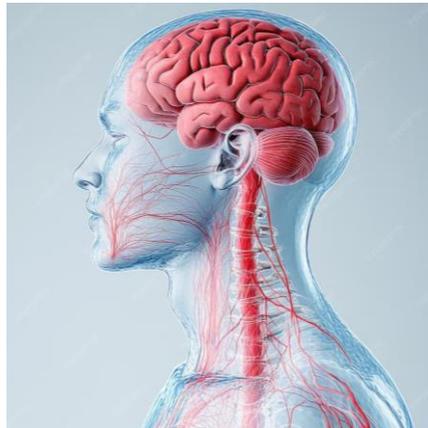


Introduction to nervous system

Dr. Rasha Abdelaziz Abdellatif

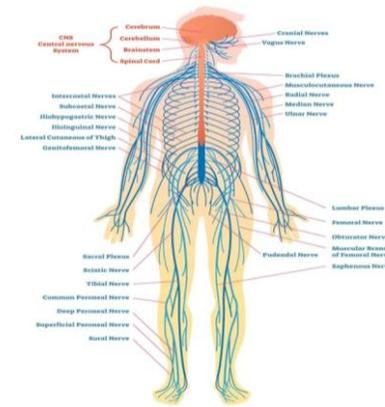
Associate professor of human anatomy and Embryology – Mutah university

ANATOMIC ORGANIZATION OF THE NERVOUS SYSTEM



Central nervous system

- 1) brain
- 2) spinal cord



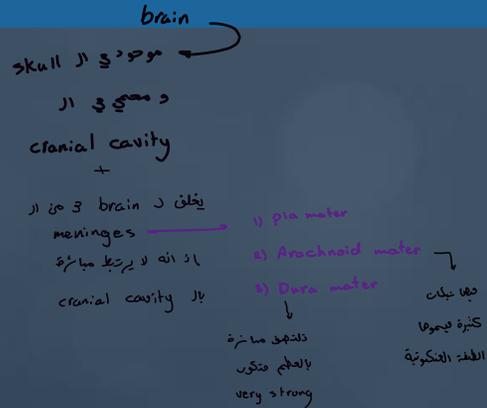
- 1) nerves
 - 2) ganglia
 - 3) nerve terminals
 - sensory (receptor)
 - motor (effector)
- Handwritten note: 3) nerve terminals → sensory (receptor) → motor (effector)*

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:

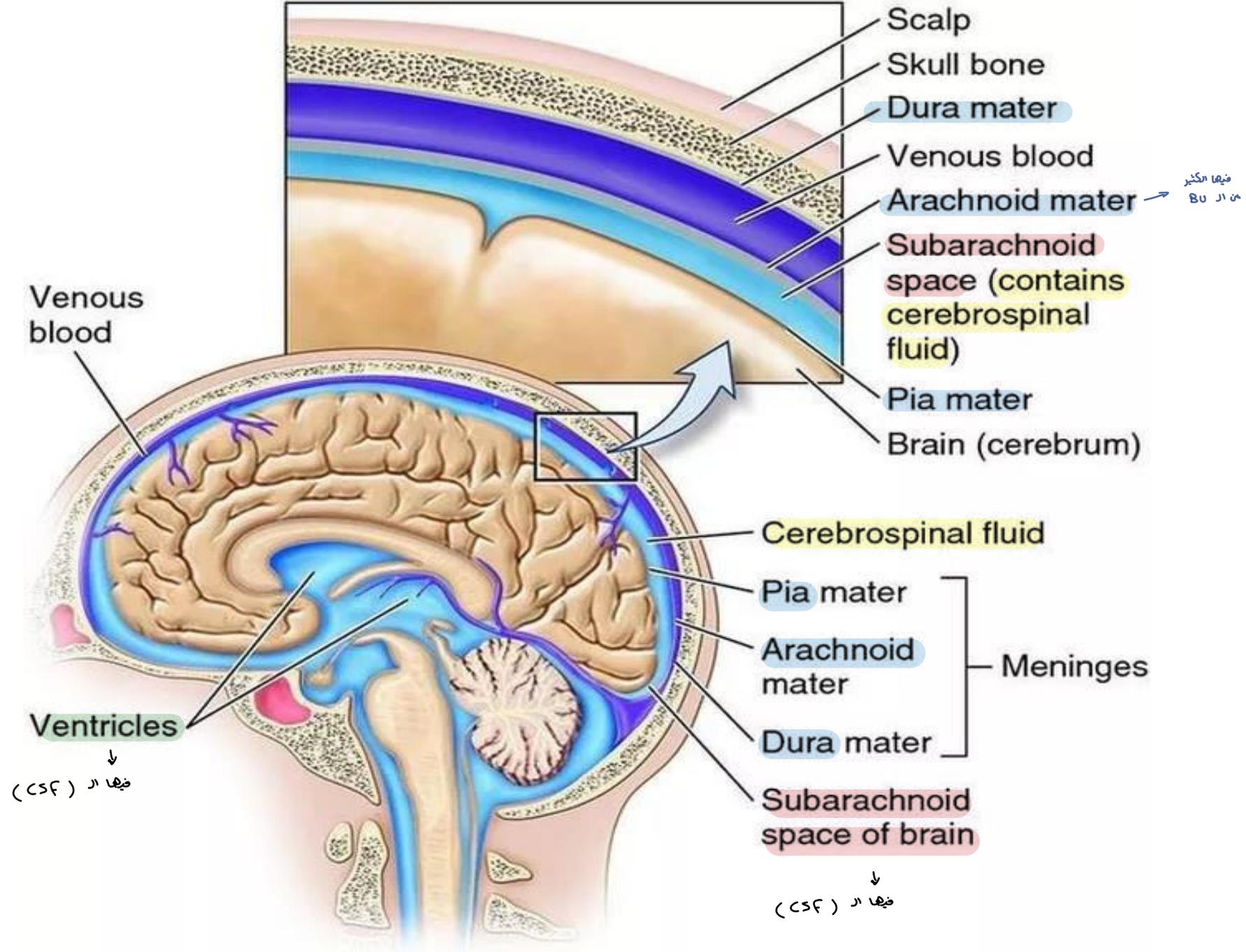
is enclosed within a bony vertebral canal and is surrounded by three layers of meninges.

spinal cord
موجود في ال

لذي لا يرتبط مع ال bone مباشرة

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

دماغ صغير ←

Diencephalon: which includes:

Thalamus

فوق ← Epithalamus

على ← Metathalamus

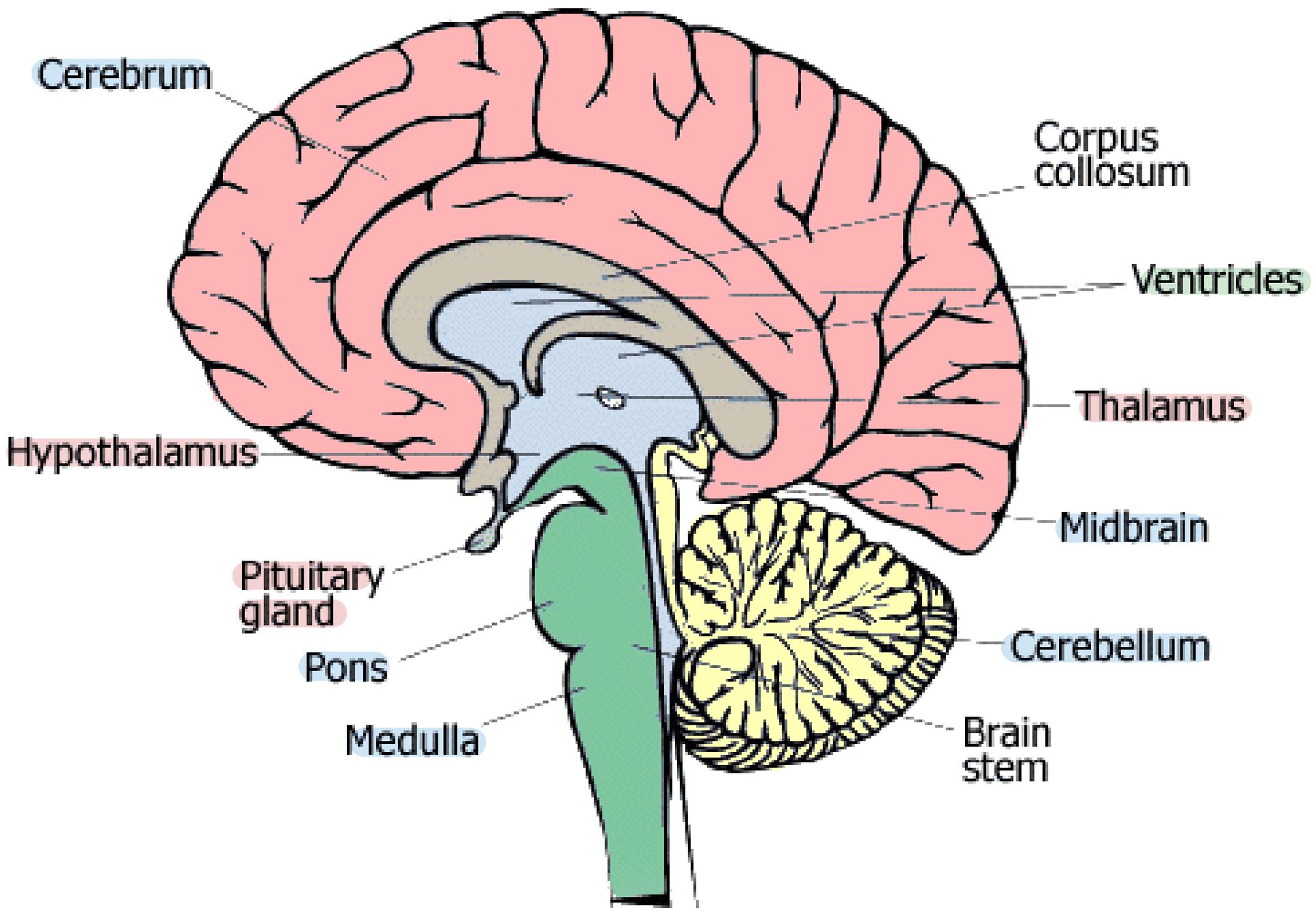
Subthalamus

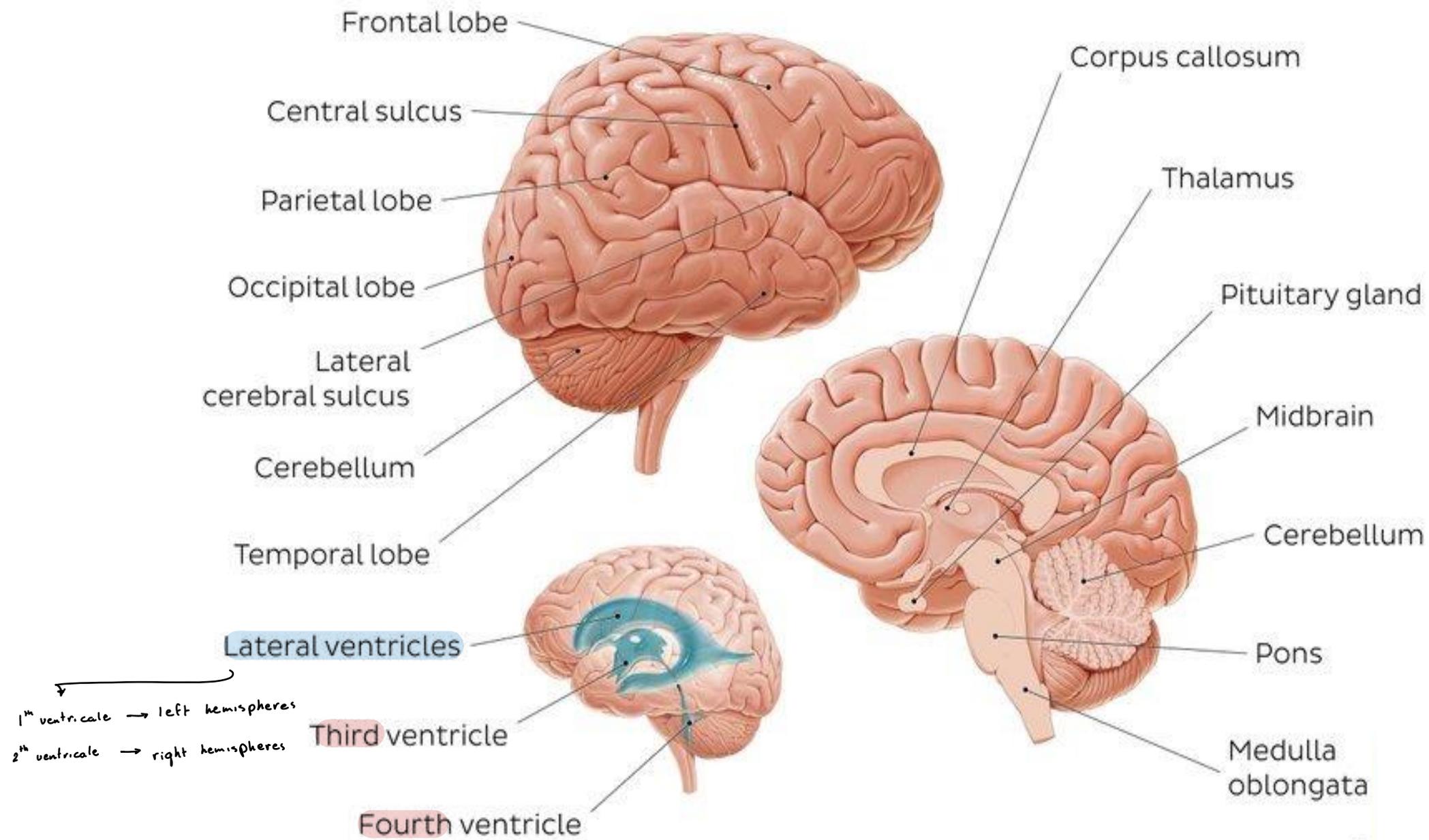
تحت ← Hypothalamus

القشرة
المخية
Cerebrum: two cerebral hemispheres

Each cerebral hemisphere includes:

Cerebral cortex - Basal ganglia, - White matter





Peripheral nervous system (P.N.S) :

• Nerves:

• A-Somatic:

Somatic nerves
 ينقل اصناف من قويد
 يعمل حركة عضلات

- **Spinal nerves (31 pairs):** arise from the spinal cord.
- **Cranial nerves (12 pairs):** arise from the brain.
- B- Visceral (autonomic): ← حركة الأعضاء / إفراز الغدد
- A pair of sympathetic chain.
- **Craniosacral parasympathetic** nerve fibers.

• Ganglia:

مراكز انقسام العزائم
 التي في ال (PNS)

Cerebrospinal ganglia

➤ (Sensory):

- ✓ **Dorsal root ganglia**
- ✓ **sensory ganglia of some cranial nerves.**

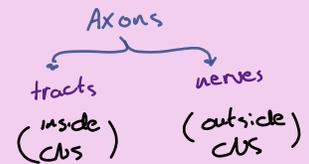
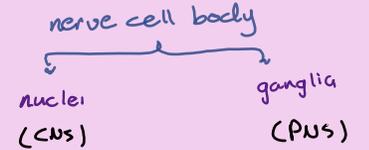
like trigeminal ganglia

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

• Nerve terminals :

a- **Sensory (Receptors)**

b- **Motor (Effectors)**



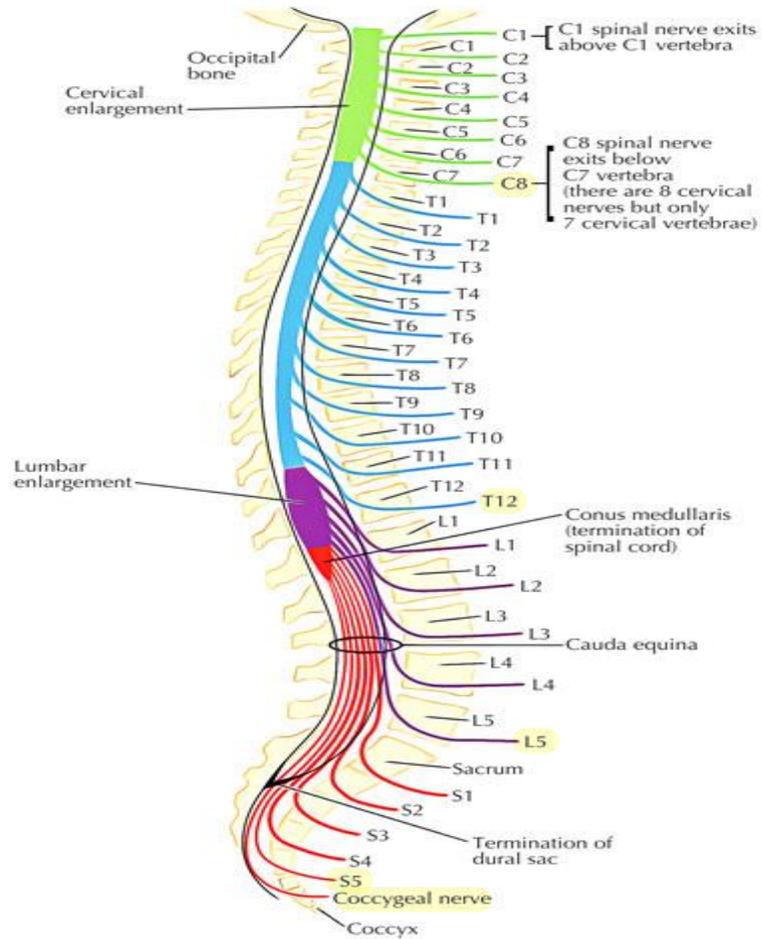
8	cervical
12	thoracic
5	lumbar
5	sacral
1	coccygeal

4 segment ←
 لكن طلوع nerve واحد

↳ otic / submandibular /
 sphenopalatin
 ganglia

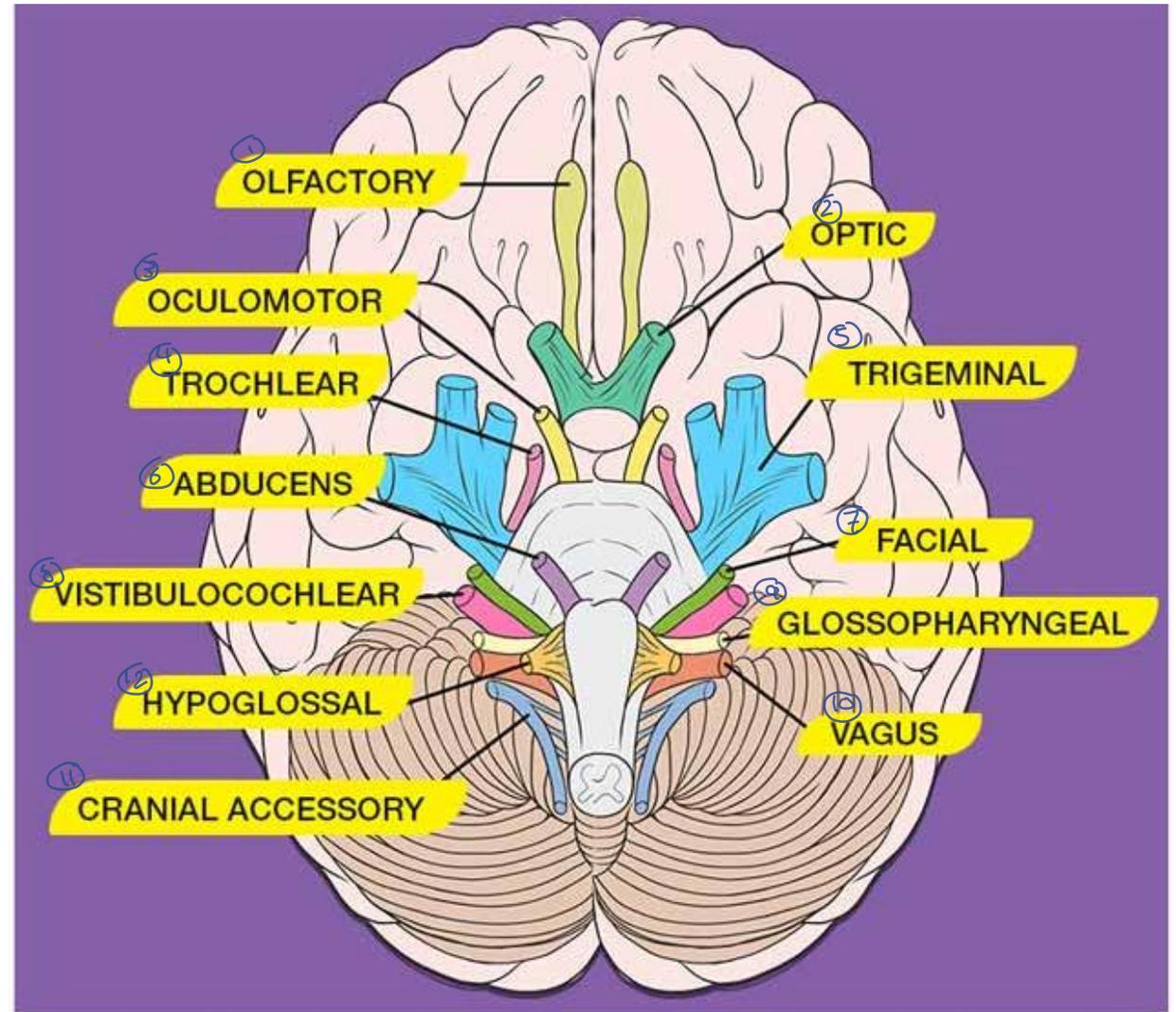
Somatic Nerves

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

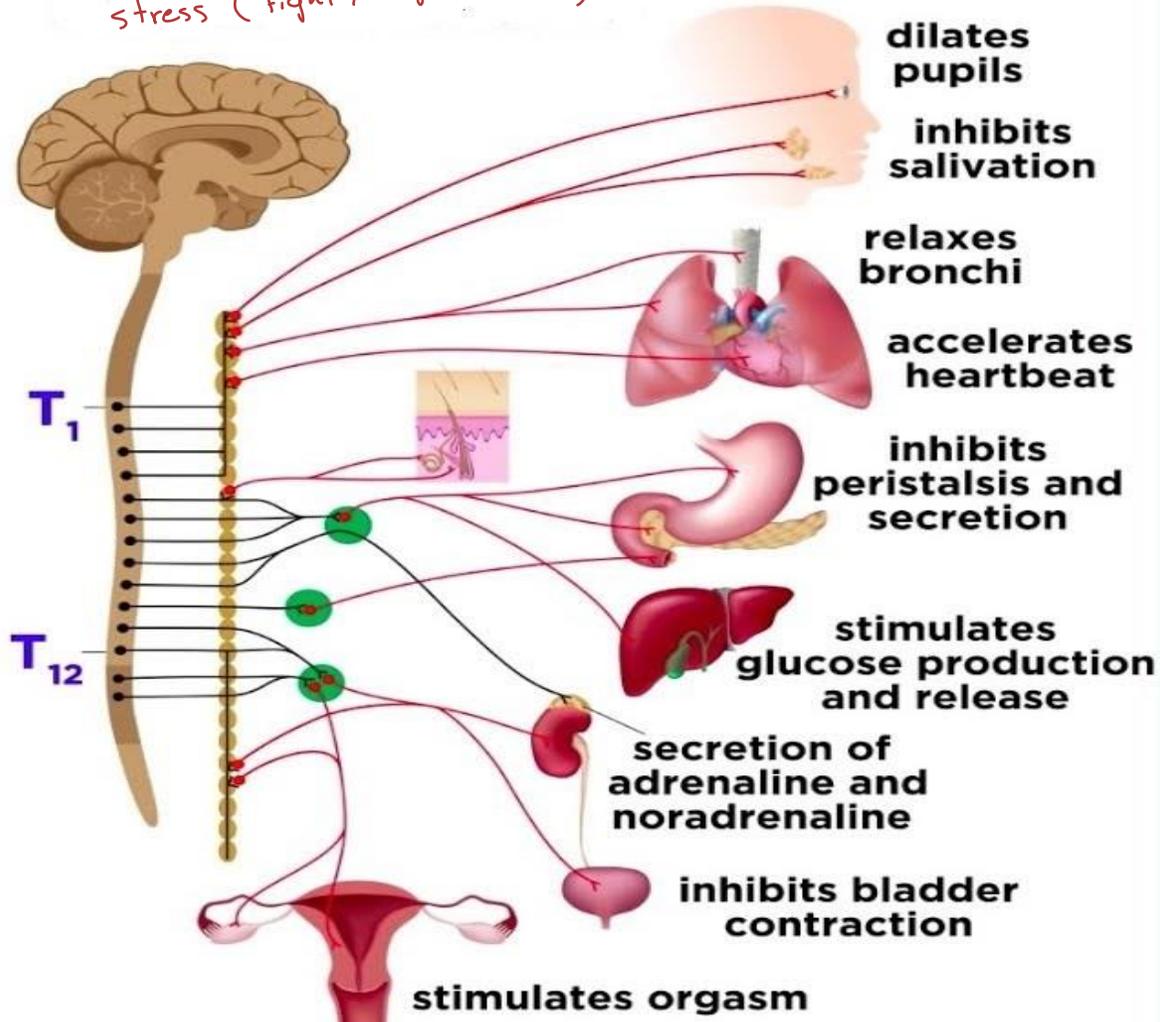
Parasympathetic

- **Craniosacral**
- Consists of fibers accompany **3,7,9,10** ¹⁹⁷³ cranial nerves and **2,3,4** sacral nerves.
صحيحة بكل بوجه الامتحان
- They have ganglia in the effector organs.

Visceral (Autonomic) Nerves

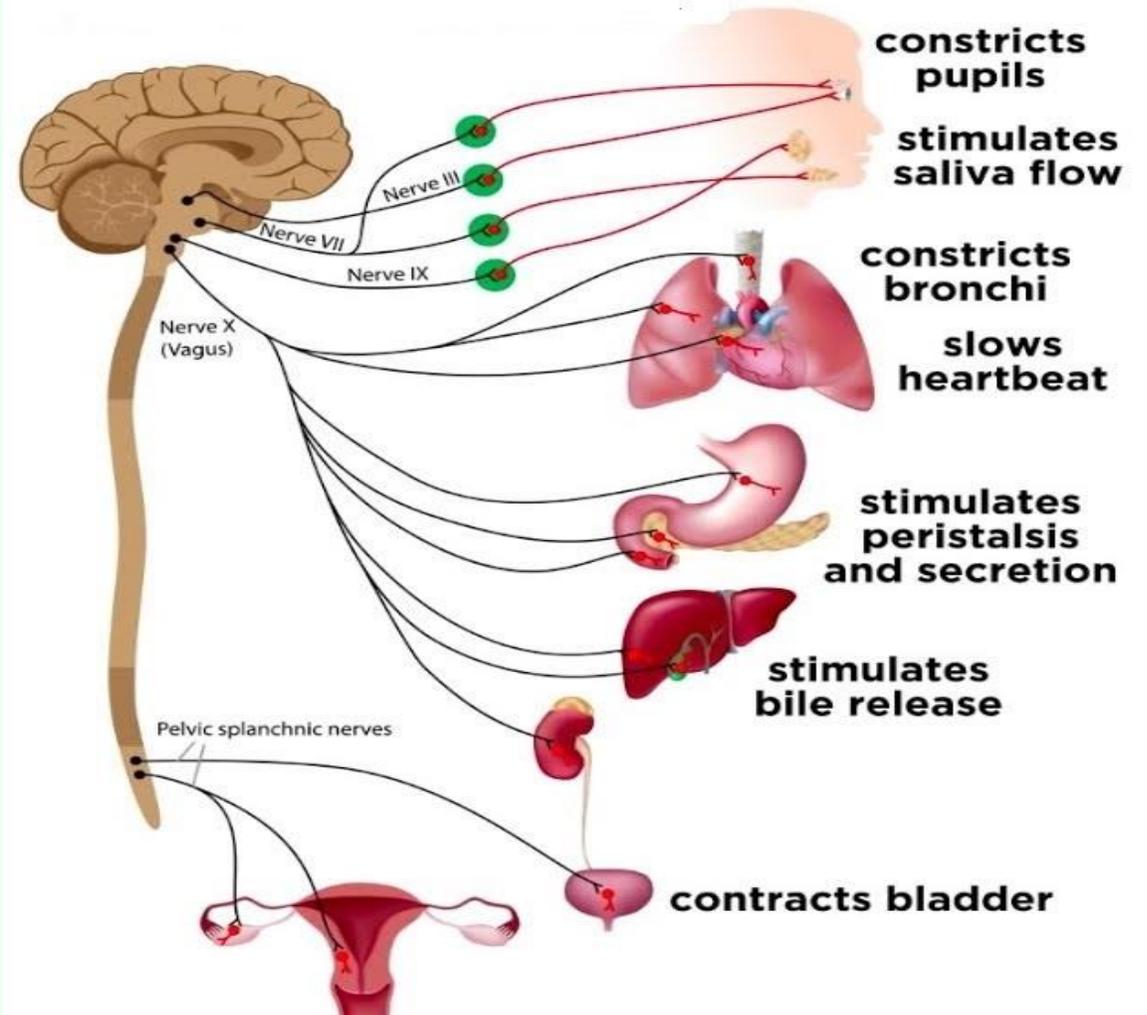
Sympathetic

stress (fight / flight / fear)



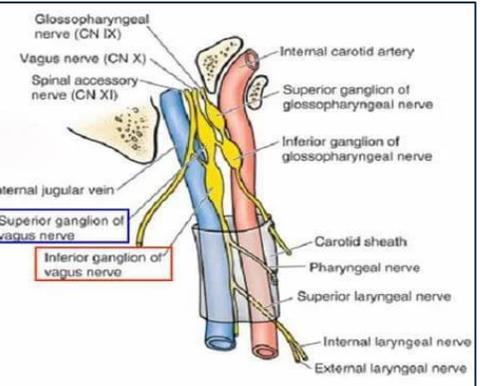
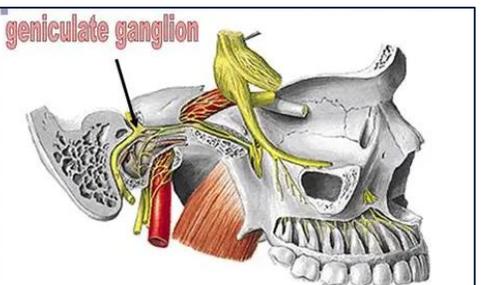
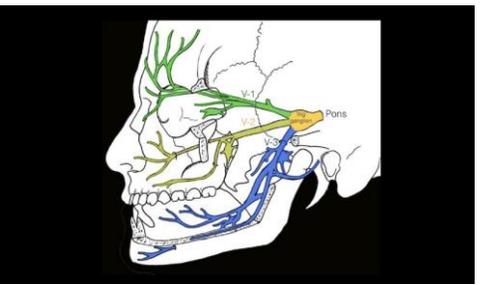
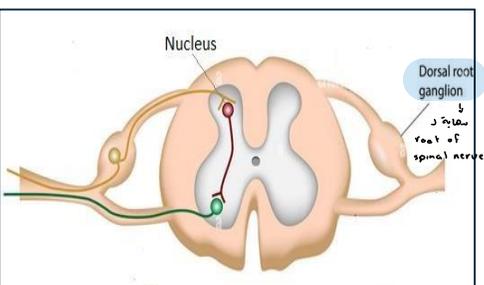
Parasympathetic

relax and secretion



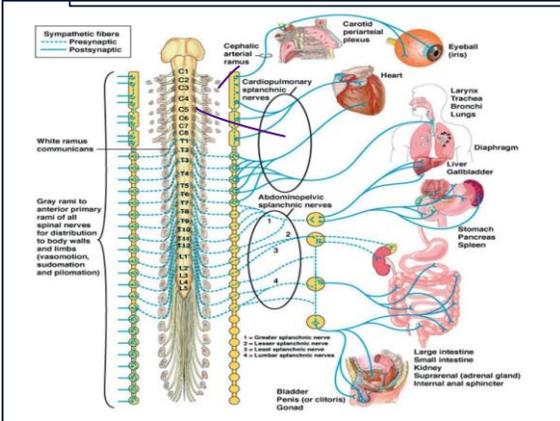
Ganglia and Nuclei

- 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:

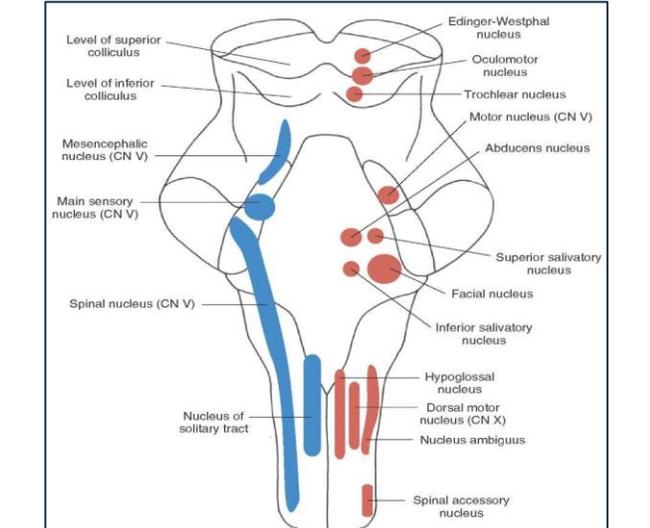
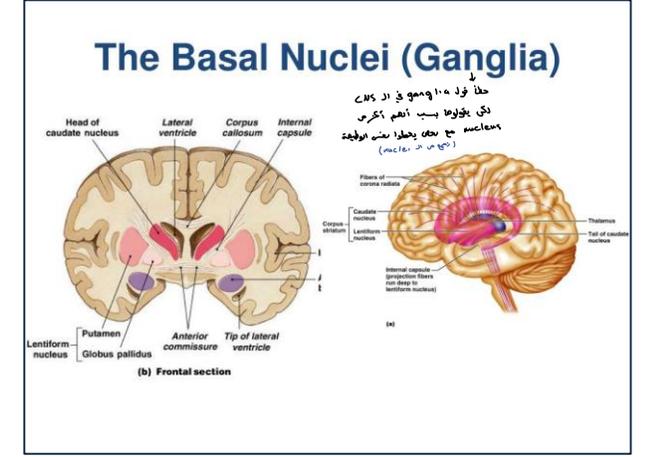
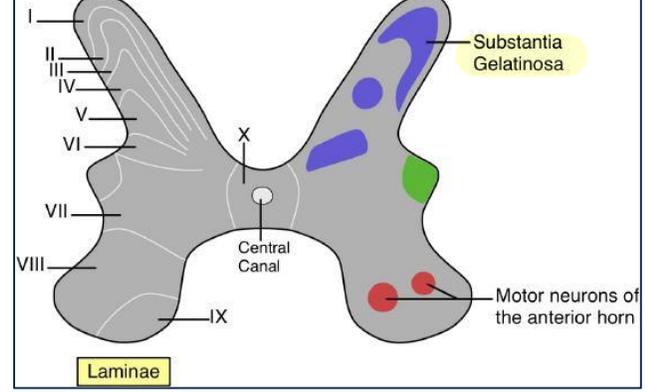
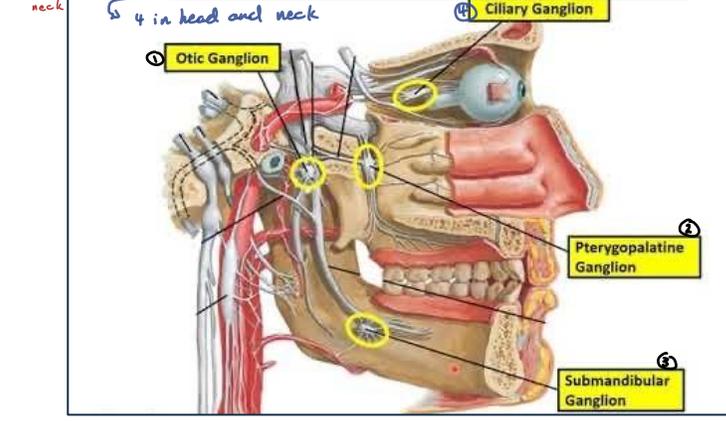


	Ganglia	Nuclei
Location	Peripheral nervous system (outside CNS)	Inside the grey matter of CNS <i>nerve cell body لہذا بیچ ل spinal cord / brain (nuclei) نوبت</i>
Types	May be sensory or autonomic	May be sensory, motor or integrated <i>mixed</i>
Example	<p>Sensory:</p> <ul style="list-style-type: none"> dorsal root ganglia Sensory ganglia of cranial nerves V, VII, VIII, IX and X. <ul style="list-style-type: none"> geniculate ganglia trigeminal ganglia (gasserian/semilunar/gasser's) ganglia X/IX (vagus + glossopharyngeal) → superior + inferior ganglia <p>Motor (Autonomic):</p> <ul style="list-style-type: none"> Sympathetic (thoracolumbar) <i>بطنی یا اندام سے نکلنے والی</i> Parasympathetic. (craniofacial) <i>مخ اور منہ کے حصے سے نکلنے والی</i> 	<ul style="list-style-type: none"> Substantia gelatinosa of Rolandi (S.G.R) → in posterior horn of spinal cord Central motor nucleus. <i>مخ کے حصے سے نکلنے والی</i> Nuclei of basal ganglia <i>cranial nerves</i> Nuclei of deep origin of cranial nerves <i>cranial nerves (12) stem brain</i>

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.



← عالم يكون
مراكز اتحاد
العقار

Grey matter

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

اي شيء هو
unmyelinated
تكون سرعته اقل
(slowly)
اقل من myelinated

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

خانا يكون
ال axons
nerve cells
nerve cells

- **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.

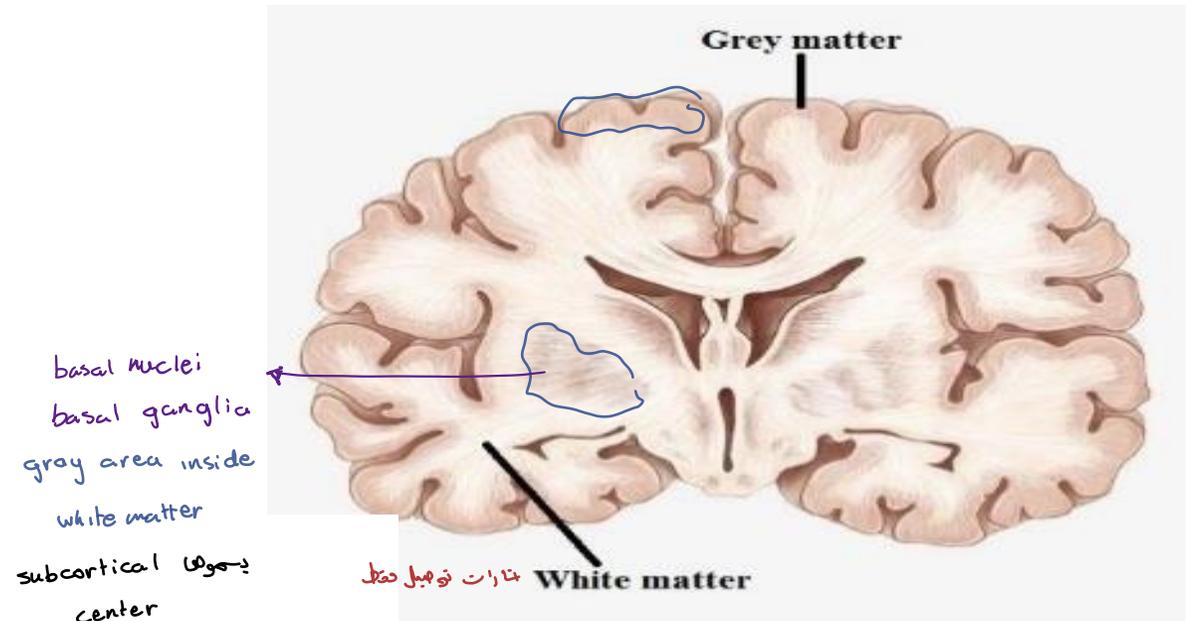
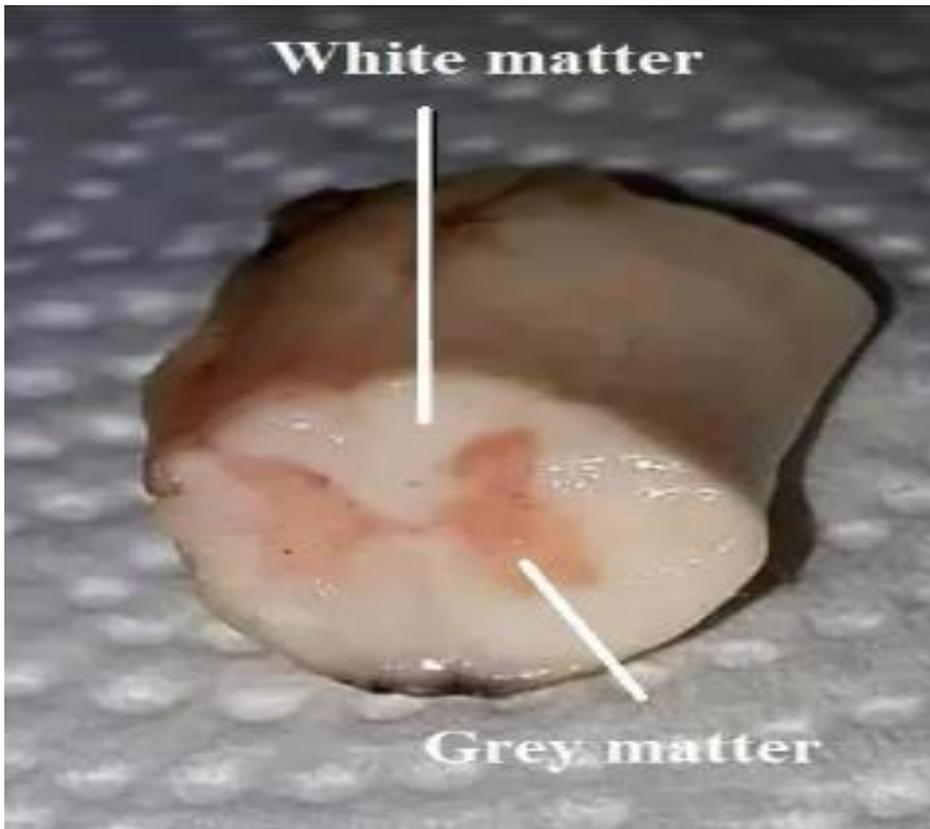
Organization in spinal cord

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



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THANK

YOU!

