# BRAIN

## Most Complex Organ of the Body

## Chapter 3

1

## 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 |

2

## 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 |

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## 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 |

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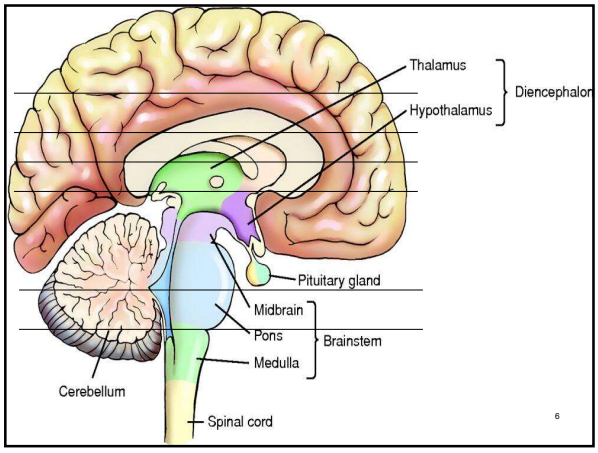


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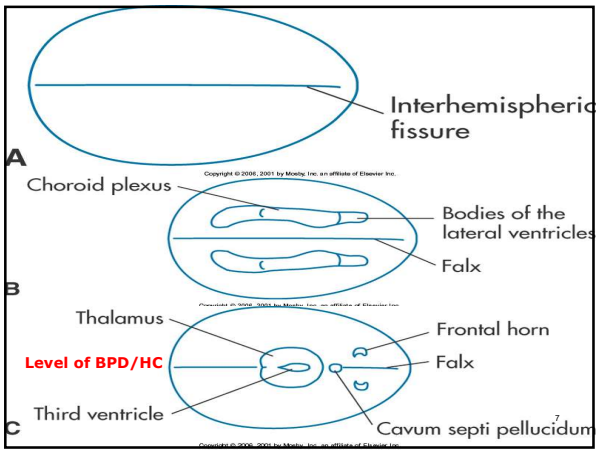


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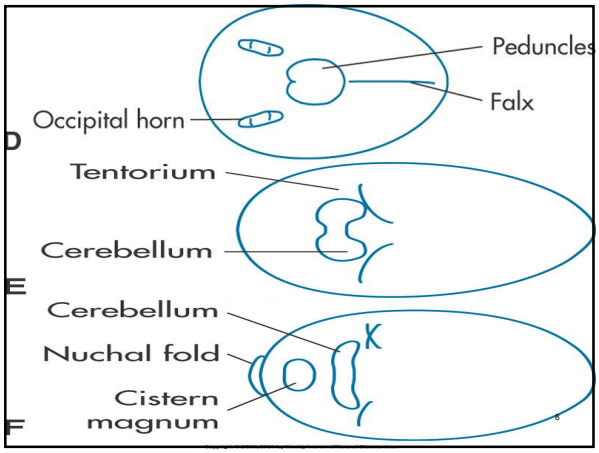


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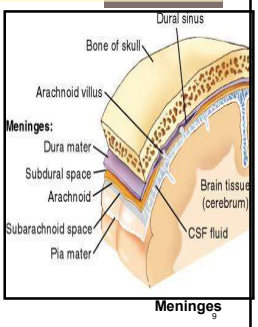
# Meninges

- 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)

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# 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

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# Ventricular System

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

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# Lateral Ventricles

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

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# 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)

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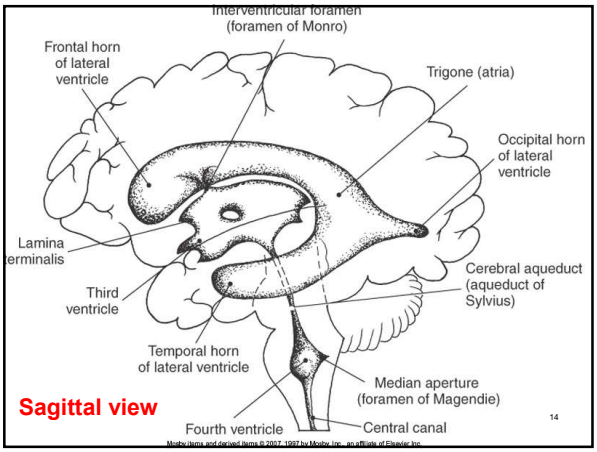


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# Choroid Plexus

- 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

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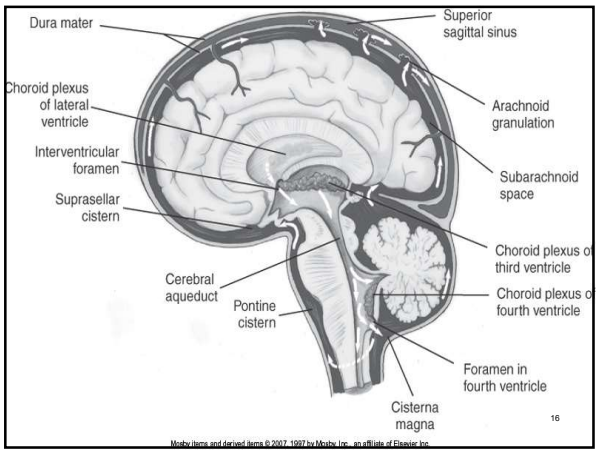
Dura mater
Superior sagittal sinus
Choroid plexus of lateral ventricle
Arachnoid granulation
Interventricular foramen
Subarachnoid space
Suprasellar cistern
Choroid plexus of third ventricle
Cerebral aqueduct
Choroid plexus of fourth ventricle
Pontine cistern
Foramen in fourth ventricle
Cisterna magna
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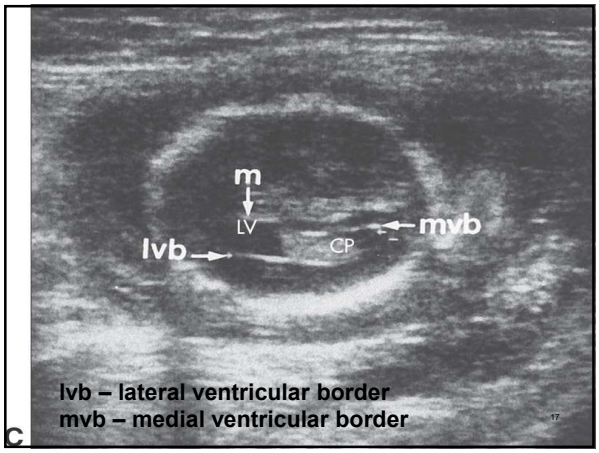
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mvb
lvb
CP
lvb – lateral ventricular border
mvb – medial ventricular border
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C

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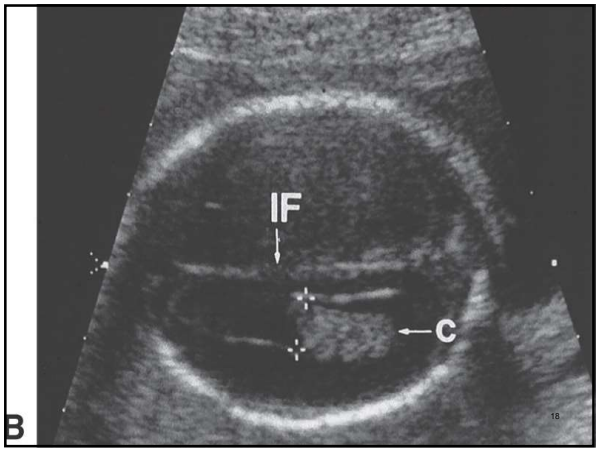
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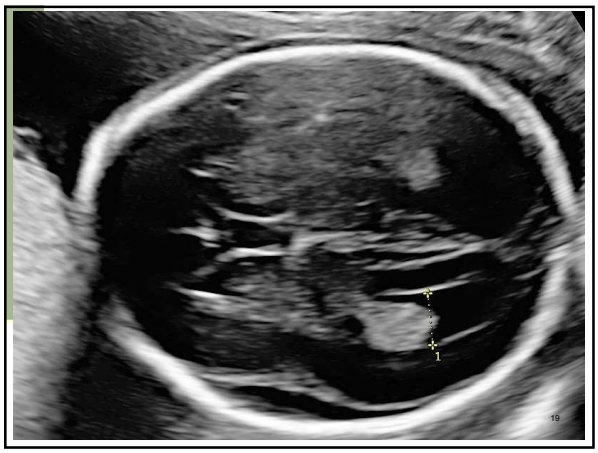


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# Third Ventricle

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

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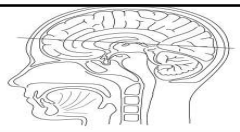
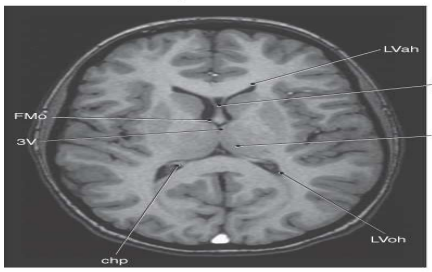


Axial View or Transverse View




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

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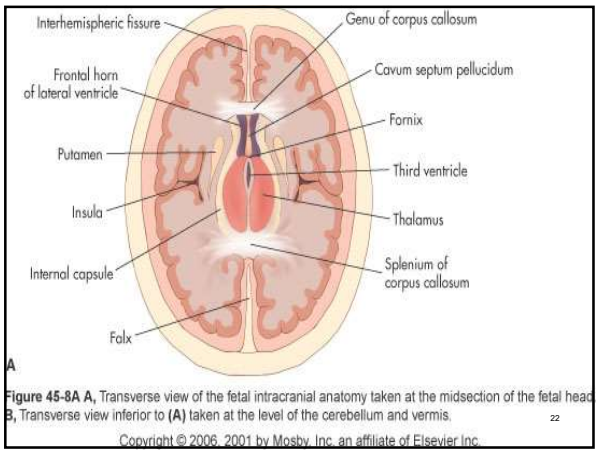


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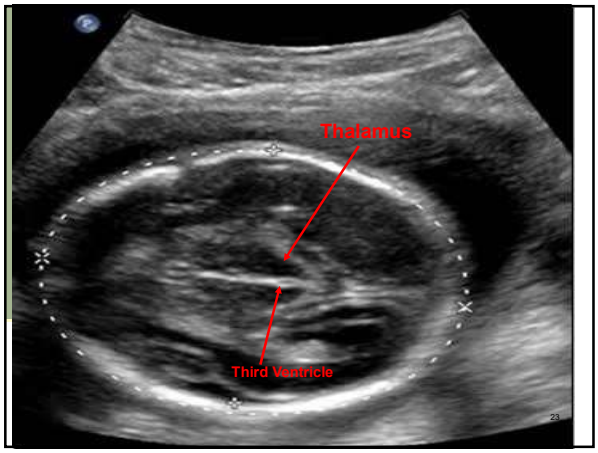


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## Fourth Ventricle

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

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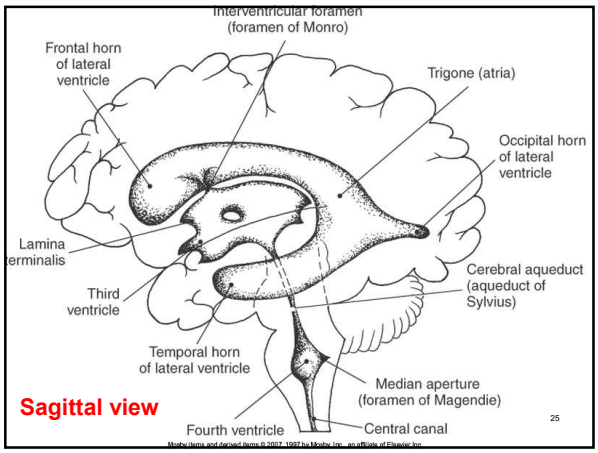


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# Cerebrum

- 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

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# Cerebrum

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

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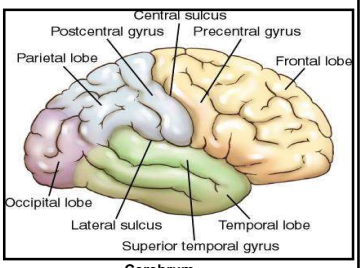
# Cerebrum

- Largest portion of brain
  - Lobes
    - Frontal
    - Temporal
    - Parietal
    - Occipital




Cerebrum

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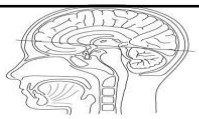


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***KEY:*** **Ins,** Insula; **FL,** frontal lobe; **TL,** temporal lobe; **pcom,** posterior commissure; **OL,** occipital lobe.

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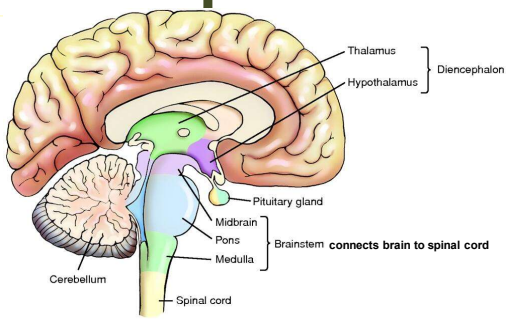
# Diencephalon

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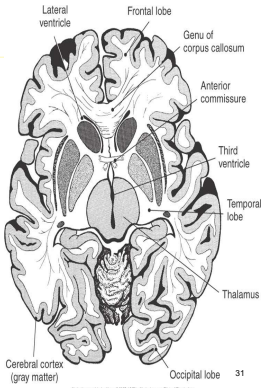
# Thalamus

- 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

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# 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

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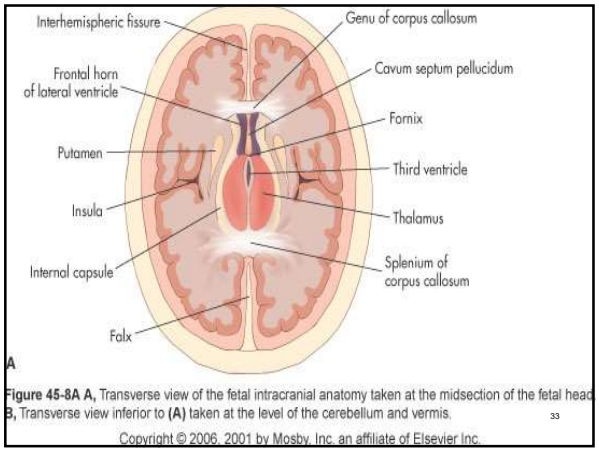


**Figure 45-8A A,** Transverse view of the fetal intracranial anatomy taken at the midsection of the fetal head **B,** Transverse view inferior to **(A)** taken at the level of the cerebellum and vermis.



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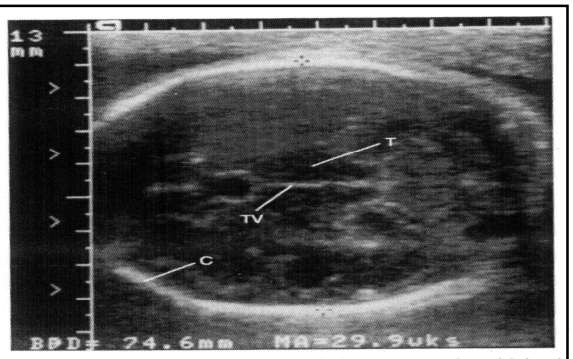


**FIGURE 6–7.** An accurate biparietal diameter can be obtained through any plane of section that intersects the third ventricle (TV) and thalami (T). The margins of the calvaria (C) must be symmetric. The first criterion ensures that the plane of section is taken at the proper craniocaudal plane. The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

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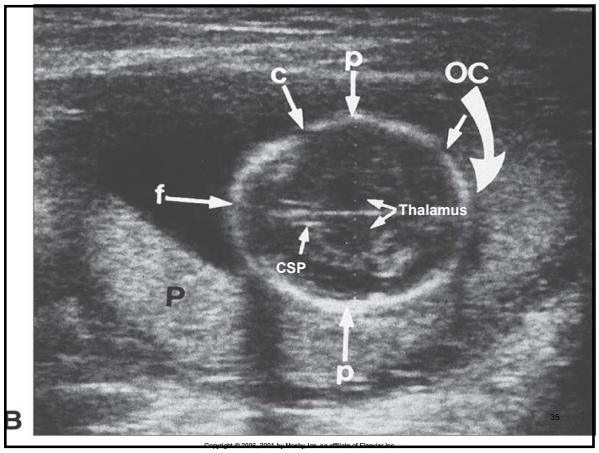


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# Hypothalamus

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

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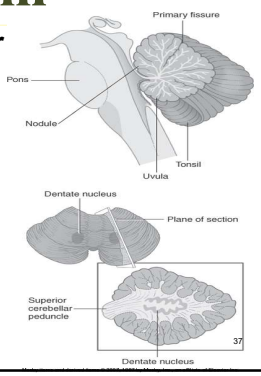
# Cerebellum

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

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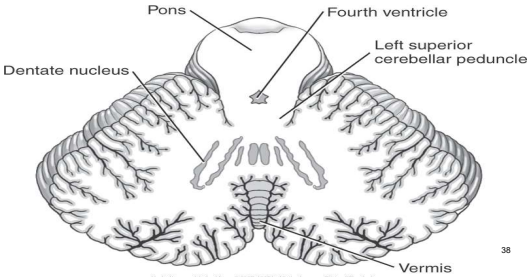
# Cerebellum

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

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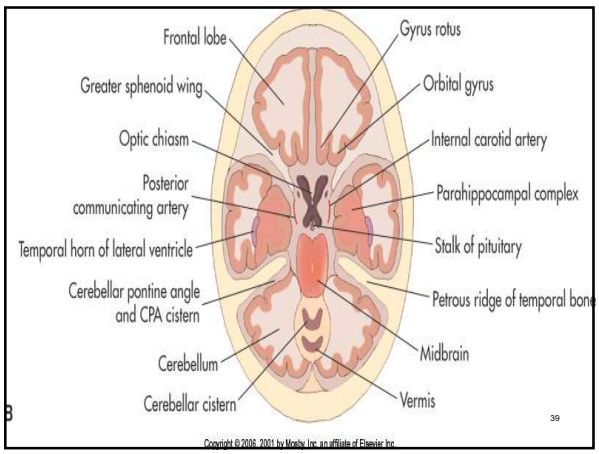


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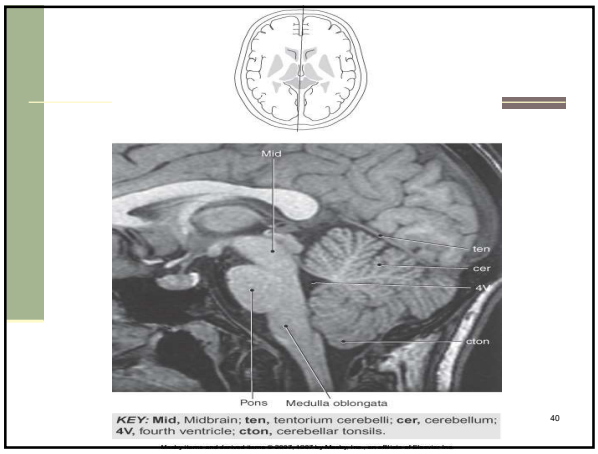
Mid
ten
cer
4V
cton
Pons
Medulla oblongata
KEY: Mid, Midbrain; ten, tentorium cerebelli; cer, cerebellum; 4V, fourth ventricle; cton, cerebellar tonsils.
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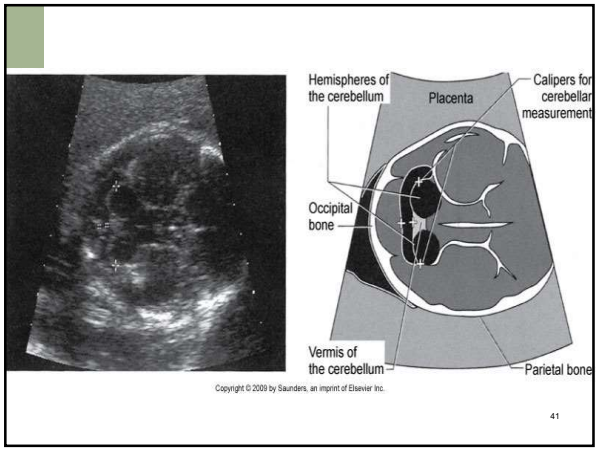
Hemispheres of the cerebellum
Placenta
Calipers for cerebellar measurement
Occipital bone
Vermis of the cerebellum
Parietal bone
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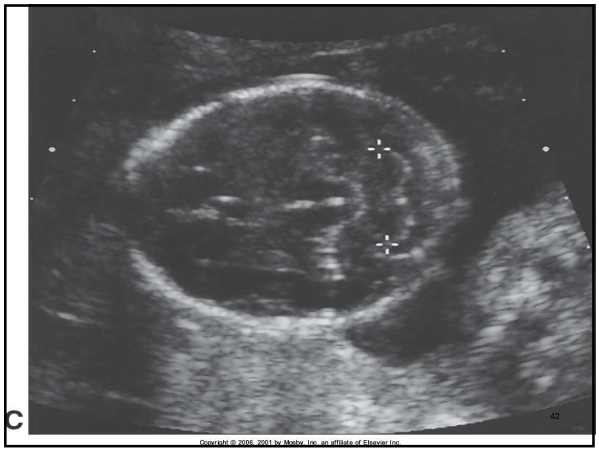
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# Cisterns

- 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)

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# 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

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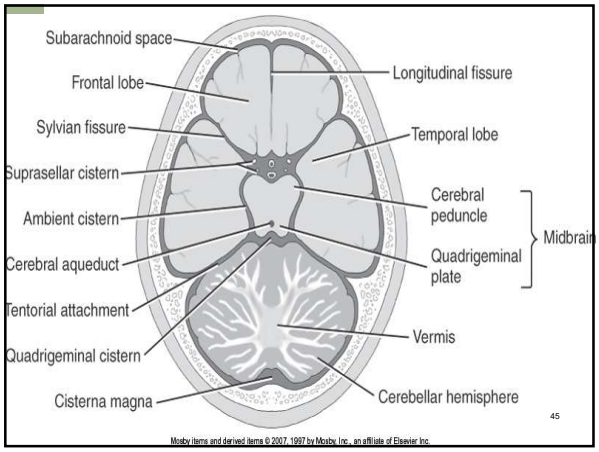


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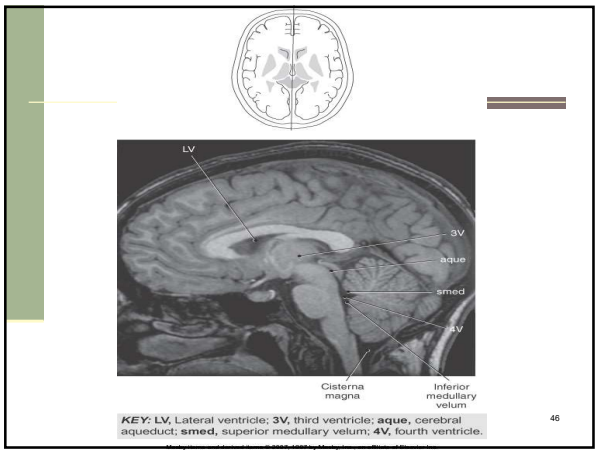
LV
3V
aque
smed
4V
Cisterna magna
Inferior medullary velum
KEY: LV, Lateral ventricle; 3V, third ventricle; aque, cerebral aqueduct; smed, superior medullary velum; 4V, fourth ventricle.
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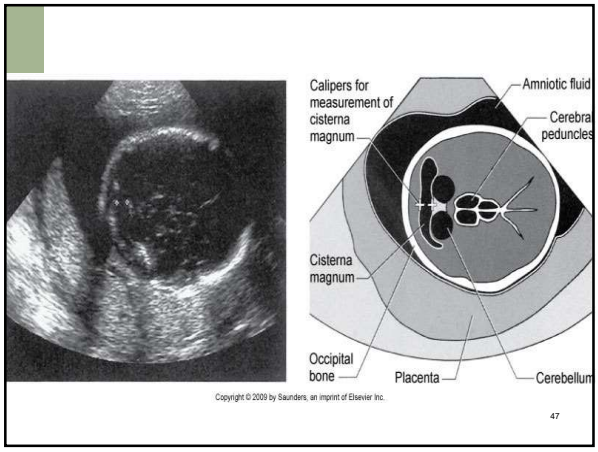
Calipers for measurement of cisterna magnum
Amniotic fluid
Cerebral peduncles
Cisterna magnum
Occipital bone
Placenta
Cerebellum
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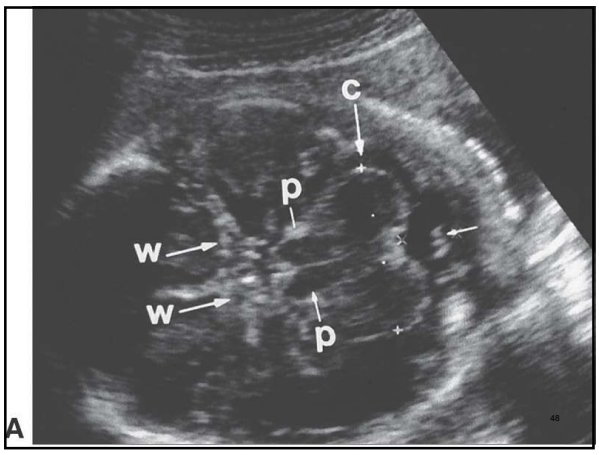
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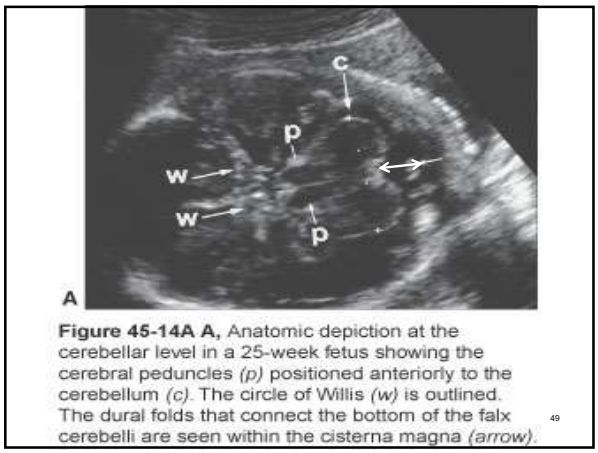


**Figure 45-14A A,** Anatomic depiction at the cerebellar level in a 25-week fetus showing the cerebral peduncles *(p)* positioned anteriorly to the cerebellum *(c)*. The circle of Willis *(w)* is outlined. The dural folds that connect the bottom of the falx cerebelli are seen within the cisterna magna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

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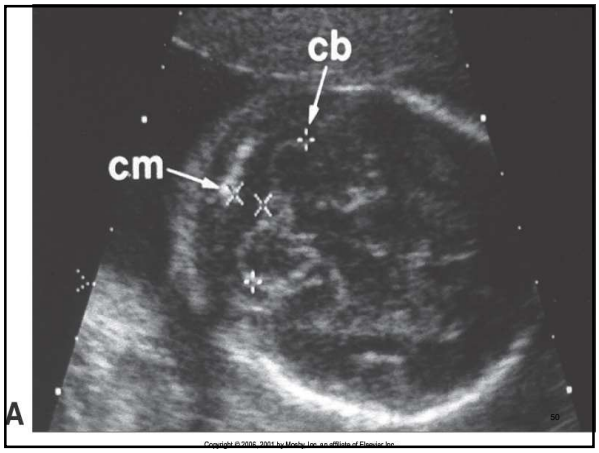


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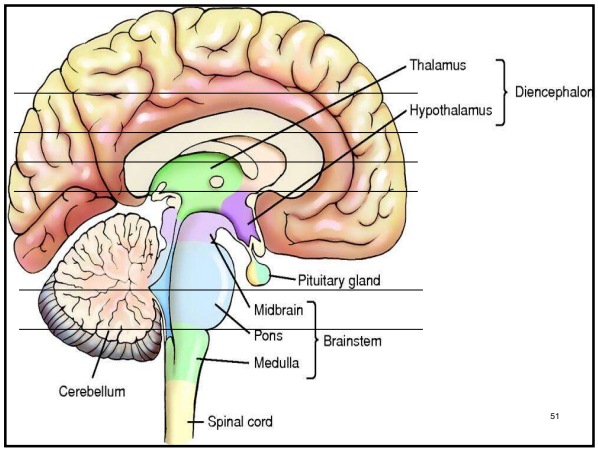


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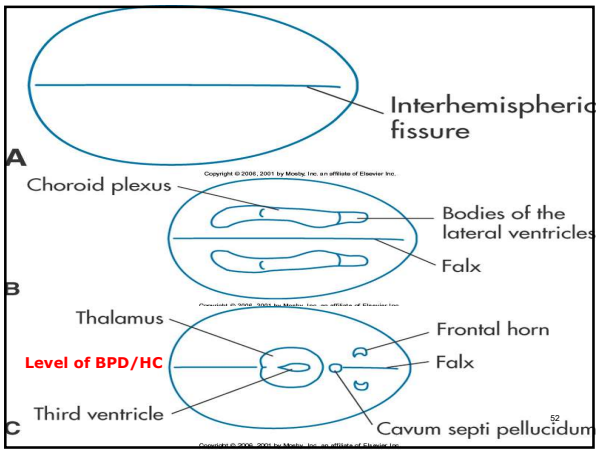


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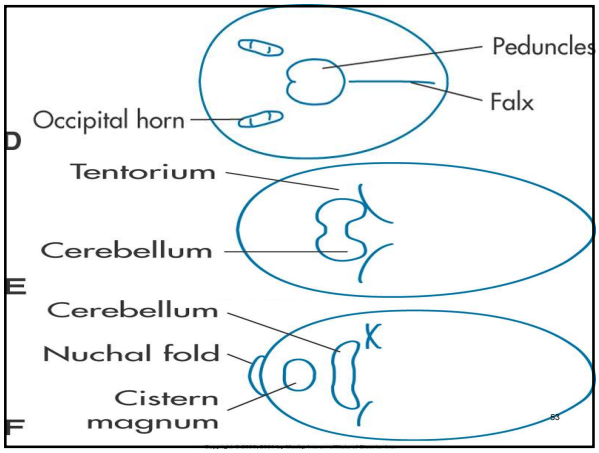


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## Vascular Supply

- 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

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