

# Meninges , ventricles & CSF

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هذا العمل لا يعتبر مصدر رئيسي للمذاكرة وإنما للمراجعة فقط: تنويه

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The **brain and spinal cord** are invested by three concentric membranes :-

# Meninges

The innermost layer is the **pia matter.**

thin, delicate & highly vascular membrane that is closely adherent to the gyri and fitted into the sulci.

subarachnoid space

contain fibrous trabeculae, main blood vessels and CSF.

The middle layer is the **arachnoid matter.**

soft, translucent membrane loosely envelops the brain.

separated from the dura by a narrow **subdural space.**

The outermost layer is the **dura matter.**

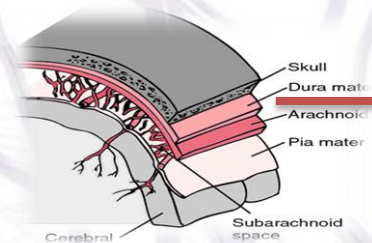
cranial dura is a thick membrane that surrounds the brain. It is formed of two layers: **periosteal** and **meningeal.**

attached to the skull.

is folded forming the **dural folds**

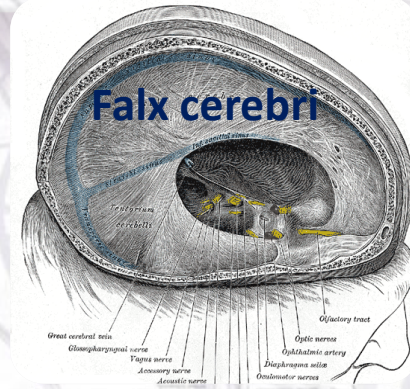
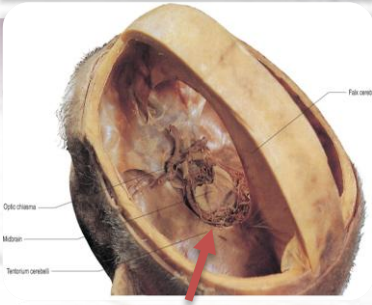
tentorium cerebelli falx cerebri

Sensory supply by :-  
5<sup>th</sup> ( three branches ) /  
10<sup>th</sup> and c1-c3 .



# Dura matter

Two large reflection of dura extend into the cranial cavity :



## 2.The tentorium cerebelli

( A horizontal shelf of dura ) .

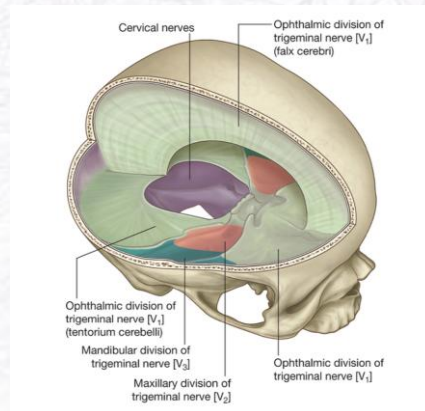
- It lies between the posterior part of the cerebral hemispheres and the cerebellum.
- It has a free border that encircles the midbrain.
- In the middle line it is continuous with the falx cerebri separated by the straight sinus

## 1.The falx cerebri .

( In the midline )

- It is a vertical sickle-shaped sheet of dura, extends from the cranial roof into the great longitudinal fissure between the two cerebral hemispheres.
- It has an attached border adherent to the skull.
- And a free border lies above the corpus callosum.

Meeting point of them called **straight sinus**



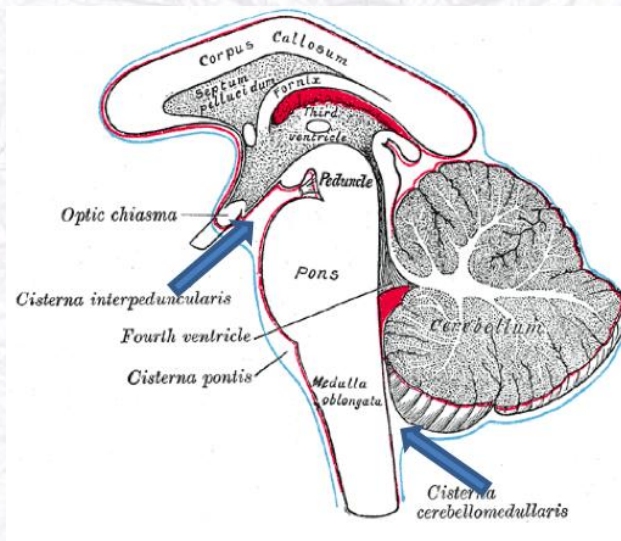
# Subarachnoid Space

## subarachnoid cisterns

### The interpeduncular cistern

which is located at the base of the brain, where the arachnoid spans the space between the two cerebral peduncles.

This cistern contains the optic chiasma & circulus arteriosus of Wills.

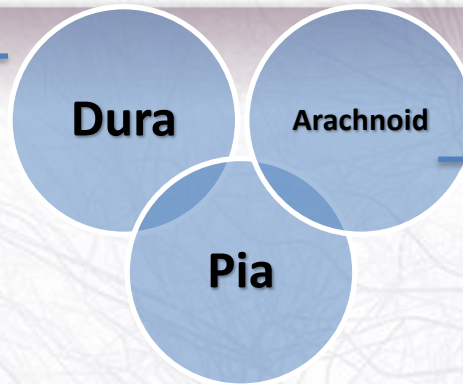
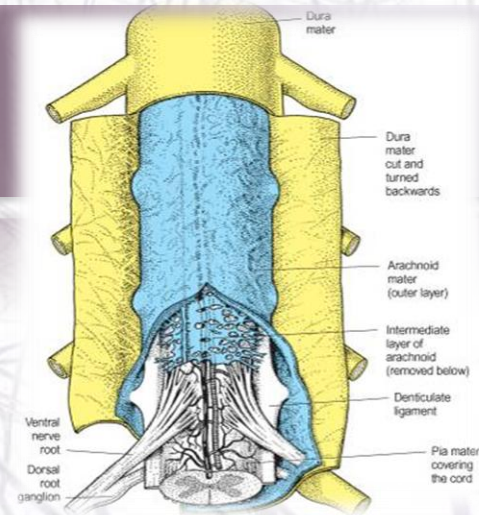


### The cisterna magna, or (cerebellomedullary cistern)

which lies between the inferior surface of the cerebellum and the back of the medulla.

At this cistern CSF flows out of the 4<sup>th</sup> ventricle

# Spinal meninges



❑ The outer covering; the **dura mater**, is a single, tough fibrous membrane.

- It envelops the cord **loosely**.
- It is **separated from arachnoid matter** by the **subdural space**, and **from the bony wall of the vertebral canal** by the **epidural space**

The innermost covering is the **pia matter**, is a delicate fibrous membrane **closely envelops the cord and nerve roots**.

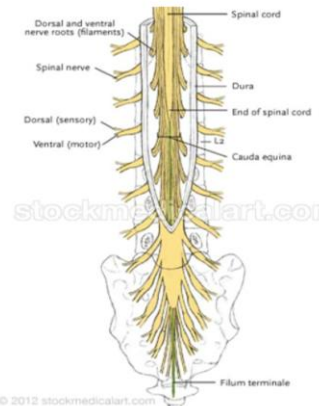
- It is **attached** through the arachnoid **to the dura** by the **denticulate ligament**.

**Archnoid matter** is a translucent membrane lies between the pia and dura,

- Between it and pia lies the **subarachnoid space** **contains CSF**.

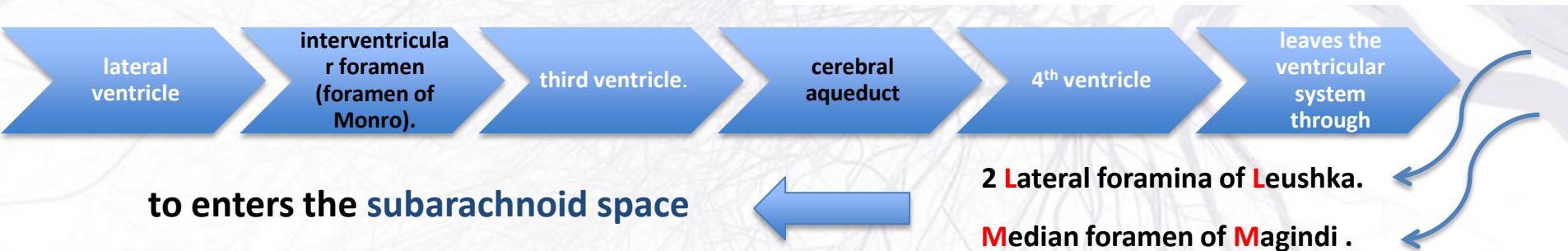
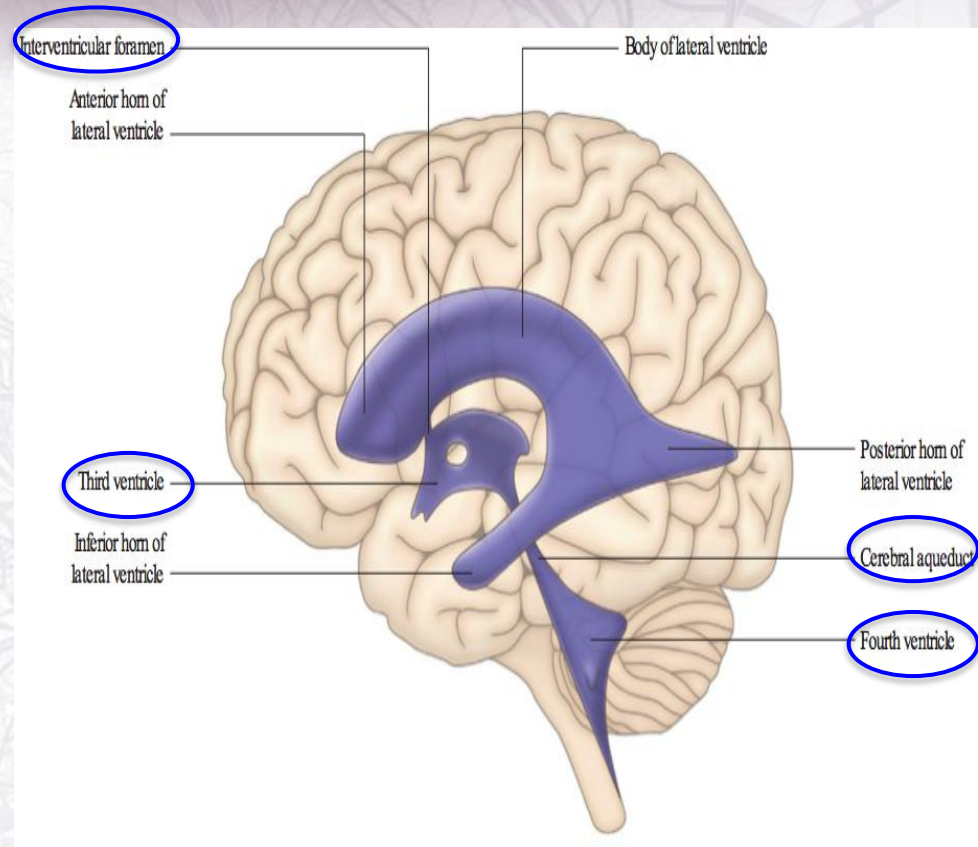
- ❑ The **spinal cord** terminates at level **L1-L2**, while
- ❑ The **arachnoid and dural** and, **subarachnoid space**, continue to **S2**.
- ❑ The **pia** extends downwards forming the **filum terminale** which pierces the **arachnoid and dural sacs** and passes through the **sacral hiatus** to be attached to the back of the **coccyx**.

L2-3 OR L3-4 for injection anesthesia or pull CSF




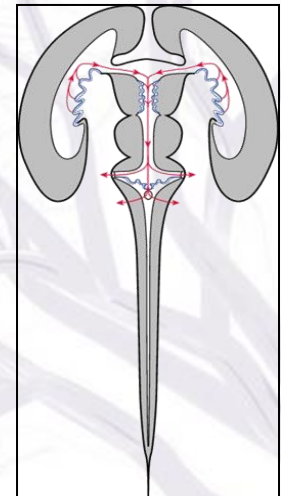
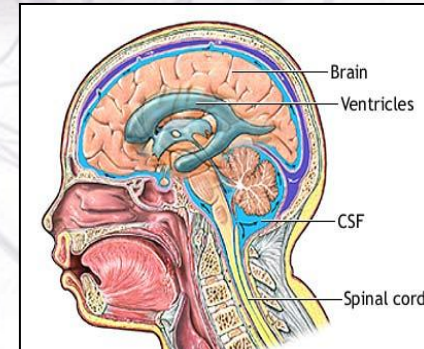
# VENTRICULAR SYSTEM

- ❑ Interconnecting channels within the CNS.
- ❑ In the spinal cord; represented by the **central canal**.
- ❑ Within the brain; a system of **ventricles** is found.
- ❑ The **central canal** of the spinal cord is **continuous upwards** to the **fourth ventricle**.
- ❑ On each side of the fourth ventricle laterally, **lateral recess** extend to open into **lateral aperture** (foramen of **Luschka**), central defect in its roof (foramen of **Magendie**)



## CEREBROSPINAL FLUID

Presence	<b>ventricular system</b> , together with the cranial and spinal <b>subarachnoid spaces</b> .
Features	It is <b>colourless</b> fluid containing <u>little protein</u> and <u>few cells</u> .
value	It is about <b>150 ml</b> .
Importance	It serves to <b>cushion the brain from sudden movements of the head</b> .
Produced by	<b>choroid plexus</b> ( <u>located in the lateral, third &amp; fourth ventricles.</u> )
reabsorbed into the venous system by	arachnoid villi, and arachnoid granulation  dural venous sinuses mainly <u>superior saggital sinus</u> .



# Clinical point

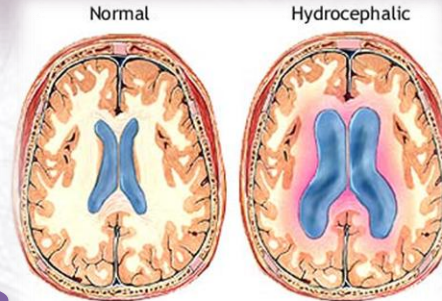
obstruction of the flow of CSF



rise in fluid pressure



causing swelling of the ventricles (hydrocephalus).



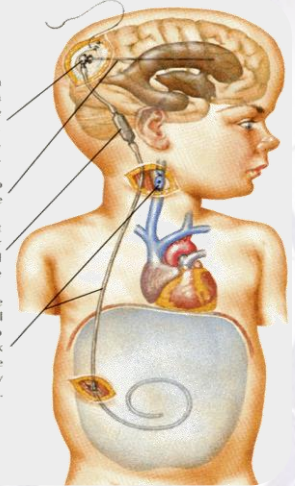
## Shunt procedure for hydrocephalus

Reservoir at end of cannula implanted beneath galea permits transcutaneous needle puncture for withdrawal of CSF, introduction of antibiotics, or dye to test patency of shunt.

Cannula inserted into lateral ventricle

One-way valve to prevent reflux of blood or peritoneal fluid and control CSF pressure

Drainage tube may be introduced into internal jugular v. and thence into right atrium via neck incision, or may be continued subcutaneously to abdomen.

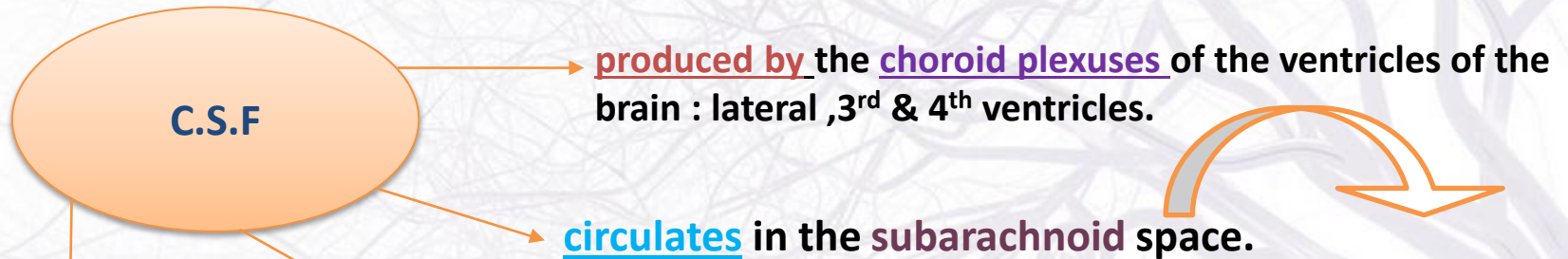
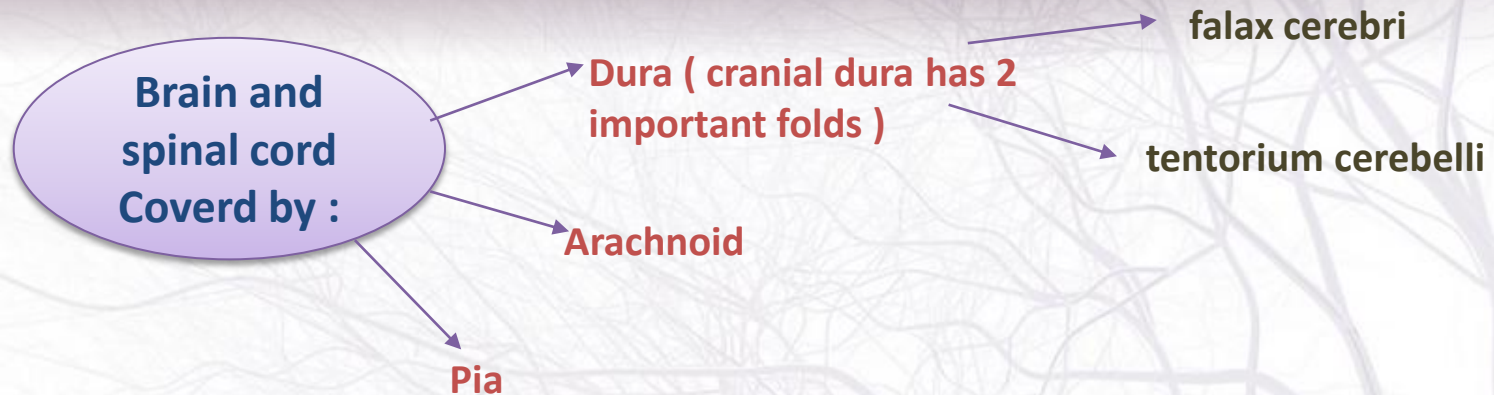


## Treatment:

**Decompression** of the dilated ventricles is achieved by **inserting a shunt** connecting the ventricles to the **jugular vein** or the **abdominal peritoneum**.



# SUMMARY



**Obstruction** of the flow of CSF as in **tumors of the brain** leads to **hydrocephalus**

drained into the **dural venous sinuses** principally **superior saggital sinus**.

The subarachnoid space in the spinal cord terminates at **the 2<sup>nd</sup> sacral vertebra**.

# Quiz

**Q1 : C.S.F produced by ?**

- 1/ basal ganglia .
- 2/ choroid plexuses .
- 3/ dura matter .

**Q2 : Obstruction of the flow of CSF lead to ?**

- 1/ calcification .
- 2/ hydrocephalus .
- 3/ hydronephrosis .

**Q3 : Spinal cord terminate at the level of ?**

- 1/ L5 - L6
- 2/ L1 - L2
- 3/ S1 - S4

**Q4: The innermost layer of meninges is ?**

- 1/ dura .
- 2/ subarachnoid .
- 3/ pia .

**Q5: which layer of dura matter that form flex cerebri and tentorium cerebelli:**

- 1- meningeal layer of dura.
- 2- periosteal layer of dura.
- 3- pia mater layer.

**Q6: The arachnoid and dura and subarachnoid space continuo:**

- 1- L1.
- 2- between L1 and L2.
- 3- S2 .

**GOOD LUCK**

**Q1 = 2 Q2 = 2 Q3 = 2 Q4 = 3 Q5=1 Q6=3**