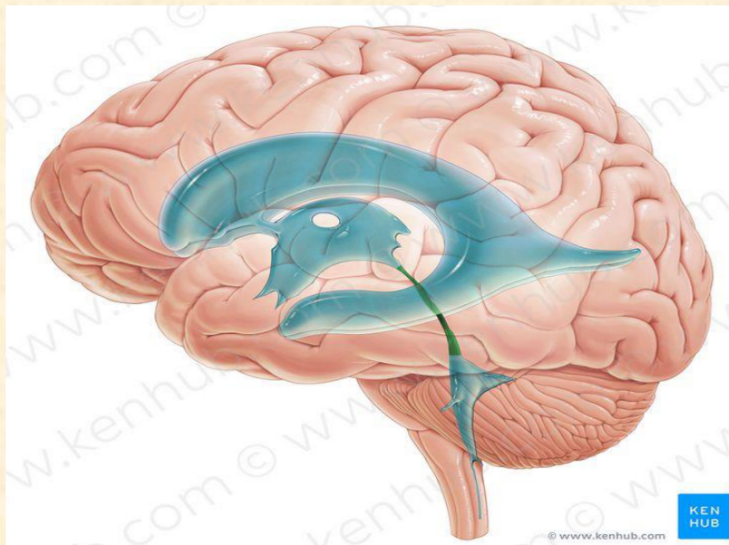


Ventricular System Study Sheet

Comprehensive notes based on the uploaded anatomy lecture slides

Ventricular System, The Cerebrospinal Fluid, and the Blood Brain Barrier



What is covered

Lateral ventricle, third ventricle, fourth ventricle, CSF circulation, subarachnoid cisterns, hydrocephalus, lumbar puncture, papilledema, and BBB.

Lecture images from the uploaded file are used as visual anchors throughout the sheet.

2. Lateral ventricle

The lateral ventricle is a Y-shaped cavity in each cerebral hemisphere.

Part	Description
Body	Extends from the interventricular foramen to the splenium of the corpus callosum.
Anterior horn	Lies in the frontal lobe, in front of the interventricular foramen.
Posterior horn	Lies in the occipital lobe.
Inferior horn	Lies in the temporal lobe.
Trigone / atrium	Part of the body at the junction of the inferior and posterior horns; contains the glomus (choroid plexus tuft), which may be calcified in adults.

Body: relations

Wall	Relation
Roof	Body of the corpus callosum.
Floor	Body of the caudate nucleus and body of the thalamus; stria terminalis lies between the thalamus and caudate.
Medial wall	Septum pellucidum and body of the fornix; the choroid fissure lies between the fornix and thalamus.

Relations of Body of the lateral ventricle

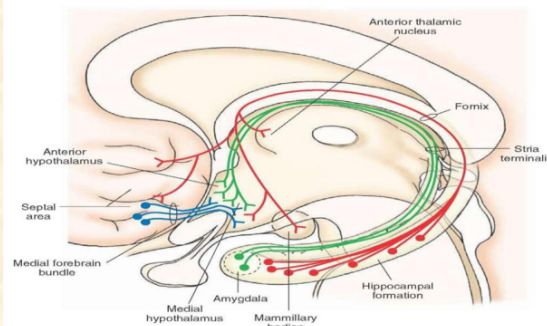
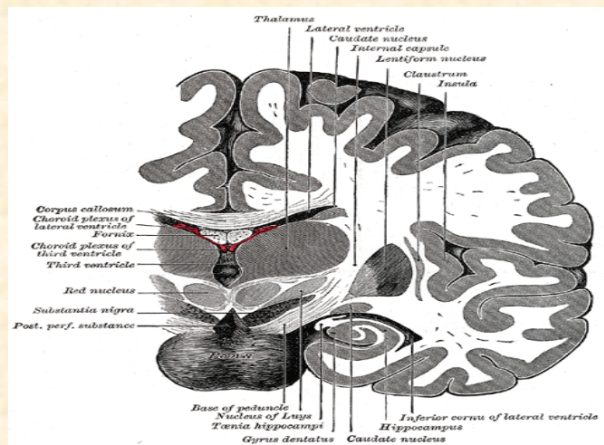
Roof : body of the Corpus callosum

Floor: body of Caudate Nucleus and body of the thalamus.
Stria terminalis between thalamus and caudate.
(connects between amygdala and ventral nucleus of the hypothalamus)

Medial wall:

Septum Pellucidum

Body of the fornix (choroid fissure between fornix and thalamus (choroid plexus))



Relations of the body of the lateral ventricle.

3. Anterior and posterior horns

Anterior horn

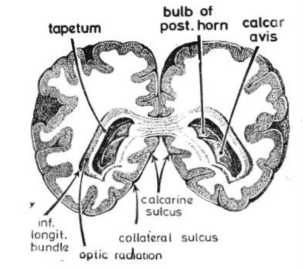
Wall	Relation
Roof	Genu of the corpus callosum.
Floor	Head of the caudate nucleus.
Medial wall	Rostrum of corpus callosum, septum pellucidum, and anterior column of the fornix.

Posterior horn

Wall	Relation
Roof and lateral wall	Tapetum of the corpus callosum; optic radiation lies against the tapetum in the lateral wall.
Medial wall	Upper convexity: bulb of the posterior horn from the splenium of the corpus callosum. Lower convexity: calcar avis from the calcarine sulcus; if well developed, it can obliterate the posterior horn.

Relations of Posterior horn of the lateral ventricle

- Roof and lateral wall**
Tapetum of the corpus callosum
Optic radiation lying against the tapetum in the lateral wall.
- Medial wall** --- two convexities:
Upper (bulb of the posterior horn)
 - Splenium of the corpus callosum (bulb)
 Lower (Calcar avis)
 - Calcarine sulcus.
 - If Calcar avis is well developed, it obliterates the posterior horn.

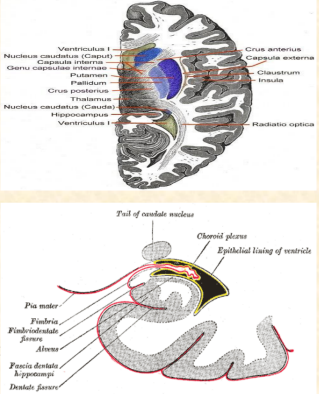


Posterior horn relations.

Relations of Inferior horn of the lateral ventricle

- Roof**
tail of the caudate nucleus, amygdaloid body
- Lateral wall**
Tapetum of corpus callosum and optic radiation
- Floor**
medially
 - hippocampus
 laterally
 - collateral eminence (by collateral fissure)

Lower part of choroid plexus enter this horn from the temporal part of the choroid fissure



Inferior horn relations.

4. Inferior horn and choroid plexus

Inferior horn

Wall	Relation
Roof	Tail of the caudate nucleus and amygdaloid body.
Lateral wall	Tapetum of the corpus callosum and optic radiation.
Floor	Medially: hippocampus. Laterally: collateral eminence (by the collateral fissure).

The lower part of the choroid plexus enters the inferior horn from the temporal part of the choroid fissure.

Choroid plexus of the lateral ventricle

Projects into the ventricle on its medial aspect. It is composed of pia mater covered by the ependymal lining of the ventricle and is formed from tela choroidea (two layers of pia mater). It lies between the fornix superiorly and the thalamus inferiorly. Blood supply: posterior choroidal branch of the posterior cerebral artery for the body, and anterior choroidal branch of the internal carotid artery for the inferior horn.

Choroid plexus of Lateral Ventricle

Choroid plexus projects into the ventricles on its **medial aspect**.

Composed of **pia mater** covered with ependymal lining of the ventricle.

Choroid plexus is made of **tela choroidea** (two layers of pia mater).

Lies between **fornix** superiorly and **thalamus** inferiorly.

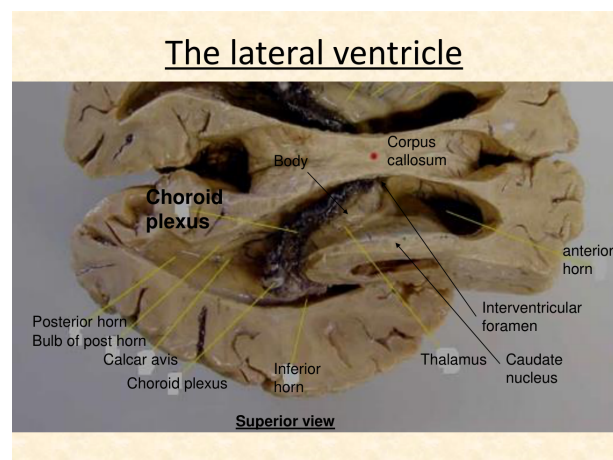
Situated in the **inferior horn** of the lateral ventricle.

Projects into the **choroid fissure**

Formed by posterior choroid branch of PCA (body) and anterior choroid branch of ICA (inferior horn)

Fig. 20.2. Boundaries of the central part of the lateral ventricle and of the third ventricle. Note the relationship of the tela choroidea and the choroid plexuses to these ventricles.

Choroid plexus of the lateral ventricle.



Gross superior view of the lateral ventricle.

5. Third ventricle

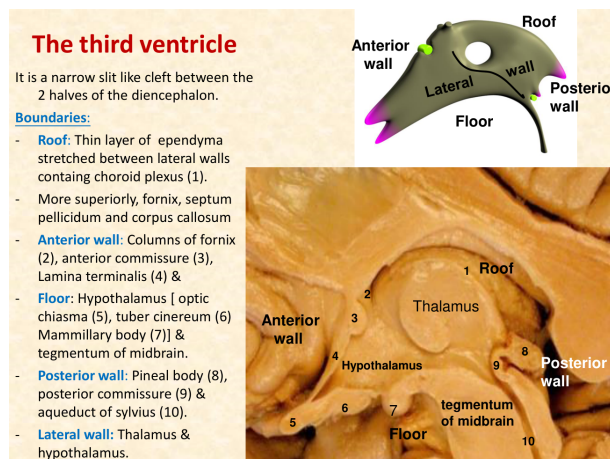
The third ventricle is a narrow slit-like cleft between the two halves of the diencephalon.

Boundary	Contents / relations
Roof	Thin ependyma stretched between the lateral walls containing choroid plexus; more superiorly: fornix, septum pellucidum, and corpus callosum.
Anterior wall	Columns of fornix, anterior commissure, lamina terminalis.
Floor	Hypothalamus (optic chiasma, tuber cinereum, mammillary body) and the tegmentum of midbrain.
Posterior wall	Pineal body, posterior commissure, and the aqueduct of Sylvius.
Lateral wall	Thalamus and hypothalamus.

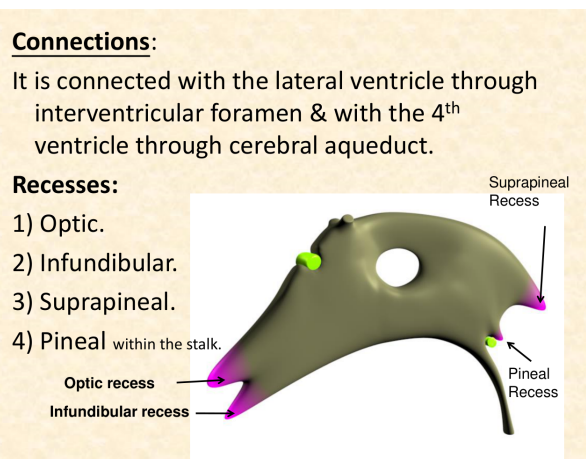
Connections: lateral ventricle through the interventricular foramen; fourth ventricle through the cerebral aqueduct.

Recesses: optic, infundibular, suprapineal, and pineal recess.

Choroid plexus of the third ventricle is formed by tela choroidea above the roof, and its blood supply is from the choroidal branch of the posterior cerebral artery.



Boundaries of the third ventricle.



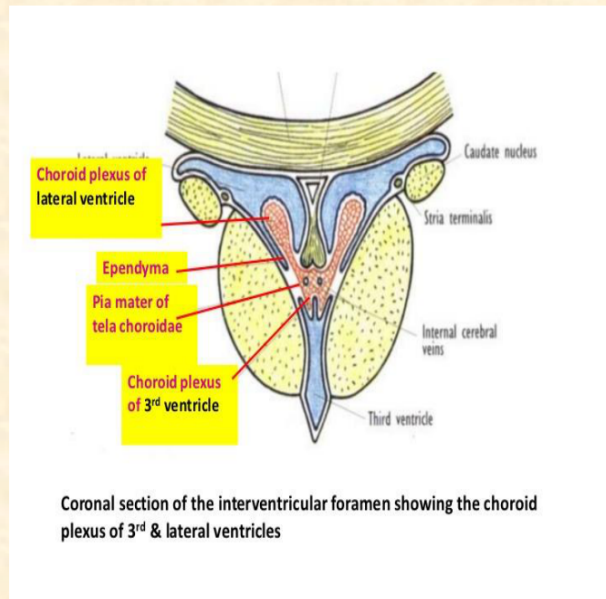
Connections and recesses of the third ventricle.

Choroid plexus of Third Ventricle

Formed of tela choroidea above **the roof** of the ventricle.

Vascular tela choroidea projects downward on each side of the midline, invaginating the **ependymal roof of the ventricle**.

Blood supply of choroid plexus of third ventricle is derived from **choroidal branch of posterior cerebral artery**



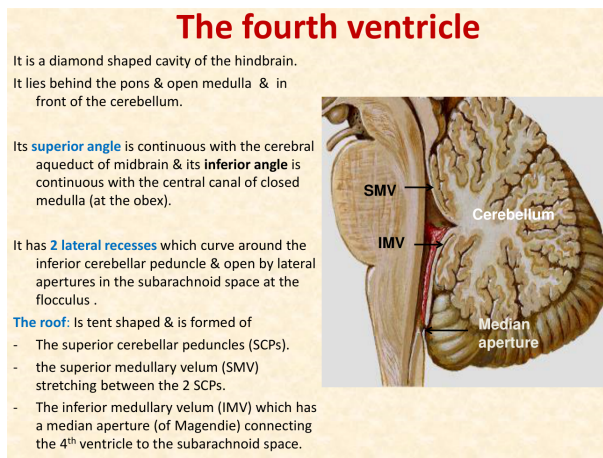
Choroid plexus of the third ventricle.

6. Fourth ventricle

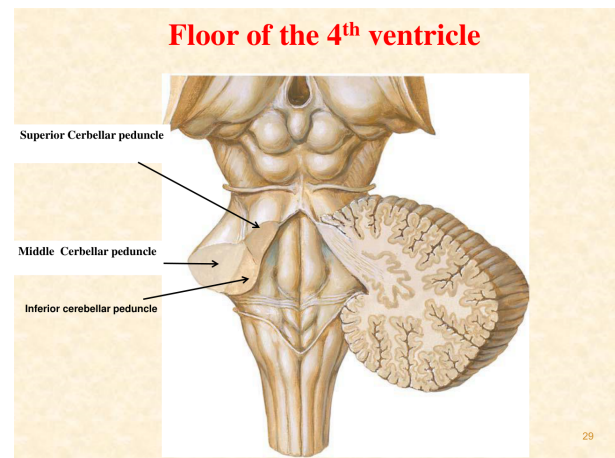
The fourth ventricle is a diamond-shaped cavity of the hindbrain. It lies behind the pons and open medulla and in front of the cerebellum.

Feature	Description
Superior angle	Continuous with the cerebral aqueduct of the midbrain.
Inferior angle	Continuous with the central canal of the closed medulla at the obex.
Lateral recesses	Curve around the inferior cerebellar peduncle and open through the lateral apertures (foramina of Luschka) into the subarachnoid space at the flocculus.
Roof	Tent-shaped: superior cerebellar peduncles, superior medullary velum, and inferior medullary velum with the median aperture (foramen of Magendie).

Choroid plexus: T-shaped, highly vascular tela choroidea suspended from the inferior half of the roof; blood supply is from the posterior inferior cerebellar arteries (vertebral arteries).



The fourth ventricle.



Floor of the fourth ventricle and cerebellar peduncles.

7. CSF, cisterns, and clinical notes

Subarachnoid cisterns

Cistern	Slide note
Cerebellomedullary cistern (cisterna magna)	Between the cerebellum and the roof of the 4th ventricle; receives the foramen of Magendie.
Pontine (pontomedullary) cistern	In front of the pons and medulla; contains the basilar and vertebral arteries; receives the foramina of Luschka; traversed by roots of the lower 8 cranial nerves.
Interpeduncular cistern	Over the interpeduncular fossa; contains the circle of Willis; traversed by roots of the 3rd and 4th cranial nerves.
Cistern of lateral fissure	Contains the middle cerebral vessels.
Callosal cistern	Lies above the corpus callosum; contains anterior cerebral vessels.
Chiasmatic cistern	Lies around the optic chiasma.

Clinical correlations

Topic	Key points from the slides
Lumbar puncture	CSF is taken from the subarachnoid space between L3 and L4 because the spinal cord ends at the lower border of L1 and the subarachnoid space is wider. Used for diagnosis, spinal anesthesia, and measurement of CSF pressure.
Hydrocephalus	Accumulation of CSF within the brain. Symptoms listed in the slides include headache, double vision, poor balance, urinary incontinence, personality changes, mental impairment, vomiting, sleepiness, seizures, and downward-pointing eyes (sunset eyes).
Communicating hydrocephalus	Impaired CSF reabsorption without flow obstruction between the ventricles and subarachnoid space; due to arachnoid granulation dysfunction.
Non-communicating hydrocephalus	CSF-flow obstruction; examples in the slides involve the foramen of Monro, aqueduct of Sylvius, the fourth ventricle, and the foramina of Luschka/Magendie.
Chiari malformation	Downward displacement of cerebellar tonsils through the foramen magnum causing non-communicating hydrocephalus due to obstruction of CSF outflow.
Papilledema	Rise in CSF pressure compresses the retinal vein, causing venous congestion and bulging of the optic disc; may progress to optic atrophy and blindness.
Blood-brain barrier	Capillary endothelial tight junctions, astrocyte coverage, and a thick basement membrane; absent in the hypothalamus, pineal gland, and area postrema.
Blood-CSF barrier	Located at the choroid plexus.
Queckenstedt sign	Compression of the jugular veins should raise CSF pressure; failure of this response is a positive Queckenstedt sign.
Kernicterus	In fetus/newborn/premature infants the BBB is not fully developed, so bilirubin may enter the CNS and yellow the brain.

Drug note from the slides: chloramphenicol, tetracyclines, lipid-soluble anesthetics, and L-dopa can pass more easily; water-soluble norepinephrine and dopamine do not pass easily.

Hydrocephalus

accumulation of **cerebrospinal fluid** (CSF) within the brain.

Not an exam material

headaches, **double vision**, **poor balance**, **urinary incontinence**, **personality changes**, or **mental impairment**.

In babies there may be a rapid increase in head size.

Other symptoms may include **vomiting**, **sleepiness**, **seizures**, and **downward pointing of the eyes** (sunset eyes).

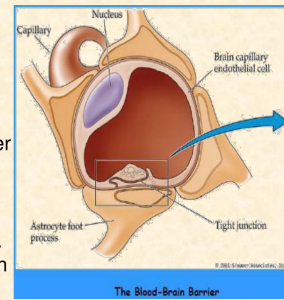


The blood brain barrier

barrier present between the brain and the blood

Structure

- The capillaries of the brain consist of **endothelial lining** which have **tight junctions** which close the pores in the blood vessels
- Astrocytes** completely cover the capillaries and make it less porous
- The blood vessels have a **thick basement membrane**.
- Exists in all parts of the brain except hypothalamus, pineal gland and area posterema



Hydrocephalus.

The blood-brain barrier.

Types of hydrocephalus

Not an exam material

Communicating (non obstructive)

impaired cerebrospinal fluid reabsorption in absence of any CSF-flow obstruction between the ventricles and subarachnoid space.

functional impairment of the **arachnoid granulations**

Causes :**subarachnoid/intraventricular hemorrhage**, **meningitis** and **congenital absence of arachnoid villi**.

Non-communicating (obstructive)

caused by a CSF-flow obstruction.

Foramen of Monro

aqueduct of Sylvius dilation of both lateral ventricles and third ventricle.

Fourth ventricle (e.g., **Chiari malformation**).

foramina of Luschka and **foramen of Magendie** may be obstructed due to congenital malformation (**Dandy-Walker malformation**): cystic dilatation of 4th ventricle.

Types of hydrocephalus.

End of study sheet.