



# Anatomy of cerebellum & 4<sup>th</sup> ventricle

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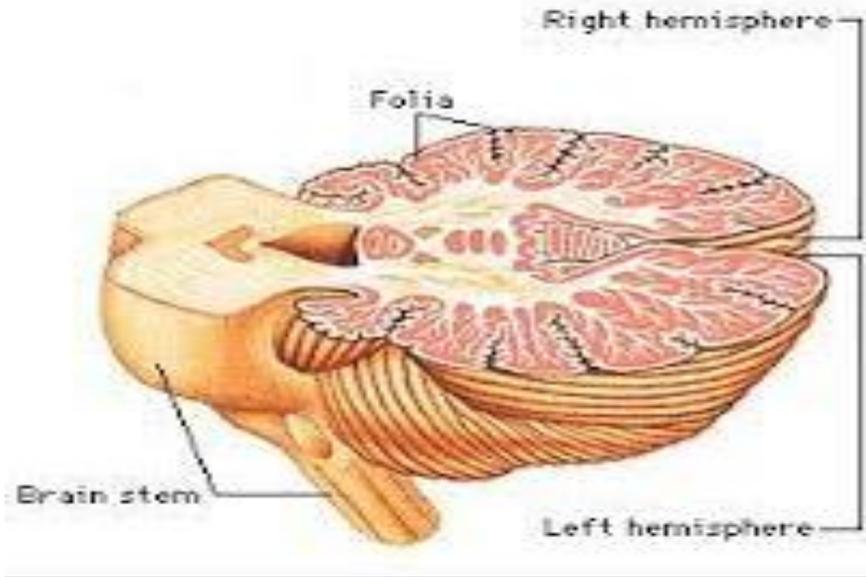
# Intended Learning Outcomes (ILOs)

1. Enumerate fissures and lobes of the cerebellum.
2. Identify the gross features of the cerebellum.
3. Recognize the 3 different divisions of the cerebellum.
4. Identify blood supply of the cerebellum.
5. Recognize boundaries of 4<sup>th</sup> ventricle .

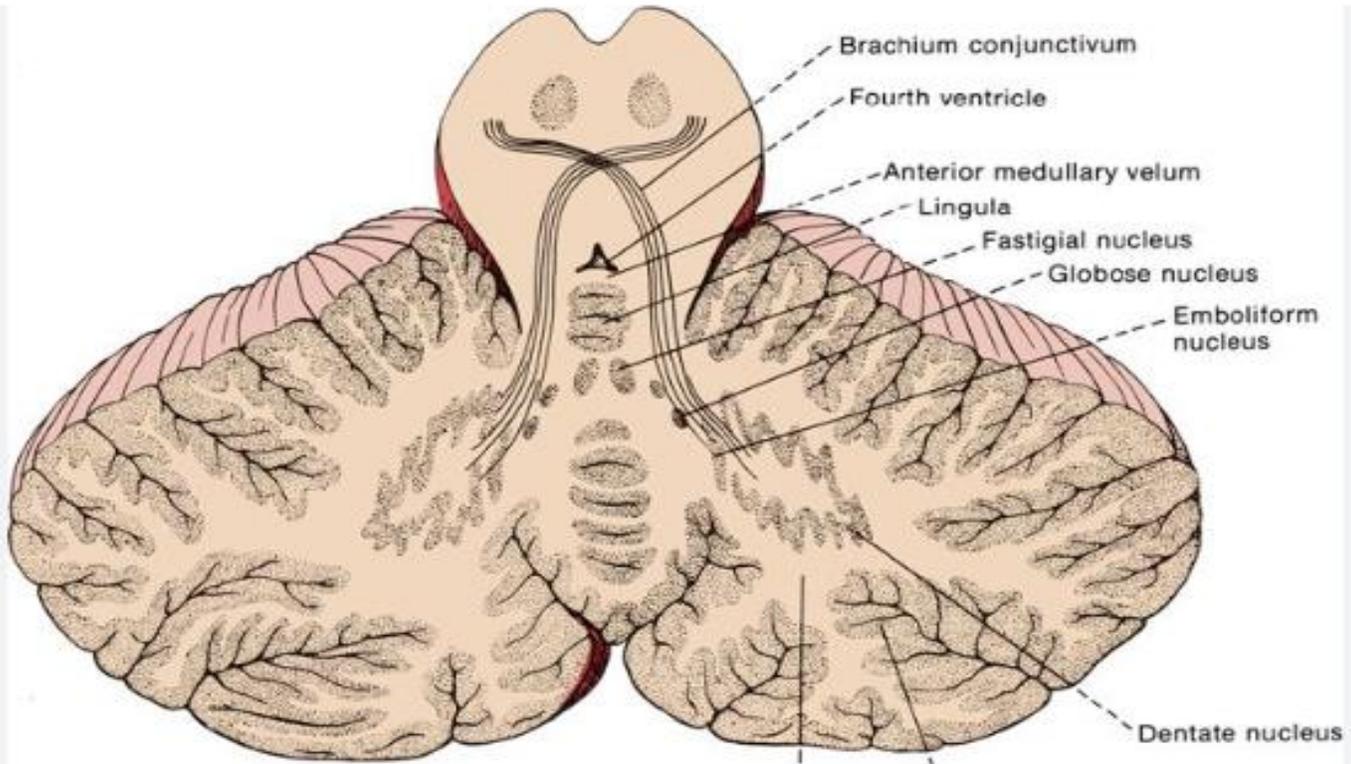
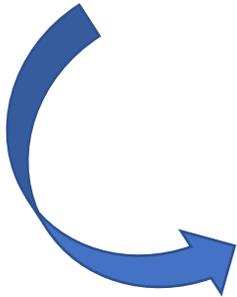
# Agenda

1. What are anatomical divisions of the cerebellum?
2. What are longitudinal divisions of the cerebellum ?
3. What are functional divisions of cerebellum?
4. What are the deep cerebellar nuclei?
5. What is the blood supply of the cerebellum?
6. What are the boundaries of the 4<sup>th</sup> ventricle ?

# cerebellum



Cerebellar cortex has many gyri called folia separated by deep fissures

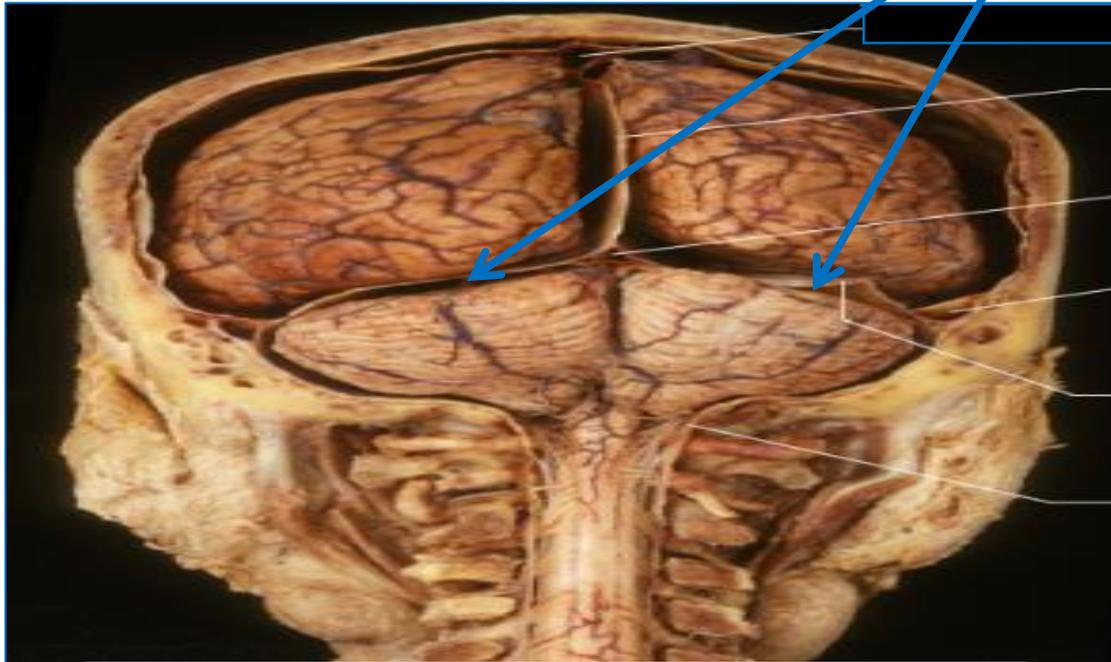


Cerebellar cortex (grey)

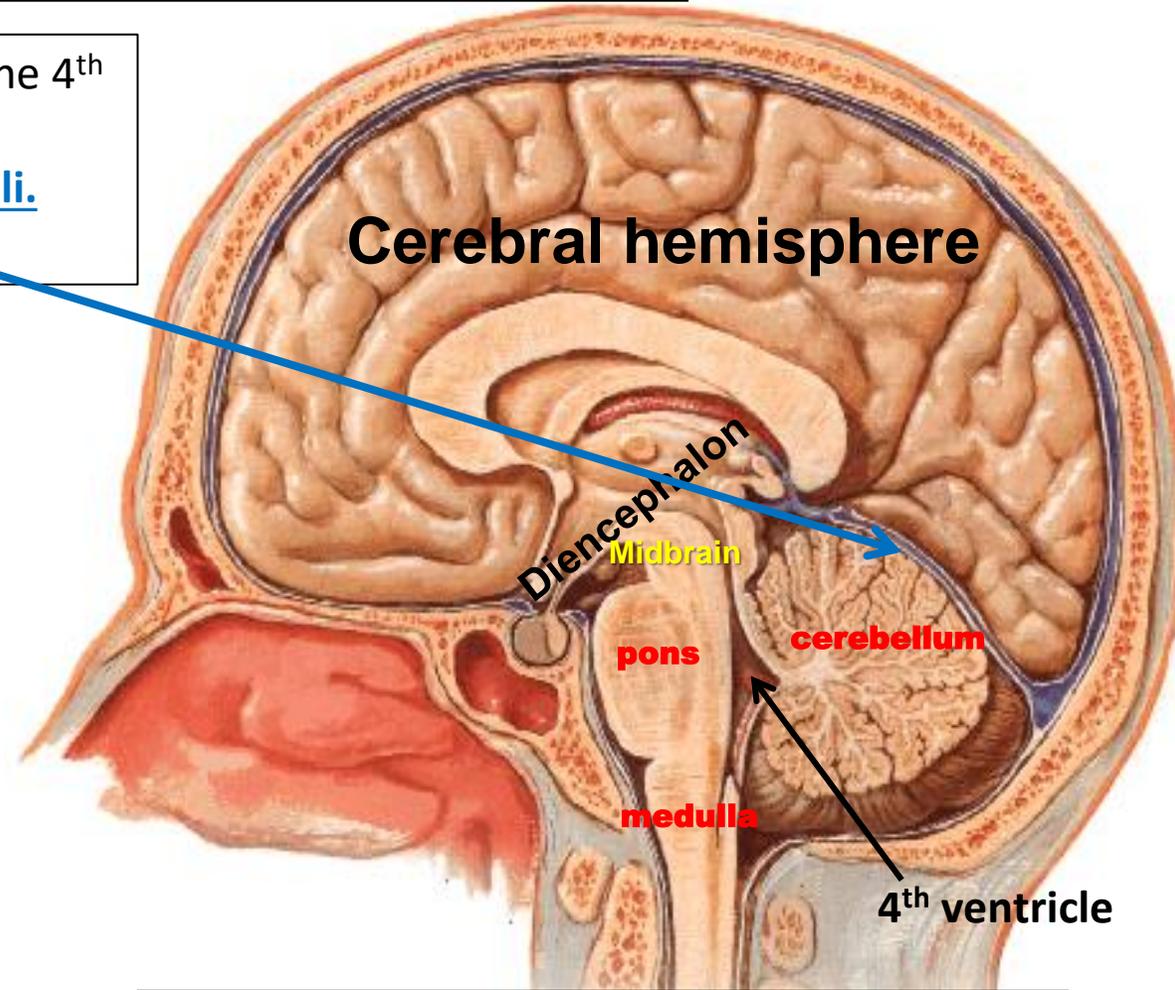
Cerebellar medulla (white)

# cerebellum

- It is separated from the pons and medulla by the cavity of the 4<sup>th</sup> ventricle.
- It is separated from the cerebrum by the tentorium cerebelli.



**Coronal section**



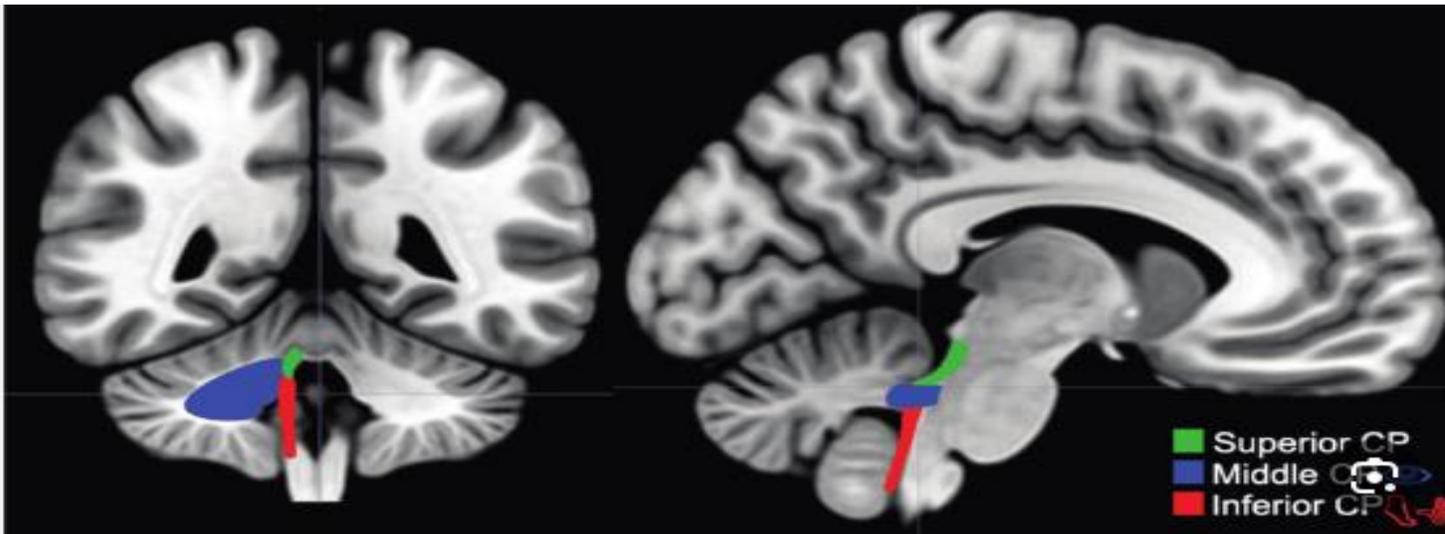
**Sagittal section, medial view**

# cerebellum

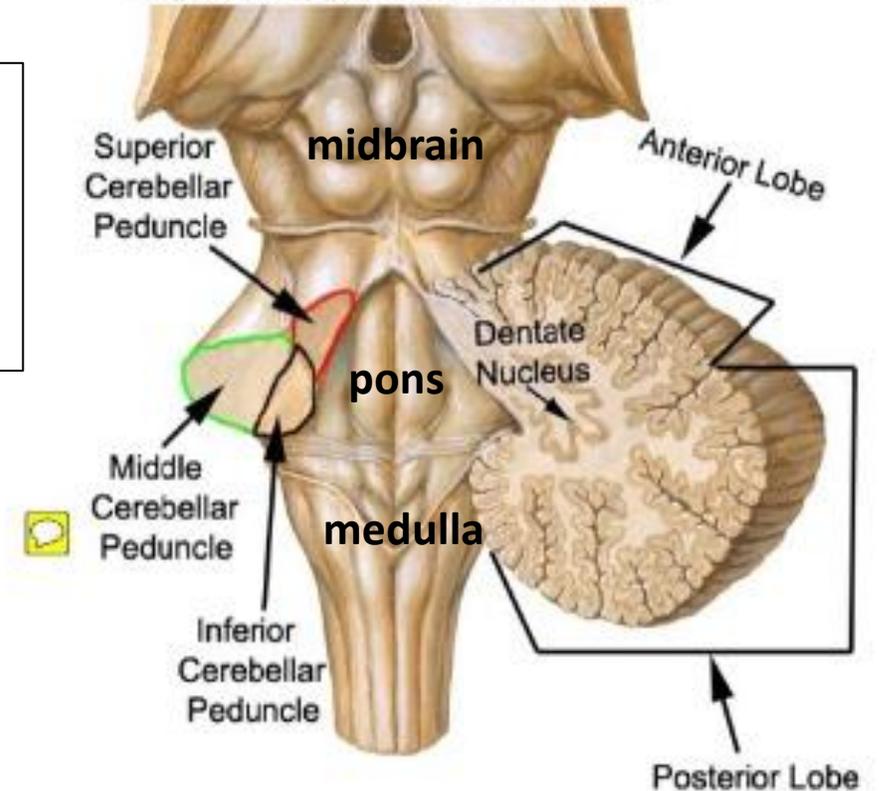
## 1) Gross features:

### A) Cerebellar peduncles :

- 1) **Superior cerebellar peduncle:** between the midbrain and the cerebellum.
- 2) **Middle cerebellar peduncle:** between the pons and the cerebellum.
- 3) **Inferior cerebellar peduncle:** between the medulla and the cerebellum.



Posterior view of the Brainstem with part of the Cerebellum removed



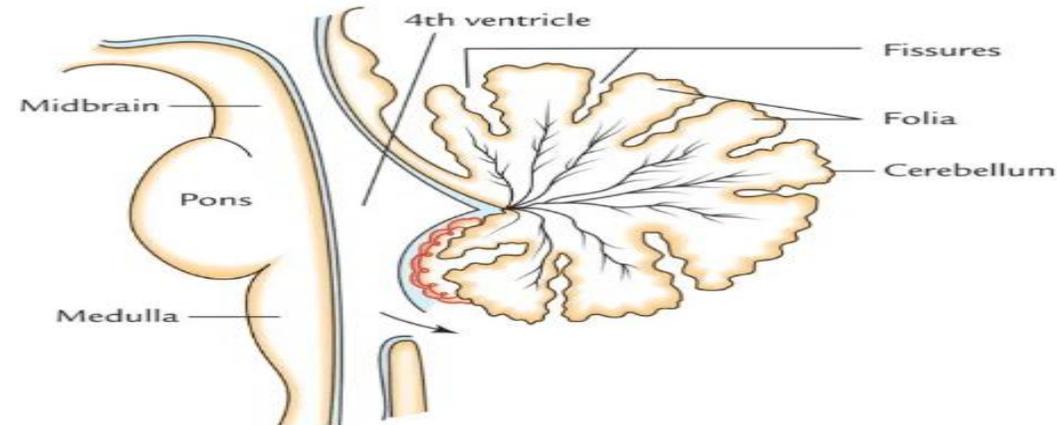
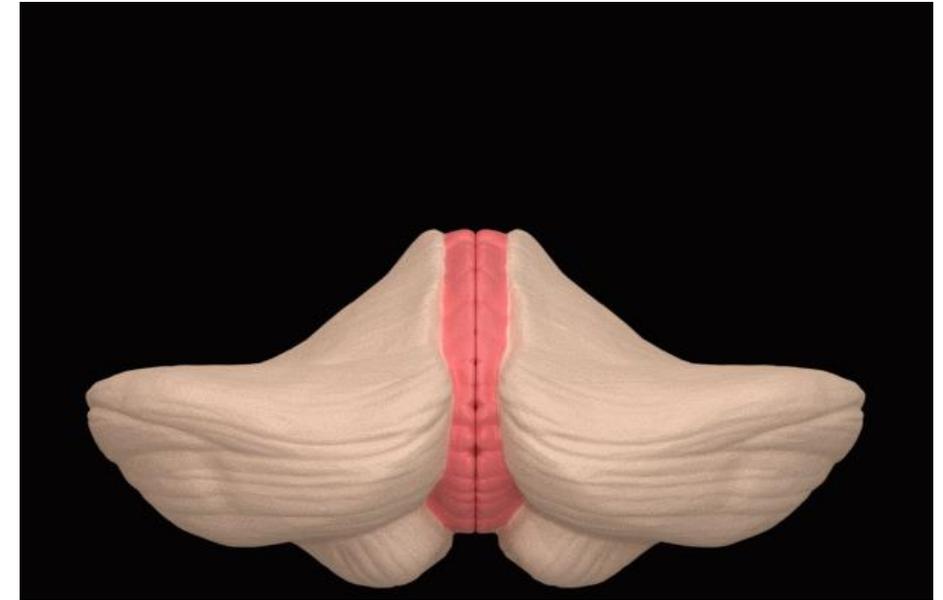
# cerebellum

## 1) Gross features:

- It consists of a central part called **vermis** and **two cerebellar hemispheres**.
- The cerebellar hemisphere has many gyri called folia separated by deep fissures.

## B) The vermis:

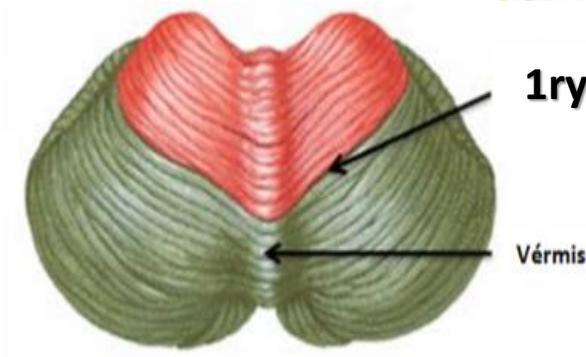
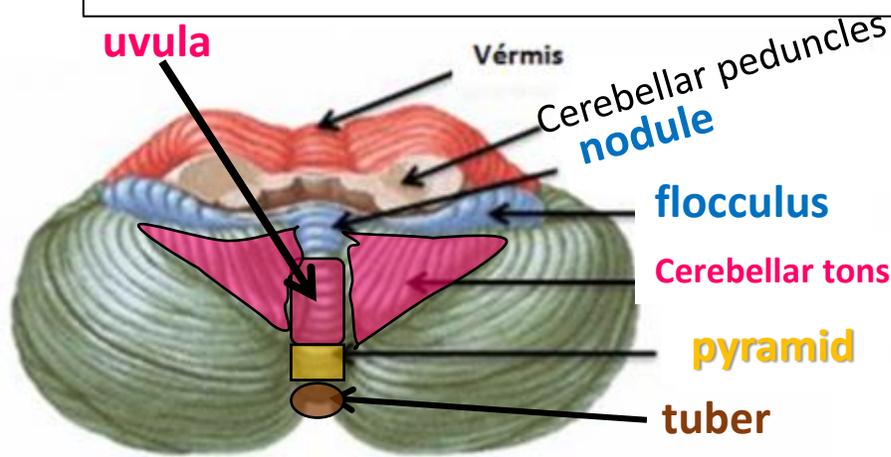
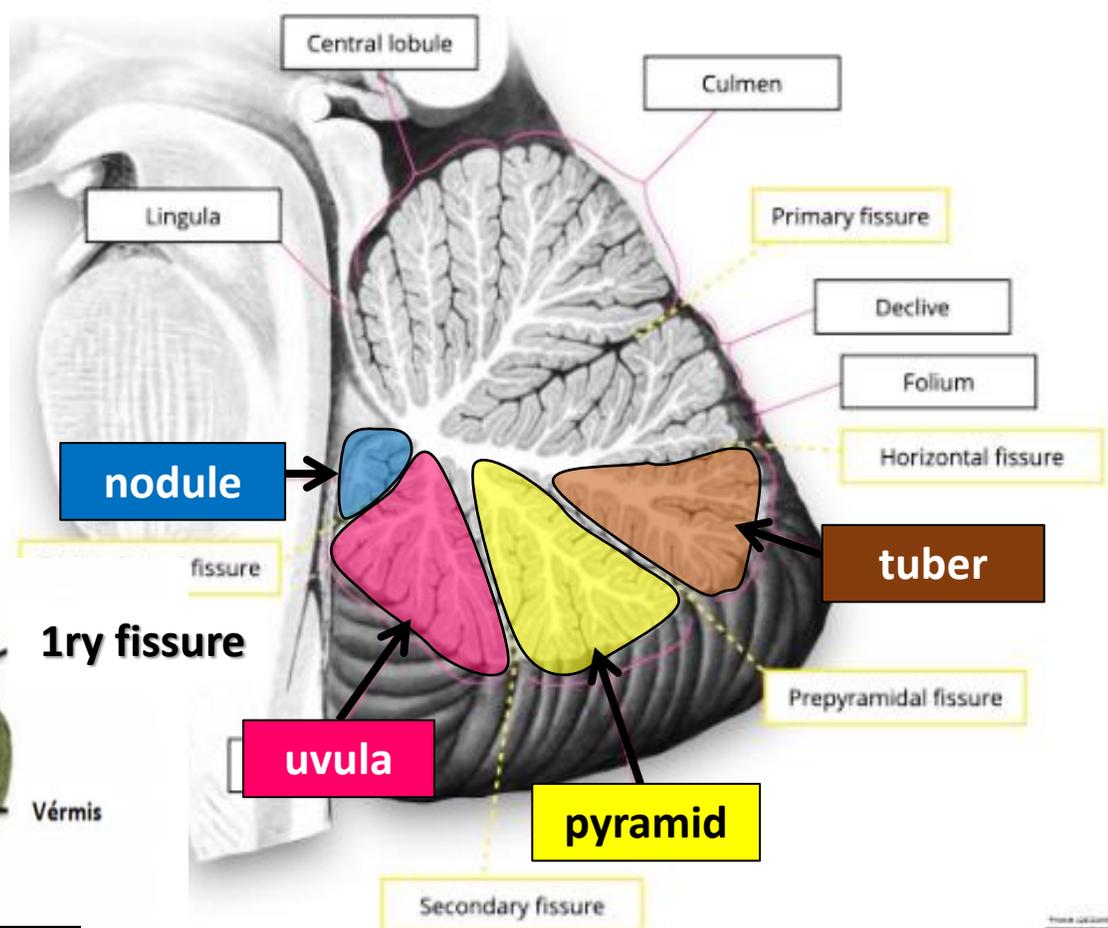
- It is divided into superior and inferior vermis:
  - The **superior vermis** is present on the superior surface.
  - The **inferior vermis**: present on the inferior surface in a groove called the **vallecula**.
- The **inferior vermis is Formed of 4 lobules**: nodule, uvula, pyramid and tuber, from before backward.  
The nodule is continuous with the flocculus.  
The uvula is continuous with the cerebellar tonsil.



# cerebellum

## B) The vermis:

- It is divided into superior and inferior vermis:
  - The superior vermis is present on the superior surface.
  - The inferior vermis: present on the inferior surface in a groove called the **vallecula**.
- The inferior vermis is formed of 4 lobules: **nodule**, **uvula**, **pyramid** and **tuber** from before backward.
  - The **nodule** is continuous with the **flocculus**.
  - The **uvula** is continuous with the **cerebellar tonsil**.



Antero-inferior view

superior view

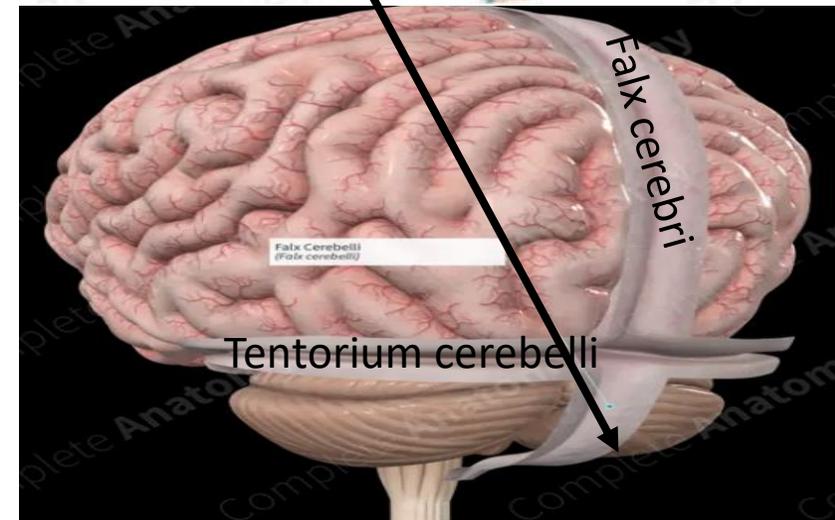
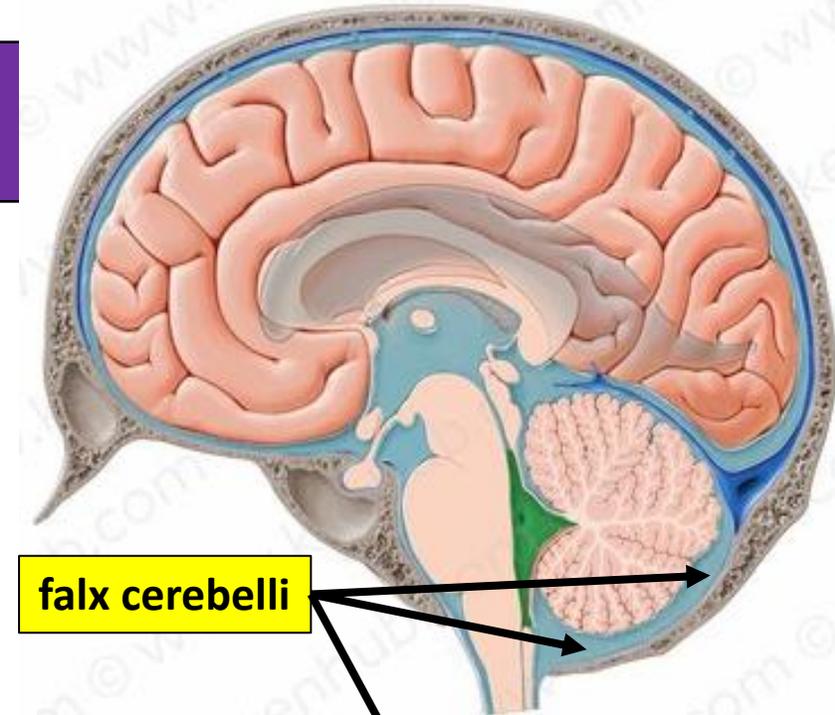
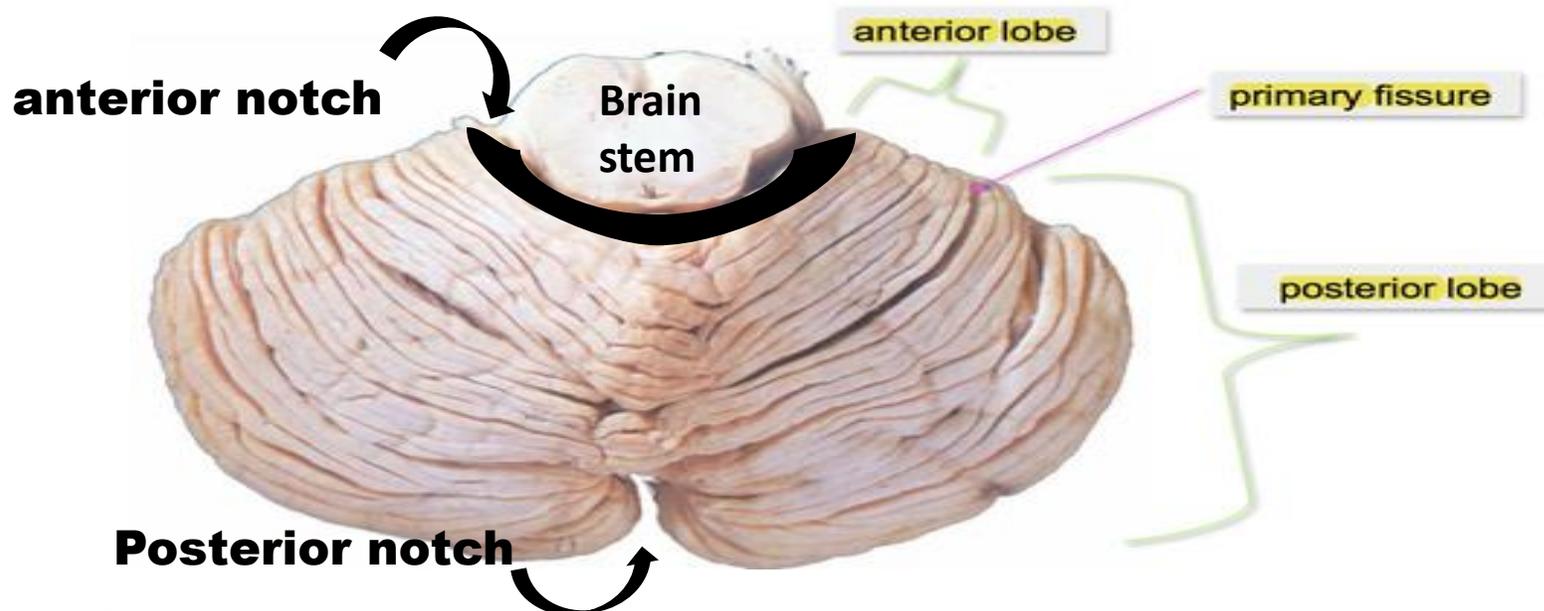
lateral view

# cerebellum

## C) Notches :

the cerebellum has 2 notches:

- 1) Anterior notch: surrounds the brainstem.
- 2) Posterior notch: contains the falx cerebelli.

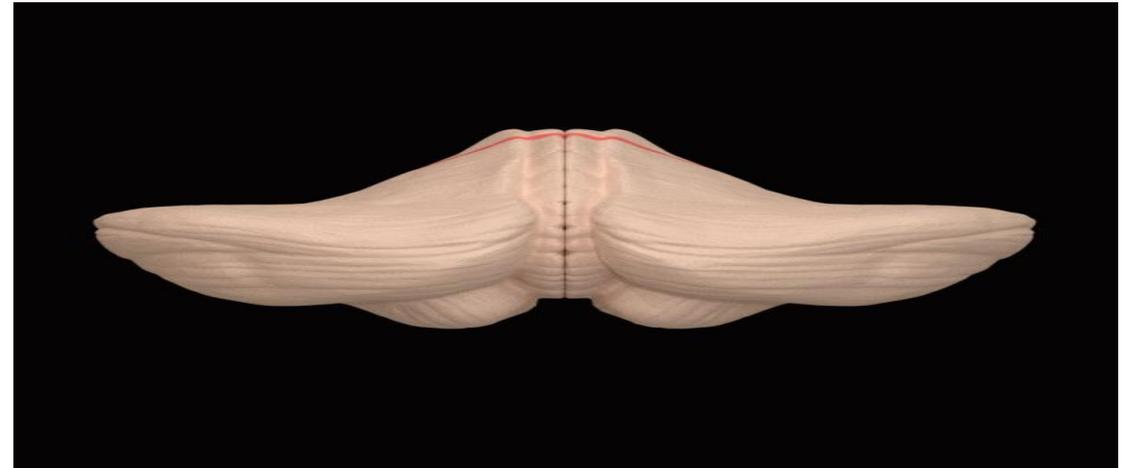
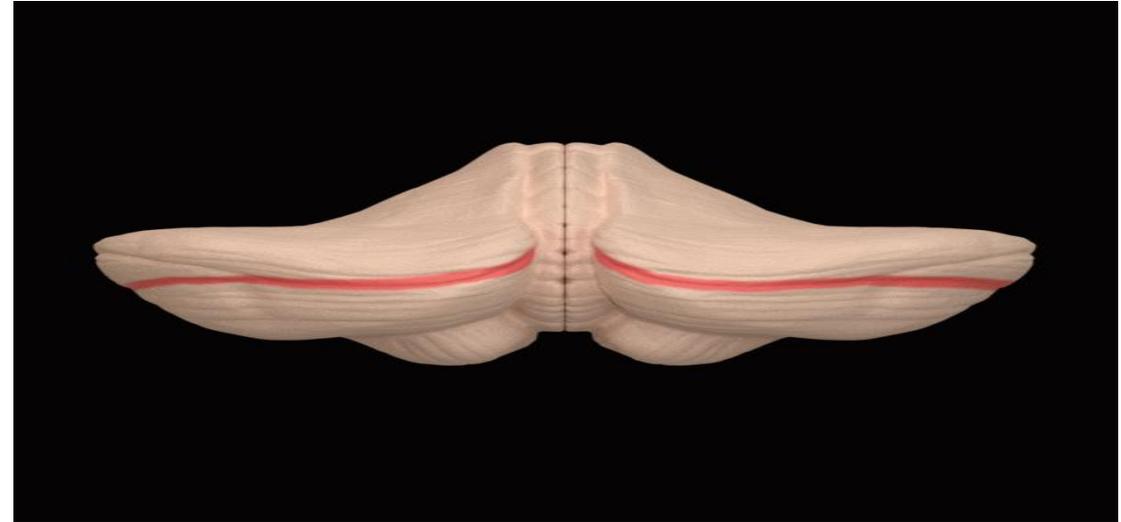


# cerebellum

## D) Fissures :

the 3 important fissures are:

1. **Horizontal fissure:** divides the cerebellum into superior and inferior surfaces.
2. **Primary fissure:** on the superior surface at the junction of its anterior third and posterior two-thirds. It separates the anterior lobe from the posterior lobe.
3. **Posterolateral fissure (uvulo-nodular fissure):** on the inferior surface separating the nodule from the uvula, and the posterior lobe from the flocculonodular lobe.

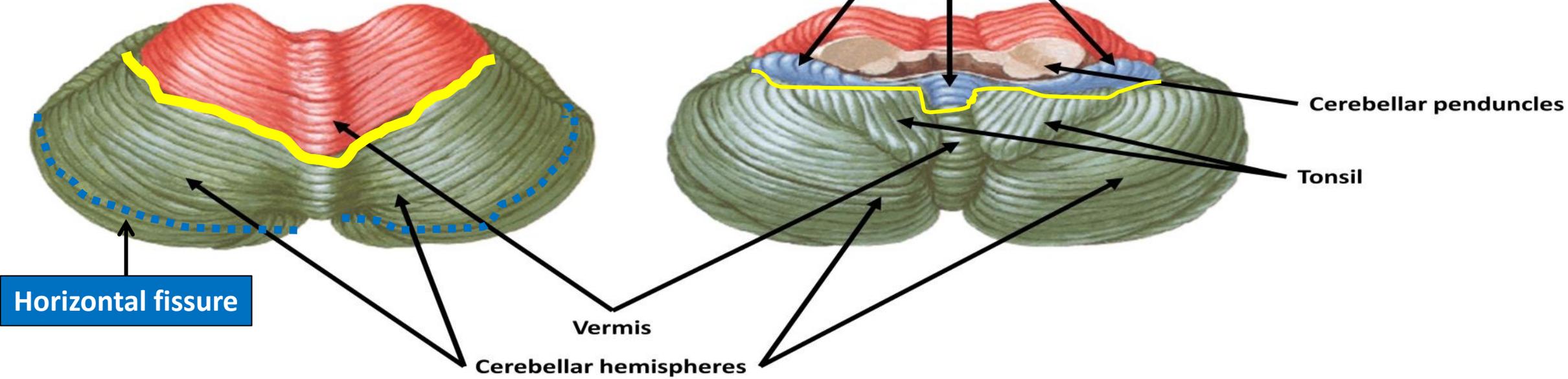


# cerebellum

## D) Fissures :

primary fissure

Posterolateral fissure



Horizontal fissure

Vermis  
Cerebellar hemispheres

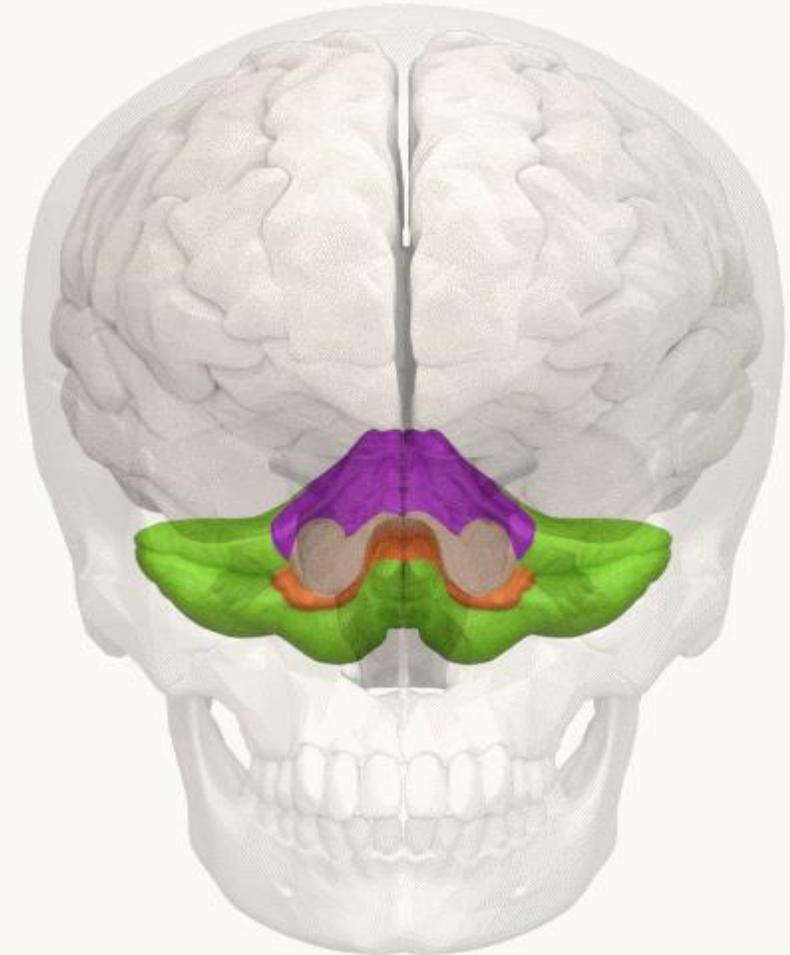
Cerebellar penduncles  
Tonsil

# cerebellum

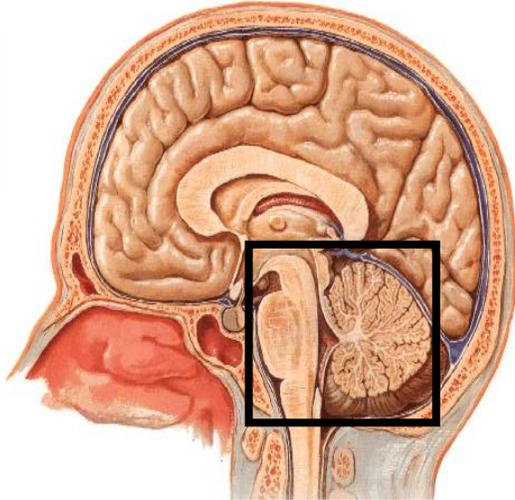
## D) Fissures :

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- **Horizontal fissure:** divides the cerebellum into superior and inferior surfaces.
- **Primary fissure:** on the superior surface at the junction of its anterior third and posterior two-thirds. It separates the **anterior lobe** from the **posterior lobe**.
- **Posterolateral fissure (uvulo-nodular fissure):** on the inferior surface separating the nodule from the uvula, and the posterior lobe from the **flocculonodular lobe**.



# cerebellum



## D) Fissures :

Superior surface



horizontal fissure

inferior surface

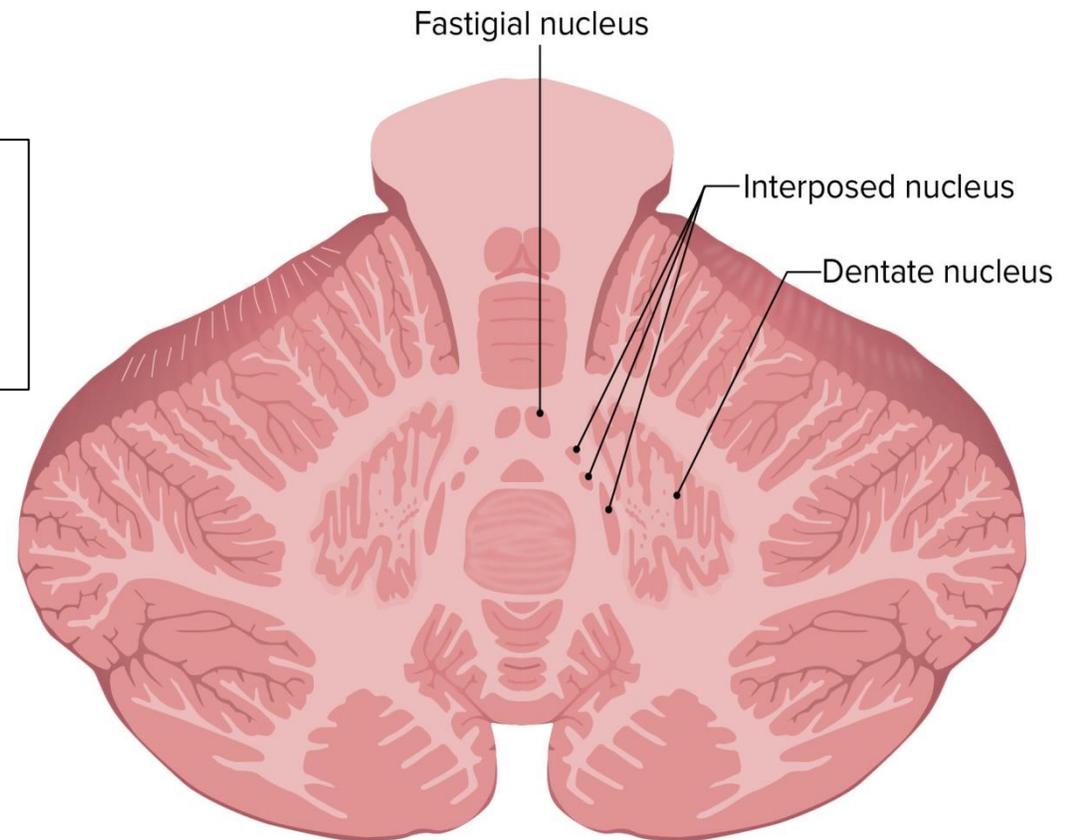
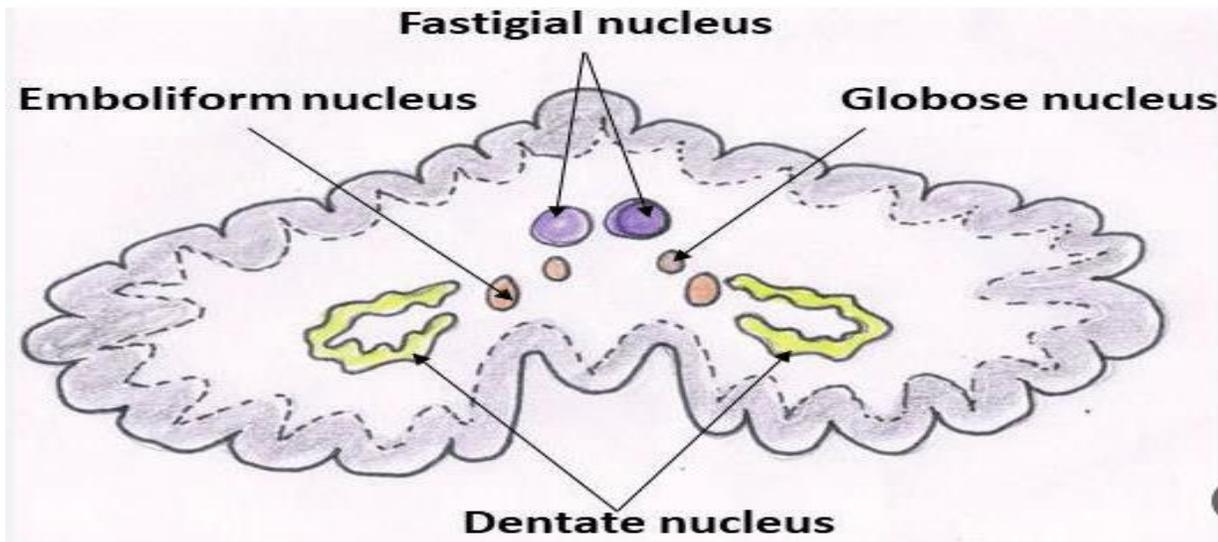


# cerebellum

## 2) Deep cerebellar nuclei:

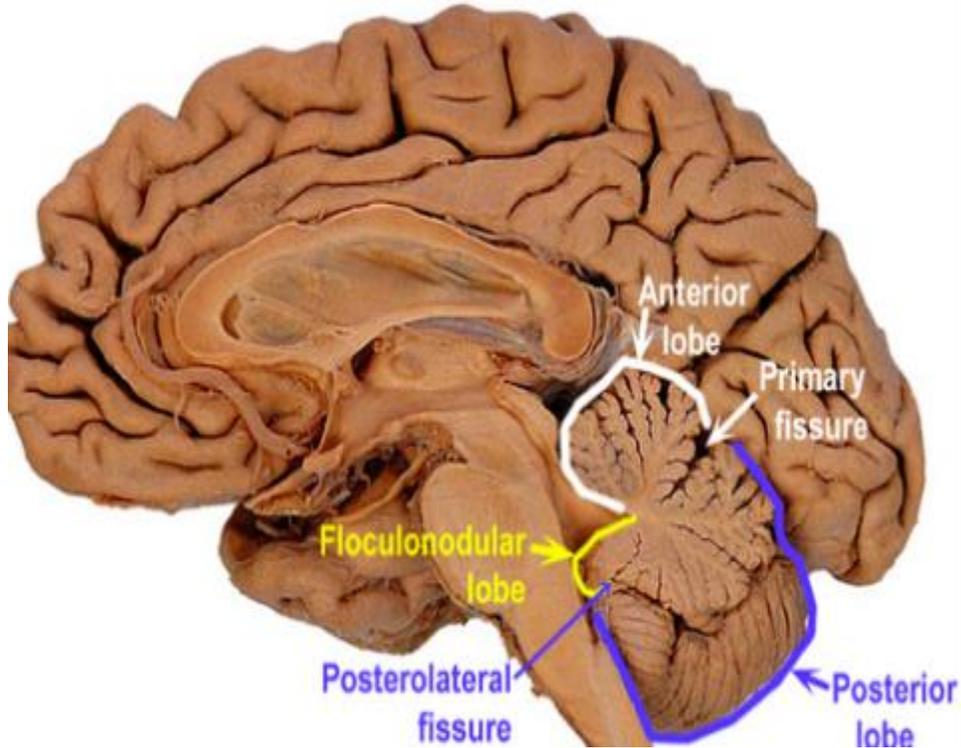
They are 4 in number, (From the medial to the lateral ):

1. Fastigial nucleus
2. Globose nucleus
3. Emboliform nucleus
4. Dentate nucleus (the largest).

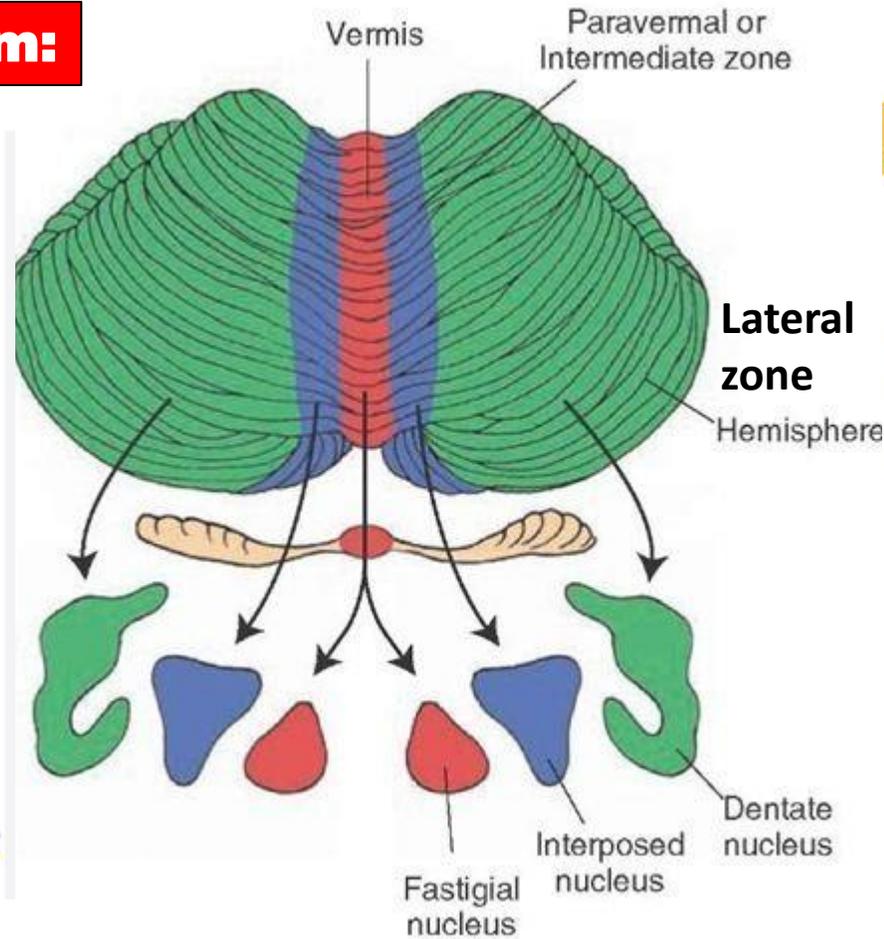


# cerebellum

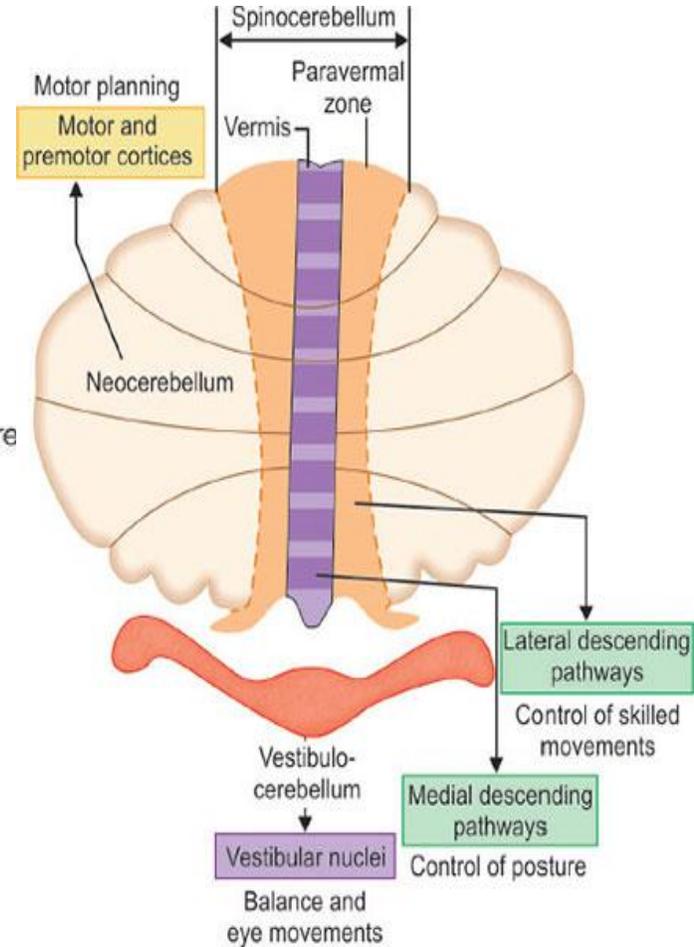
## 3) Divisions of the cerebellum:



**A) Anatomical divisions**



**B) Longitudinal divisions**



**C) Functional divisions**

# cerebellum

## 3) Divisions of the cerebellum:

### A) Anatomical divisions

- The cerebellum is divided by the primary fissure and the posterolateral fissure into:
  - **Anterior lobe:** lies cranial to the primary fissure.
  - **Posterior lobe:** lies between the primary fissure and the posterolateral fissure.
  - **Flocculonodular lobe:** is formed of the nodule and the two flocculi.

### B) Longitudinal divisions

- According to the connections of the deep cerebellar nuclei:
  - **Vermal zone:** the cerebellar cortex projects to the fastigial nucleus.
  - **Paravermal zone:** the cerebellar cortex projects to the interposed nuclei.
  - **Lateral zone:** the cerebellar cortex projects to the dentate nucleus.

### C) Functional divisions

- 3 functional zones:
  - **Archicerebellum (vestibulocerebellum):** Consists of the flocculonodular lobe.
  - **Paleocerebellum (spinocerebellum):** Consists of the vermal & paravermal zones of the anterior and posterior lobes.
  - **Neocerebellum (cerebrocerebellum):** Consists of the lateral zone of the cerebellar hemisphere.

# cerebellum

## 3) Divisions of the cerebellum:

### Functional divisions

#### 1) Archicerebellum (vestibulocerebellum):

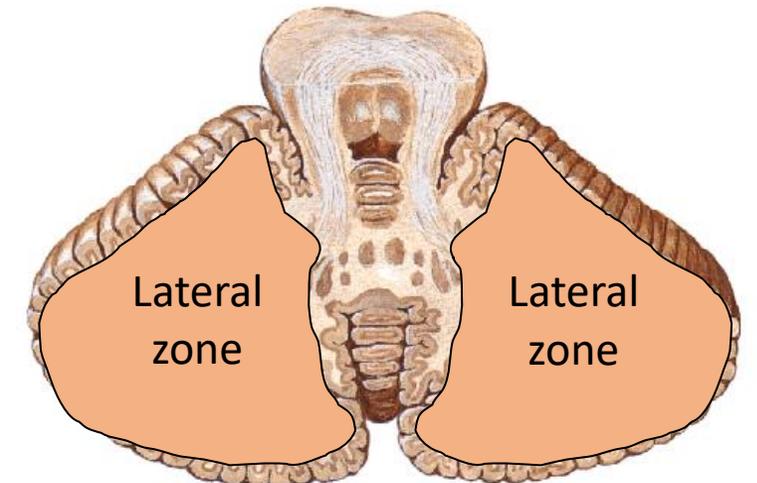
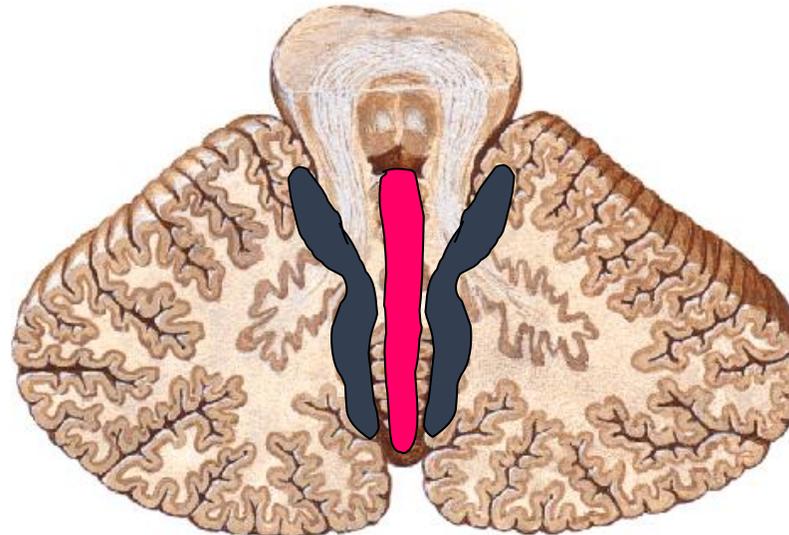
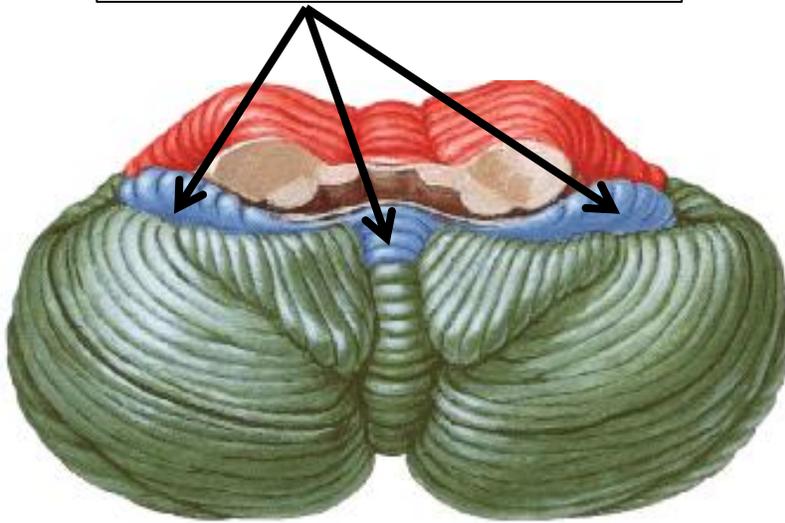
- It Consists of the **flocculonodular lobe**

#### 2) Paleocerebellum (spinocerebellum):

- It Consists of the **vermal & paravermal zones**

#### 3) Neocerebellum (cerebrocerebellum):

- It Consists of the **lateral zone** of the cerebellar hemisphere



# cerebellum

## 3) Divisions of the cerebellum:

### Functional divisions

#### a. Archicerebellum (vestibulocerebellum):

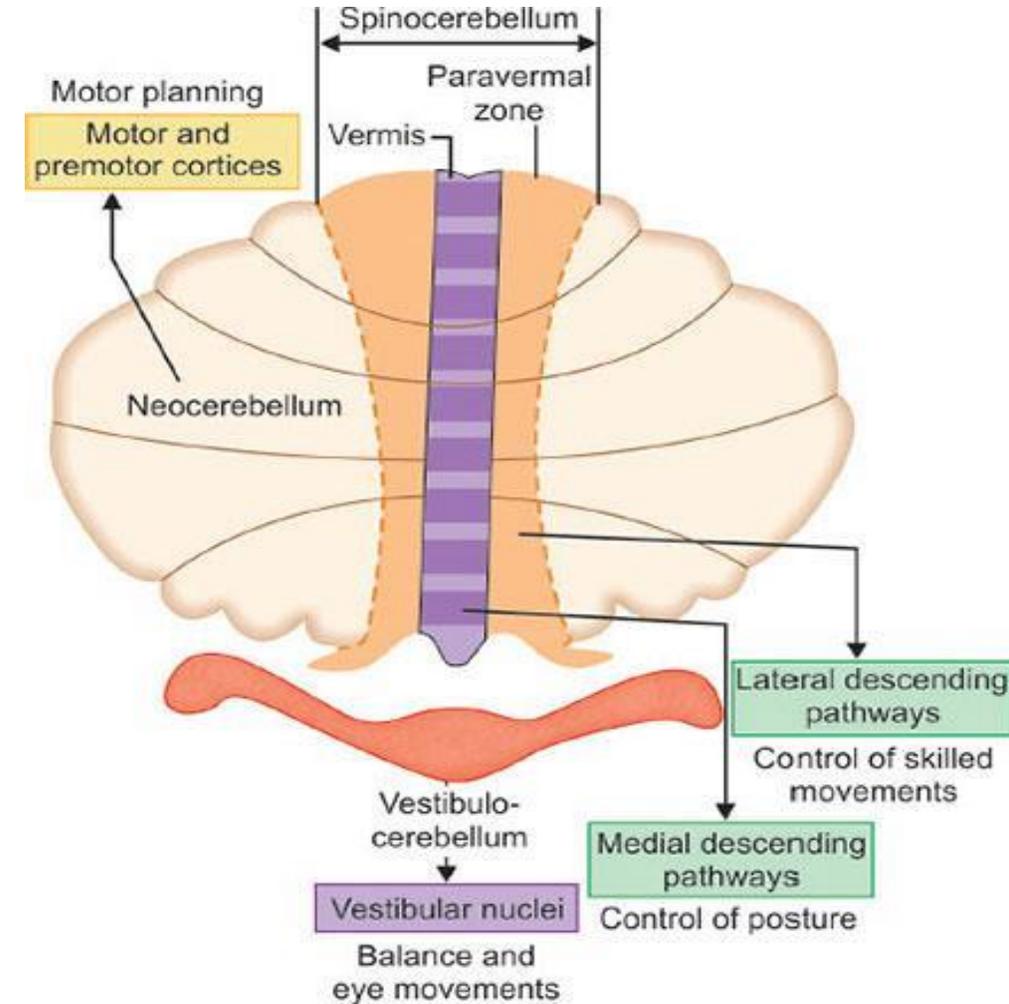
- It Consists of the flocculonodular lobe.
- It is connected with the vestibular system
- It is concerned with **equilibrium**.

#### b. Paleocerebellum (spinocerebellum):

- It Consists of the vermal & paravermal zones of the anterior and posterior lobes.
- It is Connected with spinal cord.
- It is Concerned with regulation of muscle tone and muscle coordination.

#### c. Neocerebellum (cerebrocerebellum):

- It Consists of the lateral zone of the cerebellar hemisphere.
- It is Connected with the cerebral cortex.
- It is Concerned with automatic control of movement.



# cerebellum

## 4) Arterial supply of the cerebellum

### 1) Superior cerebellar artery (SCA):

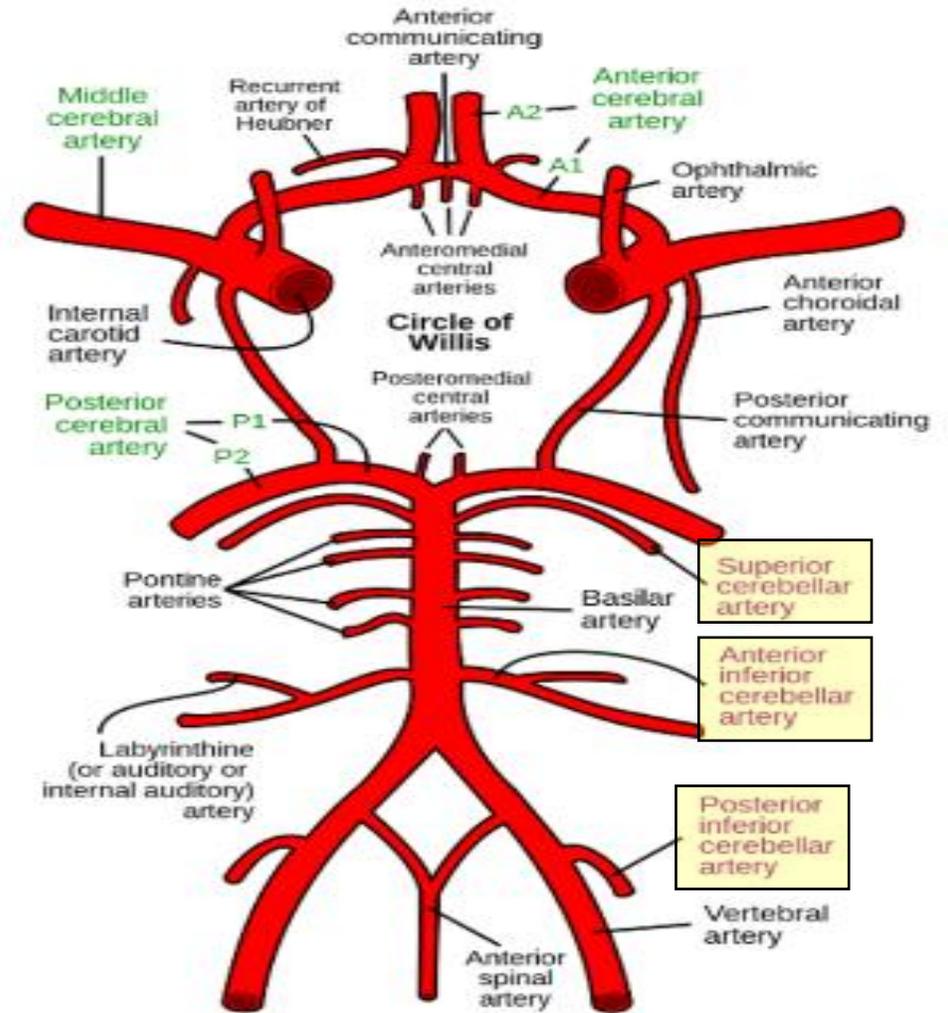
- **Branch** of the basilar artery.
- **It supplies** the superior surface of the cerebellum and the superior cerebellar peduncle.

### 2) Anterior inferior cerebellar artery (Aica):

- **Branch** of the basilar artery.
- **It supplies** the anterior part of the inferior surface and the middle cerebellar peduncle.

### 3) Posterior inferior cerebellar artery (Pica):

- **Branch** of the vertebral artery.
- **It supplies** the posterior part of the inferior surface and the inferior cerebellar peduncle



# cerebellum

## 1) Gross features

A) Cerebellar peduncles

B) The vermis

C) notches

D) Fissures

## 2) Deep cerebellar nuclei

## 3) Divisions of the cerebellum

A) Anatomical divisions

B) Longitudinal divisions

C) Functional divisions

## 4) Arterial supply of the cerebellum

# Quiz

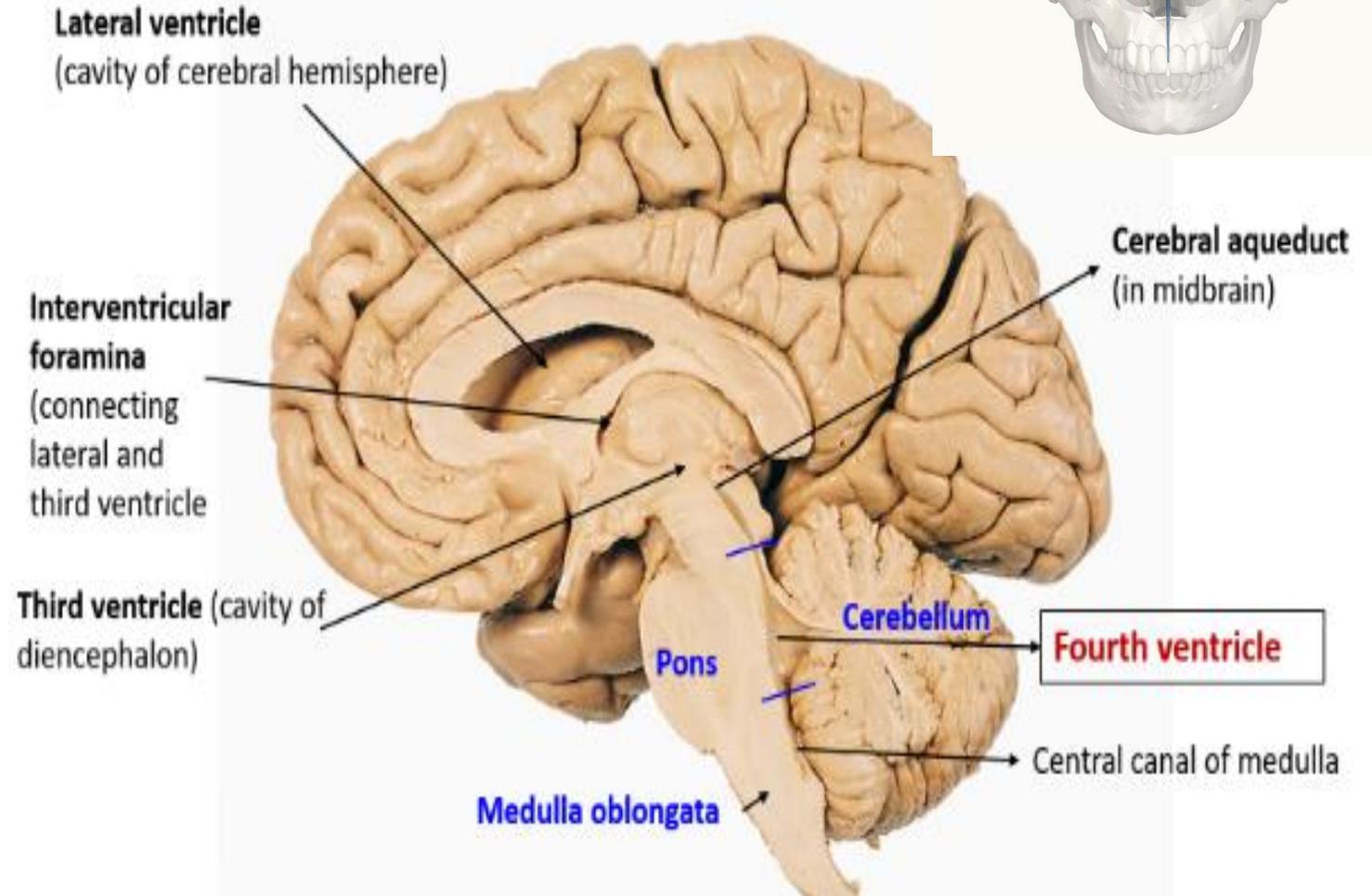
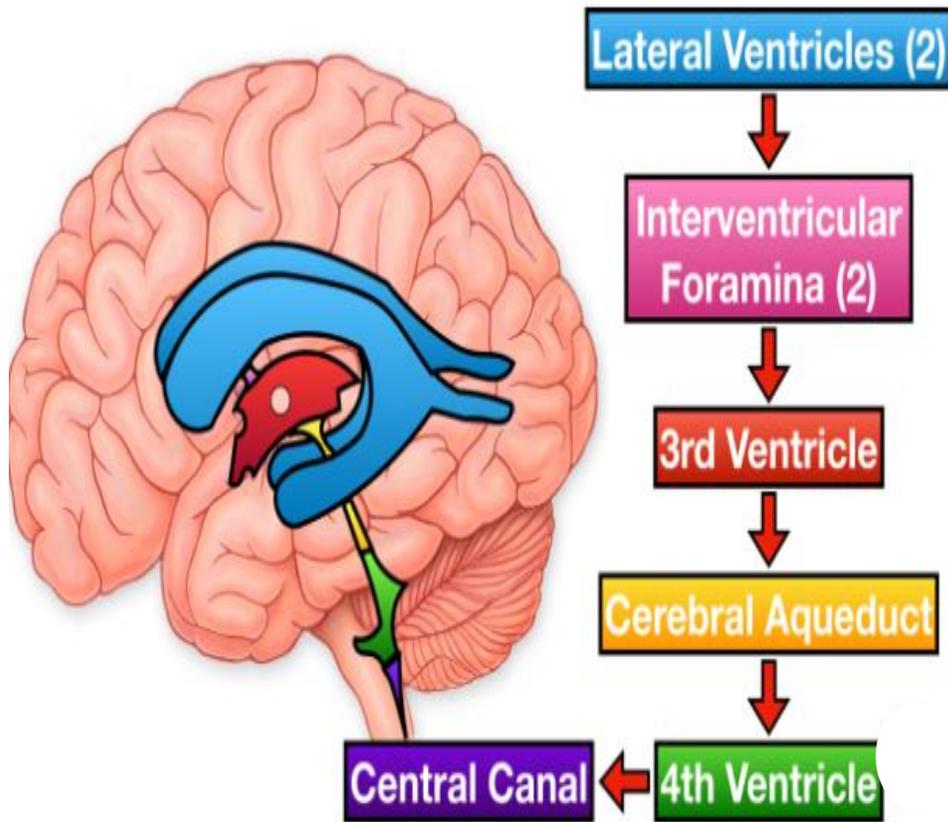
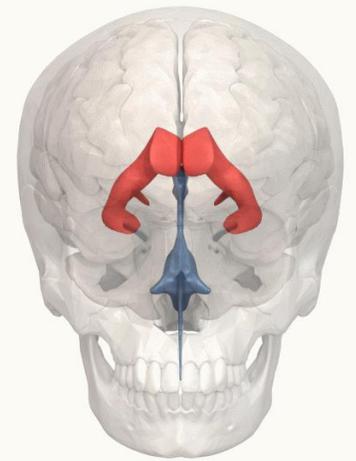
**The middle cerebellar peduncle is supplied by ?**

- A. Superior cerebellar artery .
- B. Anterior inferior cerebellar artery.
- C. Posterior inferior cerebellar artery .
- D. Middle cerebral artery.
- E. Anterior cerebral artery.

**The answer is B**

# 4<sup>th</sup> ventricle

- **Definition:** it is the cavity of the hindbrain (rhombencephalon)

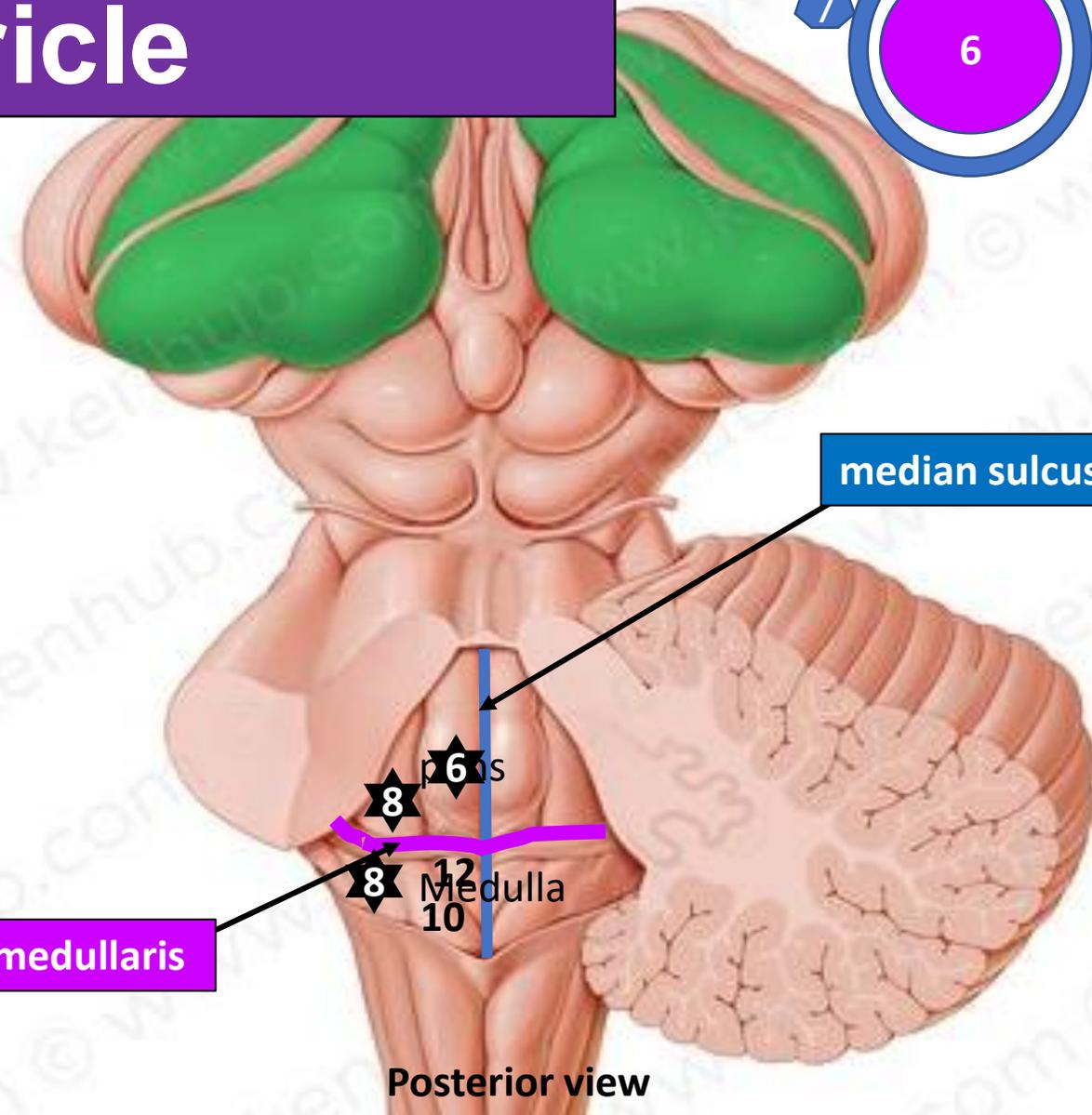


# 4<sup>th</sup> ventricle



## 1) Cranial nerve nuclei in the floor of the 4th ventricle:

- **Abducent nucleus:** opposite the facial colliculus in the pons.
- **Vestibular nuclei:** in the vestibular trigone in both the pons and medulla.
- **Dorsal motor nucleus of the vagus:** in the vagal trigone in the medulla.
- **Hypoglossal nucleus:** in the hypoglossal trigone in the medulla.

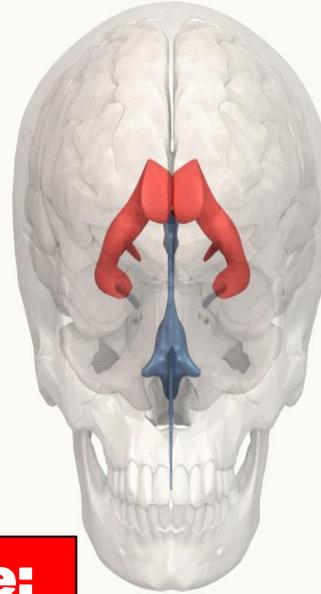


Posterior view

# 4<sup>th</sup> ventricle

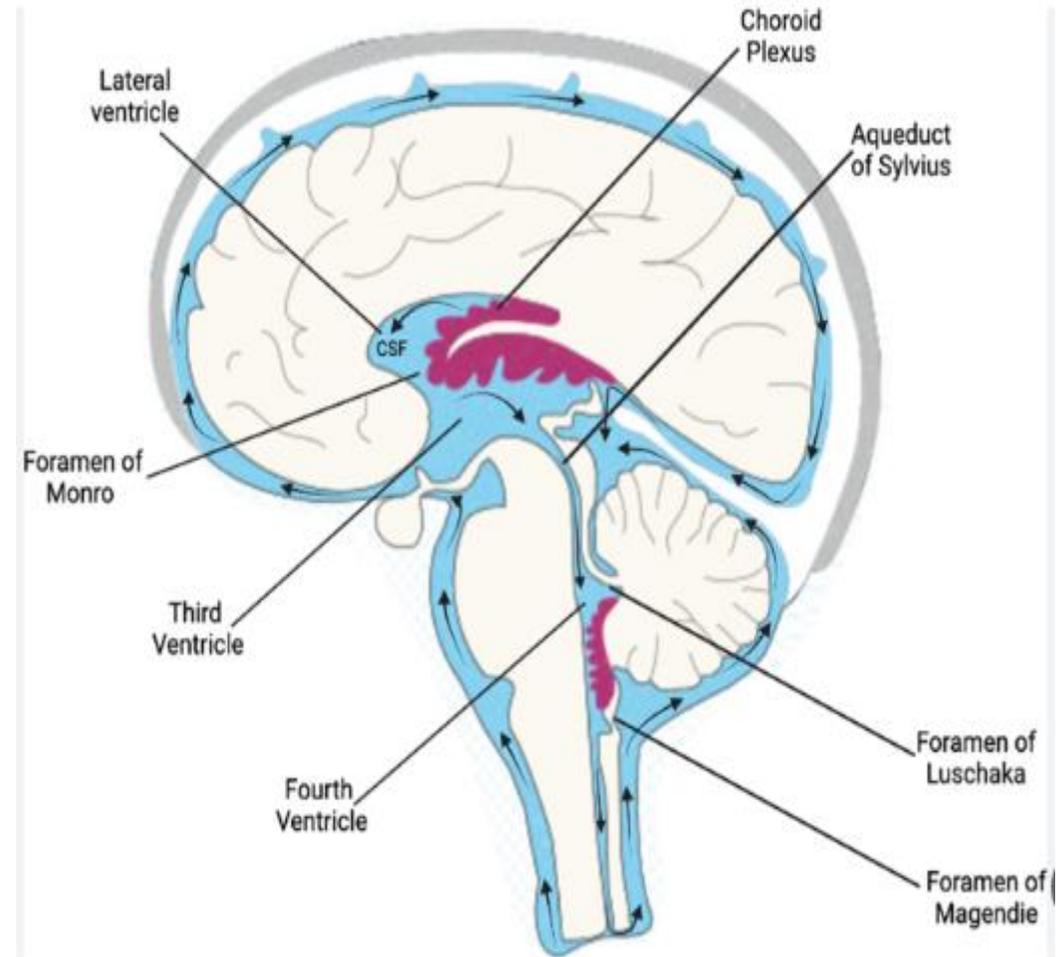
## 2) foramina of 4<sup>th</sup> ventricle:

1. **Median aperture (foramen of Magendie):** present in the inferior medullary velum.
2. **Two lateral apertures (foramina of Luschka):** in the lateral recess at the cerebellopontine angle.

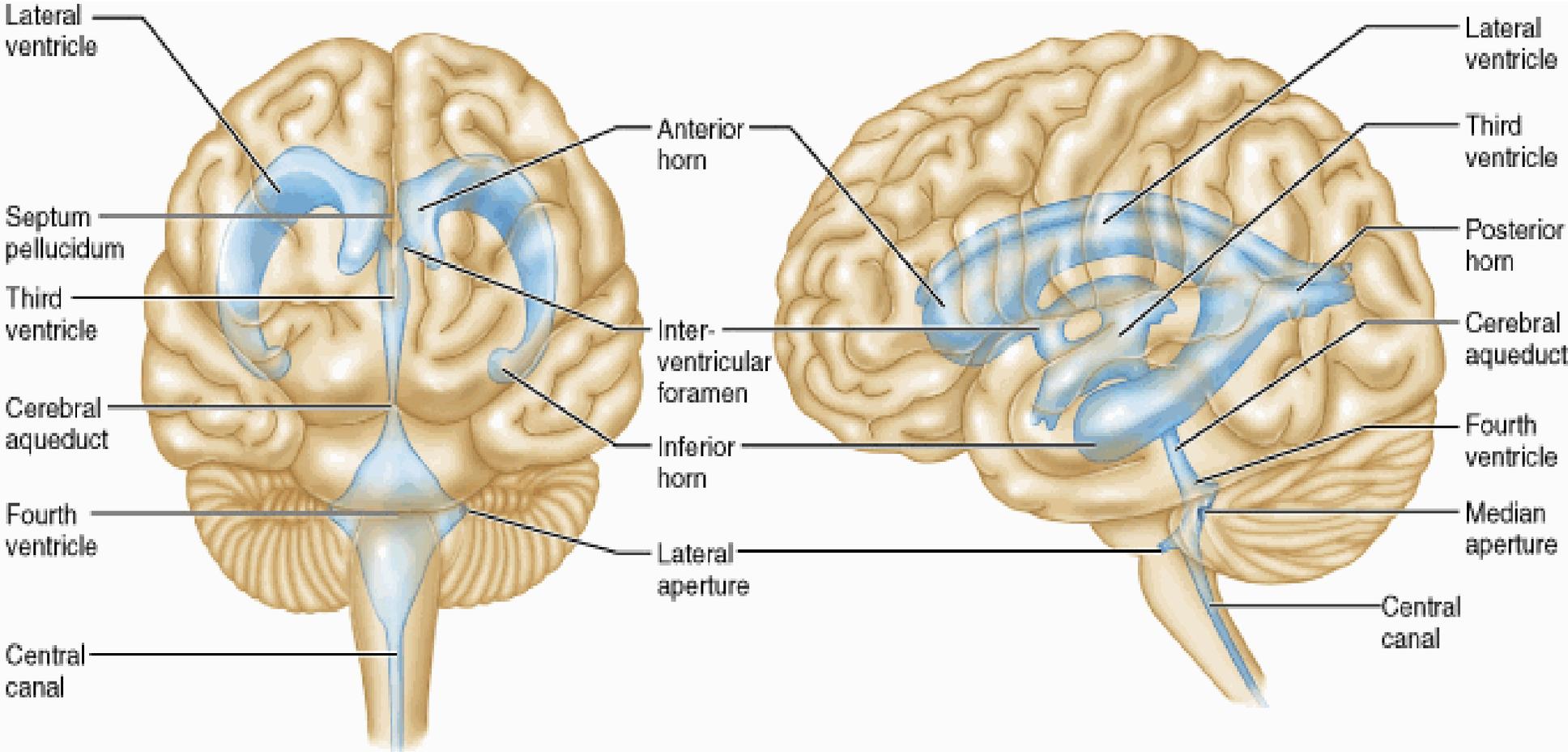


## 3) Communications of 4<sup>th</sup> ventricle:

- **With the 3<sup>rd</sup> ventricle** through the cerebral aqueduct of Sylvius.
- **With the central canal** of the medulla and spinal cord.
- **With the subarachnoid space** through foramen of Magendie & foramina of Luschka.



# 4<sup>th</sup> ventricle



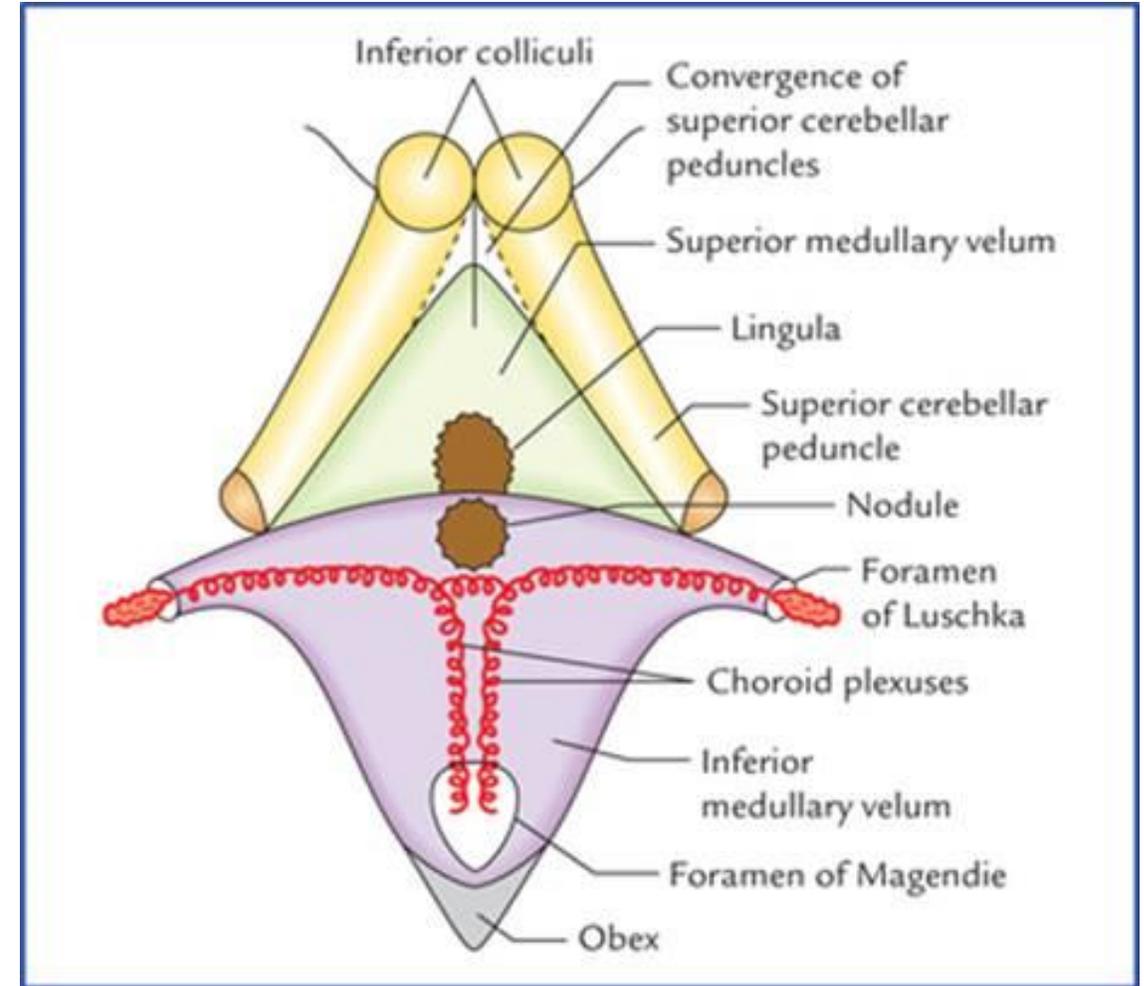
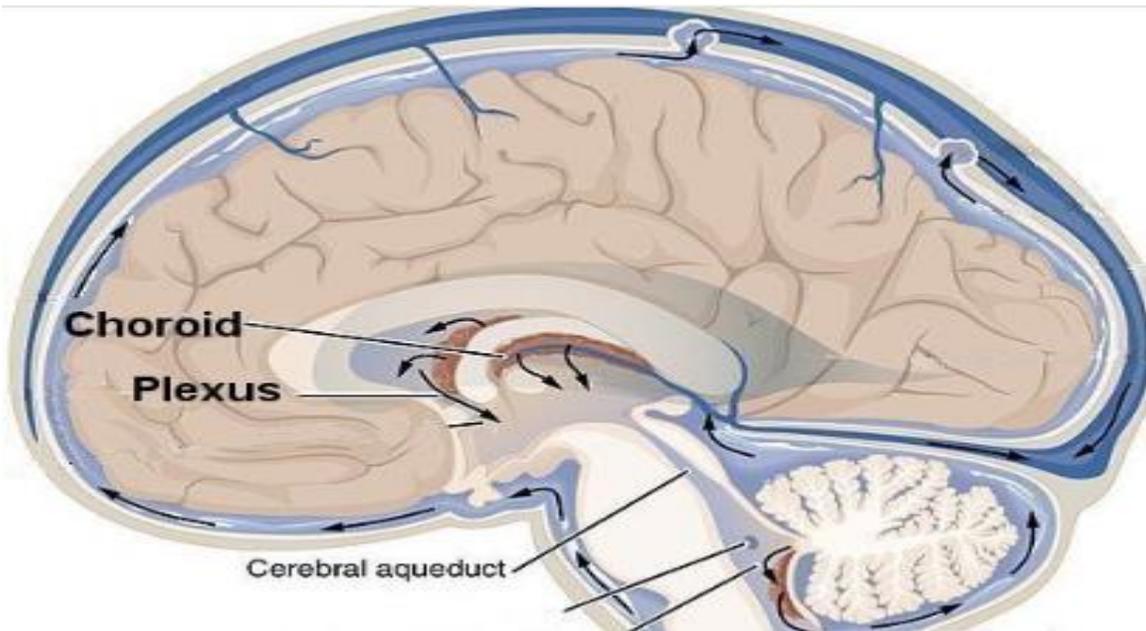
(a) Anterior view

(b) Left lateral view

# 4<sup>th</sup> ventricle

## 4) Choroid plexus:

- It has a T-shaped plexus.
- It has a stem and 2 lateral arms. Each arm extends laterally into the lateral recess and is supplied by the **PICA**.



# Quiz

**The choroid plexus of 4<sup>th</sup> ventricle is supplied by ?**

- A. Superior cerebellar artery .
- B. Anterior inferior cerebellar artery.
- C. Posterior inferior cerebellar artery .
- D. Middle cerebral artery.
- E. Anterior cerebral artery.

**The answer is C**

Thank You!

The image features the words "Thank You!" in a highly stylized, 3D font. The word "Thank" is positioned above "You!". The letters of "Thank" are filled with a gradient from purple at the top to orange at the bottom, with a thick black outline. The letters of "You!" are filled with a gradient from light blue at the top to green at the bottom, also with a thick black outline. Each letter has a shadow cast behind it, which is a bright yellow star shape with a black outline. The shadows are positioned to create a sense of depth and perspective. The overall style is vibrant and celebratory.