b>	May be sensory or autonomic	May be sensory, motor or integrated
<b>Example</b>	<p><u>Sensory:</u></p> <ul style="list-style-type: none"> <li>dorsal root ganglia</li> <li>Sensory ganglia of cranial nerves V, VII, VIII, IX and X.</li> </ul> <p><u>Motor (Autonomic):</u></p> <ul style="list-style-type: none"> <li>Sympathetic</li> <li>Parasympathetic.</li> </ul>	<ul style="list-style-type: none"> <li>Substantia gelatinosa of Rolandi (S.G.R)</li> <li>Central motor nucleus.</li> <li>Nuclei of basal ganglia</li> <li>Nuclei of deep origin of cranial nerves</li> </ul>

**Sympathetic ganglia**



**Parasympathetic ganglia**



# TERMS RELATED TO THE CNS

Macroscopically, all parts of the CNS have pinkish-gray color or white color, so it is called grey matter and white matter.

The distribution and organization of both matters are different in each part of CNS.



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## Grey matter

- **Microscopic structures forming it are:**
- **Neuronal cell bodies (Perikaryons)-  
Dendrites-Unmyelinated axons-  
Neuroglia- Nerve synapses.**

### **Physiologic role:**

- **The place where processing of sensation and perception of voluntary movement, learning, speech, and cognition takes place.**
- **It processes information and release new information through axon signaling found in the white matter.**



## **White matter**

- **Microscopic structures forming it are:**
- **Many myelinated axons (lipid in the myelin sheaths accounts for the white appearance)**
- **Neuroglia**
- **Few unmyelinated axons**

### **Physiologic role:**

**It provides communication between different grey matter areas and between grey matter and the rest of your body.**

## Organization in spinal cord

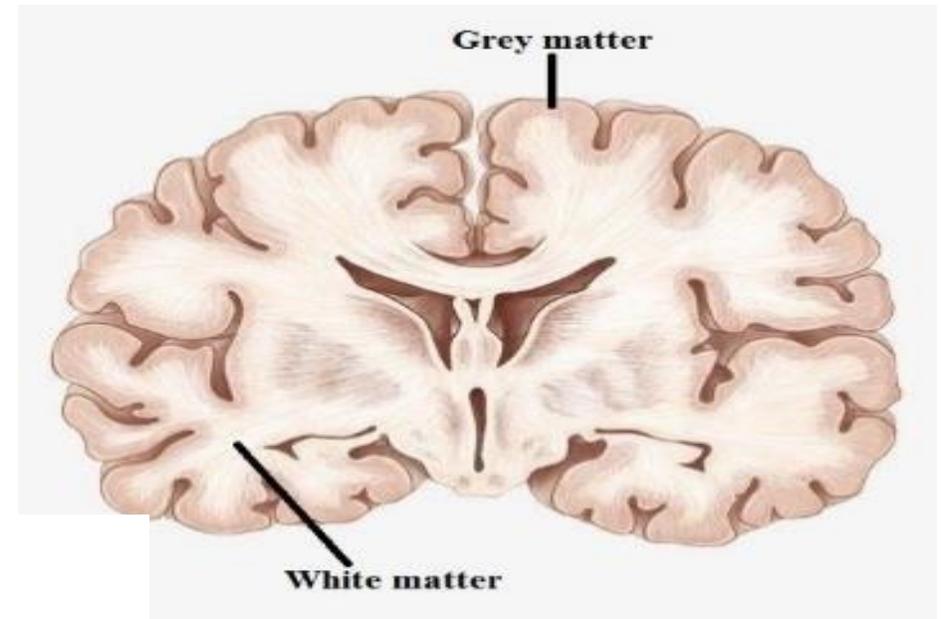
Grey matter :Central H-shape part  
White matter: Peripheral part



## Organization in brain

Grey matter :Peripheral part that called cortex

White matter: Central part.  
some nuclei of grey matter are scattered inside the white matter



## REFERENCES

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THANK

YOU!

