

BRAIN

**Most Complex Organ
of the Body**

Chapter 3

New Terminology

Combining Form	Meaning	Example	Meaning of New Term
Cephal/o	Head	Cephalagia	Pain of the head
Cerebell/o	Cerebellum	Cerebellitis	Inflammation of the cerebellum
Cerebr/o	Brain	Cerebrovascular	Pertaining to the brain and vessels
Encephal/o	Brain	Encephalocele	Hernia of the brain
Gli/o	Glue, Gluelike	Glioma	Gluelike tumor

New Terminology

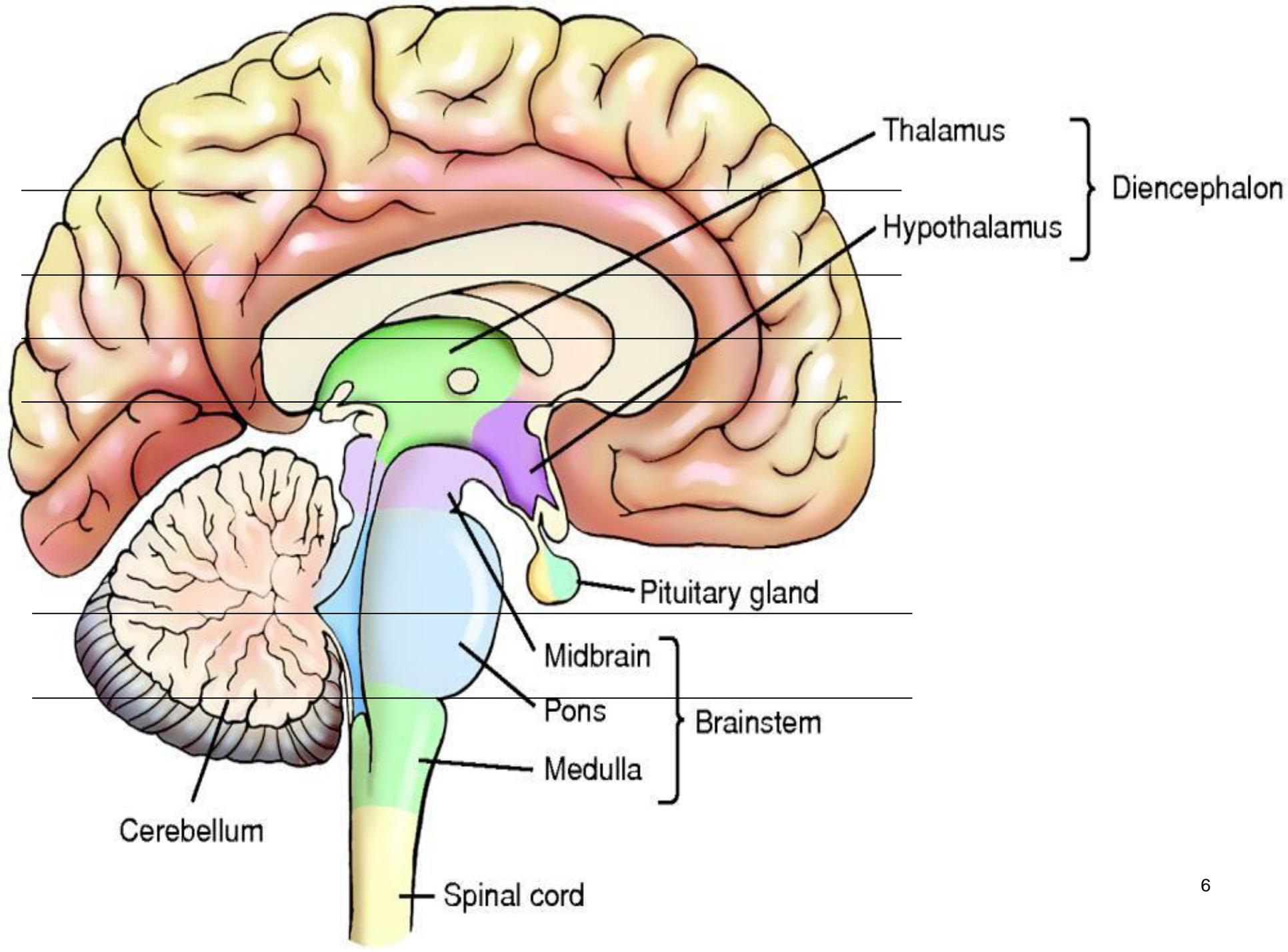
Combining Form	Meaning	Example	Meaning of New Term
Lex/o	Word, phrase	Dyslexia	Bad, painful, or difficult words or phrases
Mening/o	Meninges	Meningitis	Inflammation of the meninges
Meningi/o	Meninges	Meningioma	Tumor of the meninges
Myel/o	Spinal cord, bone marrow	Myelography	Process of recording the spinal cord or bone marrow ³

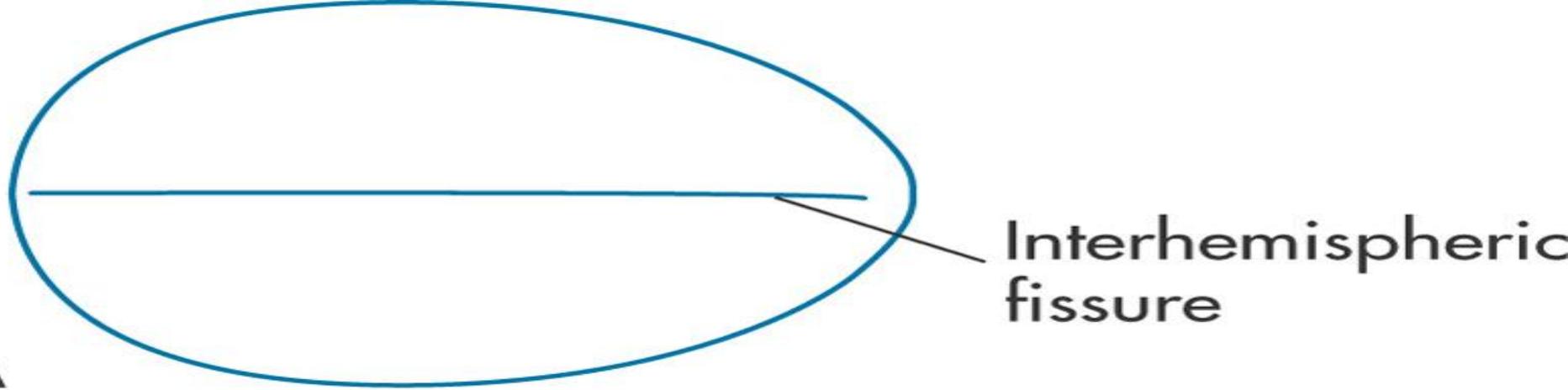
New Terminology

Combining Form	Meaning	Example	Meaning of New Term
Narc/o	Sleep, stupor	Narcolepsy	Seizure of sleep or stupor
Neur/o	Nerve	Neurocytoma	Tumor of a nerve cell
Phas/o	Speech	Aphasia	Absence of speech
Psych/o	Mind	Psychiatry	Field of medicine of the mind
Spin/o	Spine	Spinal stenosis	Narrowing or stricture of the spinal cord

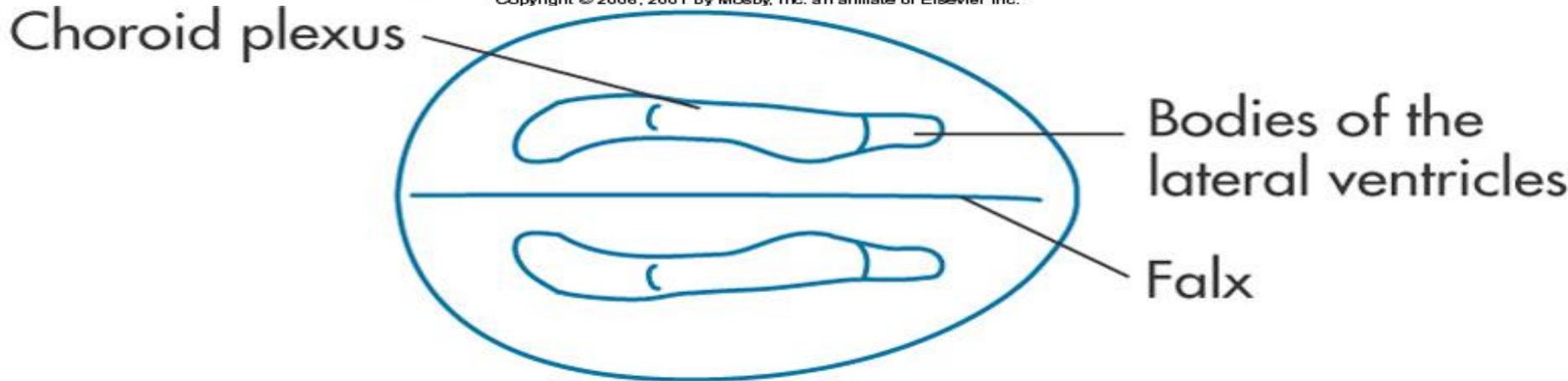
New Terminology

Combining Form	Meaning	Example	Meaning of New Term
Sthen/o	Strength	Myasthenia	Condition of absence of muscle strength
Thalam/o	Thalamus	Thalamotomy	Cutting into or incision of the thalamus
Ton/o	Tension tone	Tonometer	Measuring instrument for tension
Ventricul/o	Ventricle	Ventriculomegaly	Enlargement of the ventricle ⁵

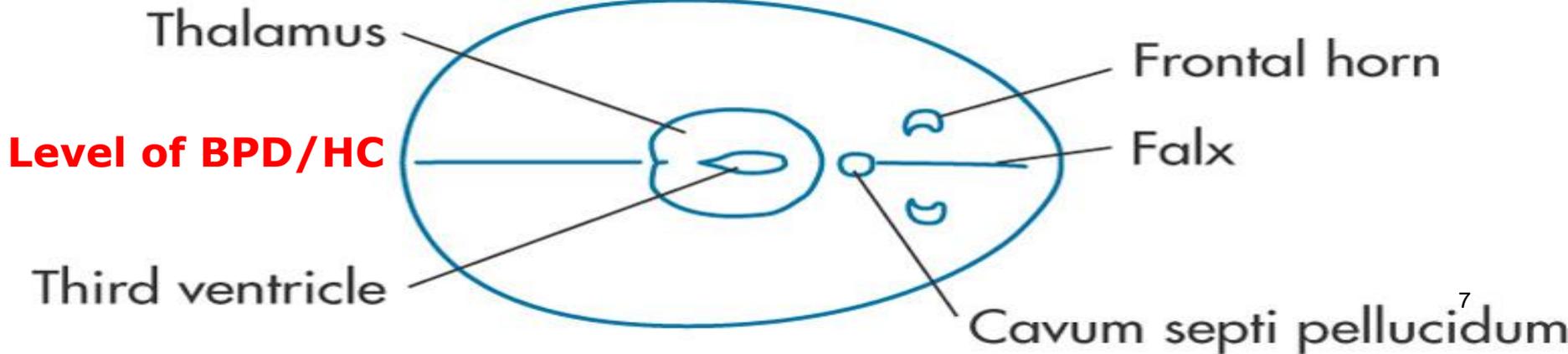




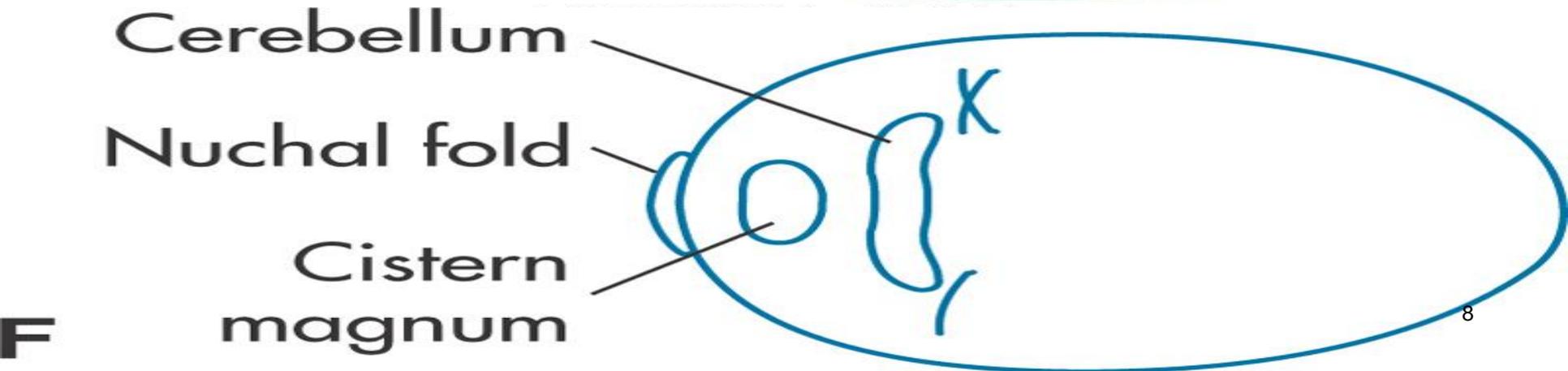
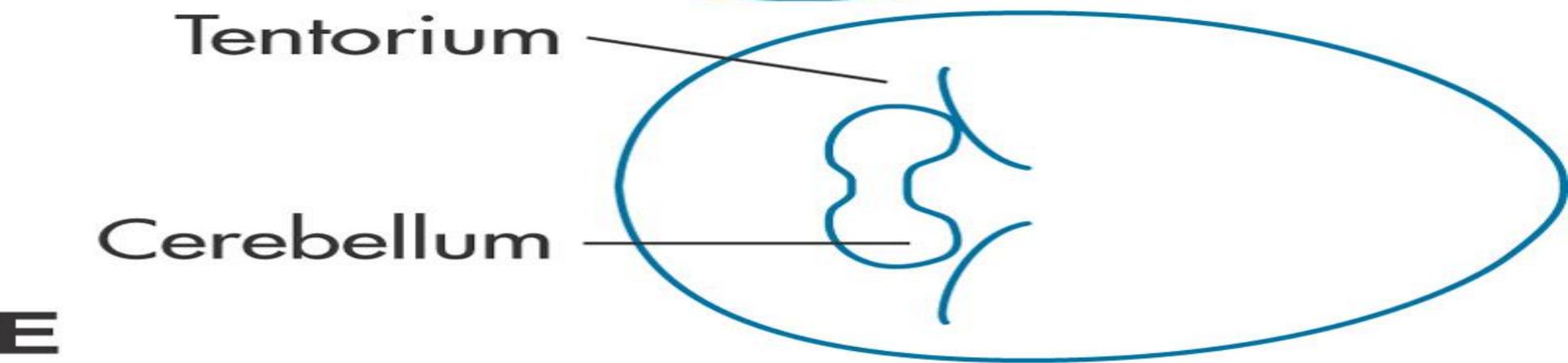
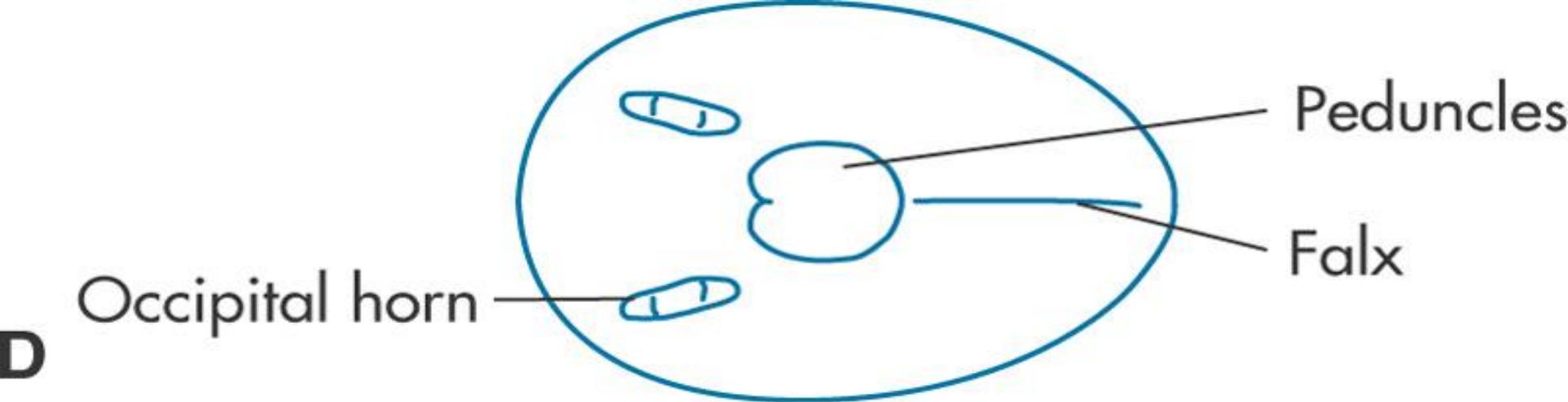
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Meninges

- **Membranes (3 layers)**
- **Surround and protect the brain**

1. Dura mater (Outer)

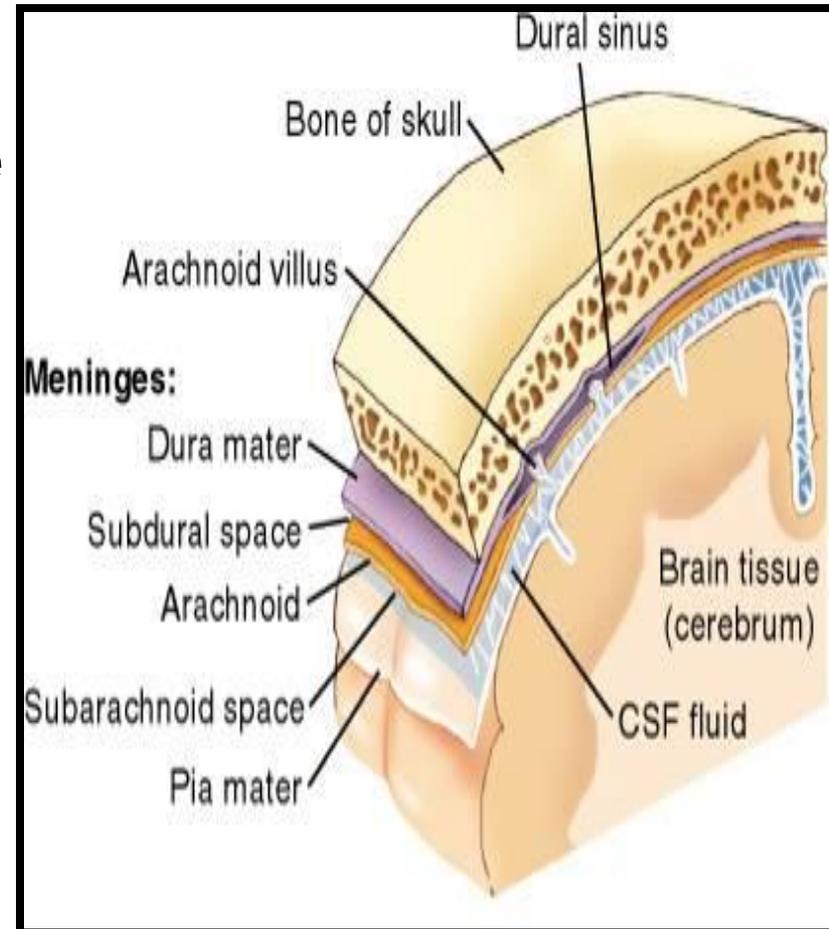
- **Subdural space**

2. Arachnoid membrane

■ **Avascular**

- **Subarachnoid space**
 - **Cerebrospinal fluid (CSF)**

3. Pia mater (Inner)



Meninges

Dura Mater

- **Continuous with periosteum of the cranium**
- **Between the double layers**
 - **Meningeal arteries**
 - **Dural sinuses**
- **Two folds of the dura mater**
 - **Falx cerebri**
 - **Falx cerebelli**

Ventricular System

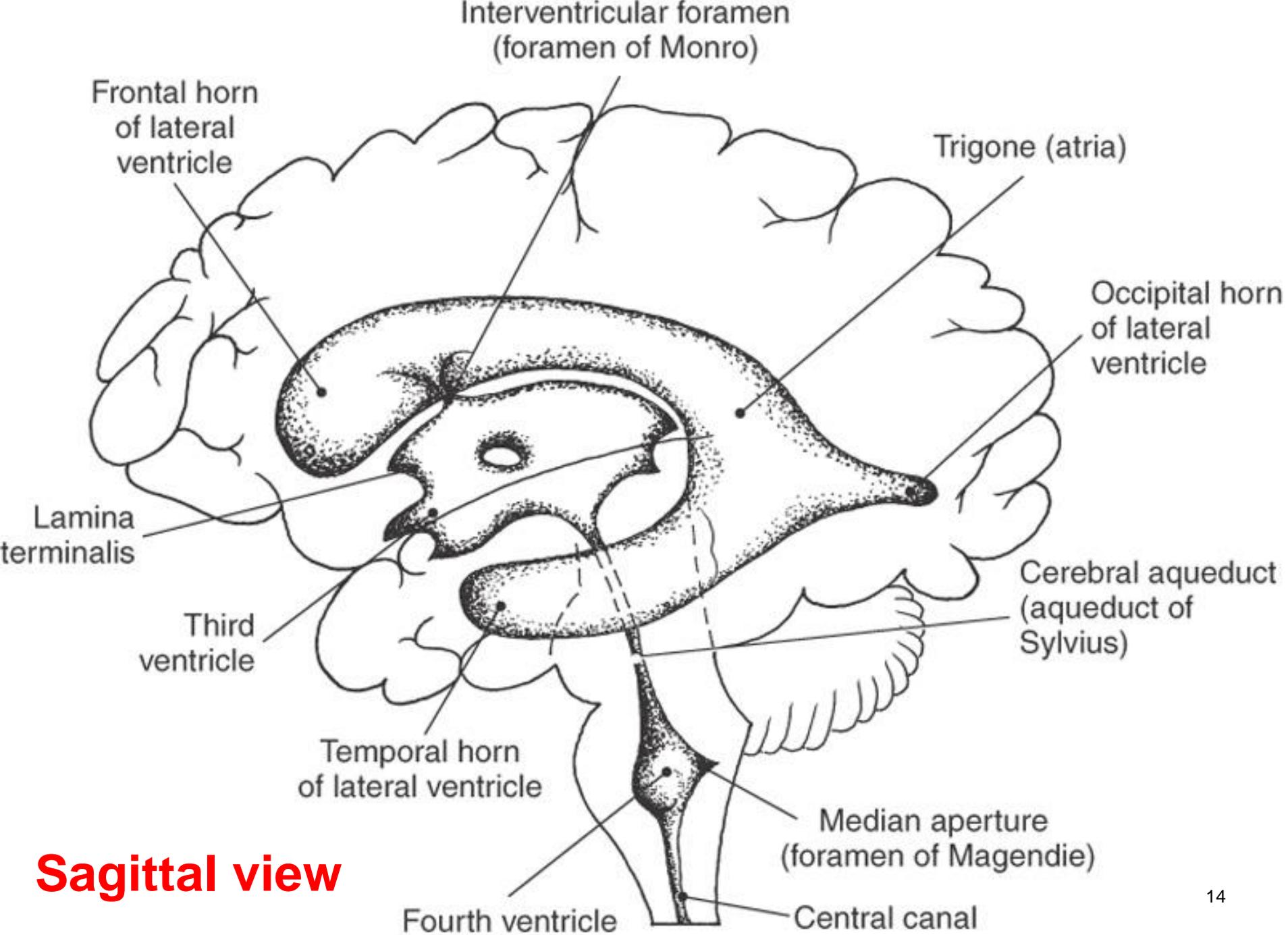
- Produce and provide
 - Pathway for circulation of cerebrospinal fluid (CSF)
- Four ventricles:
 - Right lateral*****
 - Left lateral*****
 - Third*****
 - Fourth

Lateral Ventricles

- **Right and left**
 - **Located superiorly**
 - **Lie within each cerebral hemisphere**
 - **Separated at the midline by a thin partition**
 - **Septum Pellucidum**

Lateral Ventricles

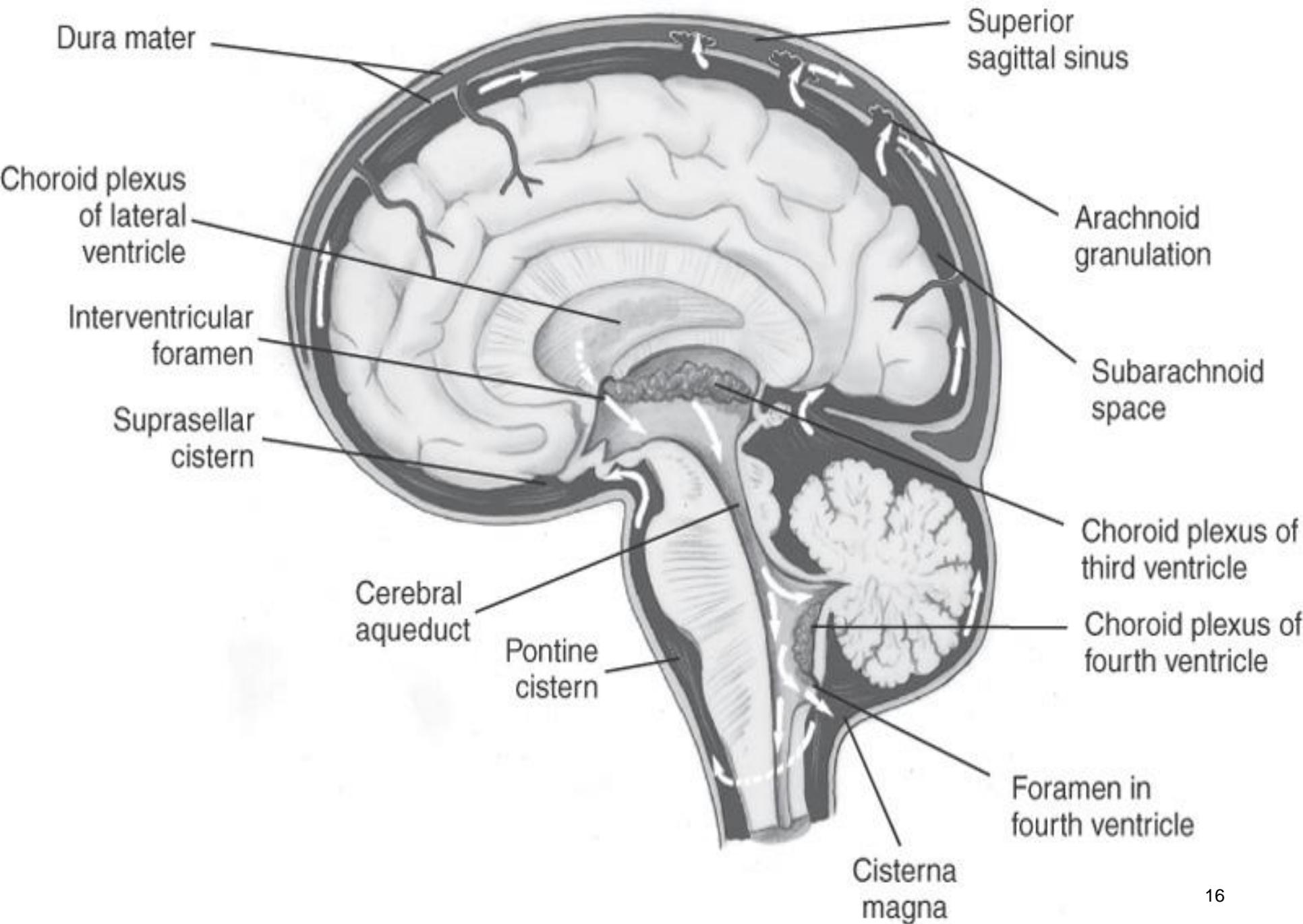
- **Consist of central portion**
 - **Body**
- **And three extensions or horns**
 - **Frontal (anterior)**
 - **Occipital (posterior)**
 - **Temporal (inferior)**
- **Open downward into the third ventricle through the paired interventricular foramen (foramen of Monro)**



Sagittal view

Choroid Plexus

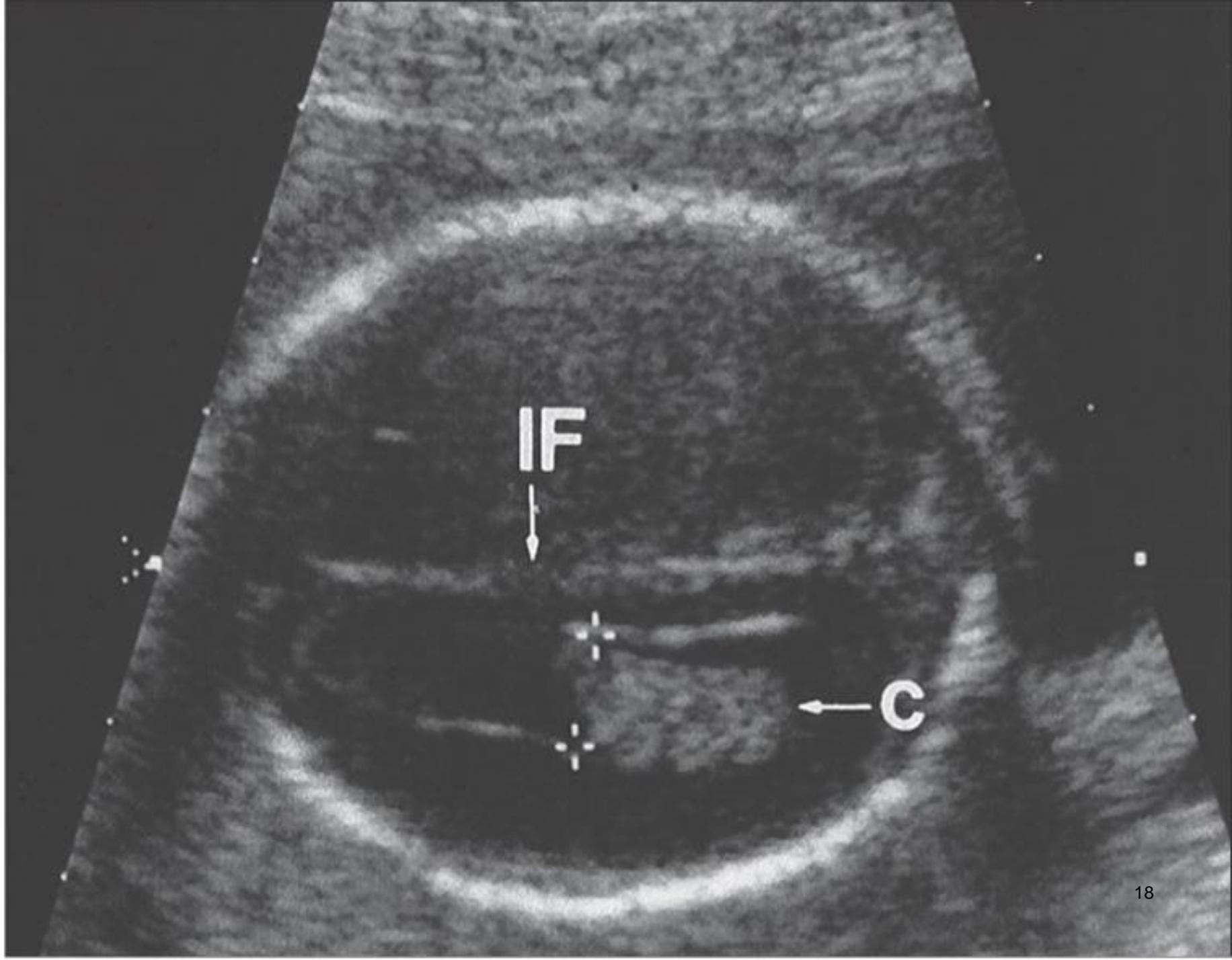
- **Network of blood vessels produces CSF**
- **Mass of special cells that regulate intraventricular pressure**
- **Located within the ventricles**
 - **Lines the floor of the lateral ventricles**
 - **Lines the roof of the third ventricle**
 - **Lines inferior medullary velum of the fourth ventricle**





lvb – lateral ventricular border
mvb – medial ventricular border

B



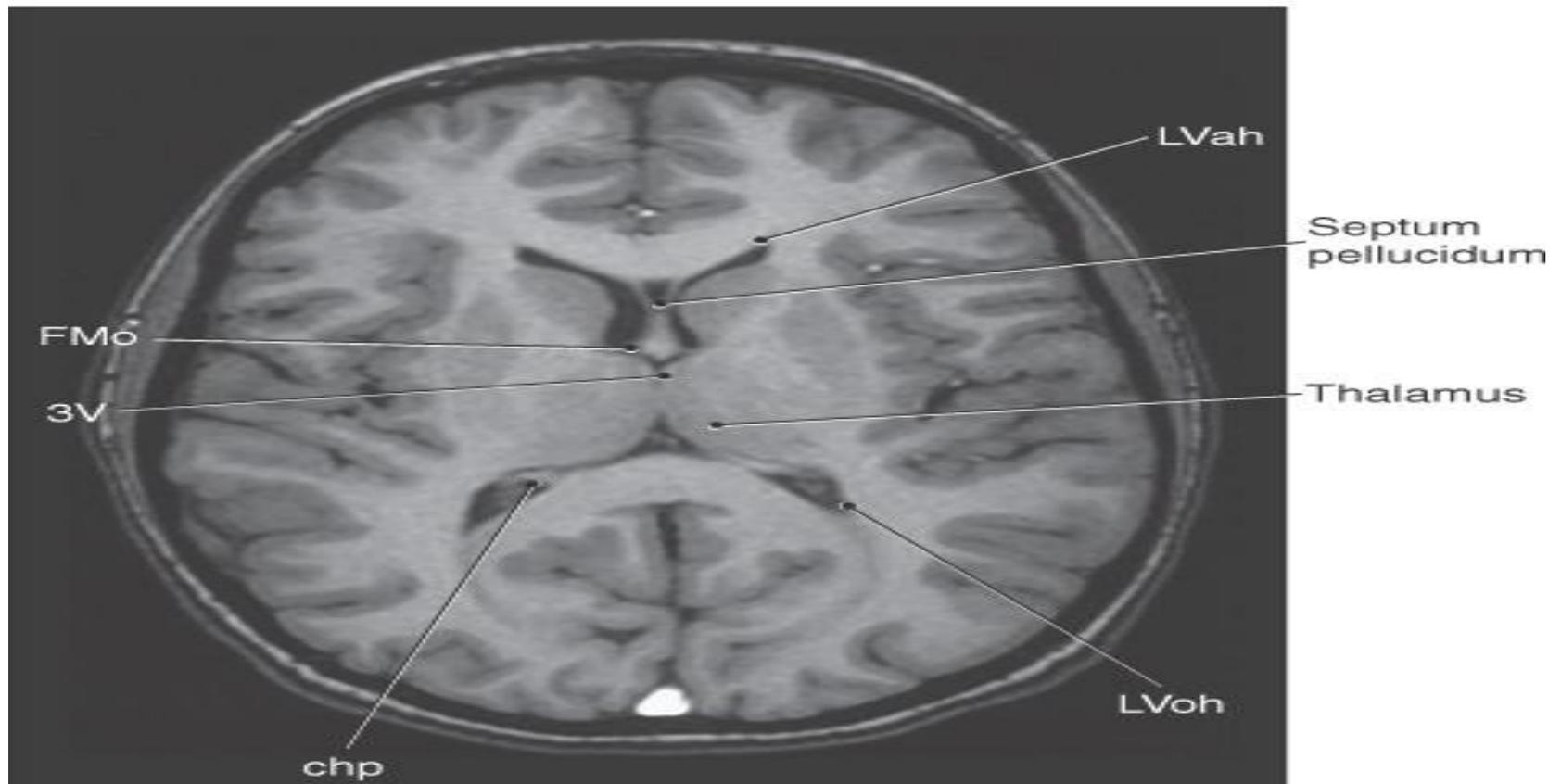


Third Ventricle

- **Thin slit-like structure**
- **Located midline**
 - **Just inferior to lateral ventricles**
- **Communicates with fourth ventricle**
 - **Via the cerebral aqueduct**
 - **(aqueduct of Sylvius)**



Axial View or Transverse View



KEY: FMo, Foramen of Monroe; 3V, third ventricle; LVah, lateral ventricle, anterior horn; LVoh, lateral ventricle, occipital horn; chp, choroid plexus.

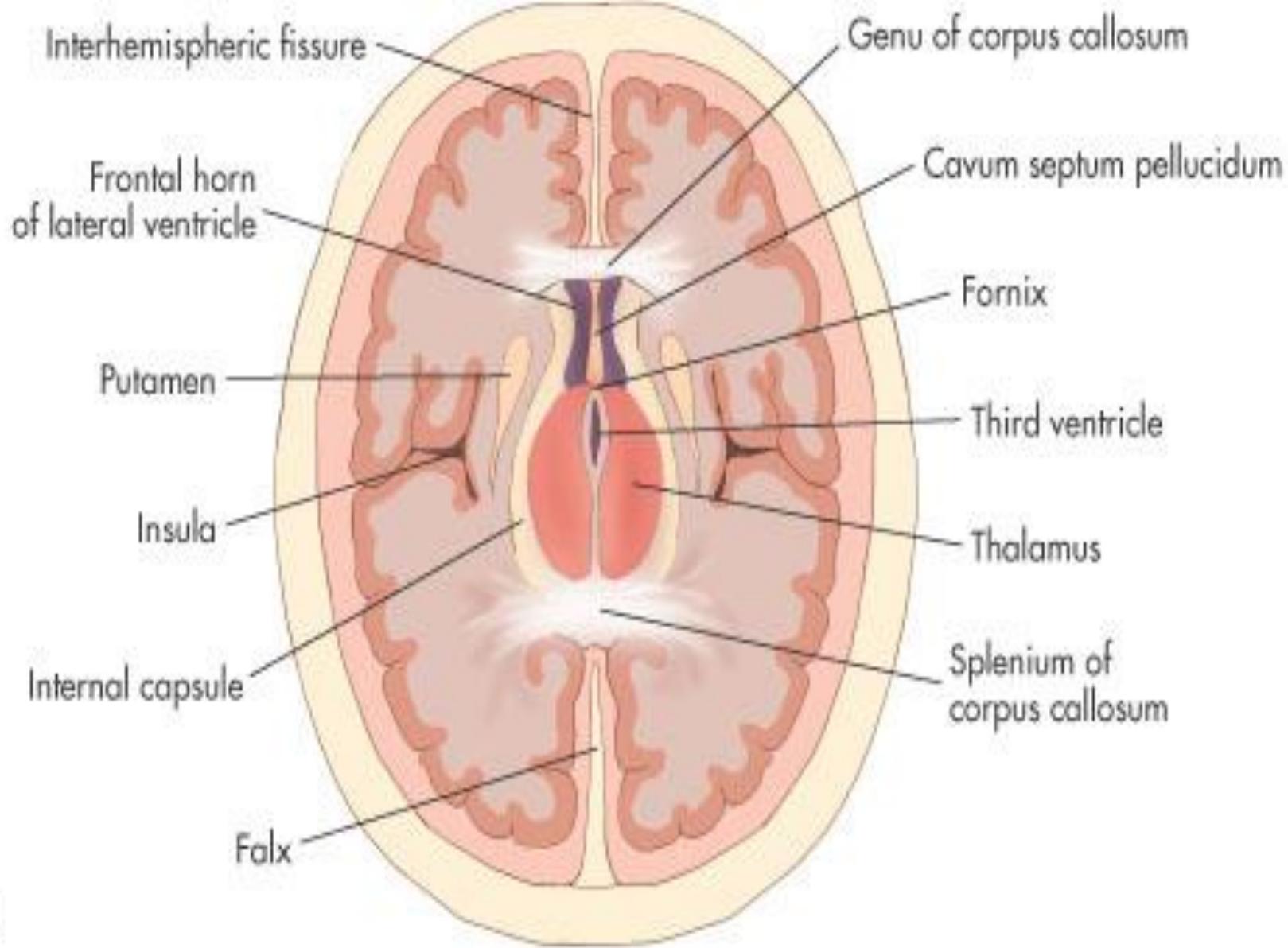
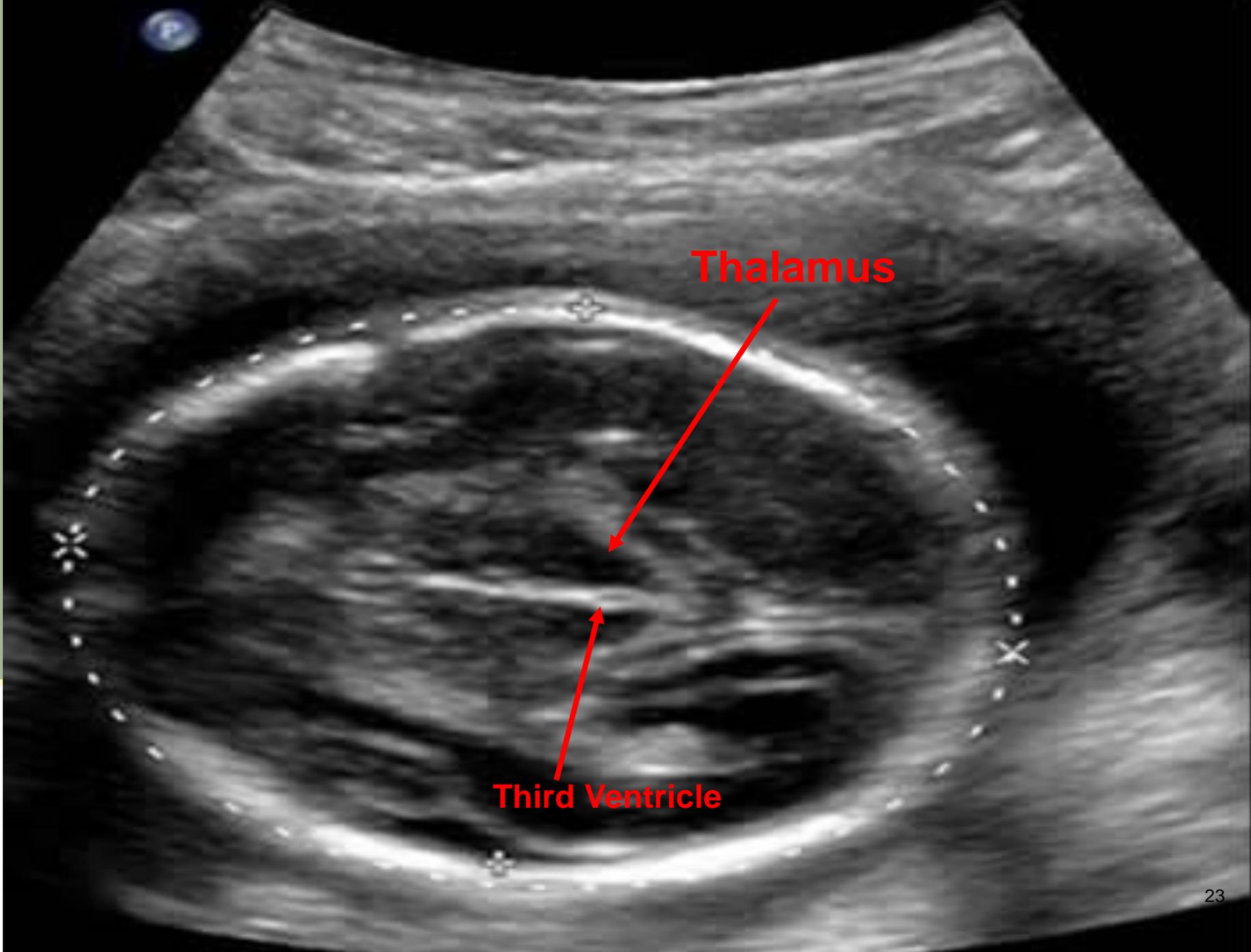


Figure 45-8A A, Transverse view of the fetal intracranial anatomy taken at the midsection of the fetal head.
B, Transverse view inferior to **(A)** taken at the level of the cerebellum and vermis.

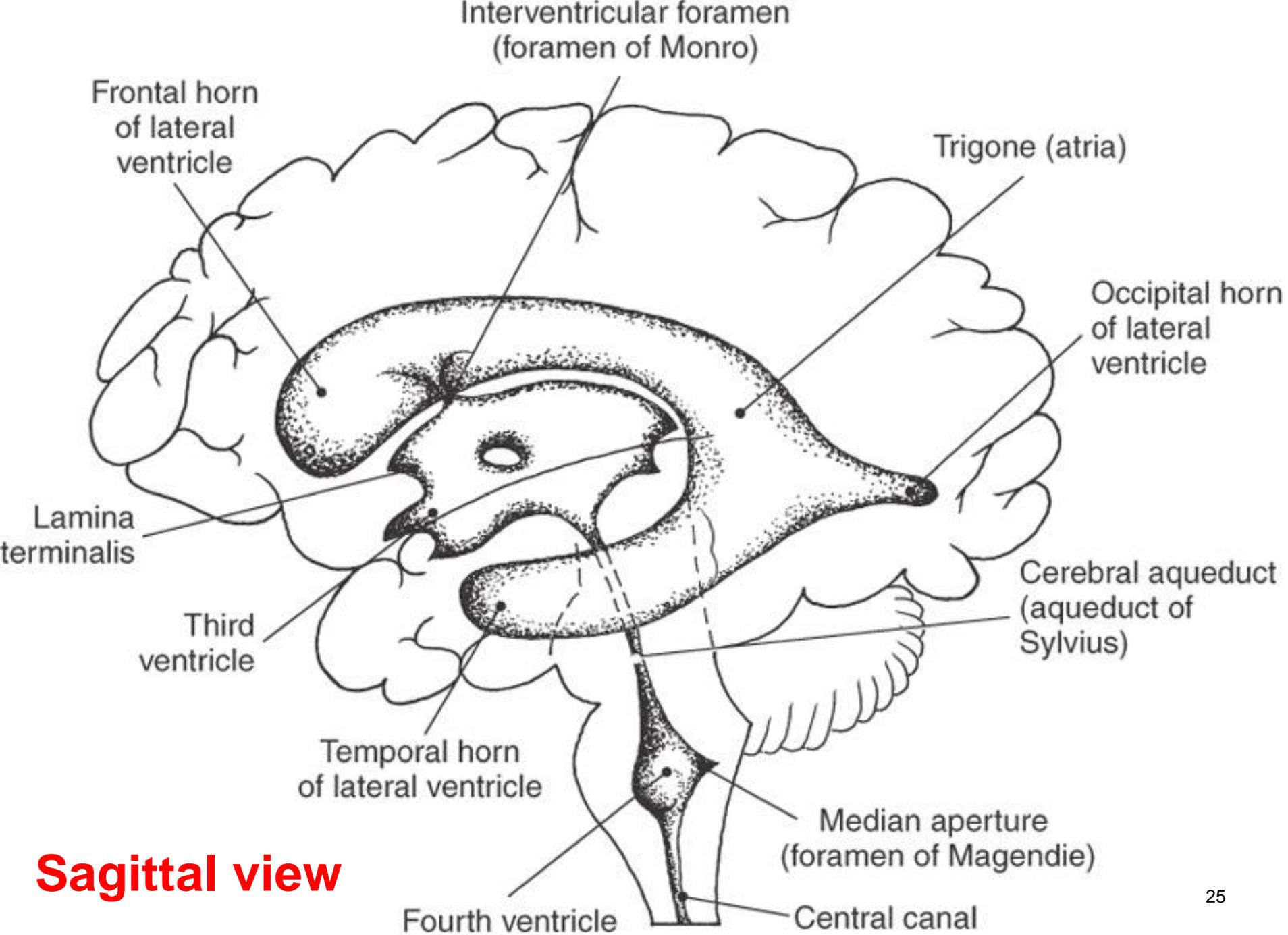


Thalamus

Third Ventricle

Fourth Ventricle

- **Diamond shaped cavity**
- **Located anterior to the cerebellum and posterior to the pons**
 - **Thin membrane separates fourth ventricle from cerebellum**



Sagittal view

Cerebrum

- **Divided into left and right cerebral hemispheres by the longitudinal (interhemispheric) fissure**
 - **Falx cerebri located in this fissure**
- **Falx cerebri is a double fold of dura-mater**

Cerebrum

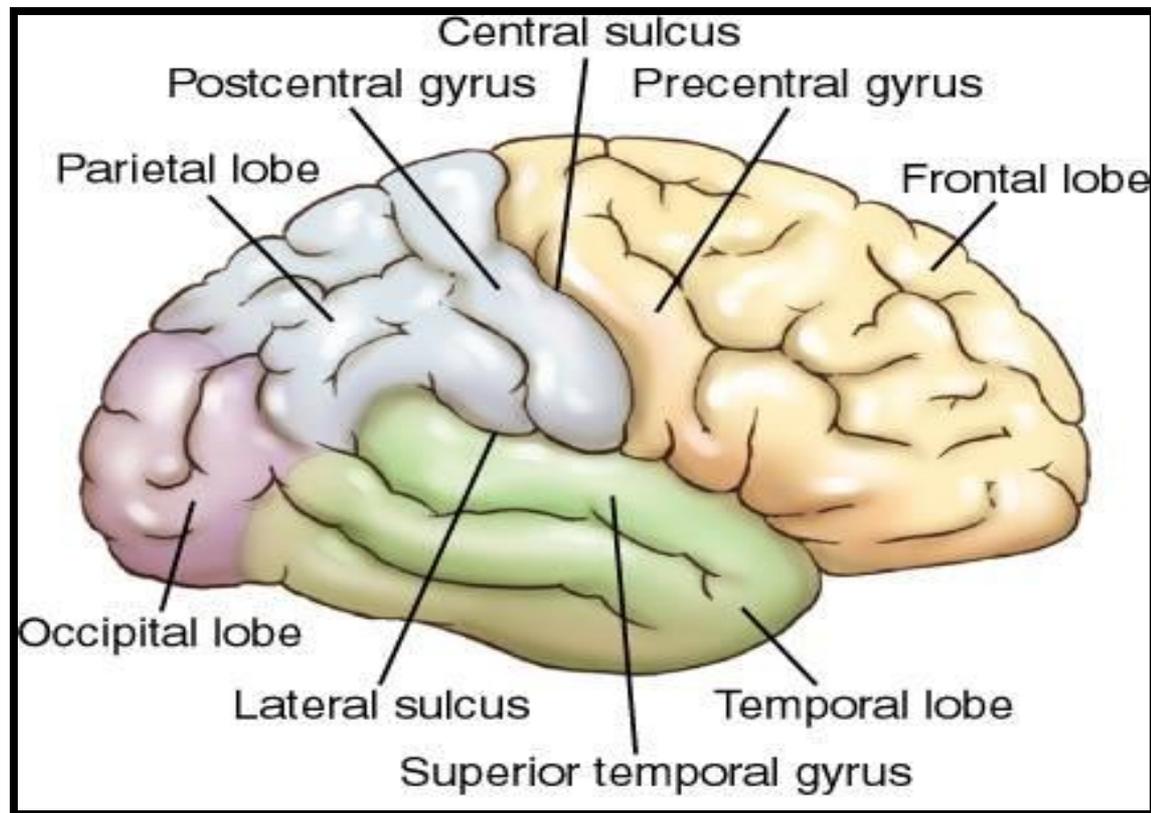
- **Each hemisphere contains neural tissue arranged in numerous folds called gyri**
- **Gyri are separated by shallow grooves called sulci**
 - **Fissures – deeper grooves**

Cerebrum

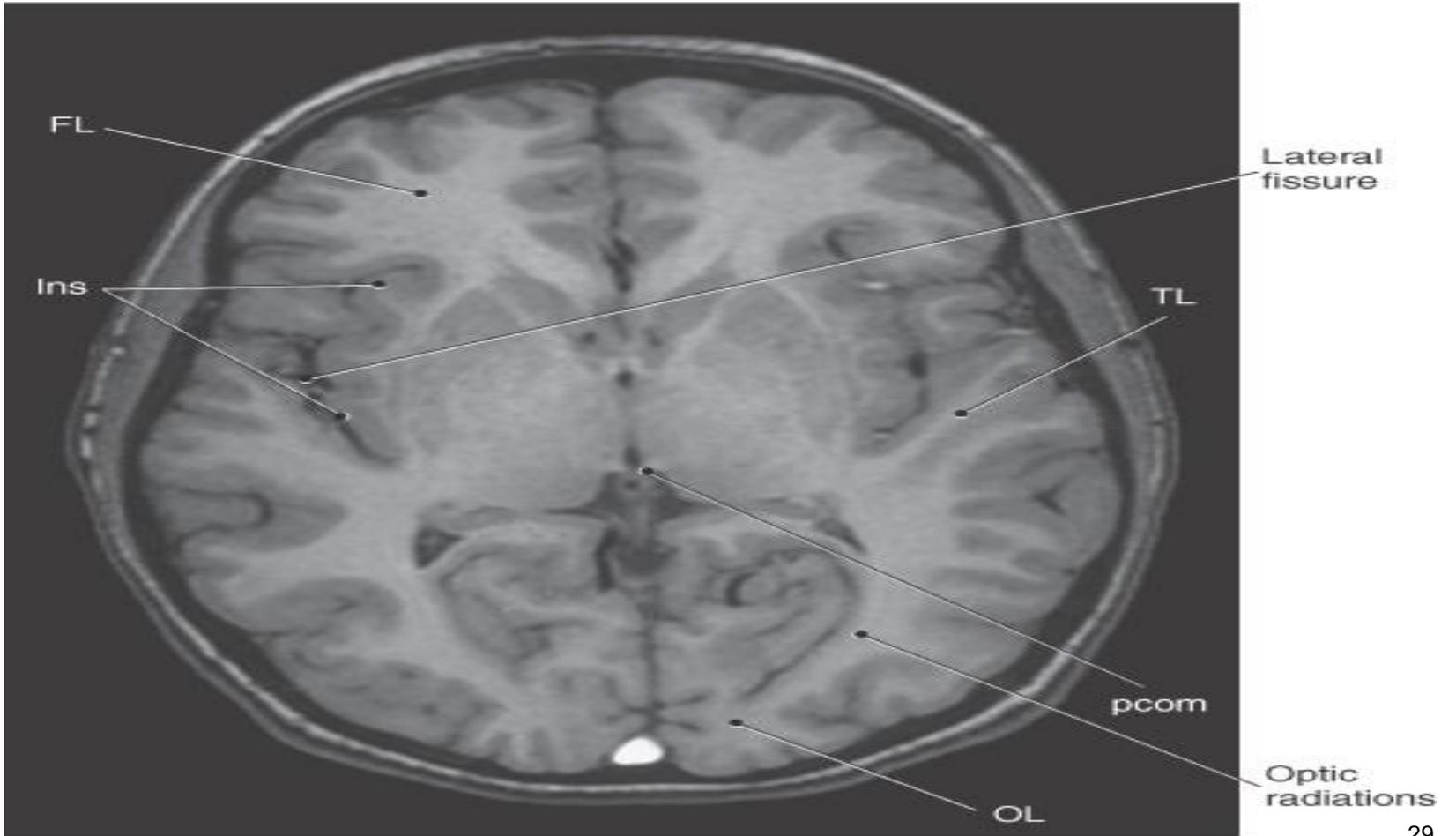
- Largest portion of brain

- Lobes

- Frontal
- Temporal
- Parietal
- Occipital

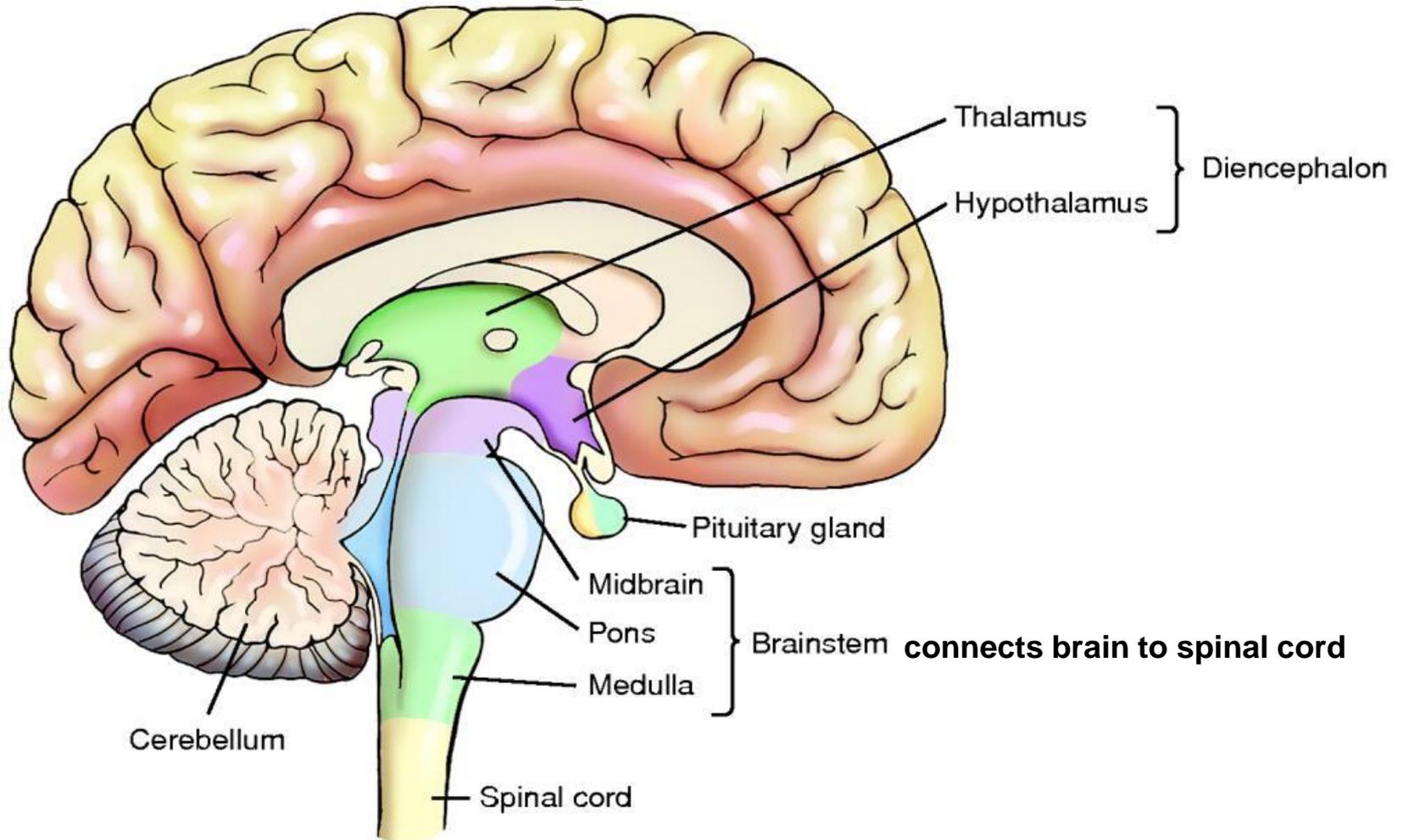


Cerebrum



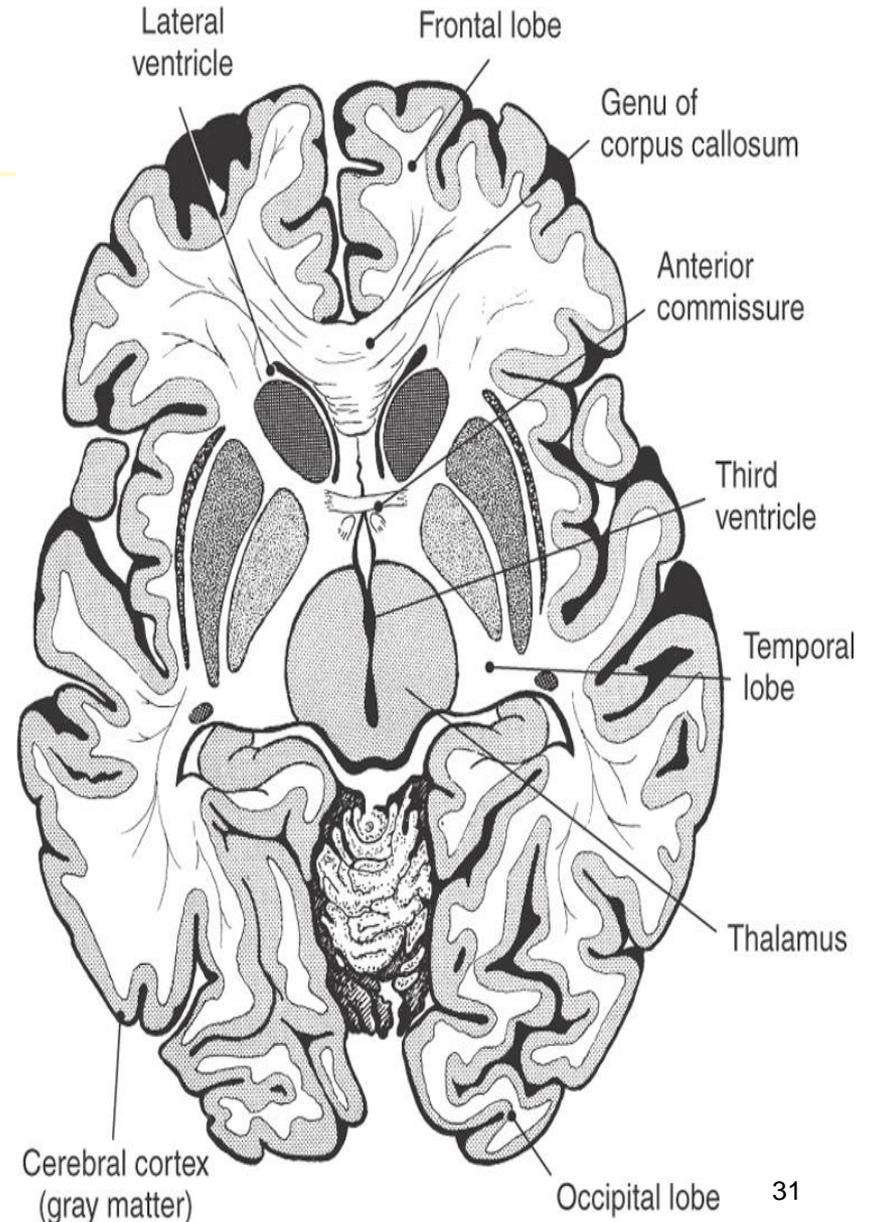
KEY: Ins, Insula; FL, frontal lobe; TL, temporal lobe; pcom, posterior commissure; OL, occipital lobe.

Diencephalon



Thalamus

- **Pair of large oval gray masses that are interconnected with most regions of the brain and spinal cord**
- **Situated on either side of the third ventricle superior to the brain stem**



Thalamus

- **Relay station to and from the cerebral cortex for all sensory stimuli**
 - **Except olfactory nerves**
- **Makes up a portion of the walls of the third ventricle**

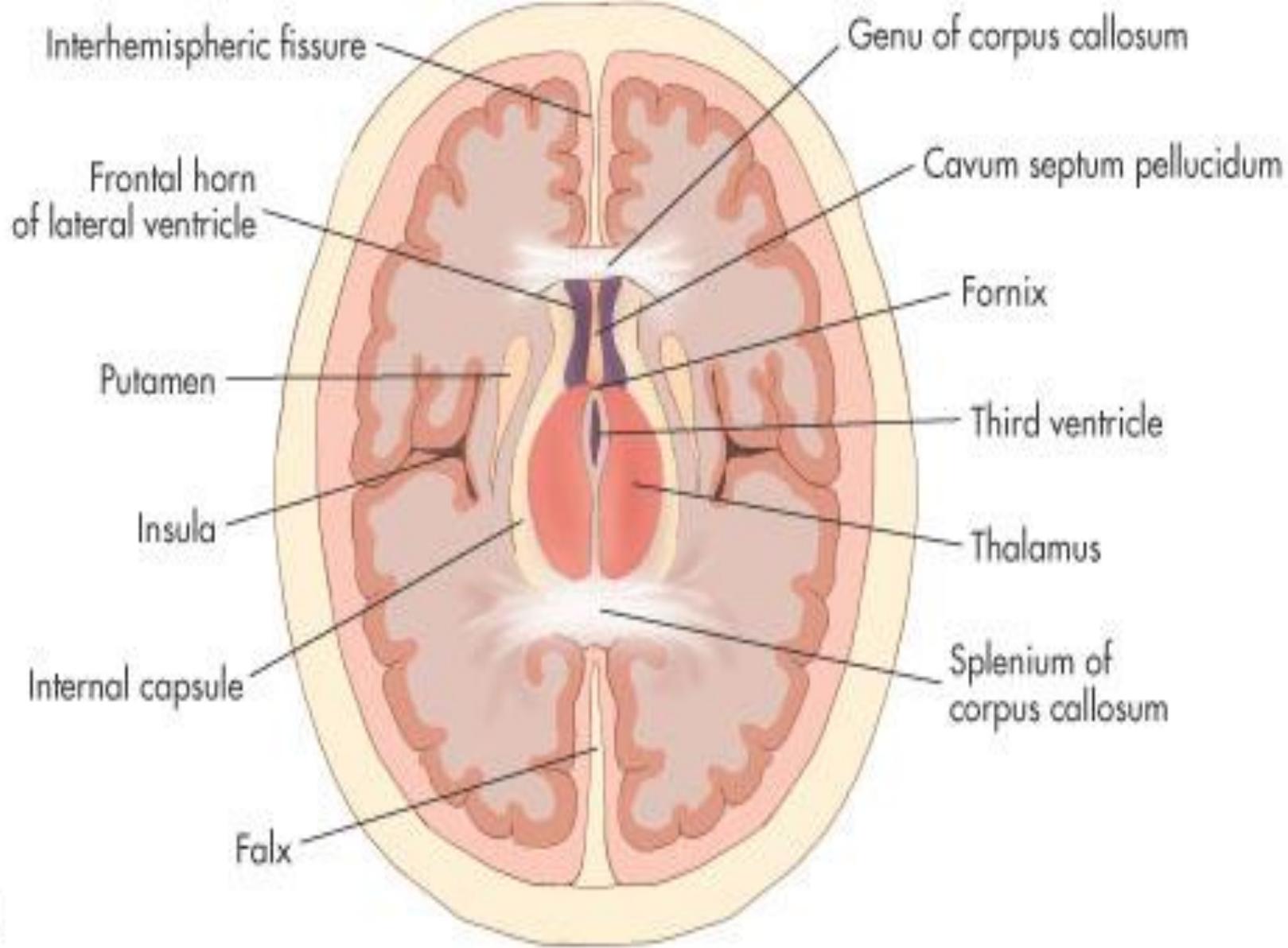


Figure 45-8A A, Transverse view of the fetal intracranial anatomy taken at the midsection of the fetal head.
B, Transverse view inferior to **(A)** taken at the level of the cerebellum and vermis.

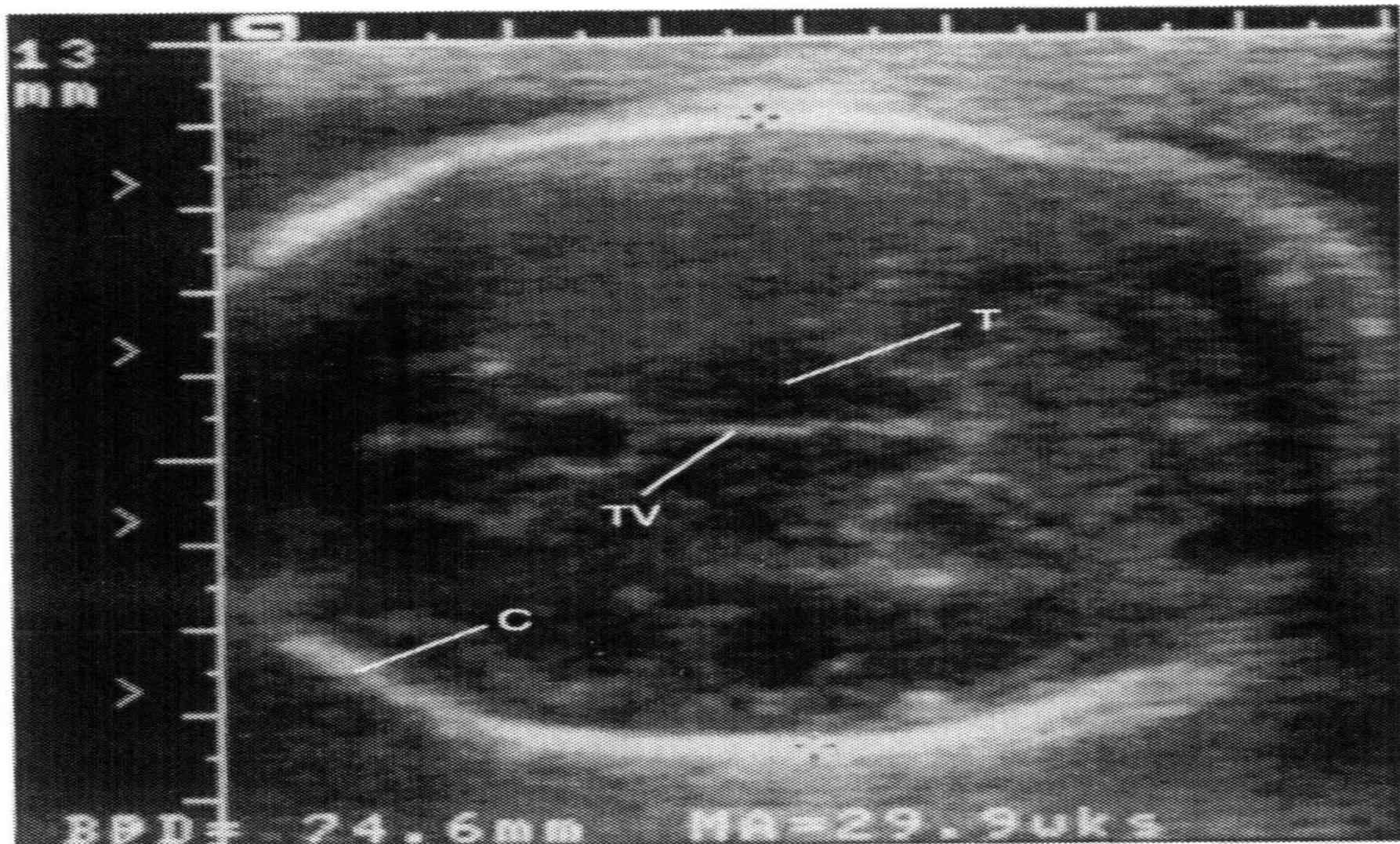
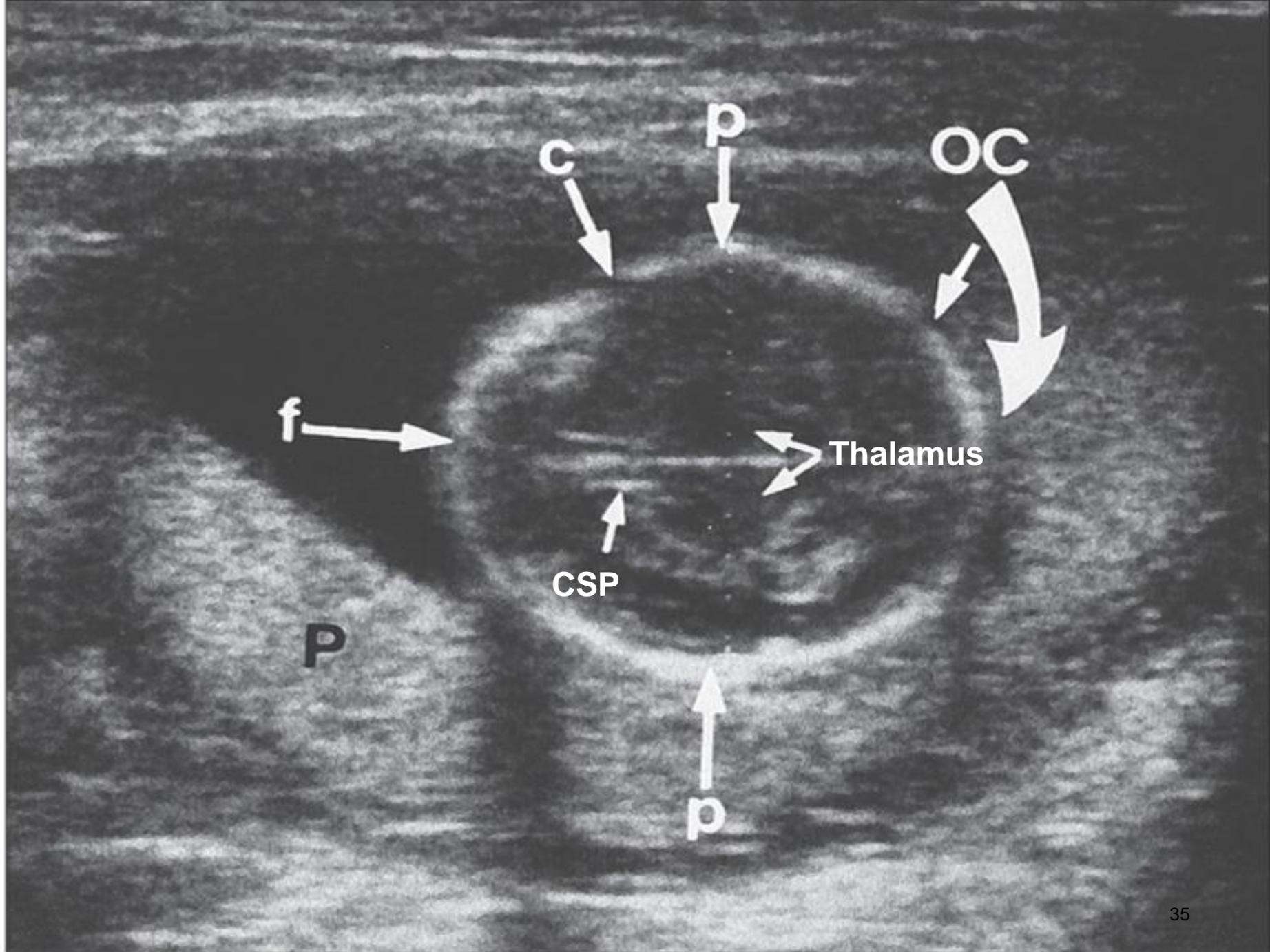


FIGURE 6-7. An accurate biparietal diameter can be obtained through any plane of section that intersects the third ventricle (TV) and thalami (T). The margins of the calvaria (C) must be symmetric. The first criterion ensures that the plane of section is taken at the proper craniocaudal plane. The second criterion ensures that the transducer is oriented perpendicular to the central axis of the head. Note the measurement is 74.6 mm.



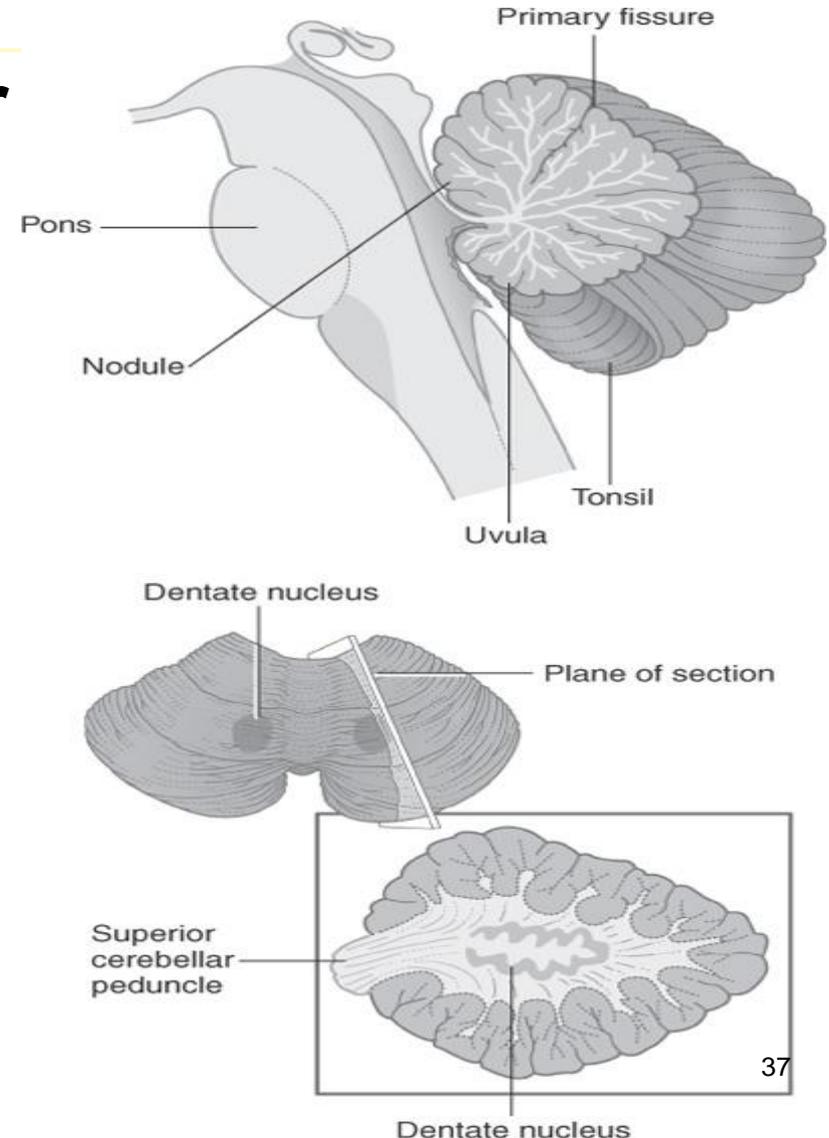
B

Hypothalamus

- **Located below the thalamus**
- **Forms the floor of the third ventricle**
- **It controls activities such as regulation of:**
 - **Temperature**
 - **Appetite**
 - **Sexual drive**
 - **Sleep patterns**

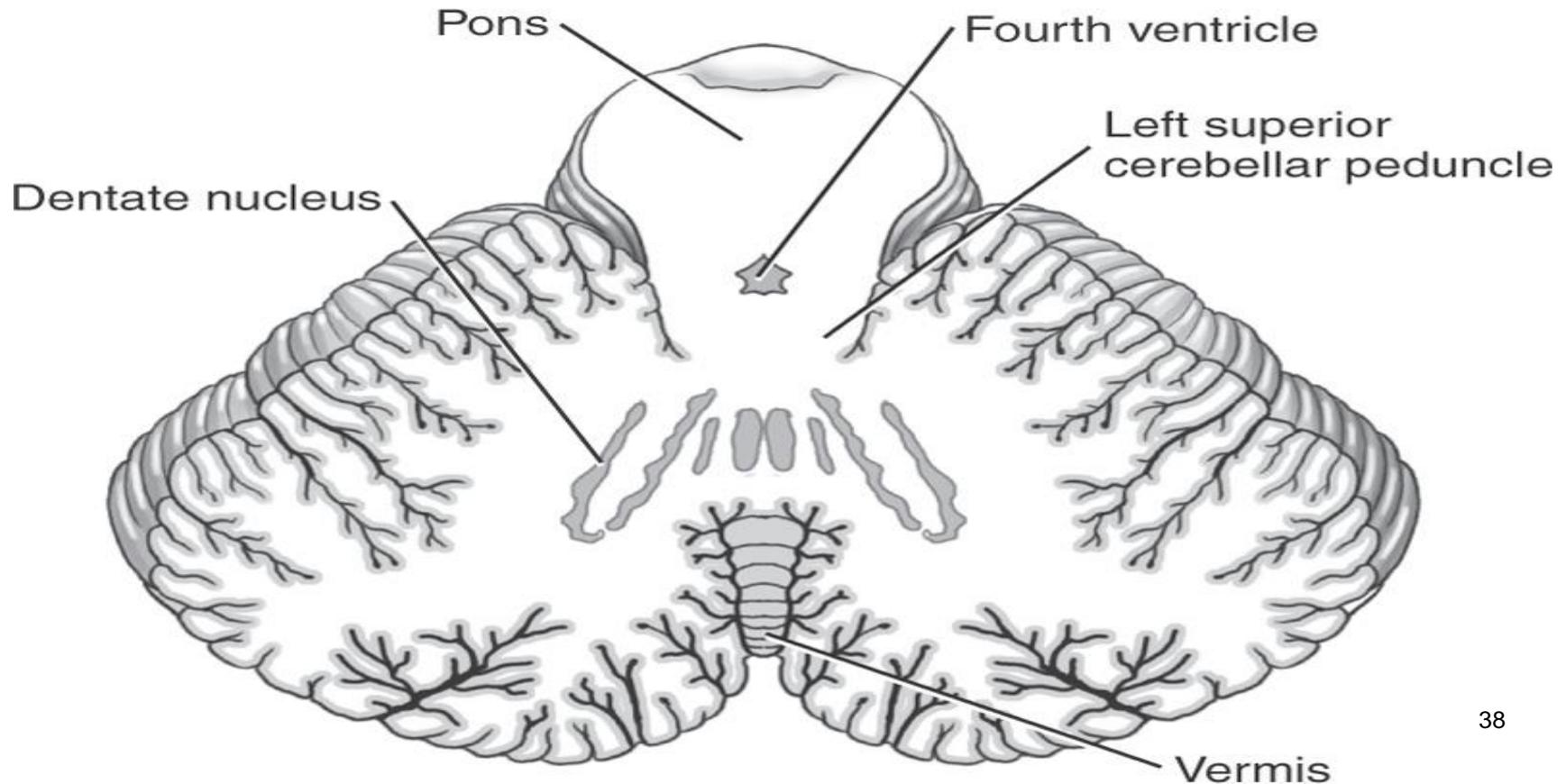
Cerebellum

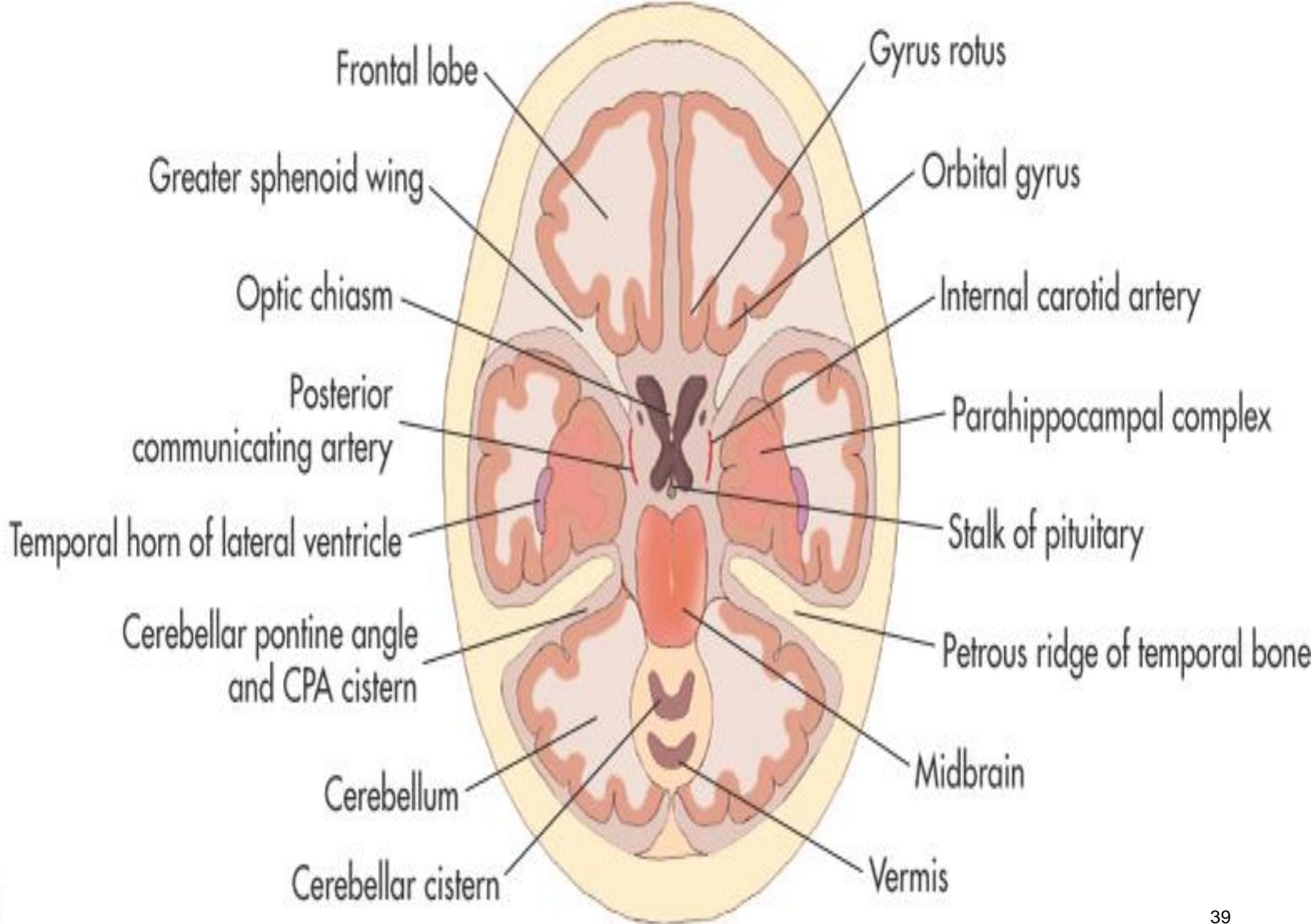
- **Coordination center for motor functions**
- **Referred to as the “little brain”**
- **Attaches posteriorly to the brainstem**
- **Occupies the posterior cranial fossa**



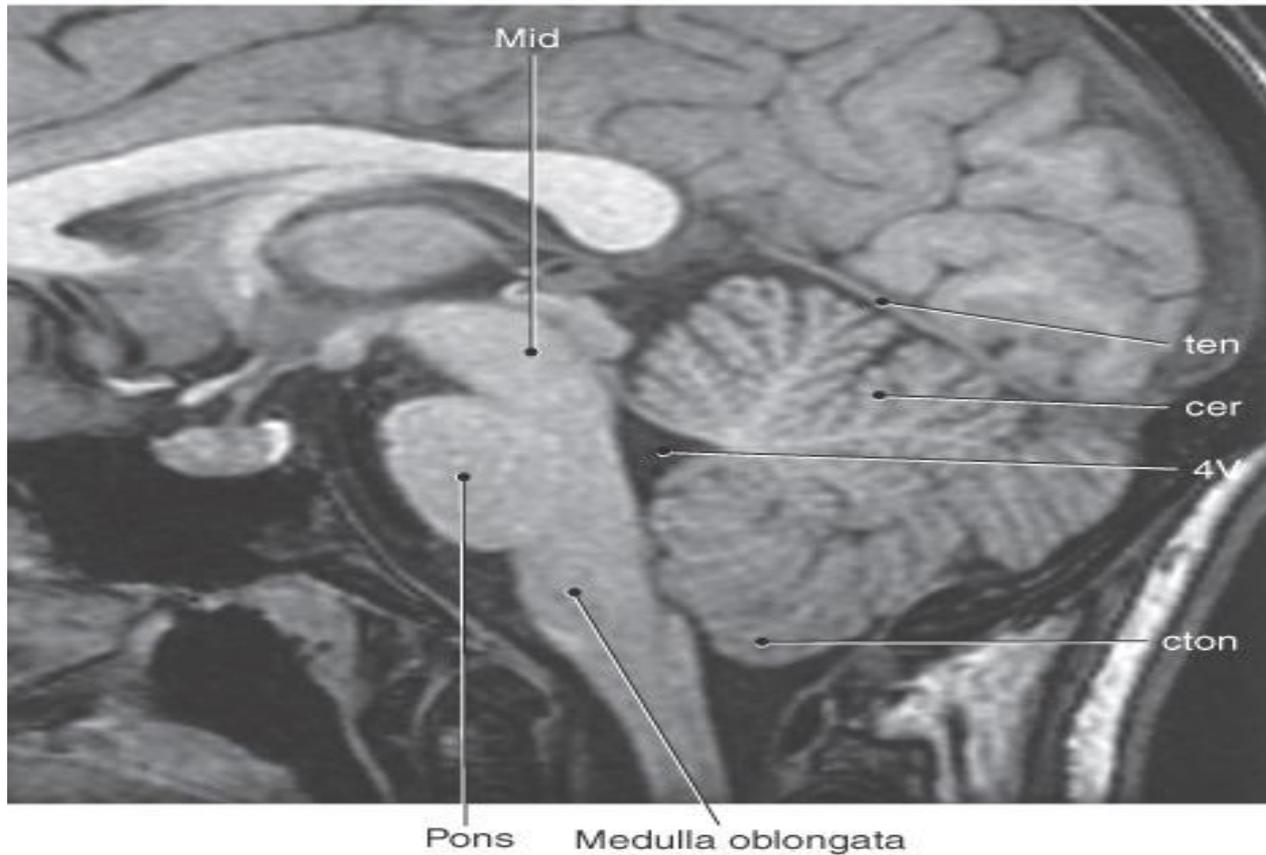
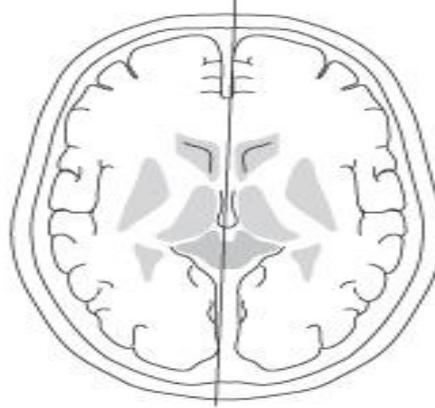
Cerebellum

- Consists of two cerebellar hemispheres connected at the midline by the vermis

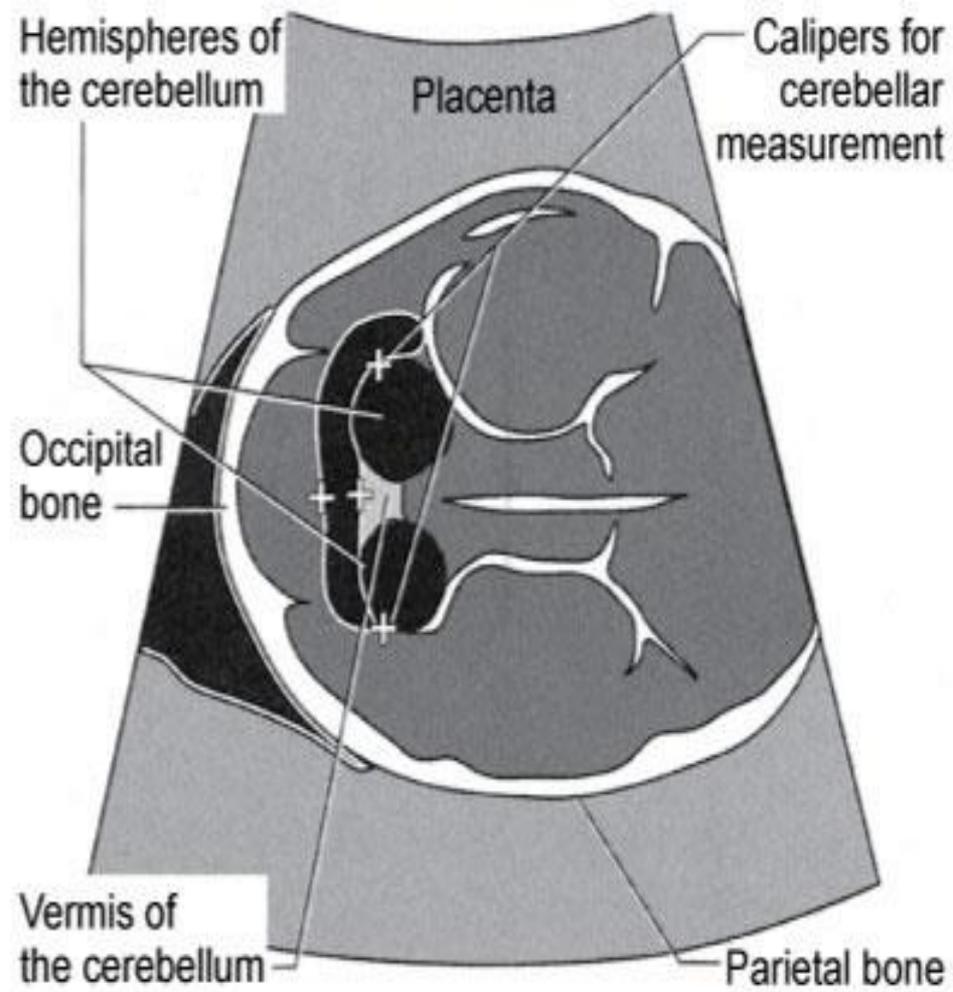




B

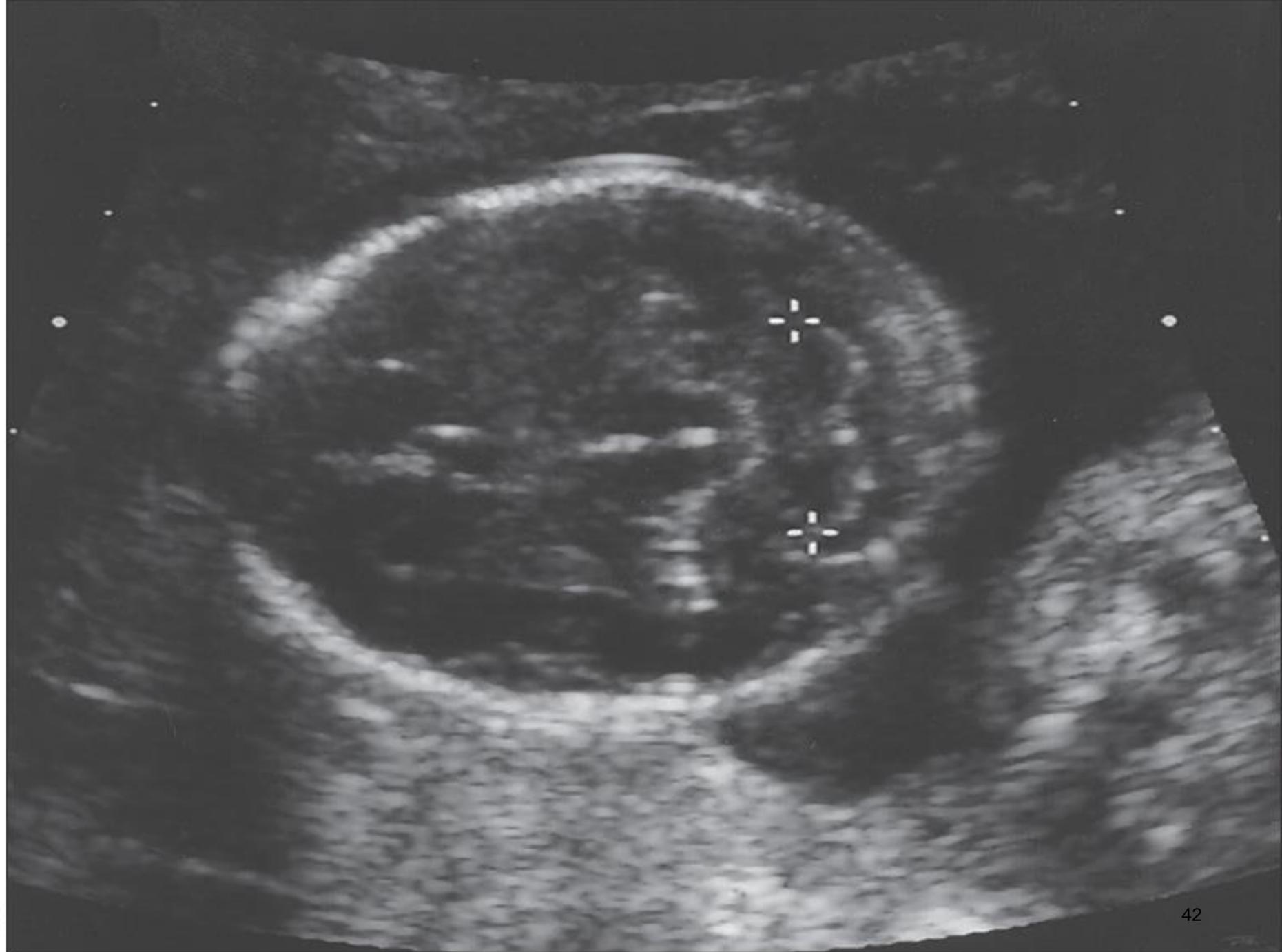


KEY: Mid, Midbrain; ten, tentorium cerebelli; cer, cerebellum; 4V, fourth ventricle; cton, cerebellar tonsils.



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C

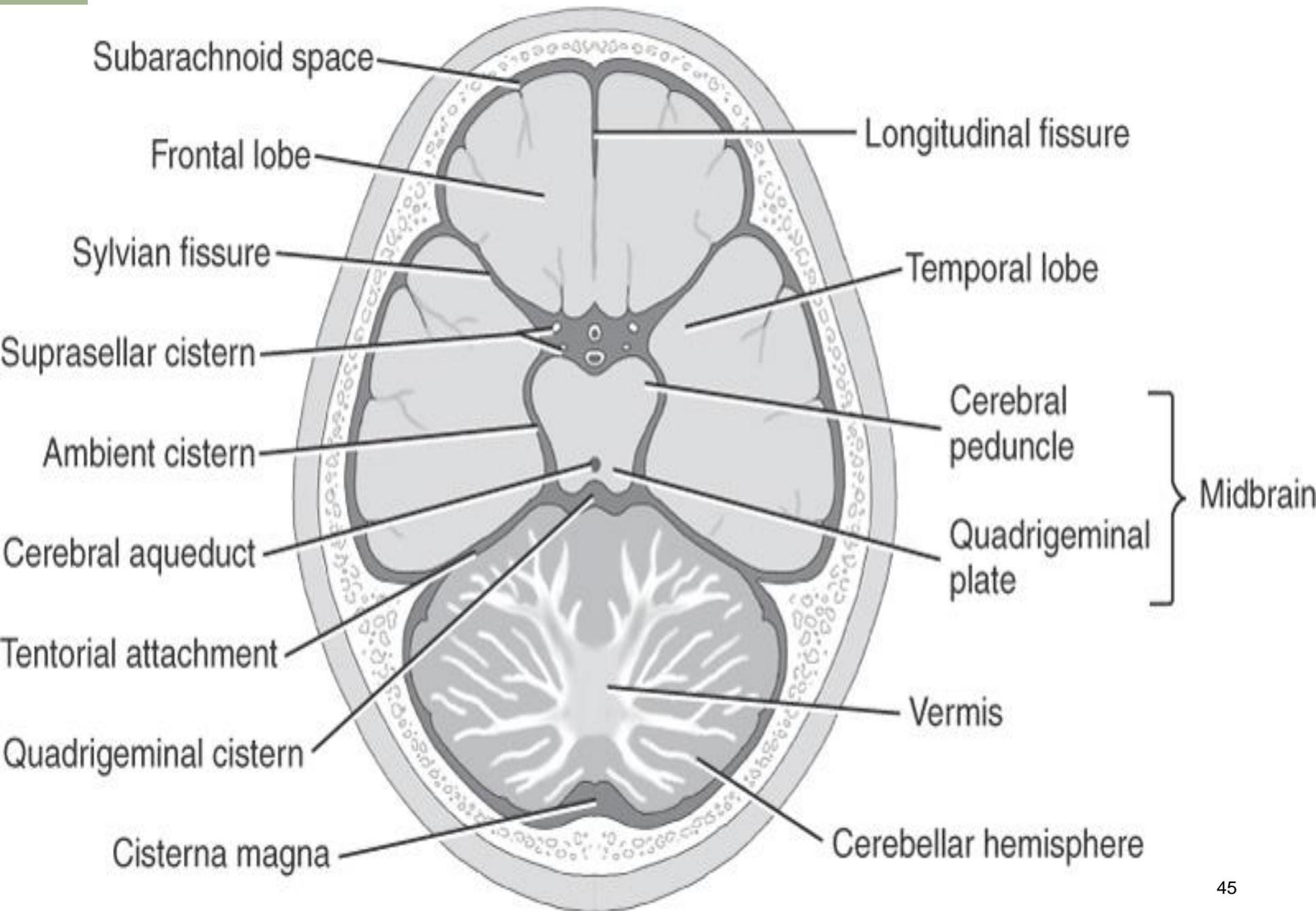


Cisterns

- **Are widened areas of the subarachnoid space**
 - **Divided into individually termed cisterns according to their location in relation to surrounding brain structures**
 - **Cisterna magna ***
 - **(One we will discuss)**

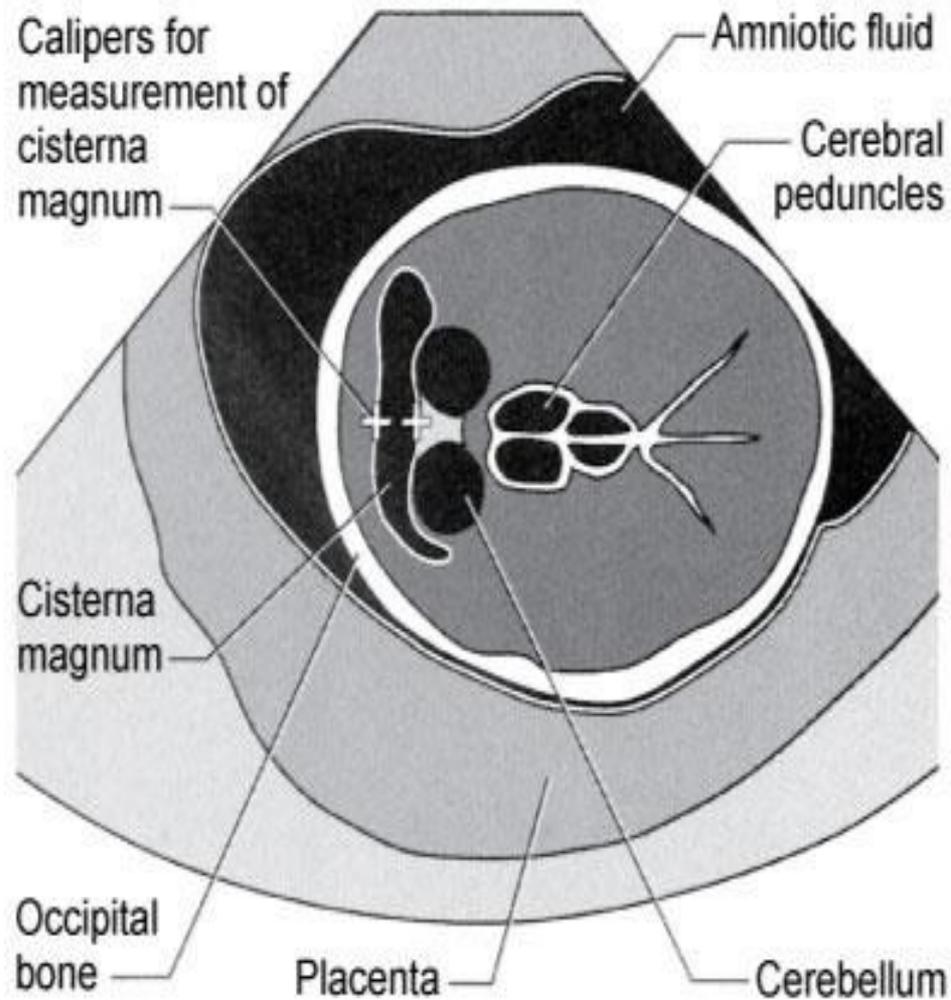
Cisterna Magna

- **Largest cistern**
- **Located in the lower posterior fossa between:**
 - **Medulla oblongata**
 - **Cerebellar hemispheres**
 - **Occipital bone**
- **Is continuous with the subarachnoid space of the spinal canal**

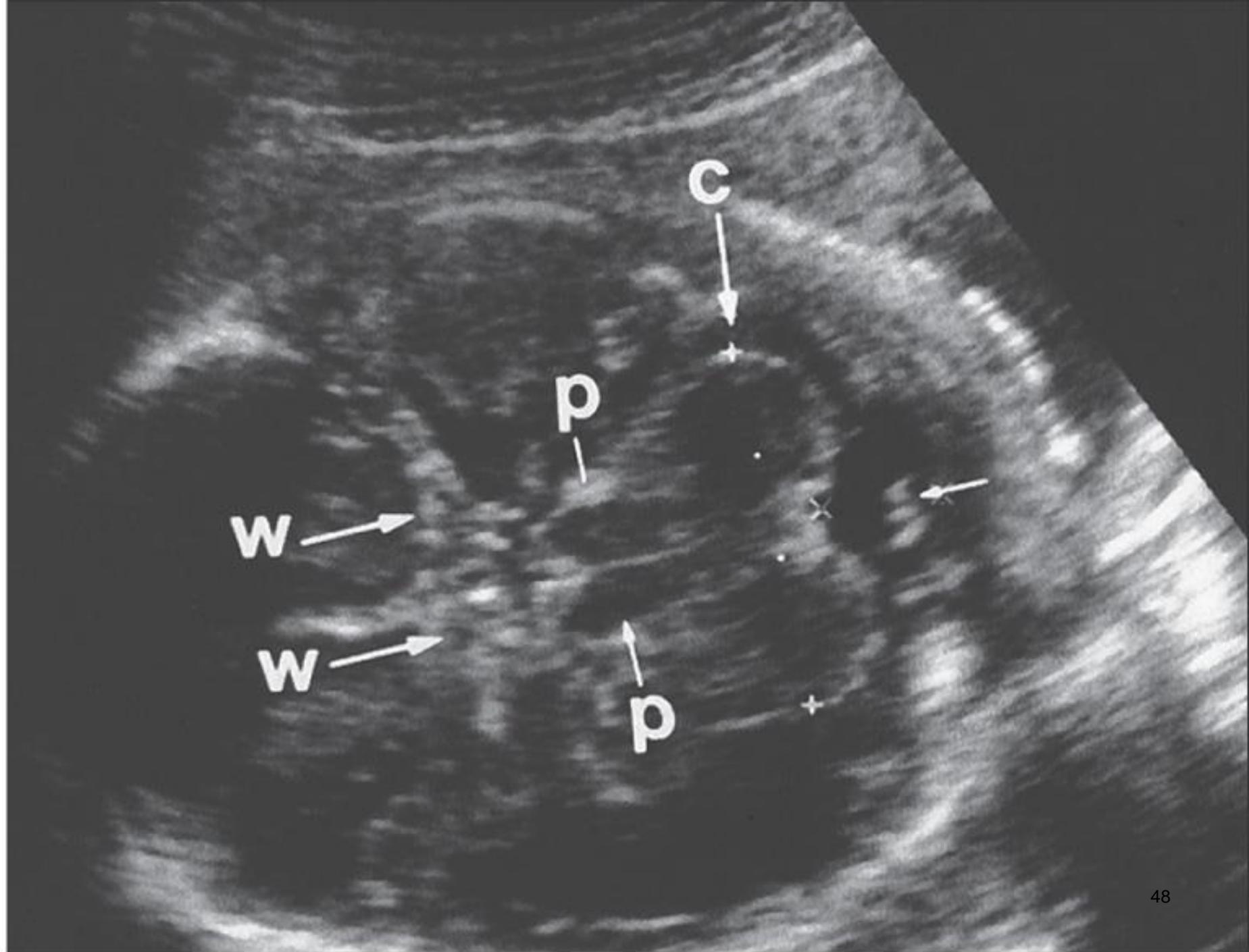




KEY: LV, Lateral ventricle; 3V, third ventricle; **aque**, cerebral aqueduct; **smed**, superior medullary velum; 4V, fourth ventricle.



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A

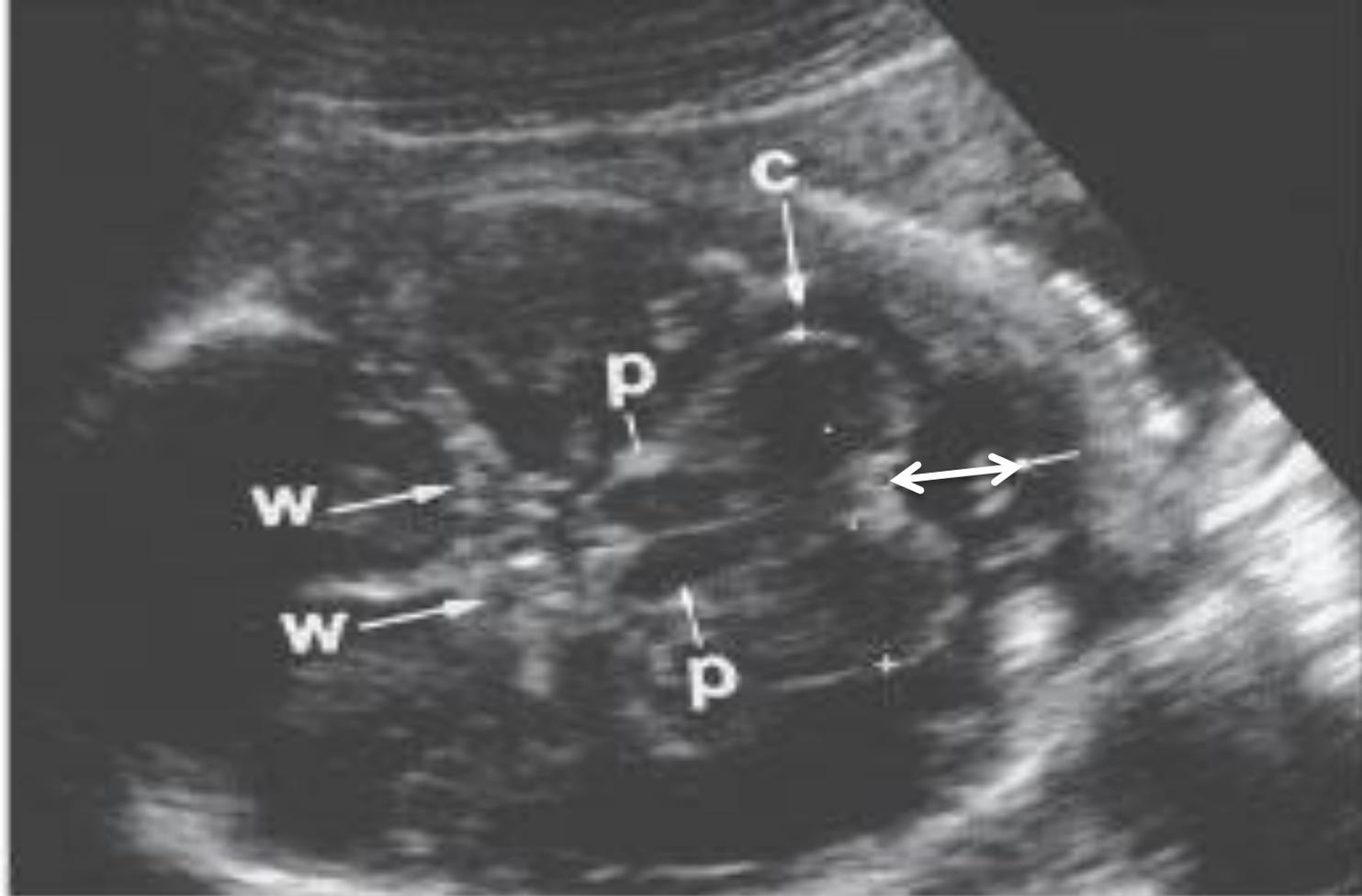
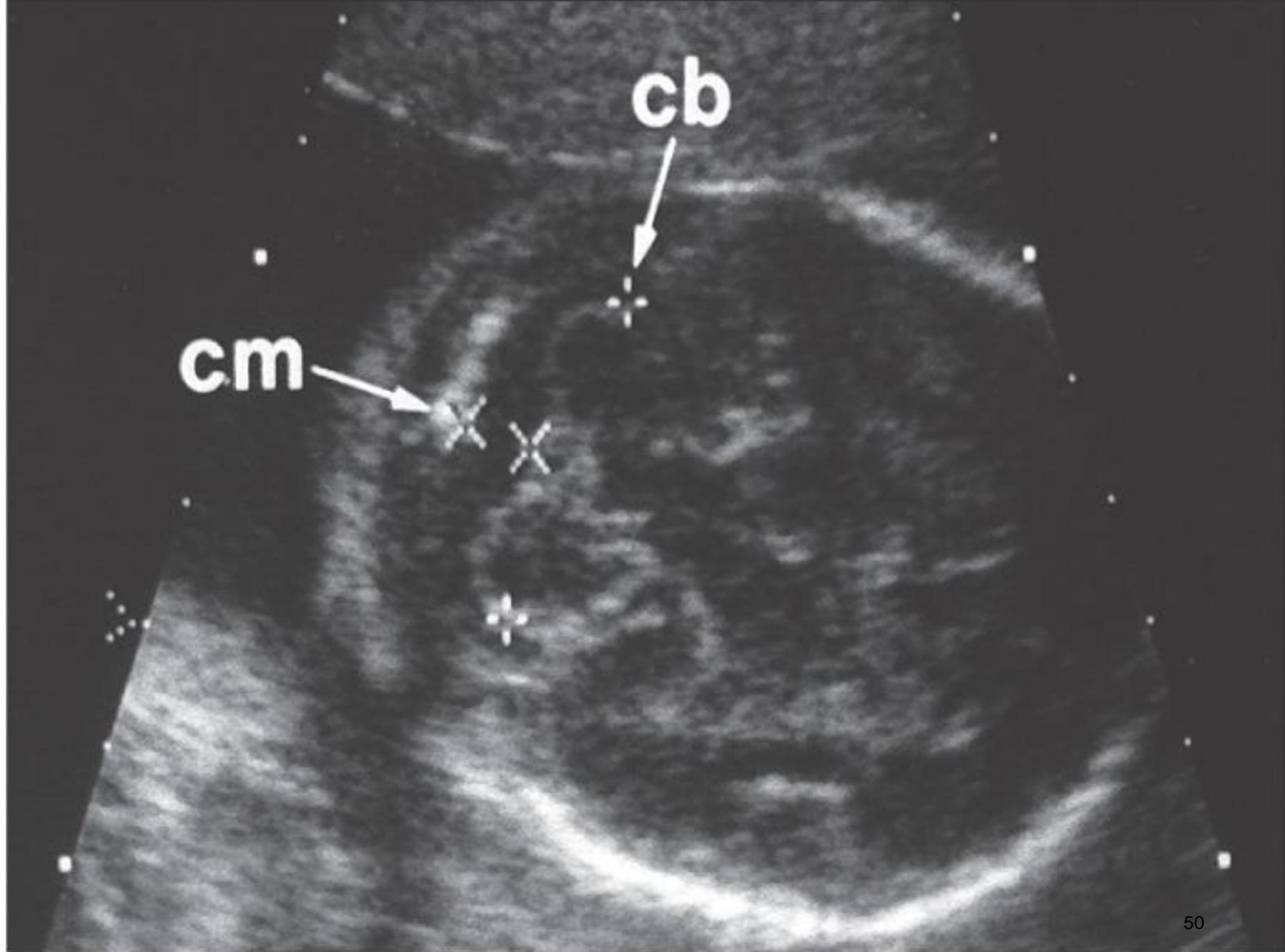
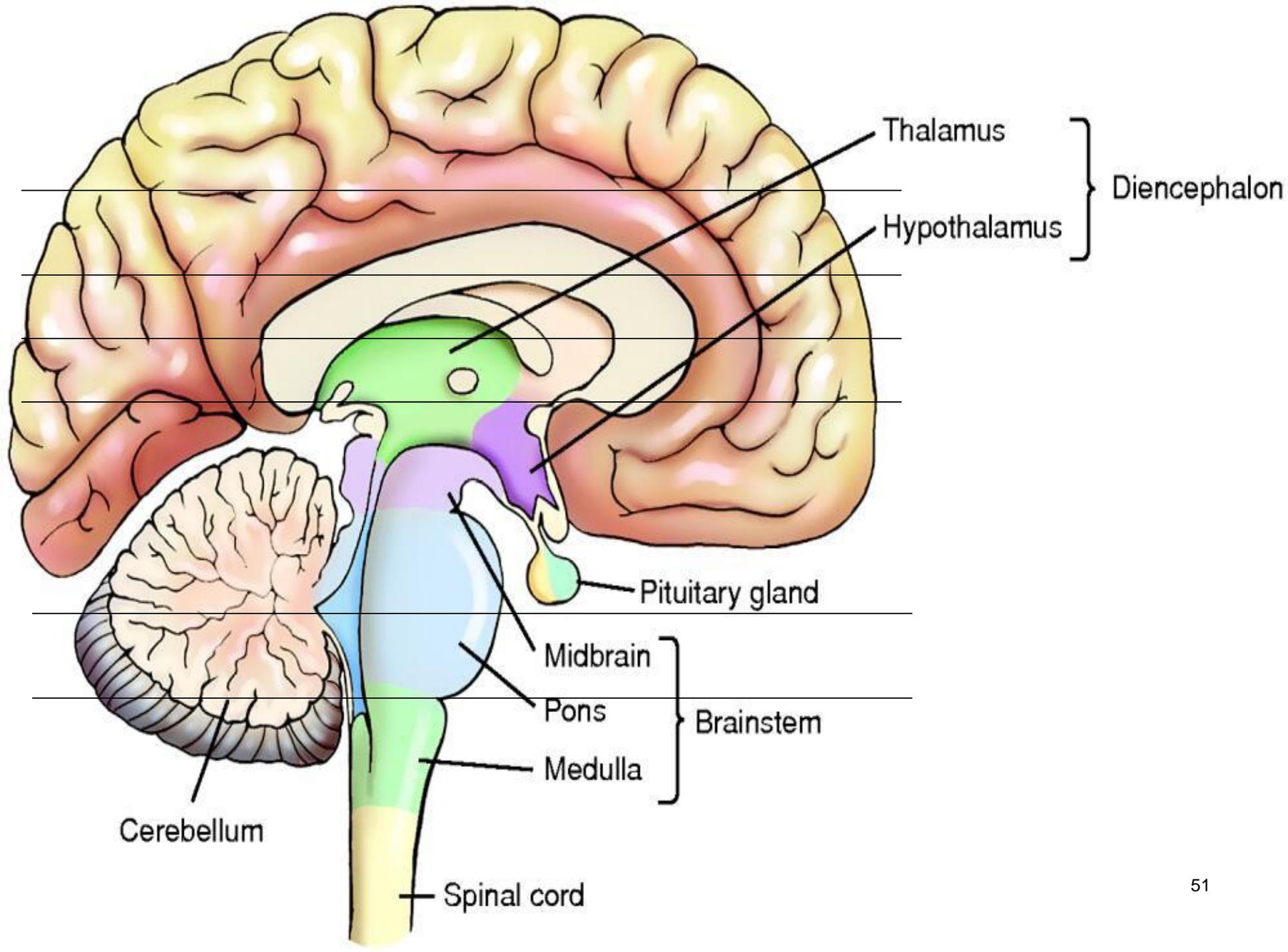
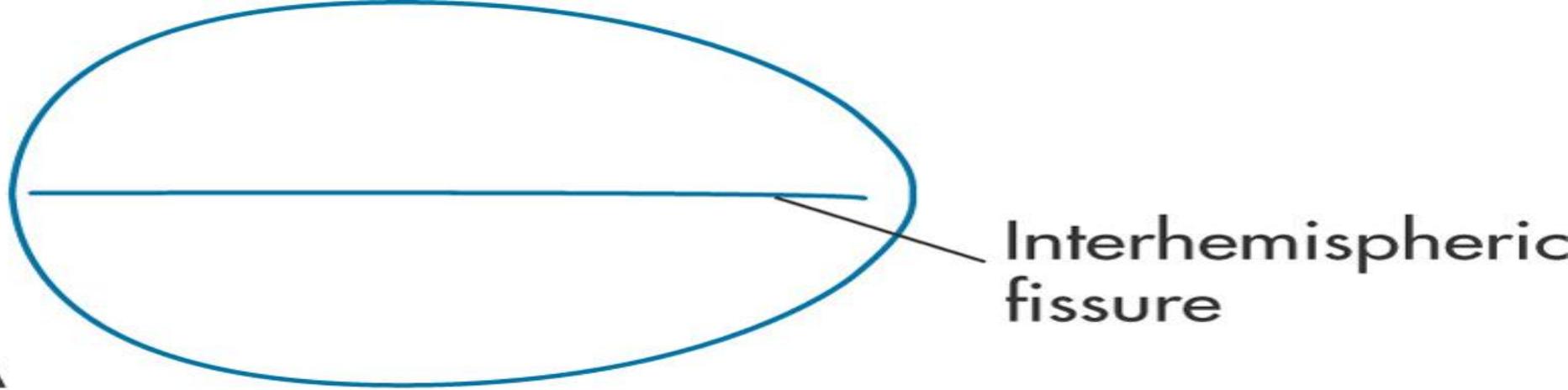


Figure 45-14A A, Anatomic depiction at the cerebellar level in a 25-week fetus showing the cerebral peduncles (*p*) positioned anteriorly to the cerebellum (*c*). The circle of Willis (*w*) is outlined. The dural folds that connect the bottom of the falx cerebelli are seen within the cisterna magna (*arrow*).

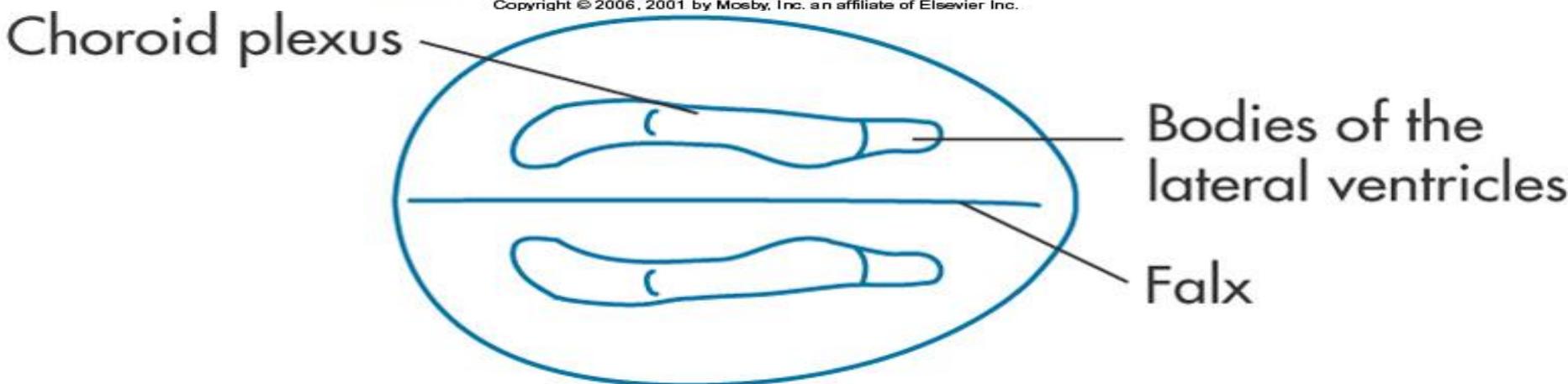
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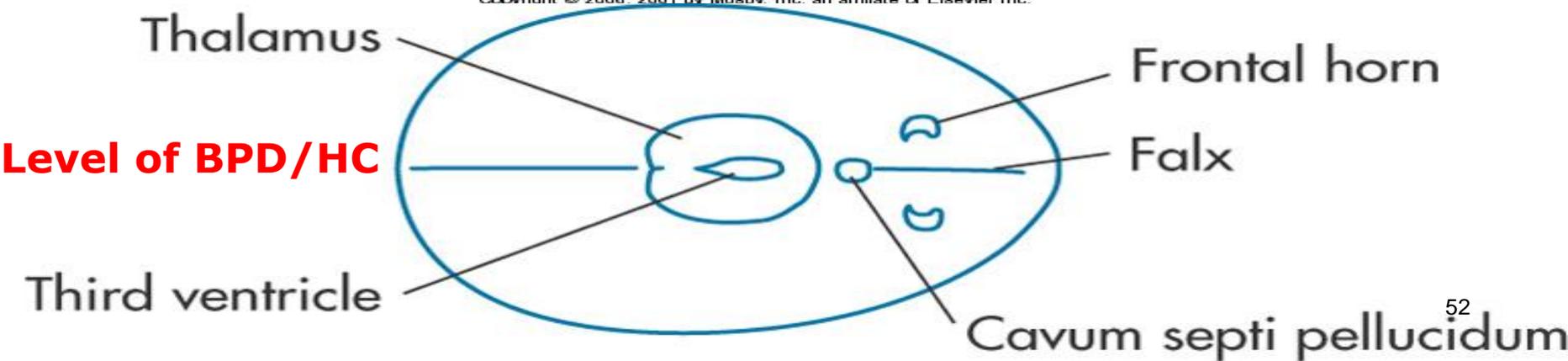




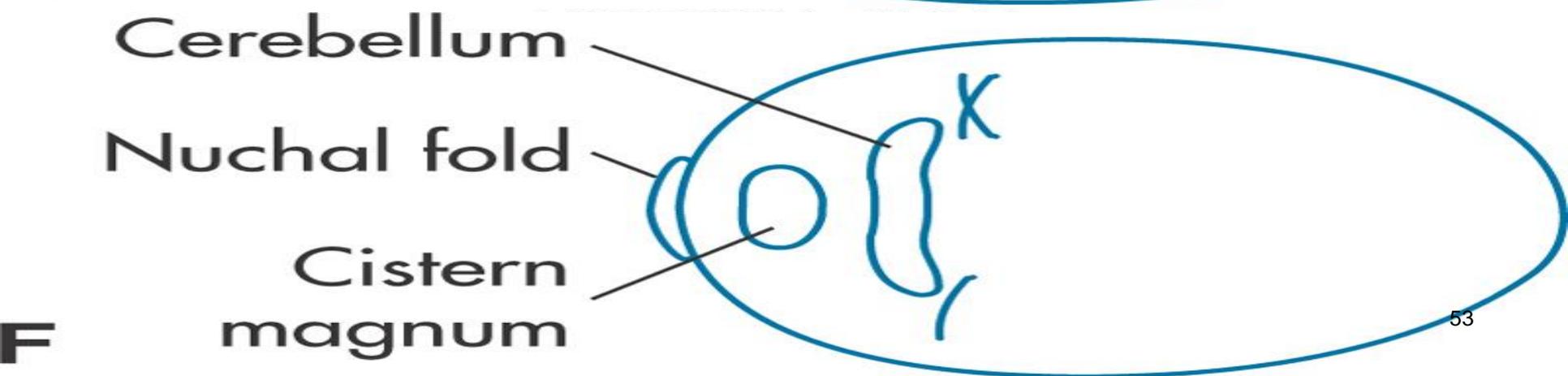
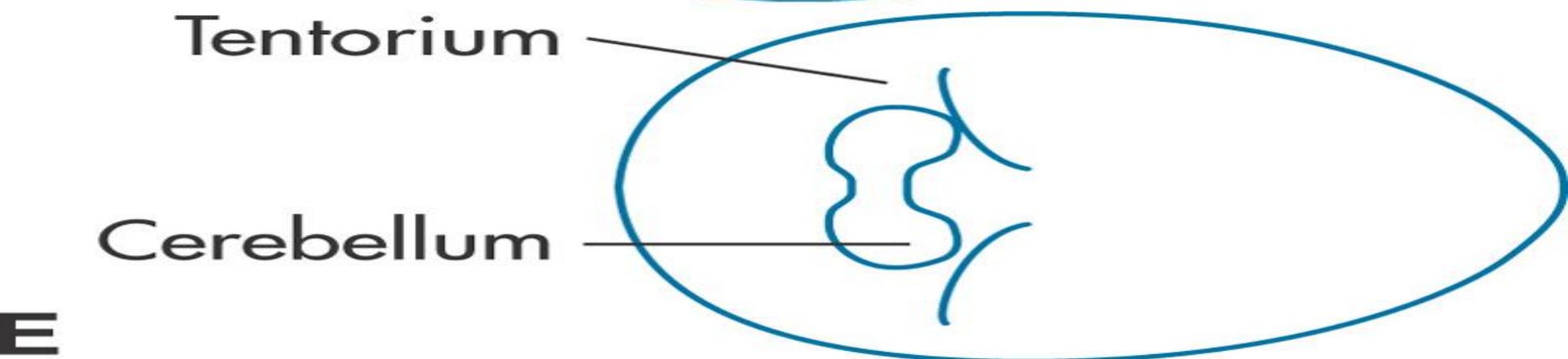
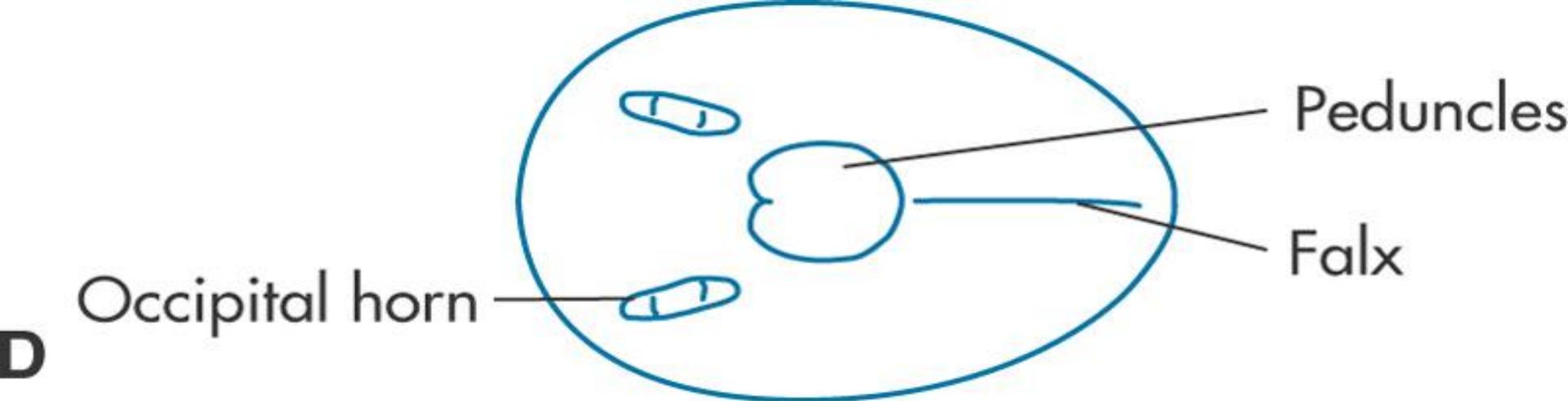
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Vascular Supply

- **Vascular supply to the brain is unique**
- **Walls of arteries in the brain are thin and weak**
 - **Leading to aneurysms and strokes**
- **Veins in the brain do not contain valves**
 - **Allows blood flow in either direction**
 - **Creating a route for blood-borne pathogen to pass from body to head and vice versa**