Introduction to Anatomy

1st Year Medical Students

2025-2026
Second Semester

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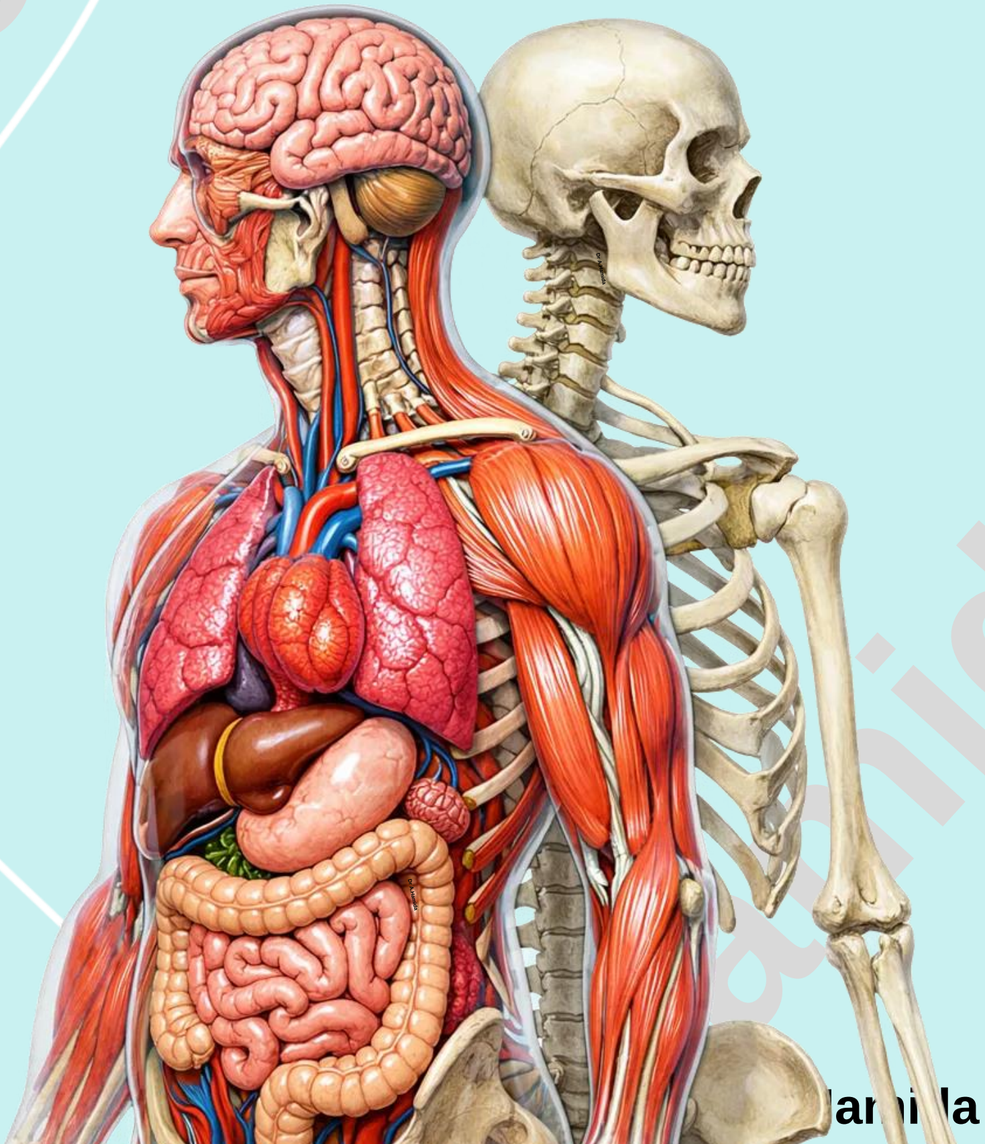
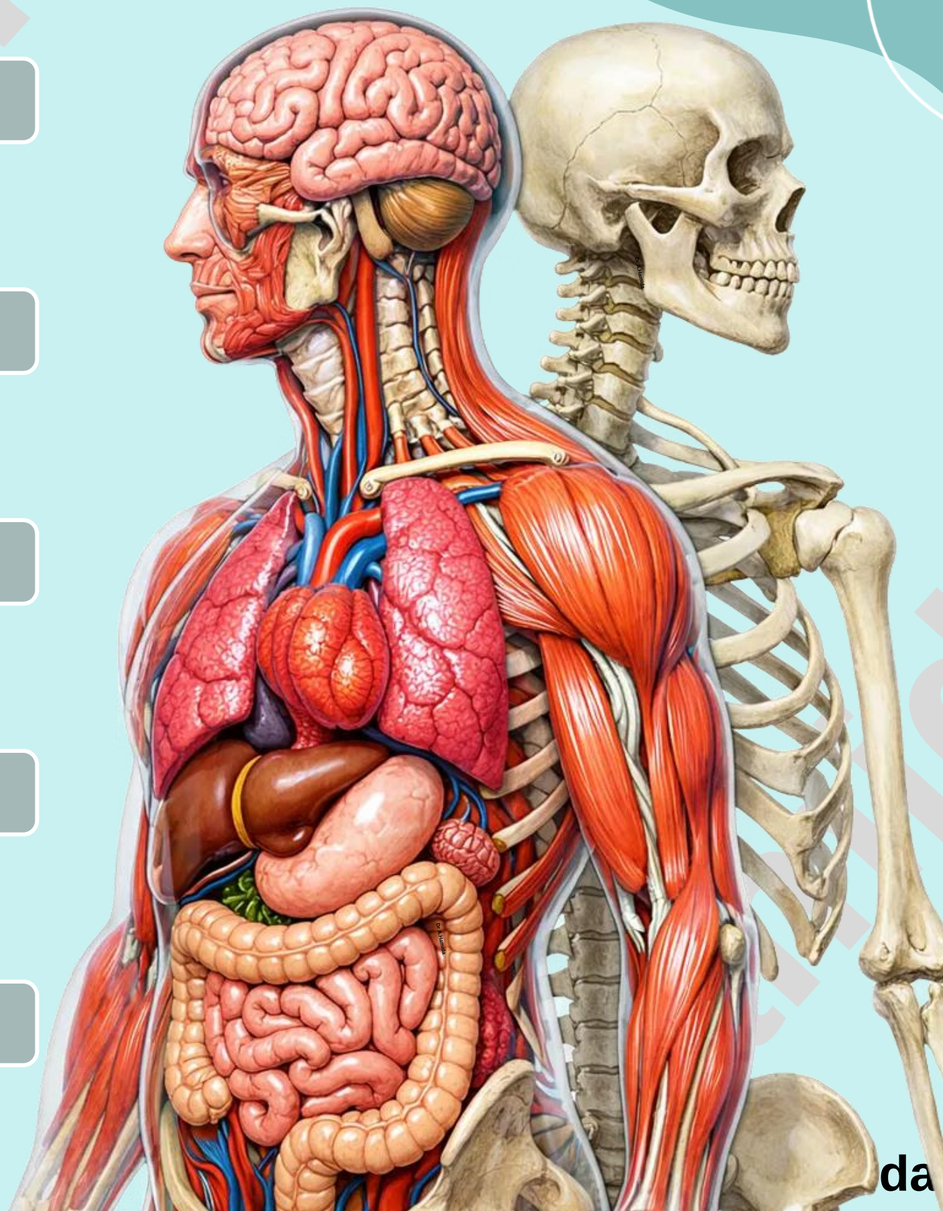


Course Outline:

Gross lecture-8

1. Introduction and Terminology
2. Skeletal System
3. Cardiovascular System
4. Lymphatic System
5. Nervous System
6. Muscular System
7. Respiratory System
8. Digestive System
9. Urinary System
10. Endocrine System



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Gross lecture-8

Nervous System

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5 Nervous System

Gross lecture-8

❖ Divisions of the Nervous System

➢ Anatomically, the nervous system is divided into two parts:

1. Central Nervous System (CNS),

   consists of:

   i. Brain (located in the cranial cavity)

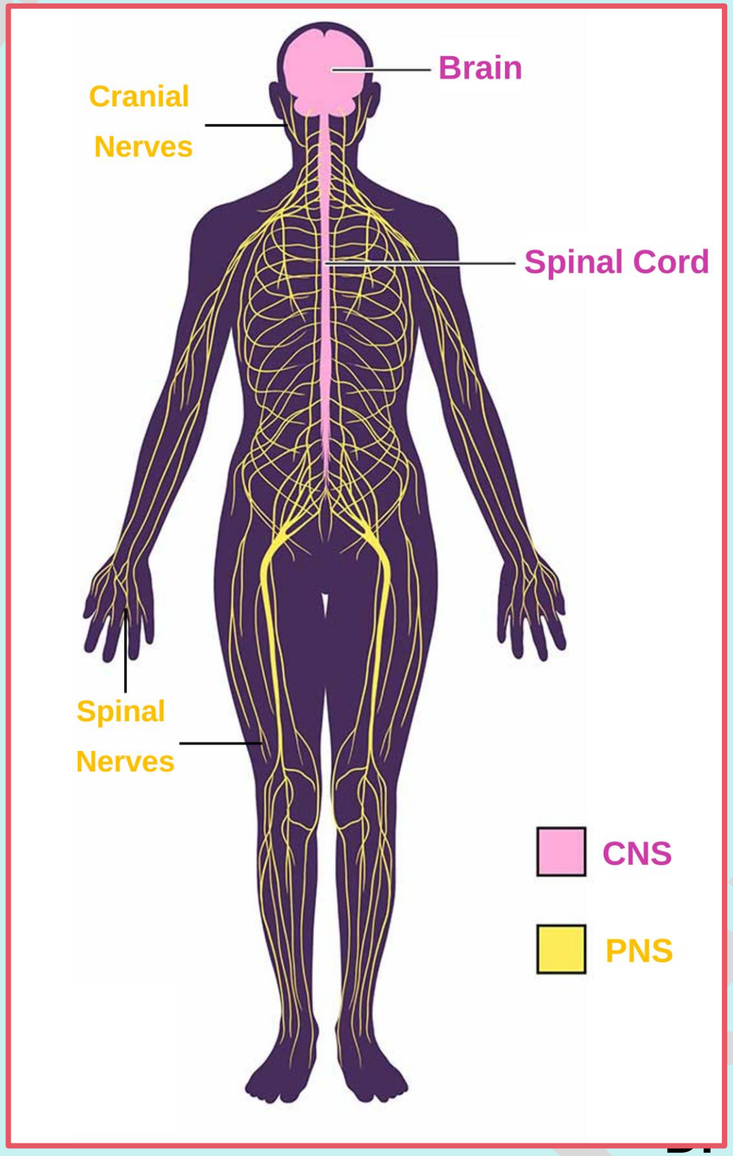
   ii. Spinal Cord (located in the vertebral canal)

2. Peripheral Nervous System (PNS),

   consists of nerves that exit from CNS:

   i. Cranial nerves (exit from the brain)

   ii. Spinal nerves (exit from the spinal cord)



5 Nervous System

Gross lecture-8

System Outline:

5.1 Nervous Tissue

5.2 Central Nervous System - Brain

5.3 Central Nervous System - Spinal Cord

5.4 Peripheral Nervous System

5

Gross lecture-8

Nervous System

2. CNS- Brain

5.2 Nervous System– CNS-Brain

Gross lecture-8

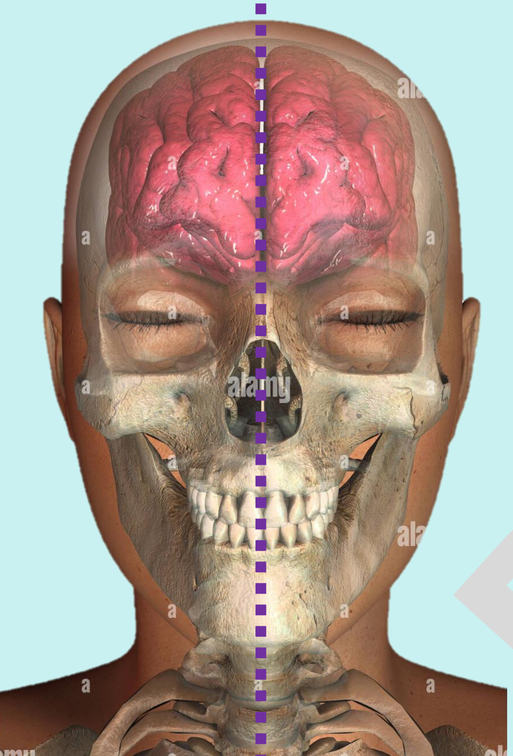
Lecture Outline:

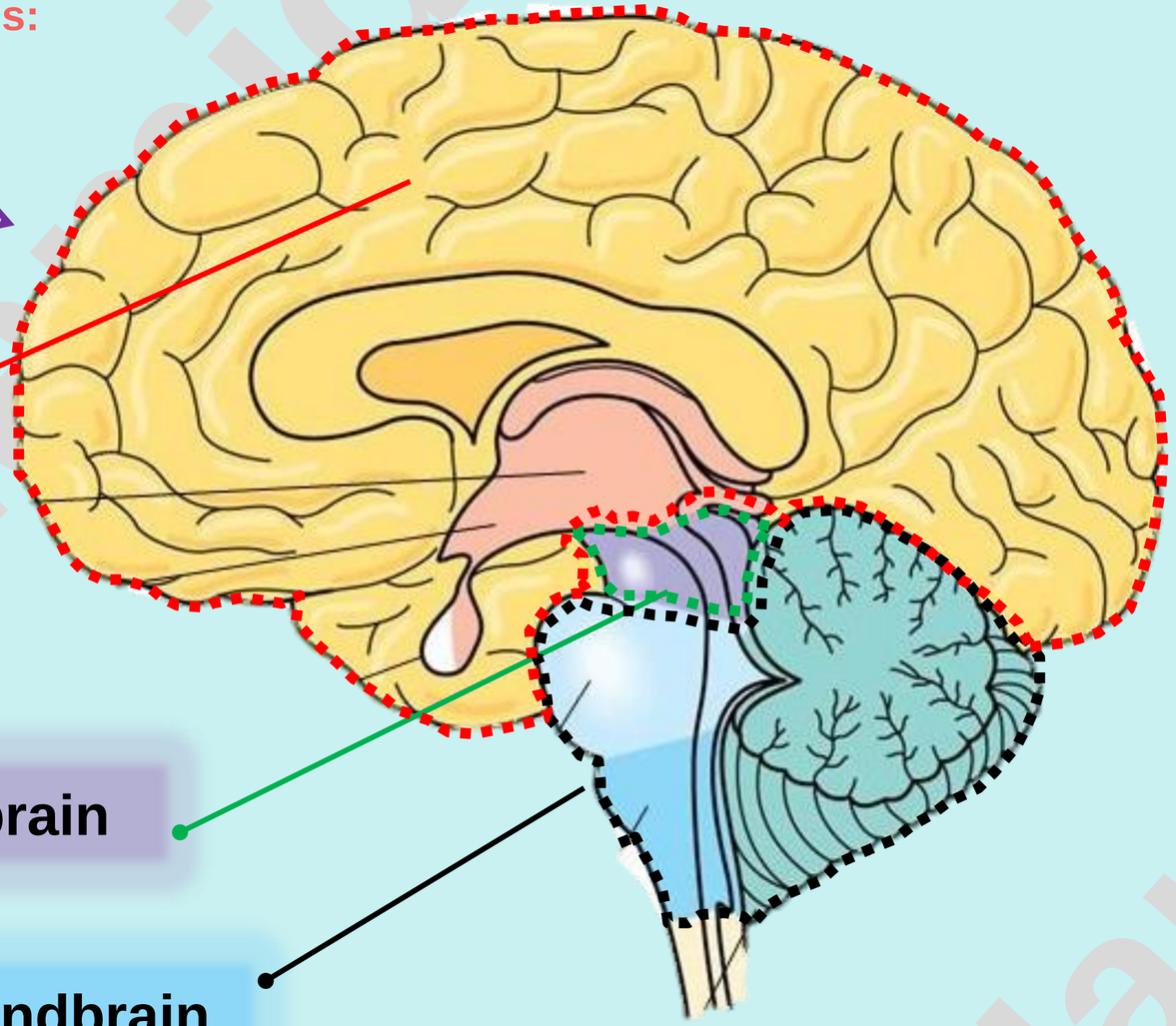
- 5.2.1 Cerebrum
- 5.2.2 Diencephalon
- 5.2.3 Midbrain
- 5.2.4 Pons
- 5.2.5 Medulla Oblongata
- 5.2.6 Cerebellum
- 5.2.7 Ventricles of the Brain
- 5.2.8 Cerebrospinal Fluid

5.2 Nervous System– CNS-Brain

Gross lecture-8

➢ The brain is divided into three major divisions:





Forebrain

Midbrain

Hindbrain

Midsagittal view

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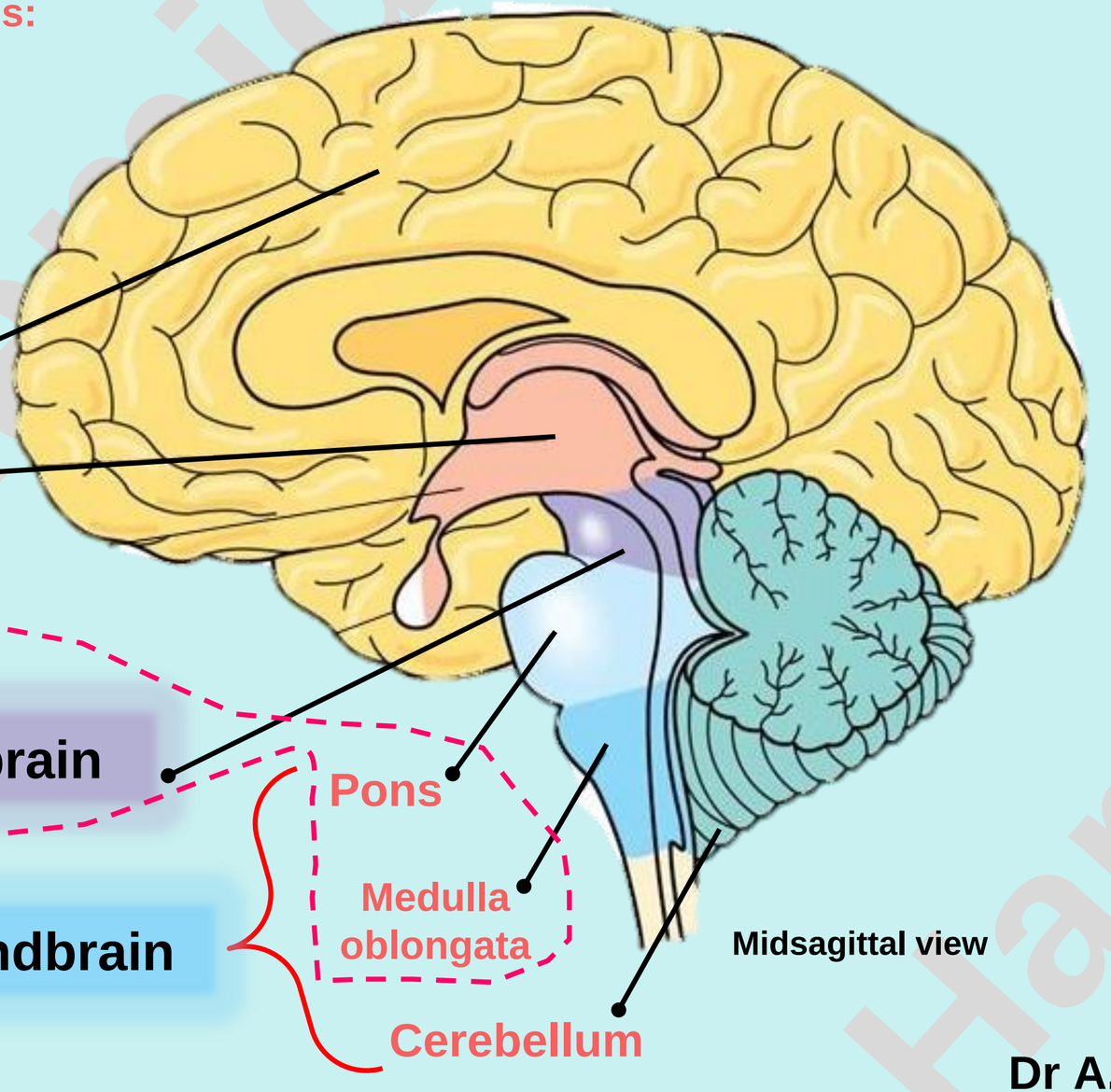
5.2 Nervous System– CNS-Brain

Gross lecture-8

➢ The brain is divided into three major divisions:



Midsagittal view

5.2 Nervous System– CNS-Brain

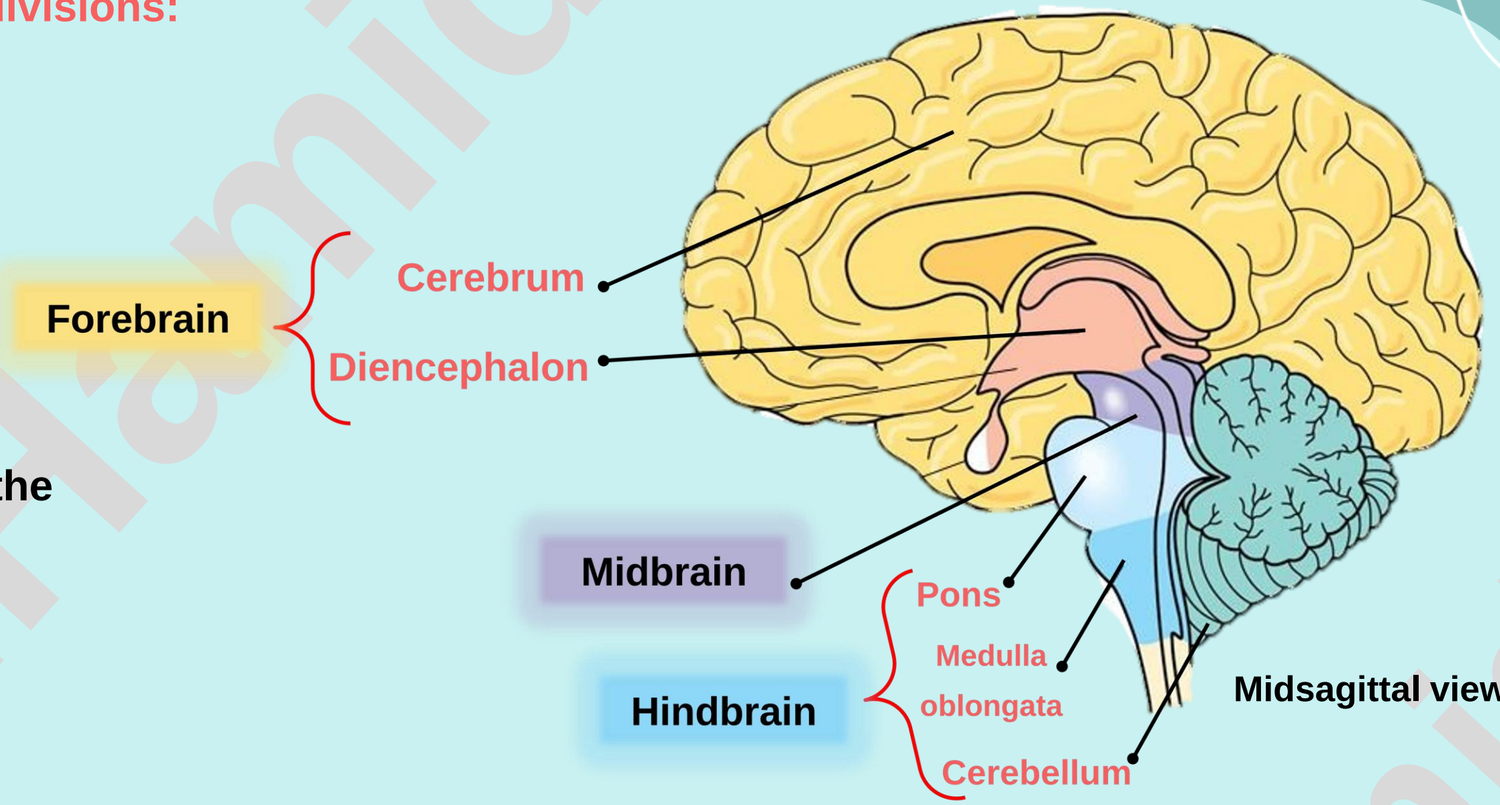
Gross lecture-8

➢ The brain is divided into three major divisions:

1. Forebrain, consists of:
   - i. Cerebrum.
   - ii. Diencephalon

2. Midbrain
   - A small region which connects the forebrain with the hindbrain.

3. Hindbrain, consists of
   - i. Medulla oblongata
   - ii. Pons
   - iii. Cerebellum

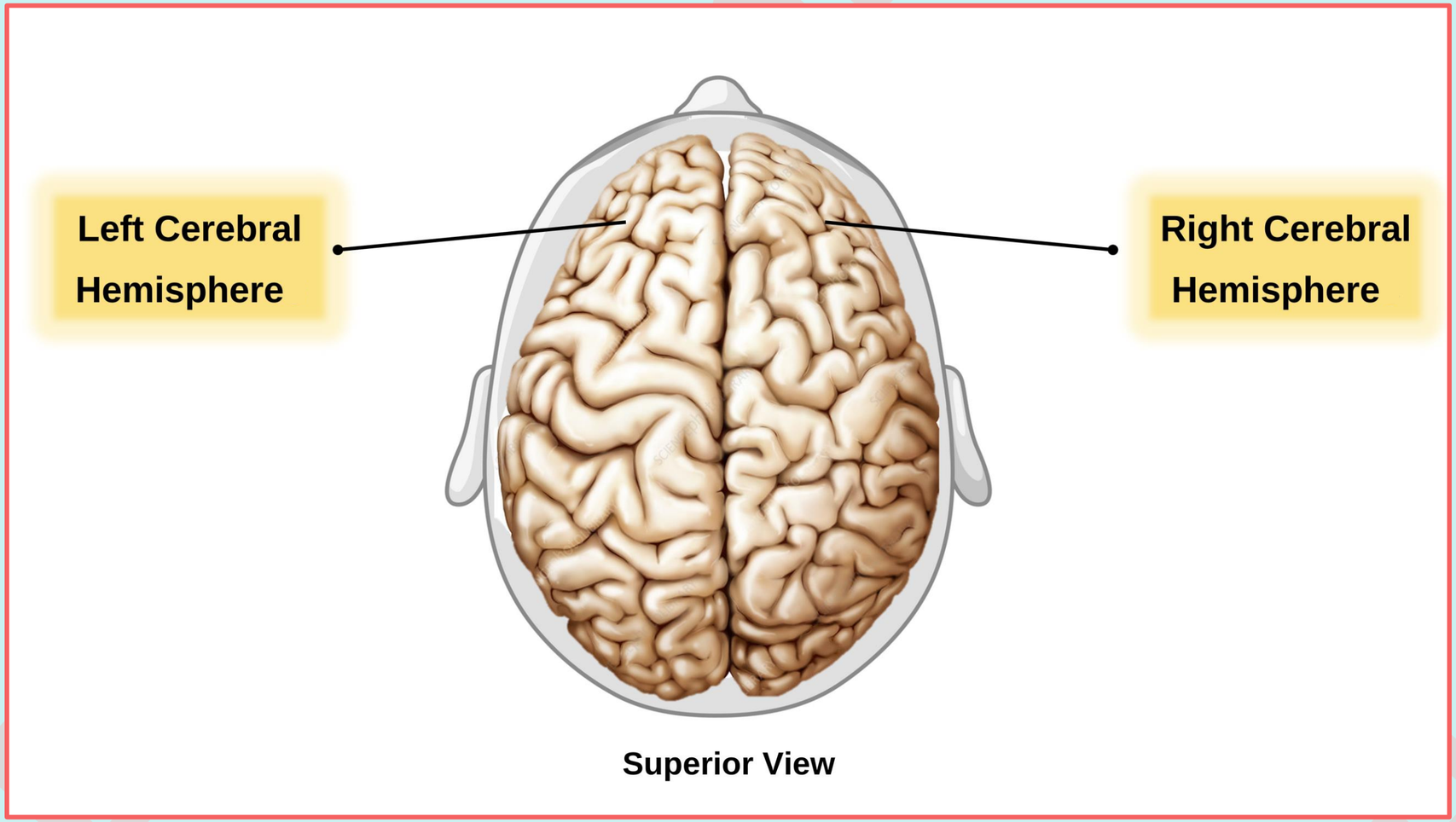


➢ **Brainstem:** is collective term for the following structure : Midbrain, Pons, and Medulla oblongata.

5.2.1 Cerebrum

➢ **The cerebrum is the largest part of the brain.**

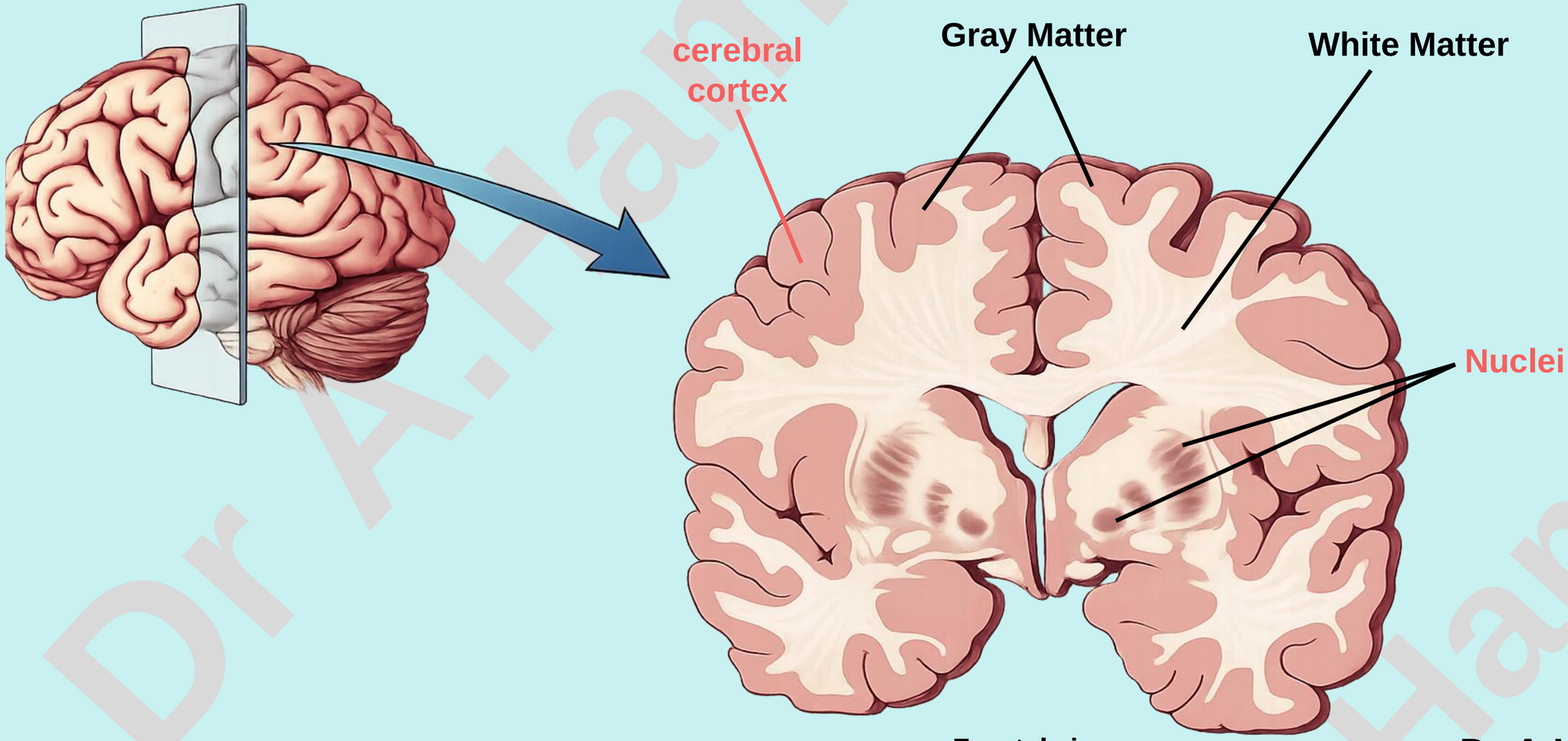
- **It consists of two large hemispheres (the left and the right cerebral hemispheres)**



5.2.1 Cerebrum

➢ **Each cerebral hemisphere consists of:**

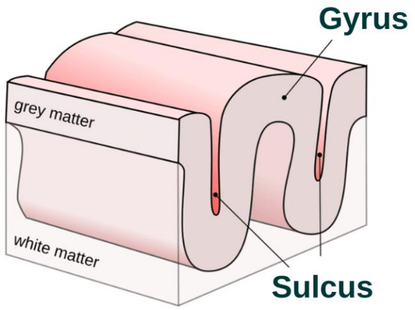
- **Surface layer of grey matter, called cerebral cortex**
- **Central core of white matter.**

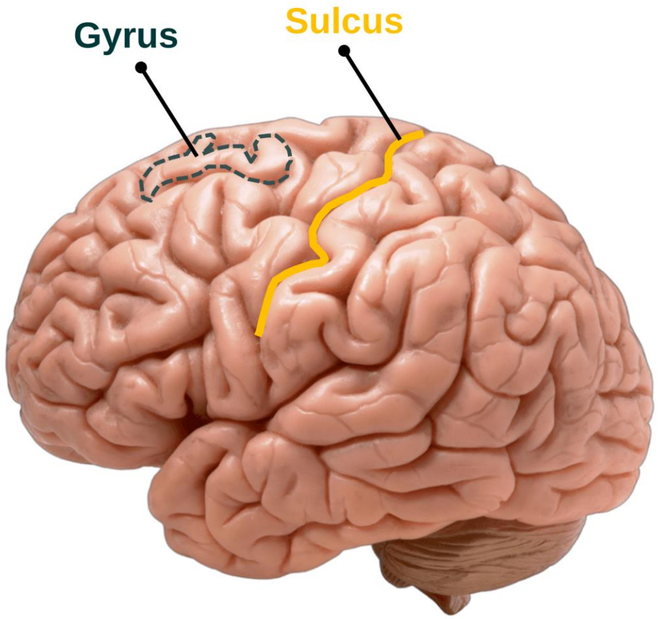


Frontal view

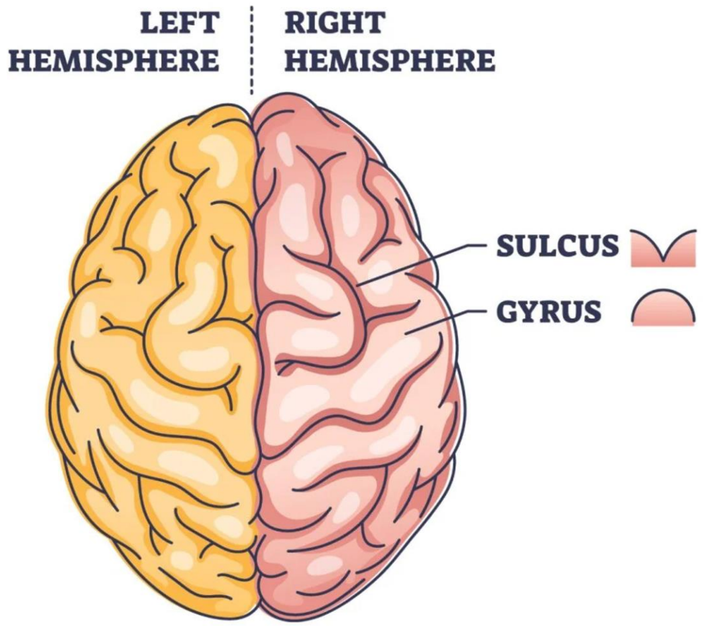
5.2.1 Cerebrum

- The outer surface of each cerebral hemisphere shows series of elevations called the **gyri**, separated by shallow grooves called the **sulci.**





Lateral view



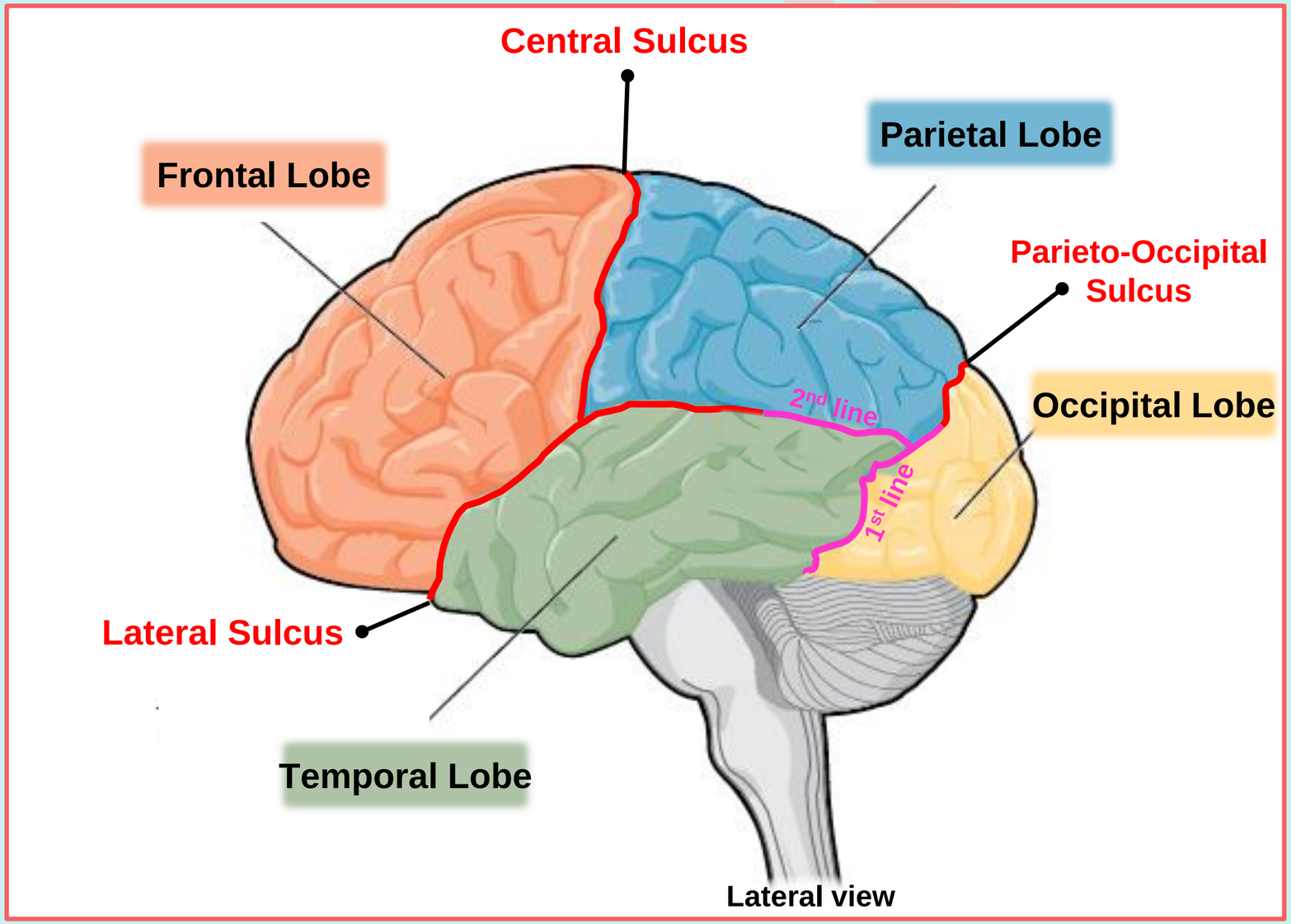
Superior view

5.2.1

Cerebrum

❖ Lobes of Cerebral Hemisphere

➢ Each cerebral hemisphere is divided by 3 main sulci into 4 main lobes



Cerebrum

❖ Lobes of Cerebral Hemisphere

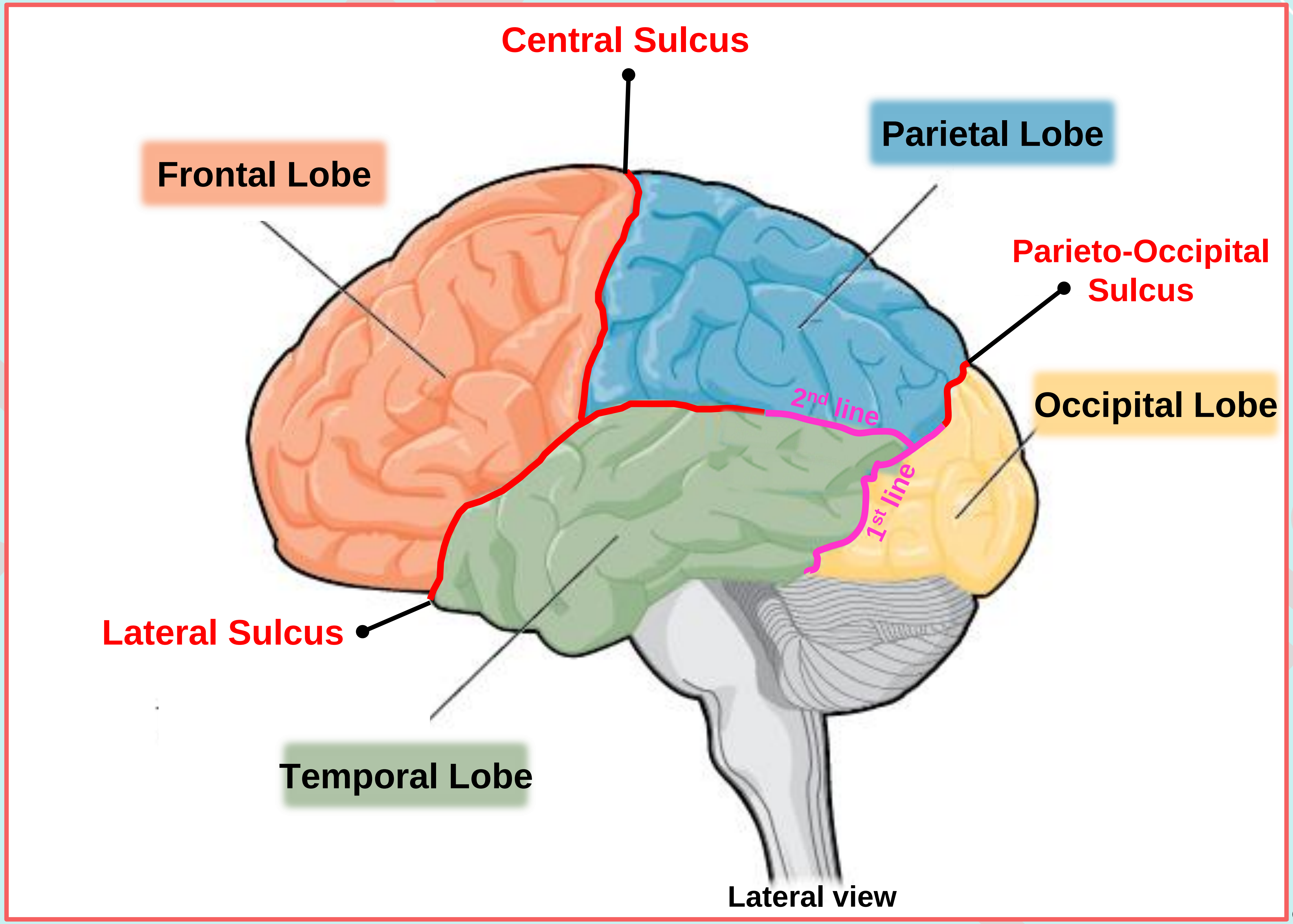
➢ Each cerebral hemisphere is divided by 3 main sulci into 4 main lobes

➢ The 3 main sulci are

1. Central Sulcus.
2. Lateral Sulcus
3. Parieto - Occipital Sulcus

➢ The 4 main lobes are

1. Frontal Lobe
2. Parietal Lobe
3. Temporal Lobe
4. Occipital Lobe



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5.2.1

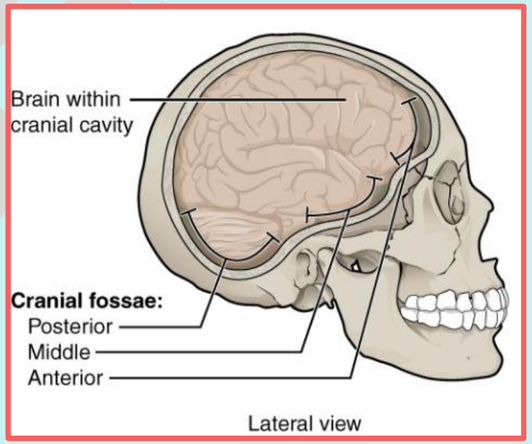
Cerebrum

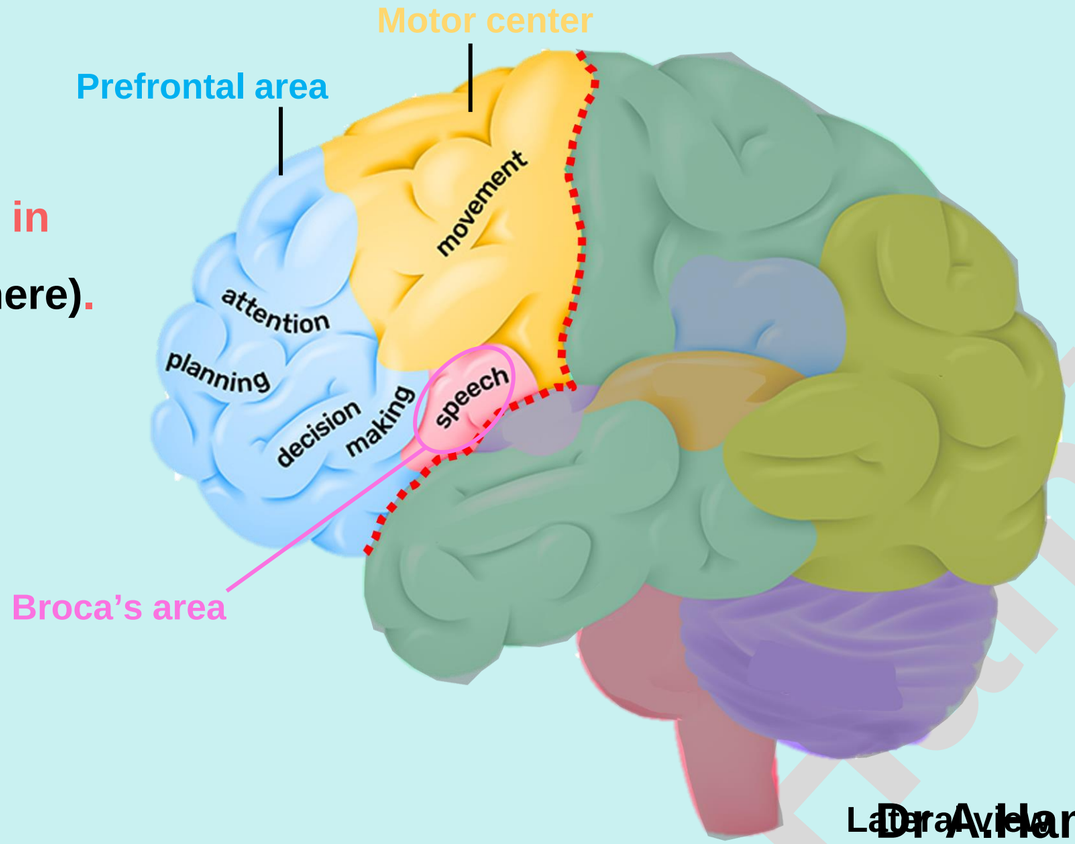
Gross lecture-8

❖ Lobes of Cerebral Hemisphere

1. Frontal Lobe

- **Located anterior to the central sulcus and superior to the lateral sulcus, occupying the anterior cranial fossa.**
- **Main centers and areas:**
  - **Motor center: controls voluntary motor activities.**
  - **Prefrontal area: responsible for thinking, decision making, motivation, and planning.**
  - **Broca's area: controls motor aspect and is located in the dominant hemisphere (usually the left hemisphere).**





5.2.1

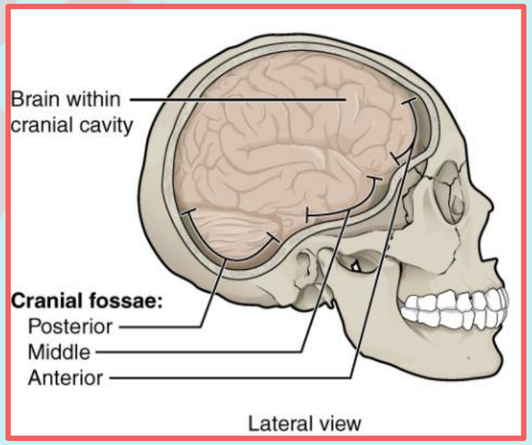
Cerebrum

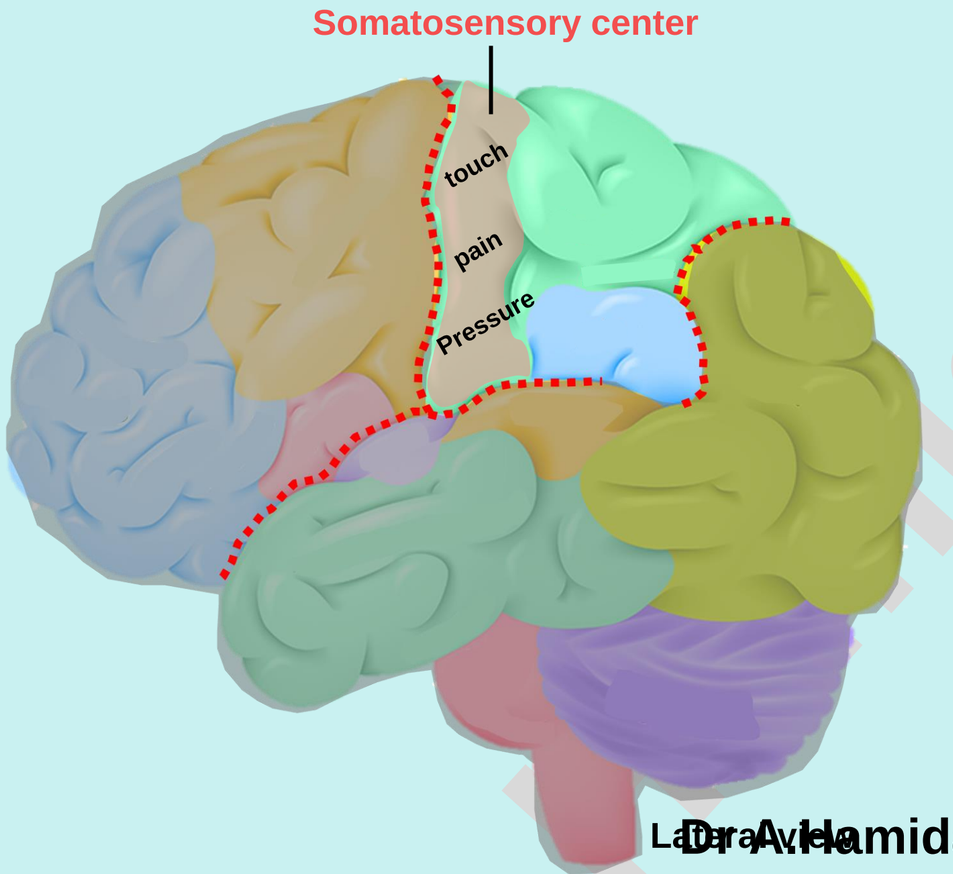
Gross lecture-8

❖ Lobes of Cerebral Hemisphere

2. Parietal Lobe

- **Located posterior to the central sulcus and superior to the lateral sulcus, occupying the superior part of the cranial cavity**
- **Main centers and areas :**
  - **Somatosensory center: receives sensory information from the body such as touch, pain, pressure, and temperature.**





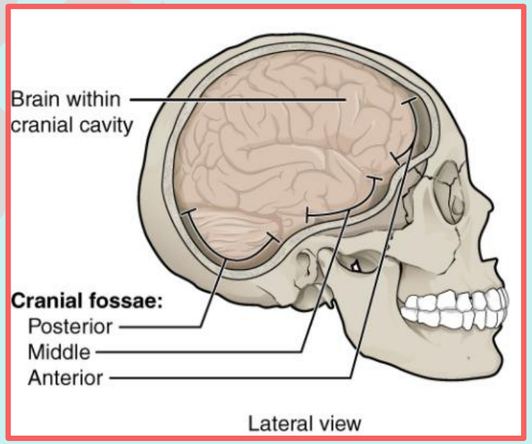
5.2.1

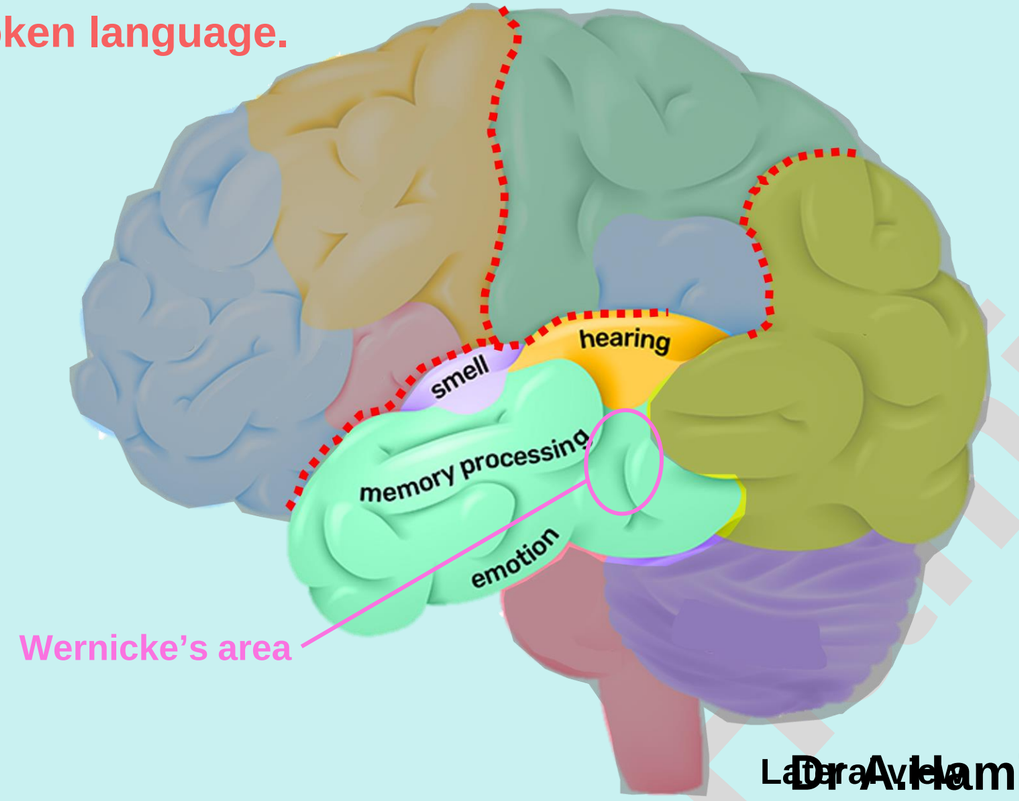
Cerebrum

❖ Lobes of Cerebral Hemisphere

3. Temporal Lobe

- **Located inferior to the lateral sulcus, occupying the middle cranial fossa**
- **Main centers and areas:**
  - **Auditory (hearing) center: receives and processes sound input.**
  - **Wernicke's area: responsible for comprehension of spoken language.**
  - **Olfactory center: perceives smell.**
  - **Areas for memory and emotion.**



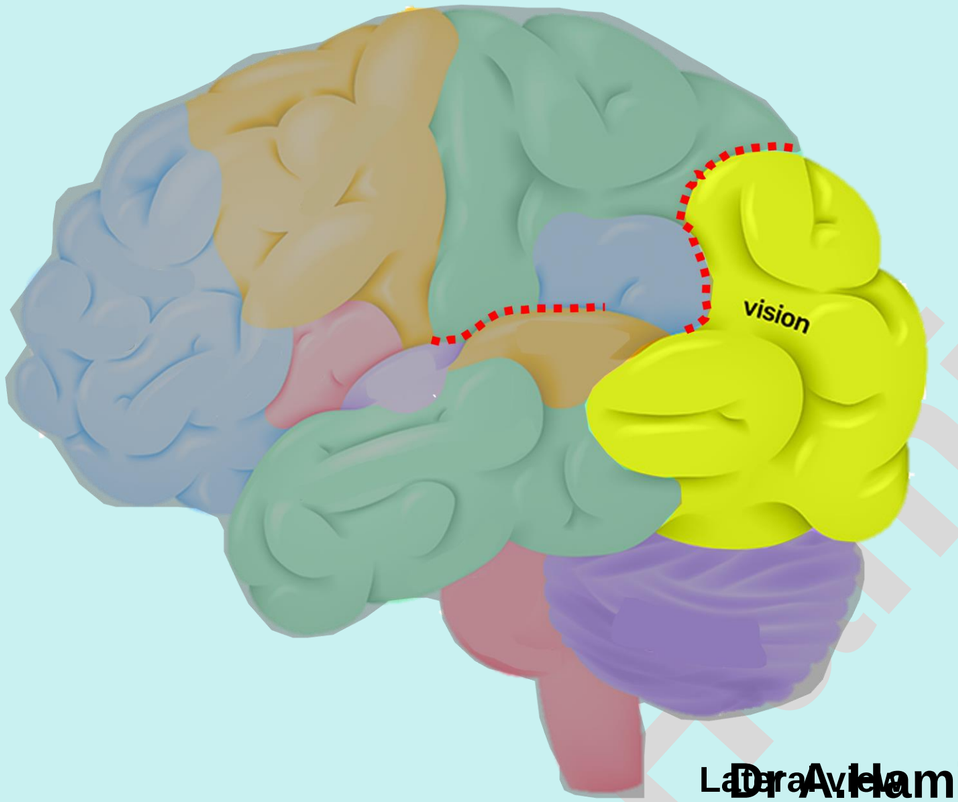


Gross lecture-8

❖ Lobes of Cerebral Hemisphere

4. Occipital Lobe

- **Located posterior to the parieto-occipital sulcus.**
- **Main centers and areas :**
  - **Visual center: receives and interprets visual information.**



5.2.2 Diencephalon

- It is located between the cerebrum and the brainstem.
- Contains a cavity called the third ventricle.

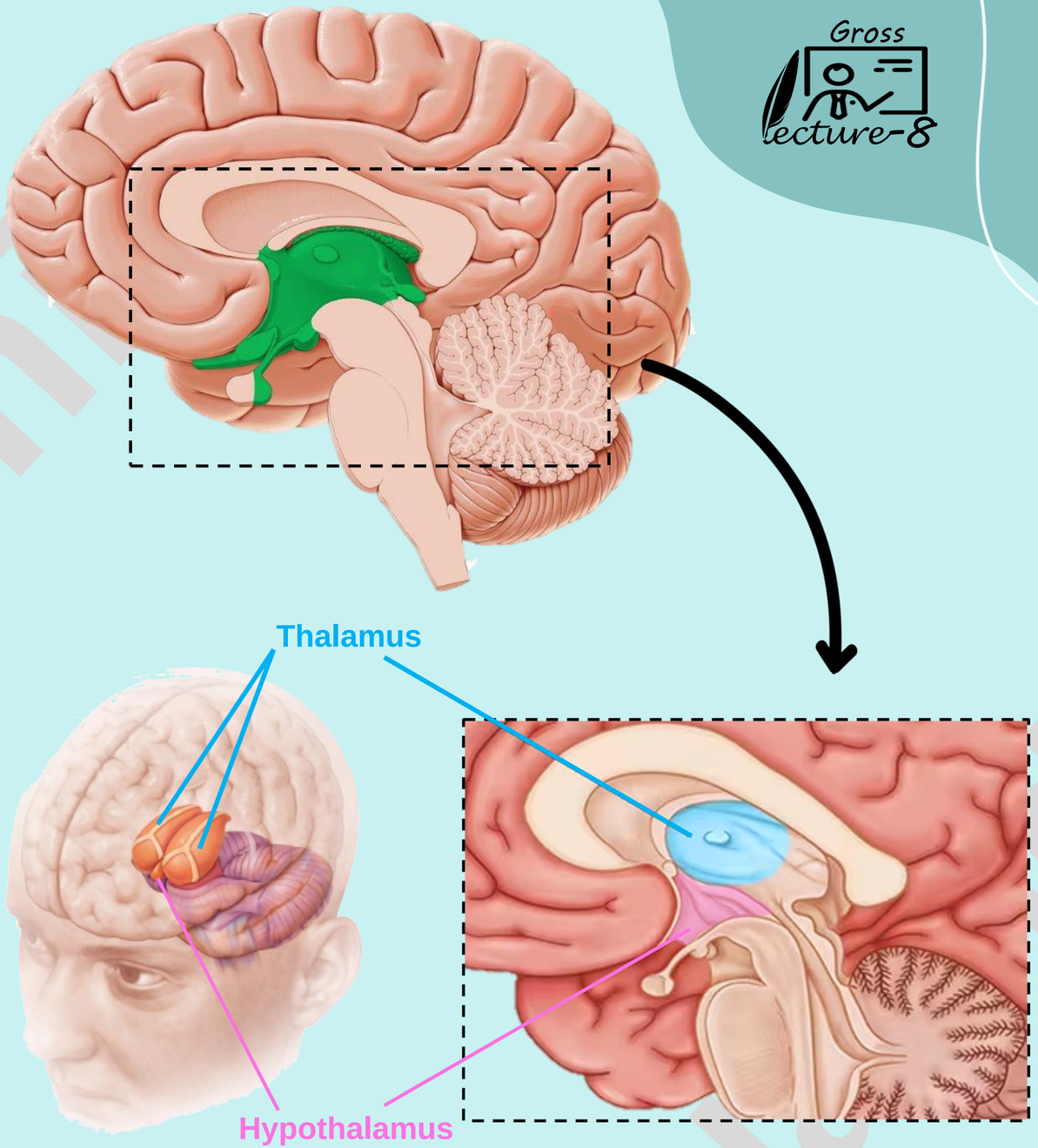
- The diencephalon has two principal parts:

1. **Thalamus:**

   Acts as a relay station for sensory information (except smell) to the cortex and helps in motor control, consciousness, and alertness.

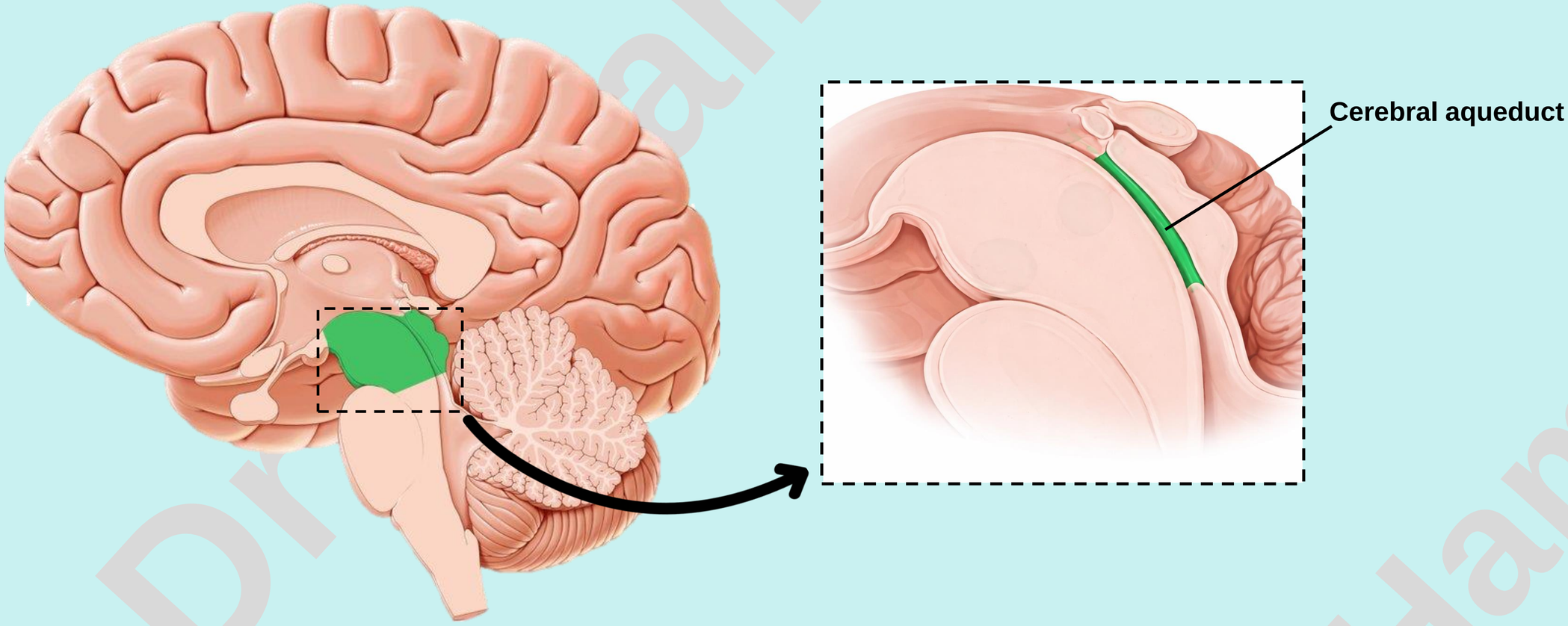
2. **Hypothalamus:**

   Maintains homeostasis, regulates the autonomic and endocrine systems, controls emotions, sleep, hunger, thirst, and body temperature.



5.2.3 Midbrain

- It is a narrow region connecting the forebrain and the hindbrain.
- Serves as a pathway for ascending and descending tracts.
- Contains the **cerebral aqueduct**, which connects the third and fourth ventricles.



Midsagittal view

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5.2.4 Pons

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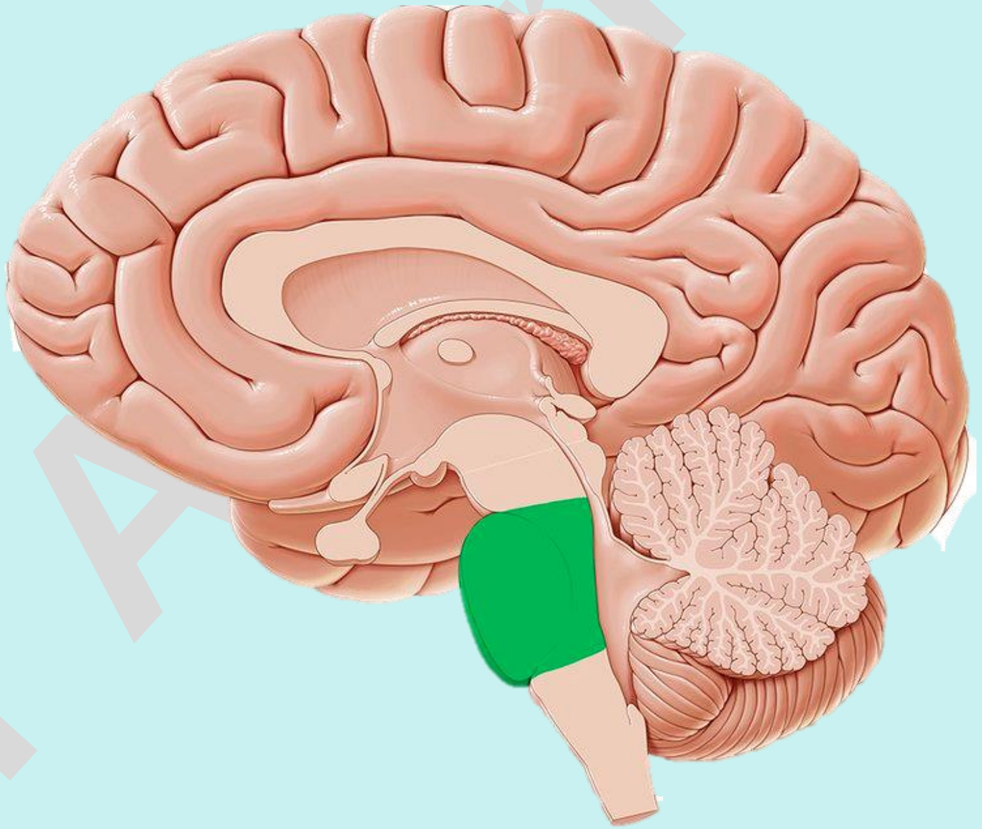
- It is the large middle part of the brainstem.
- Located anterior to the cerebellum, inferior to the midbrain, and superior to the medulla oblongata.
- Acts as a passage for ascending and descending tracts.



Midsagittal view

5.2.5 Medulla Oblongata

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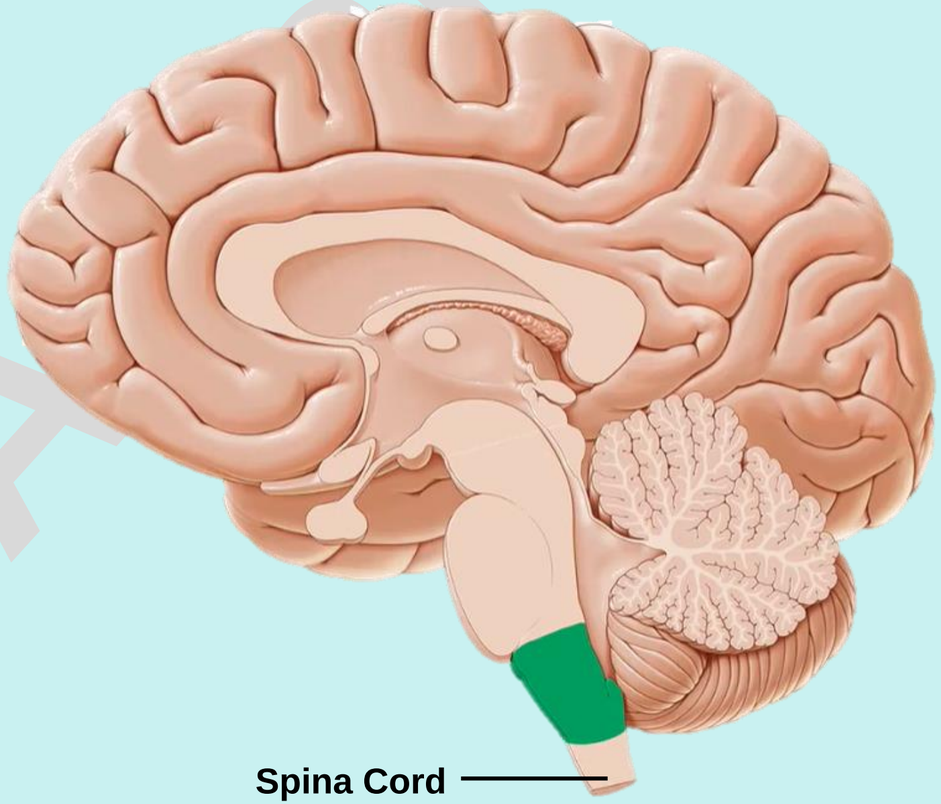
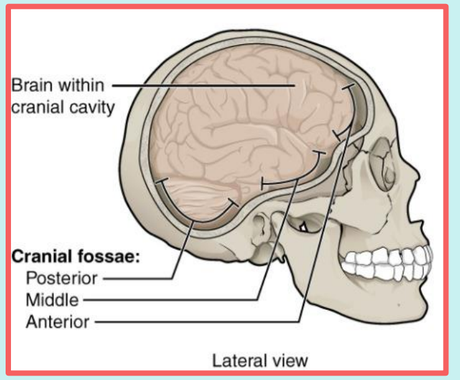
- It is the lower part of the brainstem, continuous with the spinal cord at the foramen magnum.
- Passage for ascending and descending tracts.
- Houses vital centers: **respiratory** and **cardiovascular centers**.



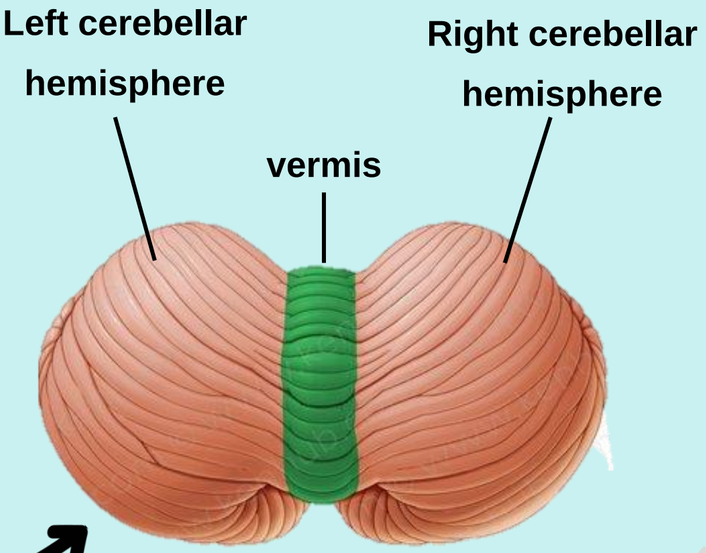
Midsagittal view

5.2.6 Cerebellum

- It is located in the posterior cranial fossa, behind the pons and medulla oblongata.
- Consists of two lateral cerebellar hemispheres and a median vermis.
- Function:
  1. Coordinates movement.
  2. Maintains muscle tone.
  3. Maintains balance.



Midsagittal view



Posterior view

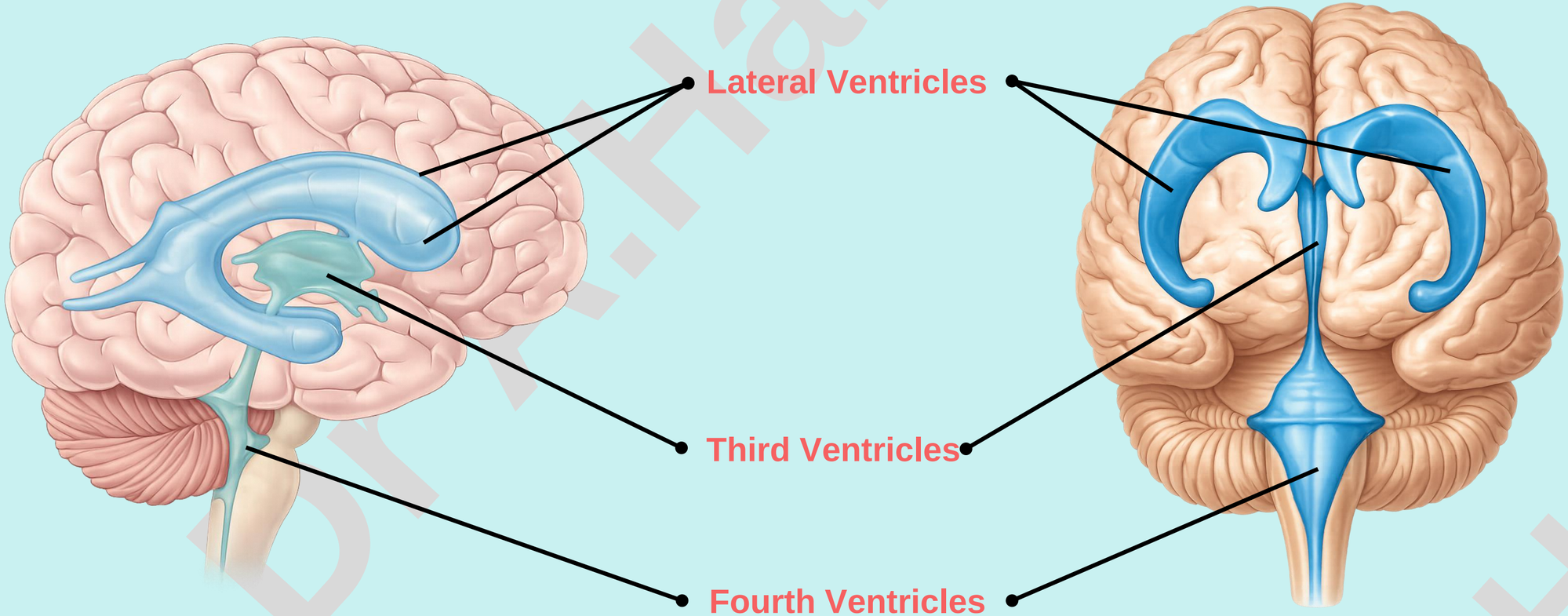
5.2.7

Ventricles of the Brain

Gross lecture-8

- They are four cavities filled with CSF located within the brain:

1. **Two Lateral Ventricles:** it is the cavity present in each cerebral hemisphere
2. **Third Ventricle:** it is the cavity present in the diencephalon
3. **Fourth Ventricle:** it lies between the pons and the medulla anteriorly, and the cerebellum posteriorly



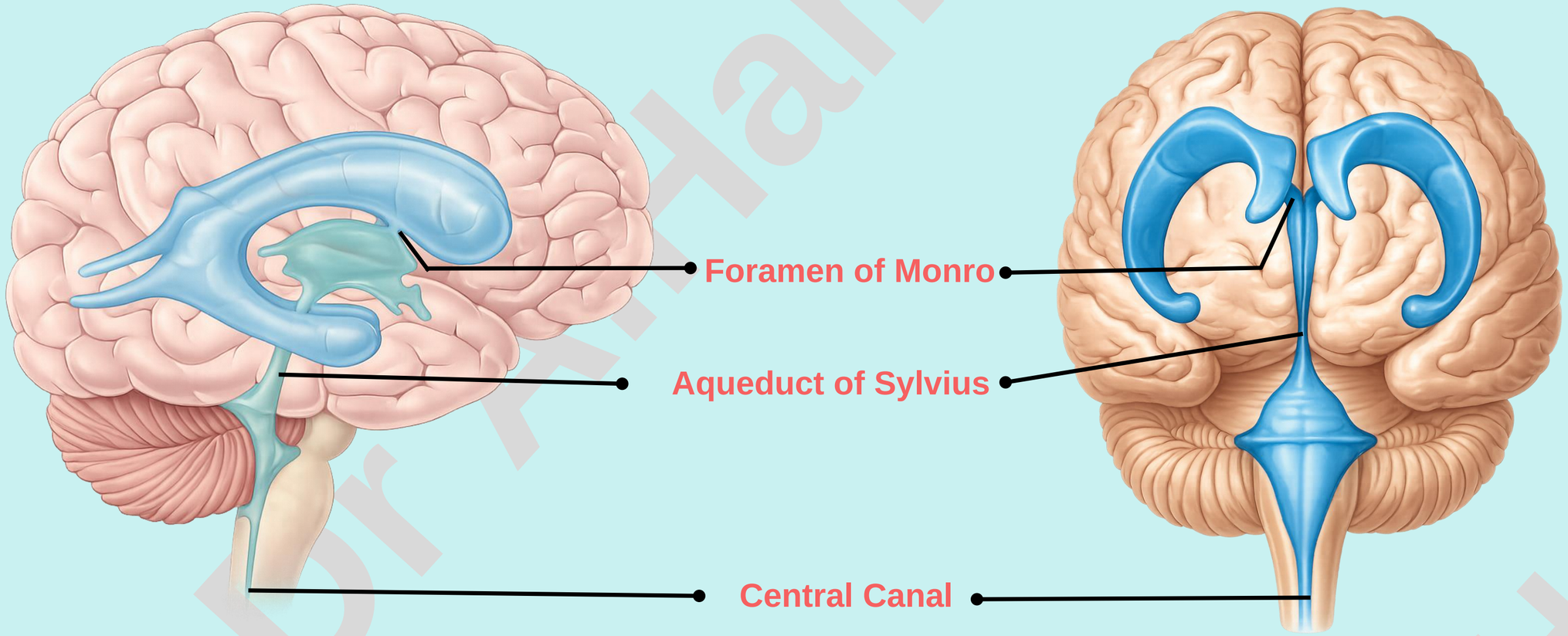
5.2.7

Ventricles of the Brain

Gross lecture-8

➢ **All ventricles are connected together which allow the CSF to circulate between each other:**

- The two lateral ventricles communicate with the third ventricle through the interventricular foramina (Foramen of Monro)
- The third ventricle communicates with the fourth ventricle through the cerebral aqueduct (Aqueduct of Sylvius)
- The fourth ventricle communicates with the spinal cord through the central canal of spinal cord



Lateral view

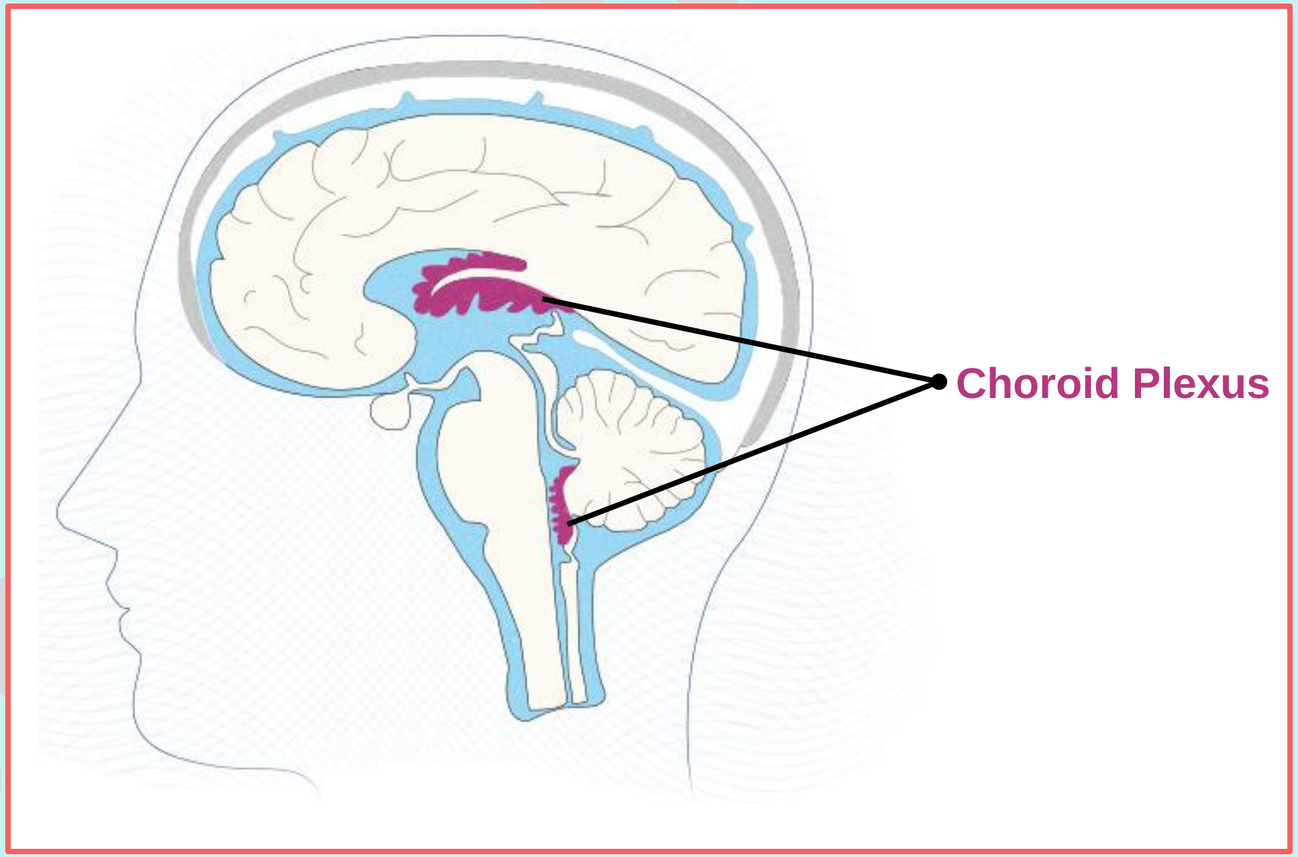
Frontal view

5.2.7 Ventricles of the Brain

Gross lecture-8

➢ **The ventricles are lined by ependymal cells.**

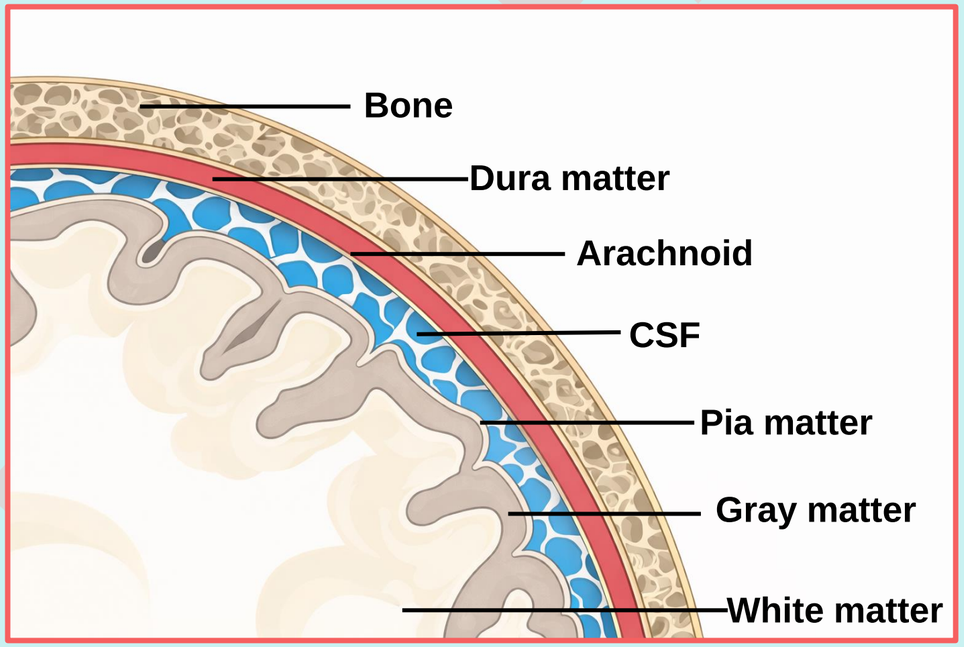
- **A collection of modified ependymal cells and capillaries form a structure called the choroid plexus.**
- **The function of choroid plexus is to produce Cerebrospinal fluid (CSF)**

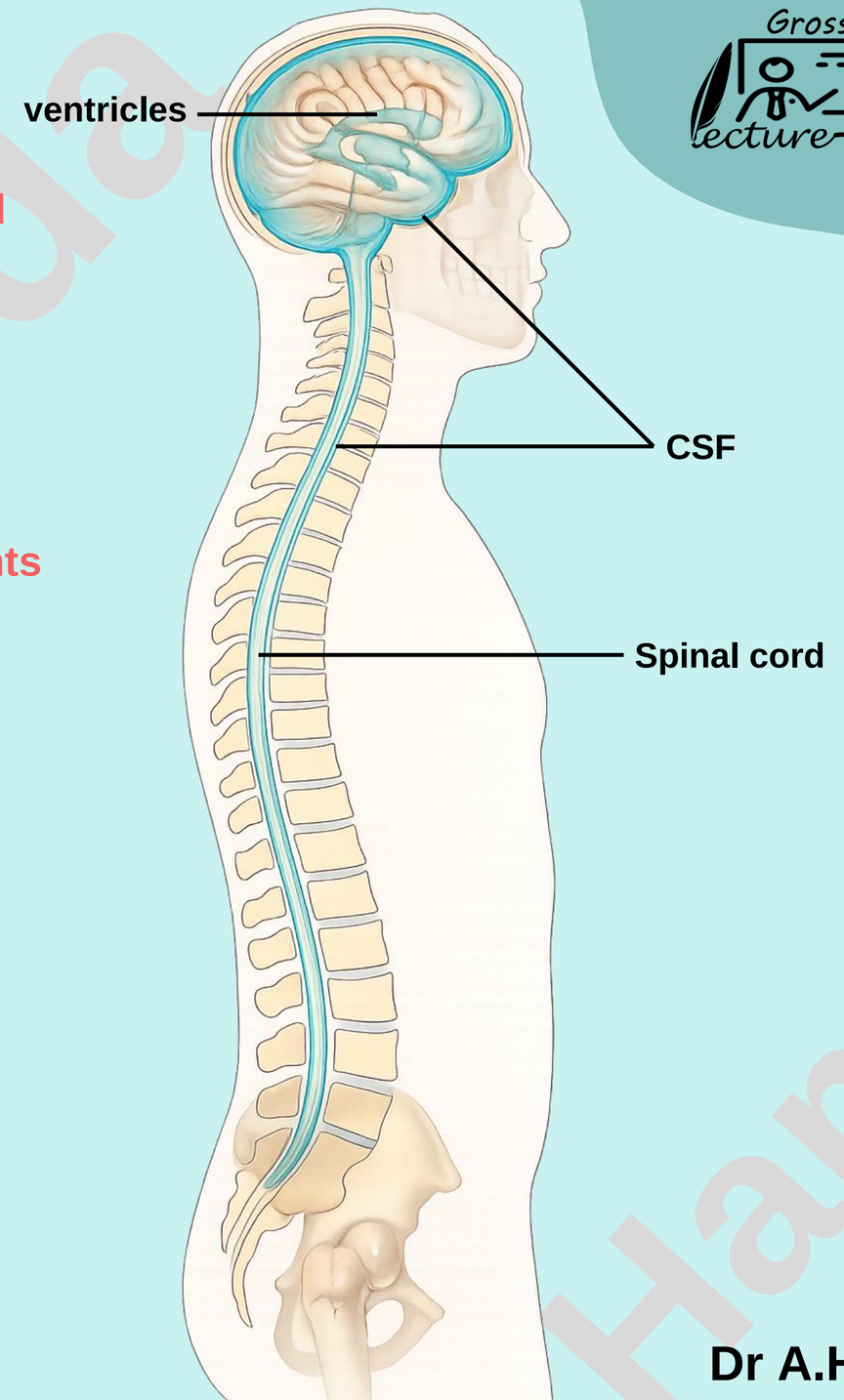


5.2.8

Cerebrospinal Fluid

- It is a clear, colorless fluid found around the brain and spinal cord occupies the **subarachnoid space**.
- It is produced by **choroid plexus** of the lateral, third, and fourth ventricles in the brain.
- It has a volume of about **150 ml**.
- It is composed primarily of water, and it also carries small amounts of oxygen, glucose, and other needed chemicals from the blood.





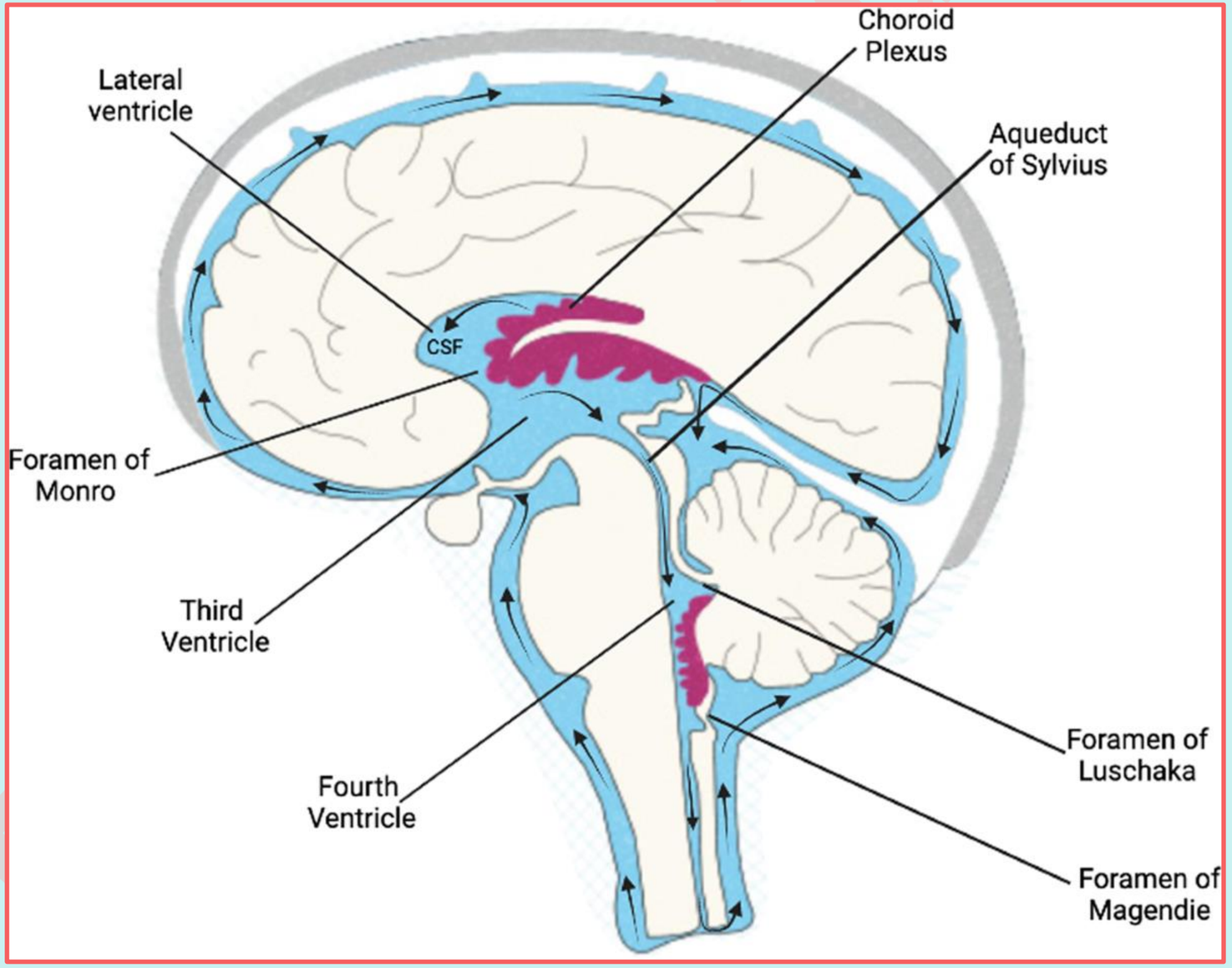
Gross lecture-8

5.2.8

Cerebrospinal Fluid

Gross lecture-8

➢ Circulation Of Cerebrospinal Fluid



5.2.8

Cerebrospinal Fluid

Gross lecture-8

➢ Circulation Of Cerebrospinal Fluid

1. **The CSF is produced primarily by the choroid plexuses of the lateral ventricles.**

   From there, it flows through the interventricular foramina (foramina of Monro) into the third ventricle.

2. **More CSF is added by the choroid plexus in the roof of the third ventricle.**

   The fluid then passes through the cerebral aqueduct (aqueduct of Sylvius) to reach the fourth ventricle.

3. **The choroid plexus of the fourth ventricle secretes more CSF, which then flows into:**

   - The central canal of the spinal cord, and

   - The subarachnoid space through the foramen of Magendie (one median aperture) and the foramina of Luschka (two lateral apertures), allowing CSF to circulate around the brain superiorly and around the spinal cord inferiorly.

5.2.8 Cerebrospinal Fluid

Gross lecture-8

➢ **Function:**

1. Mechanical protection

- Acts as a shock absorber to protect the brain and spinal cord from injury.
- Provides buoyancy, allowing the brain to “float” in the cranial cavity.

2. Chemical protection

- Maintains an optimal chemical environment for neuronal signaling.
- Even slight changes in CSF composition can affect action potential generation.

3. Circulation

- Allows minor exchange of nutrients and waste products between blood and nervous tissue.