



المرحلة الاولى 2023-2024

Anatomy Define of Brain

6th Lecture

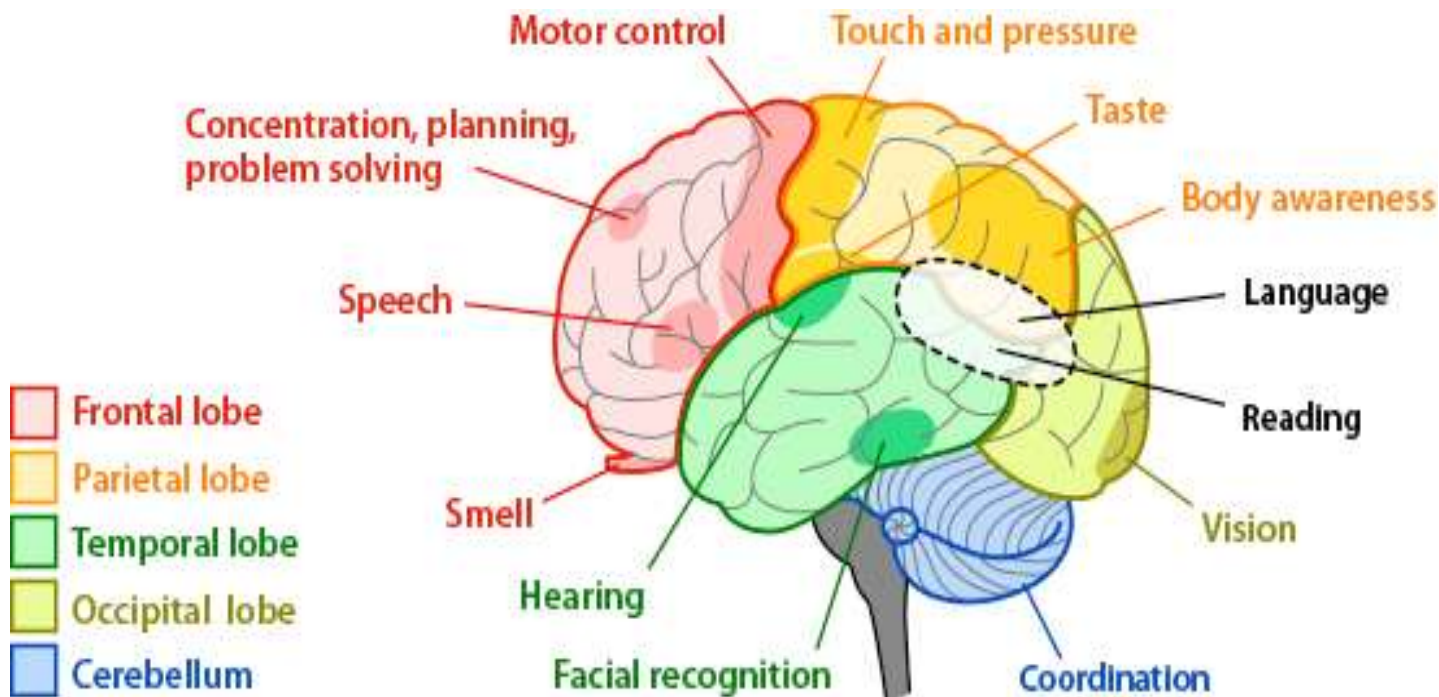
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Brain

The brain is that part of the central nervous system that lies inside the cranial cavity
It is continuous with the spinal cord through the foramen magnum.

General:

- Central nervous system component housed in the cranial cavity.
- Connects with spinal cord via foramen magnum.
- Responsible for higher brain functions, sensory processing, and motor control.



Major Parts of the Brain		Cavities of the Brain
Forebrain	Cerebrum	Right and left lateral ventricles
	Diencephalon	Third ventricle
Midbrain		Cerebral aqueduct
Hindbrain	Pons	Fourth ventricle and central canal
	Medulla oblongata	
	Cerebellum	

Main Parts:

1-Cerebrum:

Largest part, divided into two **hemispheres**.

Surface folded with **gyri and sulci**, increasing surface area.

Contains gray matter (cortex) responsible for higher functions.

Each hemisphere subdivided into

lobes with specific functions:

Frontal: planning, decision-making, personality.

Parietal: sensory processing, spatial awareness.

Occipital: vision.

Temporal: hearing, memory, language.

2-Brainstem:

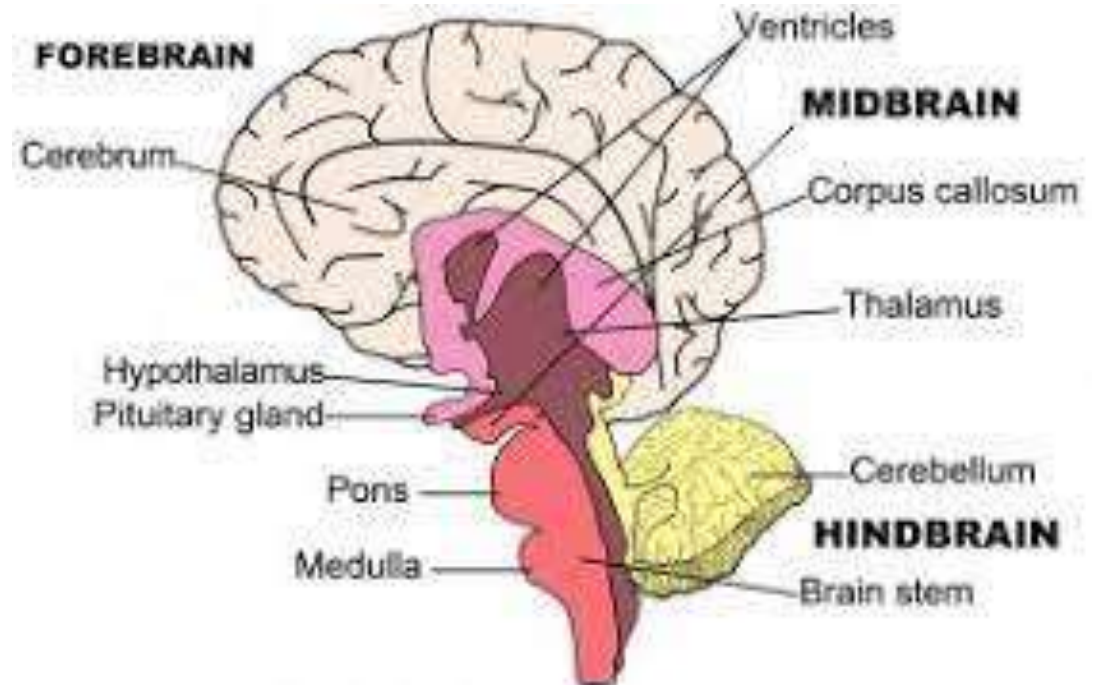
Connects cerebrum to spinal cord.

Includes:

Midbrain: regulates movement, vision, and auditory reflexes.

Pons: relays sensory and motor information between cerebrum and cerebellum.

Medulla oblongata: controls vital functions like respiration, heart rate, and blood pressure.



Cerebellum:

Located behind brainstem.

Coordinates movement, balance, and posture.

Diencephalon:

Situated between brainstem and cerebrum.

Includes:

Thalamus: sensory relay station to cortex.

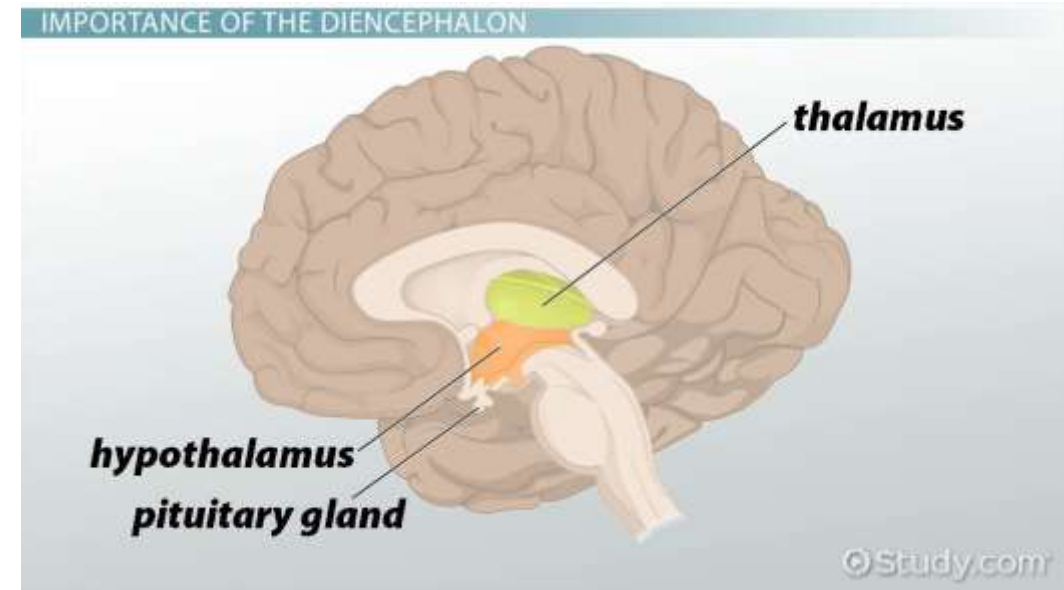
Hypothalamus: regulates vital functions like hunger, thirst, temperature, and sleep.

Additional Points:

Ventricles are fluid-filled cavities within the brain.

Meninges are protective membranes surrounding the brain and spinal cord.

Blood vessels supply the brain with oxygen and nutrients.



Cerebrum:

General:

- Largest part of the brain.
- Two hemispheres connected by corpus callosum (white matter).
- Extends from frontal to occipital bones.
- Lies in anterior & middle cranial fossae, above tentorium cerebelli posteriorly.

Surface:

- Cortex: gray matter layer with folds (gyri) and grooves (sulci) increasing surface area.
- Lobes: named for overlying cranial bones:
 - Frontal lobe: front, behind forehead.
 - Parietal lobe: top, behind central sulcus.
 - Occipital lobe: back, behind parietal lobe.
 - Temporal lobe: side, below lateral sulcus.

Internal Anatomy:

- White matter: deeper to cortex, contains nerve fibers connecting different brain regions.
- Basal nuclei: groups of gray matter deep within each hemisphere, involved in movement control.
- Ventricles: fluid-filled cavities within the hemispheres.

Additional Points:

- Longitudinal fissure separates hemispheres, falx cerebri projects into it.
- Each lobe has specific functions like sensation, motor control, vision, and language.
- The cerebrum plays a crucial role in all higher brain functions.

Diencephalon:

Location:

- Hidden within brain, below cerebral cortex.

Key Features:

- Third ventricle: Fluid-filled cavity surrounded by diencephalon structures.
- Optic chiasm: Where optic nerves cross, sending visual information to cortex.
- Tuber cinereum and infundibulum: Connect hypothalamus to pituitary gland.
- Mammillary bodies: Part of limbic system involved in memory and emotion.
- Posterior perforated substance: Area with numerous small blood vessels.

Main Structures:

Thalamus:

- Large mass of gray matter on either side of third ventricle.
- Acts as relay station for sensory information to cortex.

Hypothalamus:

- Forms part of third ventricle floor.
- Controls vital functions like body temperature, hunger, thirst, and sleep.

Additional Points:

- Diencephalon also includes epithalamus and subthalamus.
- Plays a crucial role in sensory processing, homeostatic regulation, and emotional behavior.

Brain Regions:

Midbrain:

- Connects forebrain and hindbrain.
- Two halves: cerebral peduncles (crus cerebri & tegmentum).
- Cavity: cerebral aqueduct (connects 3rd & 4th ventricles).
- Key structures:
 - **Substantia nigra** (pigmented band, involved in movement).
 - **Tectum** (with superior & inferior colliculi, involved in visual & auditory processing).
 - **Pineal body** (small gland, regulates hormones).

Cranial Nerves in the Cranial Cavity:

Number and Location:

- 12 pairs of nerves branching off the brain's base.

Types:

- **Sensory:** transmit information to the brain (olfactory, optic, vestibulocochlear).
- **Motor:** control muscle movement (oculomotor, trochlear, abducens, accessory, hypoglossal).
- **Mixed:** carry both sensory and motor information (trigeminal, facial, glossopharyngeal, vagus).

Pathways:

- Emerge from the brain through foramina and fissures in the skull base.
- Distributed in head and neck (except vagus, reaching thorax and abdomen).

Names and Numbers:

- I (olfactory): smell
- II (optic): vision
- III (oculomotor): eye movement
- IV (trochlear): eye movement
- V (trigeminal): facial sensation, chewing
- VI (abducens): eye movement
- VII (facial): facial expressions, taste
- VIII (vestibulocochlear): balance, hearing
- IX (glossopharyngeal): taste, swallowing
- X (vagus): widespread autonomic control (heart, lungs, etc.)
- XI (accessory): neck muscles, swallowing
- XII (hypoglossal): tongue movement

thank
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